Trigger Point Master Course

PART 2

Muscles of the Body and their Trigger Points

Chapters 7 to 12

NielAsher.
Advanced Trigger Point Techniques

7 Muscles of the Face, Head, and Neck

Regional Trigger Points for Head and Neck Pain

MUSCLE PAGE REFERENCE
Digastricus 90
Erector spinae 102
Frontalis 78
Levator scapulae 126
Masseter 82
Occipitalis 78
Orbicularis oculi 80
Pterygoideus lateralis 86
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Semispinalis capitis 102
Semispinalis cervicis 102
Splenius capitis 108
Splenius cervicis 108
Sternocleidomastoid 94
Temporalis 84
Trapezius 124

Temple headache
Trapezius
Sternocleidomastoid
Semispinalis capitis
Splenius cervicis
Temporalis

Headache (front of head)
Frontalis
Semispinalis capitis
Sternocleidomastoideus
Orbicularis oculi

Headache (back of head)
Sternocleidomastoideus
Digastricus
Trapezius
Semispinalis capitis
Semispinalis cervicis
Occipitalis
Temporalis
Splenius cervicis

Headache (top of head)
Splenius capitis
Sternocleidomastoideus

Sinus area pain
Lateral pterygoid
Orbicularis oculi
Epicranius (frontalis)
Masseter
Temporalis
Sternocleidomastoideus

Toothache
Masseter
Digastricus
Temporalis

Eye region pain
Orbicularis oculi
Masseter
Suboccipitalis
Trapezius
Temporalis
Occipitalis
Splenius cervicis

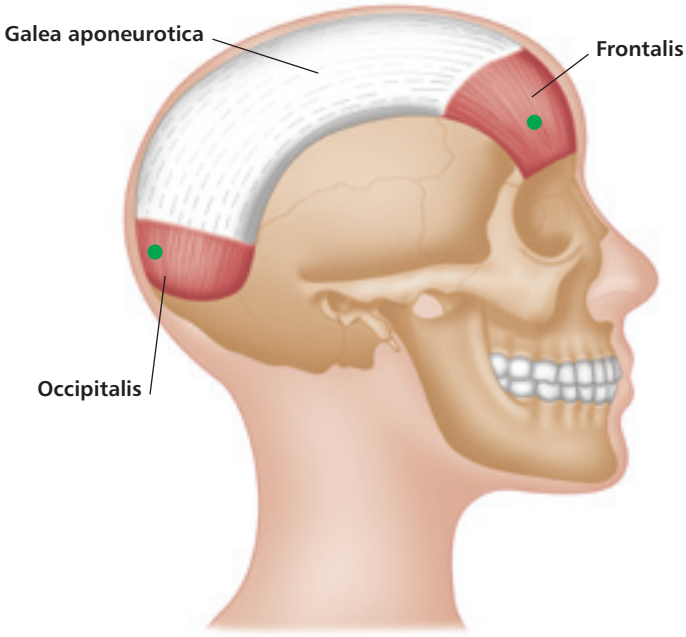
Cheek and jaw pain
Sternocleidomastoid
Masseter
Lateral pterygoid
Medial pterygoid
Trapezius
Digastric
Buccinator
Orbicularis oculi

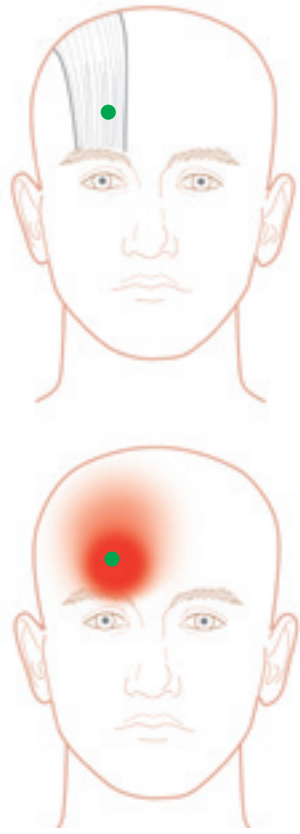
TMJ and ear pain
Masseter
Lateral pterygoid
Medial pterygoid
Sternocleidomastoid

(Front of) neck pain
Sternocleidomastoid
Digastricus
Medial pterygoid

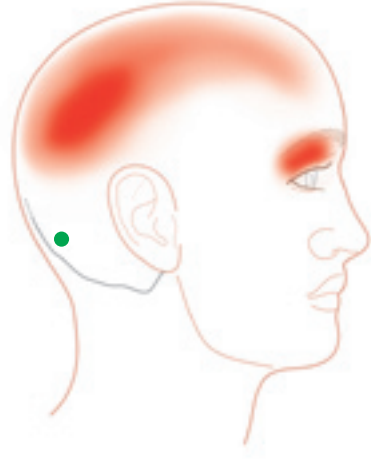
(Back of) neck pain
Trapezius
Levator scapulae
Multifidus
Splenius cervicis
Infraspinatus

OCCIPITOFRONTALIS (EPICRANIUS)





Frontalis



Occipitalis

Greek *epi*, upon; Latin *cranium*, skull

This muscle is effectively two muscles (occipitalis and frontalis), united by an aponeurosis called the *galea aponeurotica*, so named because it forms what resembles a helmet upon the skull.

ORIGIN

Occipitalis: lateral two-thirds of superior nuchal line of occipital bone. Mastoid process of temporal bone.
Frontalis: galea aponeurotica.

INSERTION

Occipitalis: galea aponeurotica (a sheet-like tendon leading to frontal belly).
Frontalis: fascia and skin above eyes and nose.

ACTION

Occipitalis: pulls scalp backward. Assists frontal belly to raise eyebrows and wrinkle forehead.
Frontalis: pulls scalp forward. Raises eyebrows and wrinkles skin of forehead horizontally.

NERVE

Facial **V11** nerve.

BASIC FUNCTIONAL MOVEMENT

Example: raising eyebrows (wrinkling skin of forehead horizontally).

REFERRED PAIN PATTERNS

Occipitalis: pain in lateral and anterior scalp; diffuse into back of head and into orbit.
Frontalis: localized pain with some referral upward and over forehead on same side.

OVERVIEW

INDICATIONS
Headache, pain (back of head), cannot sleep on back/pillow, earache, pain behind eye/eyebrow/eyelid, visual activity, "jumping text" on reading black and white print, squinting, wrinkly forehead, tension headache, pain above eye.

CAUSES
Anxiety, overwork, lifestyle, computer use, wrong glasses, frowning.

DIFFERENTIAL DIAGNOSIS
Scalp tingling. Greater occipital nerve entrapment.

CONNECTIONS
Suboccipital muscles, clavicular division of SCM, semispinalis capitis, zygomaticus major, platysma, scalenes, posterior neck muscles, eye muscles.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

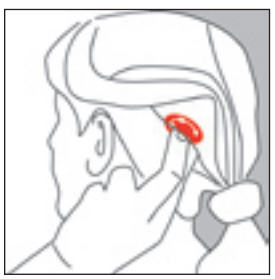
SELF HELP

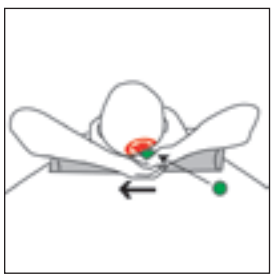
This muscle is often related to many types of headache and is readily treated using a range of techniques. The simplest is:

SELF-HELP TECHNIQUE
1. Study the anatomy.
2. Locate and feel/palpate the tender trigger point – usually at the back of the head.
3. Rest the back of the head/trigger point on a pressure ball for up to 10 minutes until the pain eases.

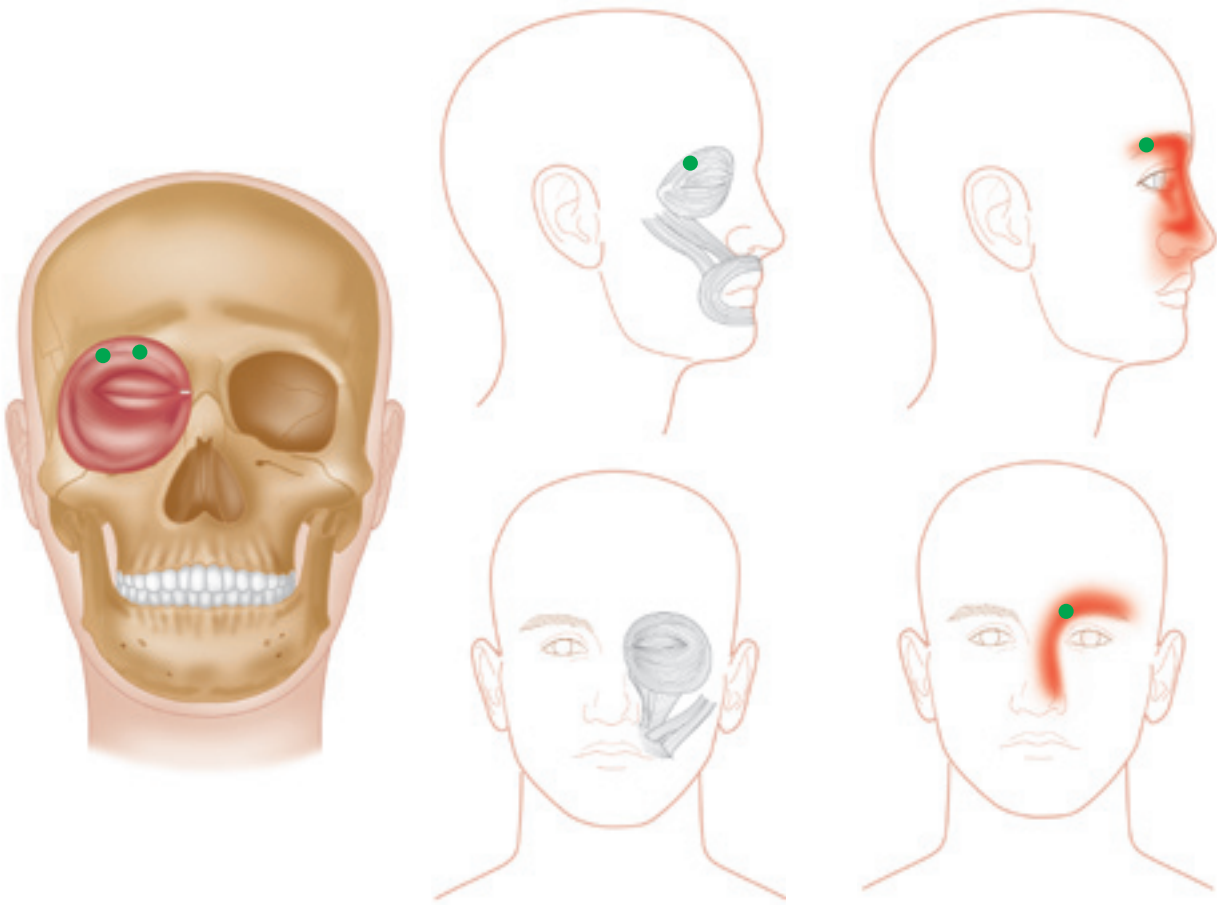
A TRUE STORY
Osteopaths frequently use this technique. It was one of the first osteopathic techniques invented by its founder, Andrew Taylor-Still. He used to suffer from headaches as a youth and tied a piece of rope between two chair legs. He would fall asleep with the rope on his neck and found he had cured himself!

ADVICE
Avoid frowning and wrinkling of forehead.





ORBICULARIS OCULI



Latin *orbis*, orb, circle; *oculi*, of the eye

This complex and extremely important muscle consists of three parts, which together form an important protective mechanism surrounding the eye.

Orbital part

ORIGIN
Frontal bone. Medial wall of orbit (on maxilla).

INSERTION
Circular path around orbit, returning to origin.

ACTION
Strongly closes eyelids (firmly "screws up" eye).
Antagonist: levator palpebrae superioris.

NERVE
Facial **V11** nerve (temporal and zygomatic branches).

Palpebral part (in eyelids)

Latin *palpebralis*, pertaining to the eyelids

ORIGIN
Medial palpebral ligament.

INSERTION
Lateral palpebral ligament into zygomatic bone.

ACTION
Gently closes eyelids (and comes into action involuntarily, as in blinking).

NERVE
Facial **V11** nerve (temporal and zygomatic branches).

Lacrimal part
(behind medial palpebral ligament and lacrimal sac)

Latin *lacrimalis*, pertaining to tears

ORIGIN
Lacrimal bone.

INSERTION
Lateral palpebral raphe.

ACTION
Dilates lacrimal sac and brings lacrimal canals onto surface of eye.

NERVE
Facial **V11** nerve (temporal and zygomatic branches).

REFERRED PAIN PATTERNS
Palpebral: localized "searing" pain above eye and up to ipsilateral nostril.
Lacrimal: into eye, sinus pain, bridge of nose pain. Ice cream often reproduces eye pain/headache.

OVERVIEW

INDICATIONS
Headache, migraine, trigeminal neuralgia, eyestrain, "twitching" eyes, poor eyesight, drooping eyelid, sinus pain, eyebrow pain, dry eyes.

CAUSES
Eyesight problems, anxiety, frowning, tension, computer screen overuse.

DIFFERENTIAL DIAGNOSIS
Ptosis—Horner's syndrome.

CONNECTIONS
Digastricus, temporalis, trapezius, spleneii, posterior cervical muscles. Often associated with SCM.

PRACTITIONER HANDS ON TECHNIQUES

		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
		Muscle energy
		Positional release
✓		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

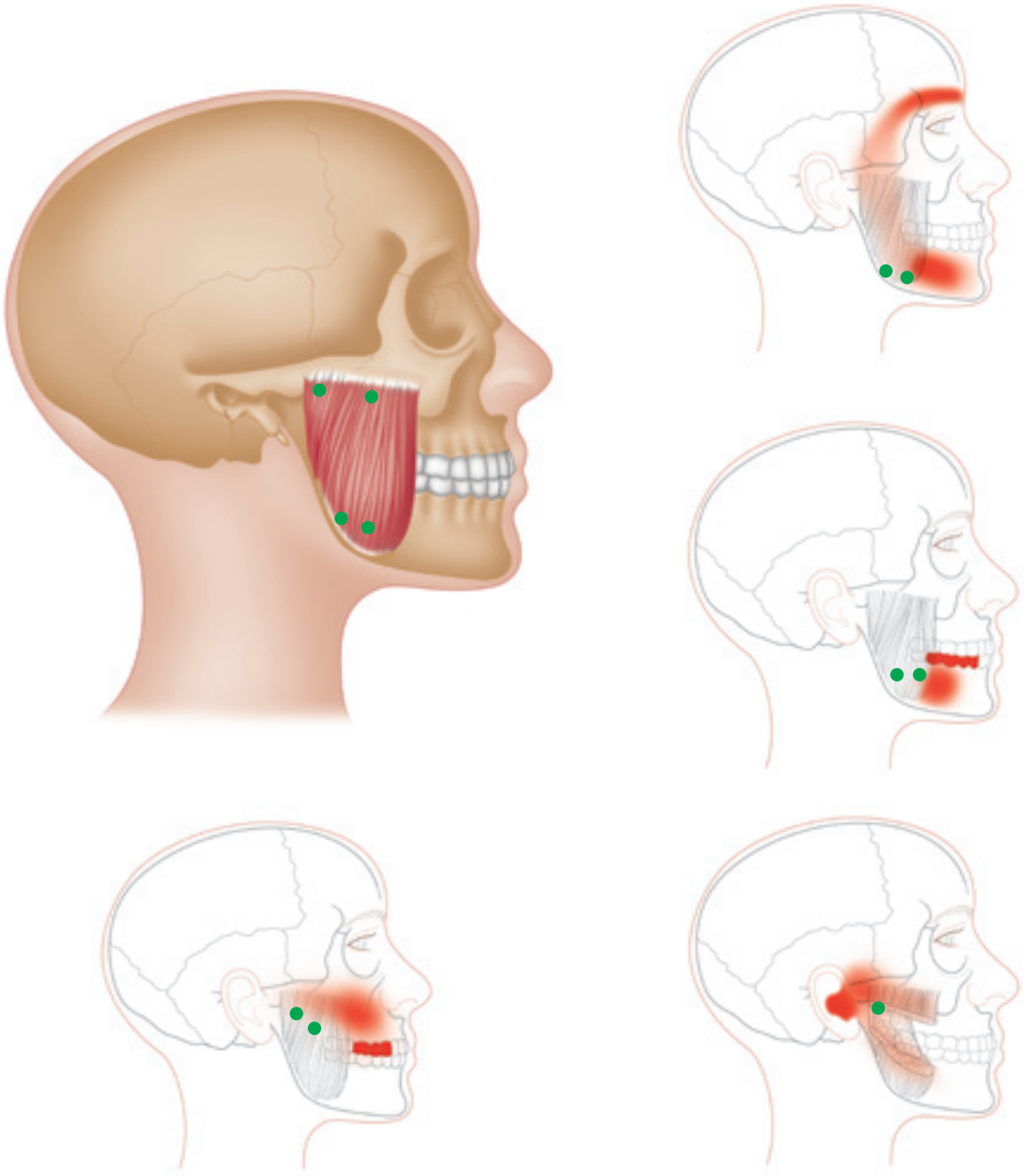
This muscle is often related to many types of sinus type headache and is readily treated using a range of techniques. The simplest is:

SELF-HELP TECHNIQUE
1. Study the anatomy.
2. Locate and feel/palpate the tender trigger point – usually under the ridge of the eyebrow
3. Using your thumbs apply pressure using the ICT until the pain has eased.
4. Move around the point from another direction and press again.
5. Repeat until all the tenderness has gone.

A WORD OF CAUTION
The pain of this point can be very searing and unpleasant; make sure you breathe and relax into the pain and focus on the relaxation. It is an amazingly effective technique for computer-related eyestrain, sinus pain and frontal headaches. Sometimes you can press the points for both eyes simultaneously using your thumbs.

ADVICE
Check eyesight regularly. Increase sleep/rest. Take regular breaks when driving/using computer screen. Ensure glasses not too tight on bridge of nose.

MASSETER



Greek *maseter*, chewer

The masseter is the most superficial muscle of mastication, easily felt when the jaw is clenched.

ORIGIN
Zygomatic process of maxilla.
Medial and inferior surfaces of zygomatic arch.

INSERTION
Angle of ramus of mandible.
Coronoid process of mandible.

ACTION
Closes jaw. Clenches teeth. Assists in side to side movement of mandible.
Antagonist: platysma.

NERVE
Trigeminal **V** nerve (mandibular division).

BASIC FUNCTIONAL MOVEMENT
Chewing food.

REFERRED PAIN PATTERNS
Superficial: eyebrow, maxilla, and mandible (anterior). Upper and lower molar teeth.
Deep: ear and TMJ.

OVERVIEW

INDICATIONS
Trismus (severely restricted jaw), TMJ pain, tension/stress headache, ear pain, ipsilateral tinnitus, dental pain, bruxism, sinusitis pain, puffiness under the eyes (often present in singers).

CAUSES
Chewing gum, tooth grinding/bruxism, prolonged dental work, stress, emotional tension, head-forward postures, occupation.

DIFFERENTIAL DIAGNOSIS
TMJ pain/syndrome. Tinnitus. Trismus.

CONNECTIONS
Ipsilateral temporalis, medial pterygoid, contralateral masseter, SCM.

PRACTITIONER HANDS ON TECHNIQUES

✓	Spray and stretch
✓ ✓	Dry needling
✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓	Wet needling

Contract Relax, Antagonist Contract (CRAC) Technique
1. This is a combination of PIR and RI
2. Contract agonist
3. Relax
4. Contract antagonist
5. Stretch
6. Originally concentric agonist contraction and eccentric antagonist contraction
7. Now isometric contraction is just as easily used, especially in painful, awkward regions
8. Hold stretch for 15–30 seconds
9. Repeat 3 times

SELF HELP

BITE PLATES/OCCLUSAL SPLINTS
Opinion varies as to efficacy, type, and duration of use of occlusal devices. An evidence base suggests they can be beneficial.

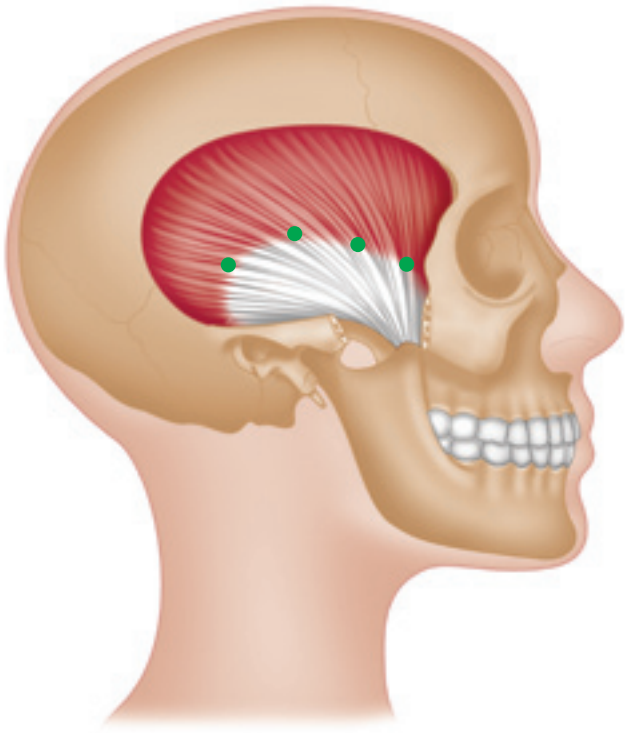
BREATHING AND STRESS CONTROL TECHNIQUES
Stress, tension, and poor breathing mechanics can be a factor. Autogenic and breathing methods might be worth exploring for some.

POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

ADVICE
Stop tooth grinding (bite plates). Work posture (telephone). Posture of head–neck–tongue. Stop chewing gum/ice/nails.

SELF-HELP TECHNIQUE
Use pincer grip, placing thumb inside the mouth.

TEMPORALIS



Latin *temporalis*, pertaining to the lateral side of the head

ORIGIN
Temporal fossa, including parietal, temporal, and frontal bones. Temporal fascia.

INSERTION
Coronoid process of mandible. Anterior border of ramus of mandible.

ACTION
Closes jaw. Clenches teeth. Assists in side to side movement of mandible.

NERVE
Anterior and posterior deep temporal nerves from the trigeminal **V** nerve (mandibular division).

BASIC FUNCTIONAL MOVEMENT
Chewing food.

REFERRED PAIN PATTERNS
Upper incisors and supraorbital ridge. Maxillary teeth and mid-temple pain. TMJ and mid-temple pain. Localized (backward and upward).

OVERVIEW

INDICATIONS
Headache, toothache, TMJ syndrome, hypersensitivity of teeth, prolonged dental work, eyebrow pain, headaches, bruxism, sinusitis pain, trismus (lockjaw), tingling in cheek area.

CAUSES
Chewing gum, tooth grinding/bruxism, prolonged dental work, stress, emotional tension, jaw/bite alignment, nail biting, thumb sucking.

DIFFERENTIAL DIAGNOSIS
Temporalis tendonitis. Polymyalgia rheumatica. Temporal arteritis, or giant cell arteritis (GCA).

CONNECTIONS
Upper trapezius, SCM, masseter.

PRACTITIONER HANDS ON TECHNIQUES

☐	Spray and stretch
✓	Dry needling
✓	Deep stroking massage
✓	Compression
✓	Muscle energy
✓	Positional release
✓	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
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3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

BITE PLATES/BLOCKS/OCCLUSAL SPLINTS
Opinion varies as to efficacy, type, and duration of use for occlusal devices. An evidence base suggests they can be beneficial.

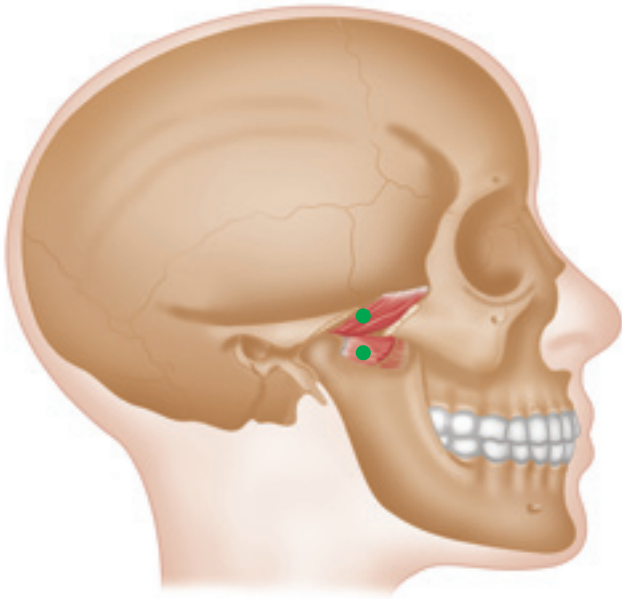
POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

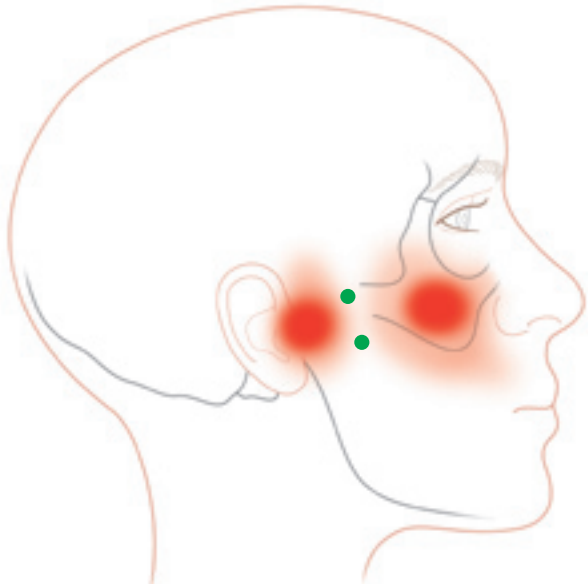
ADVICE
Avoid gum chewing or hard substance chewing. Tongue position. Air conditioning in car/at work. Correct the head-forward posture. Stretch.

SELF-HELP TECHNIQUE
Use flat-fingered pressure techniques to the side of the head/scalp.

1. Study the anatomy and look at the trigger point location.
2. Find the trigger points at the front of the muscle first and build up gentle pressure; these often cause a deep pain that radiates to the teeth.
3. Maintain the pressure until the pain dissolves.
4. Massage the area gently and find the next trigger point, if there is one, and repeat.

PTERYGOIDEUS LATERALIS





Greek *pterygodes*, like a wing; Latin *lateralis*, pertaining to the side

The superior head of the lateral pterygoid is sometimes called the *sphenomeniscus*, because it inserts into the disc of the temporomandibular joint.

ORIGIN

Superior head: lateral surface of greater wing of sphenoid.
Inferior head: lateral surface of lateral pterygoid plate of sphenoid.

INSERTION

Superior head: capsule and articular disc of the temporomandibular joint.
Inferior head: neck of mandible.

ACTION

Protrudes mandible. Opens mouth. Moves mandible from side to side (as in chewing).

NERVE

Trigeminal **V** nerve (mandibular division).

BASIC FUNCTIONAL MOVEMENT

Chewing food.

REFERRED PAIN PATTERNS

Two zones of pain:
(1) TMJ in a 1 cm localized zone;
(2) zygomatic arch in a 3–4 cm zone.

OVERVIEW

INDICATIONS
TMJ syndrome, craniomandibular pain, problems chewing/masticating, tinnitus, sinusitis. decreased jaw opening, headaches, bruxism, sinusitis pain, trismus (lockjaw), tingling in cheek area.

CAUSES
Chewing gum, tooth grinding/ bruxism, prolonged dental work, stress, emotional tension, jaw/ bite alignment, nail biting, thumb sucking.

DIFFERENTIAL DIAGNOSIS
Arthritic TMJ. Anatomical variations of TMJ. Tic douloureux (trigeminal neuralgia). Shingles.

CONNECTIONS
TMJ, atlanto-occipital joint facets, neck muscles, masseter, medial pterygoid, temporalis (anterior), zygomaticus, buccinator, orbicularis oculi, SCM.

PRACTITIONER HANDS ON TECHNIQUES

☐ ☐	Spray and stretch
✓ ☐	Dry needling
✓ ☐	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ☐	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
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4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

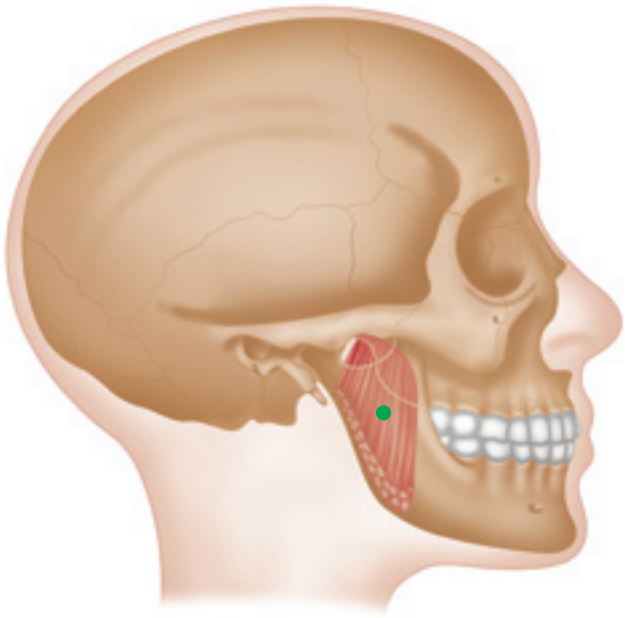
BITE PLATES/BLOCKS/ OCCLUSAL SPLINTS
Opinion varies as to efficacy, type, and duration of use for occlusal devices. An evidence base suggests they can be beneficial.

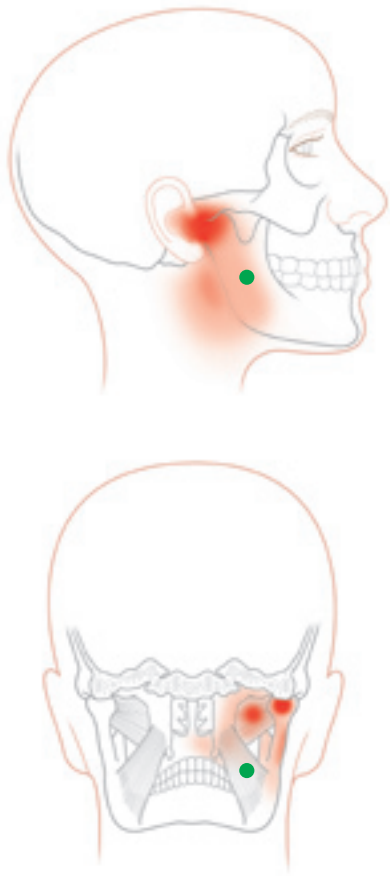
POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

ADVICE
Chew on both sides of mouth. Avoid gum chewing/nail biting. Bite guard, phone-in-neck postures.

SELF-HELP TECHNIQUE
Use pincer-grip pressure techniques inside of the mouth in the sulcus, right at the back of the molars (or wisdom teeth if you have them); push inward and upward toward the top of the cheek.

PTERYGOIDEUS MEDIALIS





Greek *pterygodes*, like a wing; Latin *medius*, middle

The medial pterygoid mirrors the masseter muscle in both its position and its action, with the ramus of the mandible positioned between the two muscles.

ORIGIN
Medial surface of lateral pterygoid plate of the sphenoid bone. Pyramidal process of the palatine bone. Tuberosity of maxilla.

INSERTION
Medial surface of the ramus and the angle of the mandible.

ACTION
Elevates and protrudes the mandible. Therefore, it closes the jaw and assists in side to side movement of the mandible, as in chewing.

NERVE
Trigeminal **V** nerve (mandibular division).

BASIC FUNCTIONAL MOVEMENT
Chewing food.

REFERRED PAIN PATTERNS
Pain in throat, mouth, and pharynx. Localized zone about TMJ radiating broadly down ramus of jaw toward the clavicle.

OVERVIEW

INDICATIONS
Throat pain, odynophagia, TMJ syndrome, lockjaw, inability to fully open jaw, ENT pain, excessive dental treatment, TMJ pain on biting, bruxism, blocked ears.

CAUSES
Chewing gum, tooth grinding/bruxism, prolonged dental work, stress, emotional tension, jaw/bite alignment, nail biting, thumb sucking, incorrect pillows.

DIFFERENTIAL DIAGNOSIS
TMJ syndrome. ENT pathologies. GI referral, e.g. Barrett's syndrome (esophagus). Bruxism.

CONNECTIONS
Masseter, temporalis, lateral pterygoid, tongue, SCM, digastricus, longus capitis/colli, platysma, clavipectoral fascia, zygomaticus, buccinator, tensor vali palentini, salpingopharyngeus, SCM.

PRACTITIONER HANDS ON TECHNIQUES

- [ ] Spray and stretch
- [x] Dry needling
- [ ] Deep stroking massage
- [x] Compression
- [x] Muscle energy
- [x] Positional release
- [x] Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

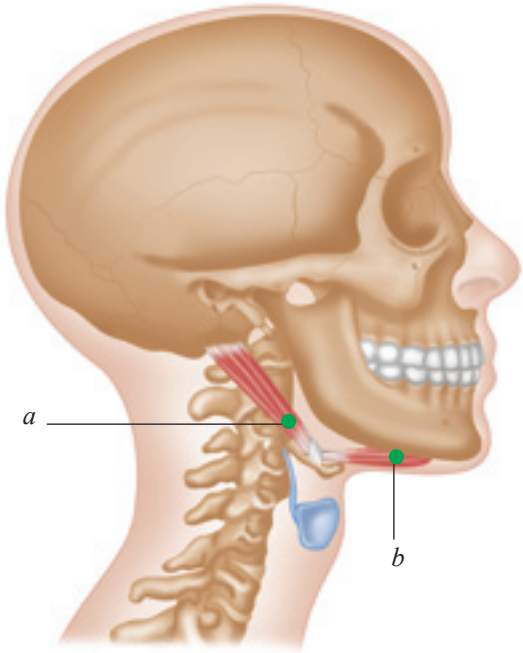
BITE PLATES/BLOCKS/ OCCLUSAL SPLINTS
Opinion varies as to efficacy, type, and duration of use for occlusal devices. An evidence base suggests they can be beneficial.

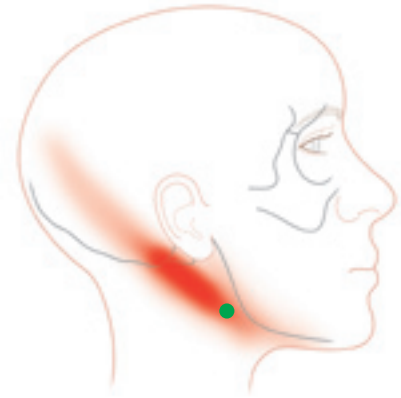
ADVICE
Head postures. Chew on both sides of mouth. Bite guard (soft). Avoid chewing gum/nails.

POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

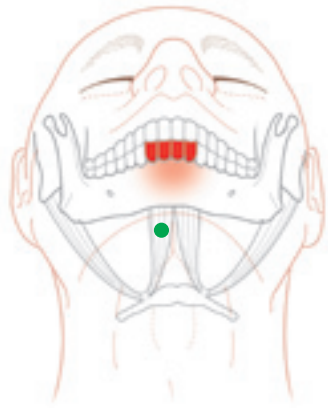
SELF-HELP TECHNIQUE
1. Use flat-finger pressure techniques inside cheek and mouth; start at back of teeth and sweep downward toward bottom of mouth. Use deep breathing if there is a gag reflex.
2. Use thumb pressure under outer angle of chin bone and find the sore spot. Go easily, as it will be tender.

DIGASTRICUS





a) Posterior trigger point



b) Anterior trigger point

Latin *digastricus*, having two (muscle) bellies

ORIGIN
Anterior belly: digastric fossa on inner side of lower border of mandible, near symphysis.
Posterior belly: mastoid notch of temporal bone.

INSERTION
Body of hyoid bone via a fascial sling over an intermediate tendon.

ACTION
Raises hyoid bone. Depresses and retracts mandible as in opening the mouth.

NERVE
Anterior belly: mylohyoid nerve, from trigeminal **V** nerve (mandibular division).
Posterior belly: facial (**V11**) nerve.

REFERRED PAIN PATTERNS
Anterior: lower four incisor teeth, tongue, and lip, occasionally to chin.
Posterior: strong 2 cm zone around mastoid and vaguely the zone to chin and throat, occasionally to scalp.

OVERVIEW

INDICATIONS
Throat pain, dental pain (four lower incisors), headache, jaw pain, renal tubular acidosis, prolonged/extensive dental work (blurred vision and dizziness), lower mouth opening, difficulty swallowing, vocal/singing problems.

CAUSES
Head-forward/upper crossed pattern, poor bite mechanics and/or clenching/grinding of teeth (bruxism), whiplash, telephone to chin, musical instruments (e.g. violin or wind instruments).

DIFFERENTIAL DIAGNOSIS
Dental problems—malocclusion. Hyoid bone. Thyroid problems. Thymus gland. Sinusitis. Carotid artery.

CONNECTIONS
SCM, sternothyroid, mylohyoid, stylohyoid, longus colli/capitis, geniohyoid, cervical vertebrae, temporalis, masseter.

PRACTITIONER HANDS ON TECHNIQUES

☐	Spray and stretch
✓	Dry needling
✓	Deep stroking massage
✓	Compression
✓	Muscle energy
✓	Positional release
✓	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

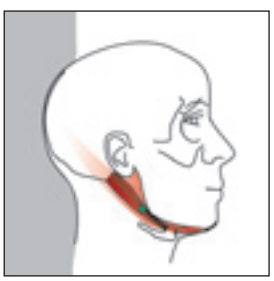
SELF HELP

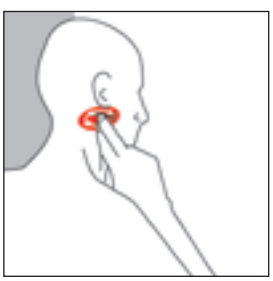
BITE PLATES/BLOCKS/OCCLUSAL SPLINTS
Opinion varies as to efficacy, type, and duration of use for occlusal devices. An evidence base suggests they can be beneficial.

ADVICE
Breathing patterns. Bruxism. Head postures.

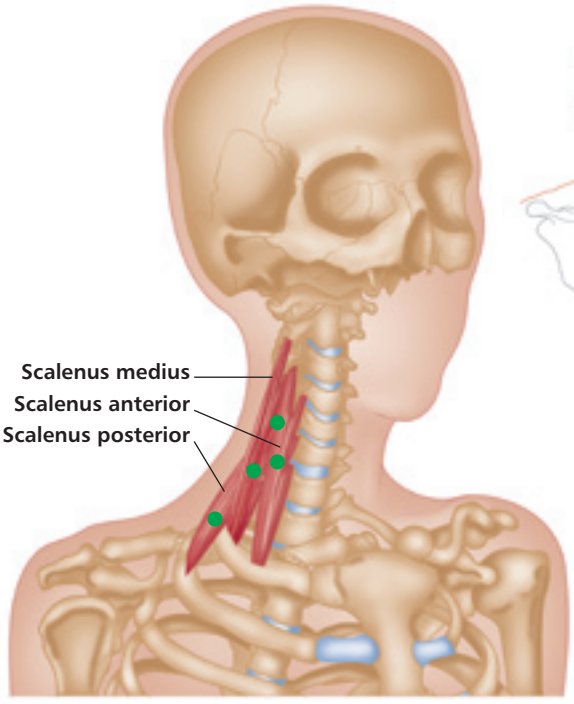
POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

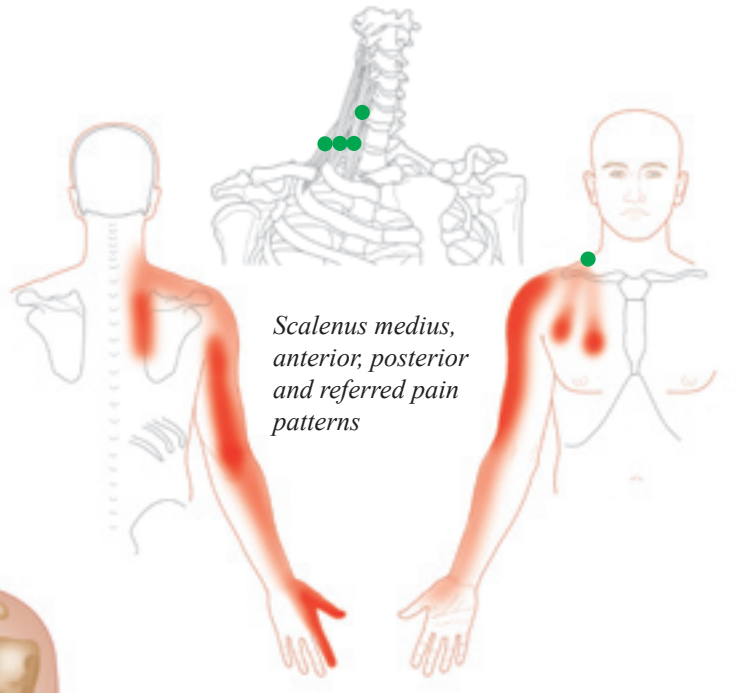
SELF-HELP TECHNIQUE
1. Use two flat fingers and apply pressure techniques under jaw and behind ear.
2. Use deep breathing, as the points can be tender and are often mistaken for lymph nodes.
3. Go easily as they are often tender.



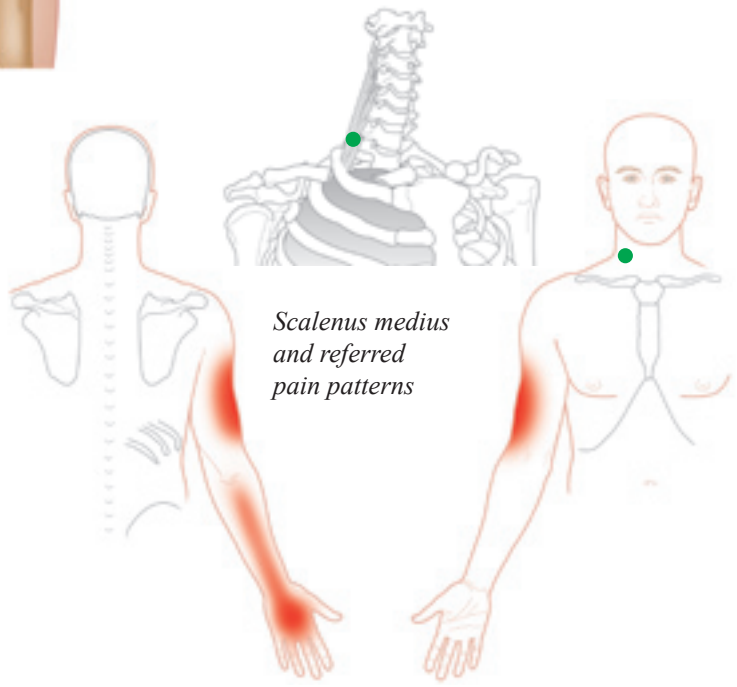


SCALENUS ANTERIOR, MEDIUS, POSTERIOR





Scalenus medius, anterior, posterior and referred pain patterns



Scalenus medius and referred pain patterns

Greek *skalenos*, uneven; Latin *anterior*, before; *medius*, middle; *posterior*, behind

ORIGIN
Transverse processes of cervical vertebrae.

INSERTION
Anterior and medius: 1st rib.
Posterior: 2nd rib.

ACTION
Acting together: flex neck. Raise 1st rib during a strong inhalation.
Individually: laterally flex and rotate neck.

NERVE
Ventral rami of cervical nerves, C3–C8.

BASIC FUNCTIONAL MOVEMENT
Primarily muscles of inspiration.

REFERRED PAIN PATTERNS
Anterior: persistent aching, pectoralis region to the nipple.
Posterior: upper medial border of scapula.
Lateral: front and back of the arm to the thumb and index finger.

OVERVIEW

INDICATIONS
Back/shoulder/arm pain, thoracic outlet syndrome, scalene syndrome, edema in the hand, phantom limb pain, asthma, chronic lung disease, whiplash, "restless neck," irritability, hyperventilation syndrome, panic attacks.

CAUSES
Anxiety, stress, pillow height, chronic lung problems, smoking, heavy lifting/bracing, allergies, wind instruments, RTA.

DIFFERENTIAL DIAGNOSIS
Brachial plexus. Subclavian vessels. Cervical discs (C5–C6). Thoracic outlet syndrome. Angina. Carpal tunnel syndrome. Upper trapezius. SCM. Splenius capitis.

CONNECTIONS
SCM, levator scapulae, platysma.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
Indications: tight fibrotic muscles/ chronic settings
1. Position the muscle at the restriction barrier.
2. Ask the patient to actively contract the muscle for 2–4 seconds at about 10–25%, while you resist.
3. Overcome this resistance, actively pushing against the muscle into eccentric contraction towards the physiological barrier for 15–30 seconds.
4. Repeat 3–5 times.

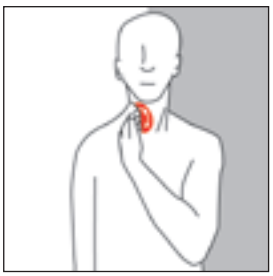
SELF HELP

BREATHING
Hyperventilation syndrome is strongly associated with scalene syndrome. Breathing techniques from yoga and Butyeko method are worth exploring.

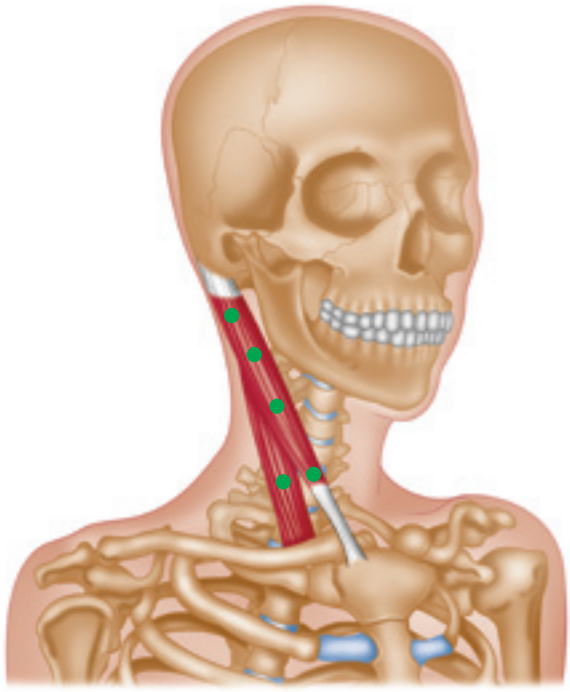
ADVICE
Use of pillows. Swimming. Backpacks. Consider breast reduction. Warm scarves. Warmth. Moist heat. Pulling and lifting.

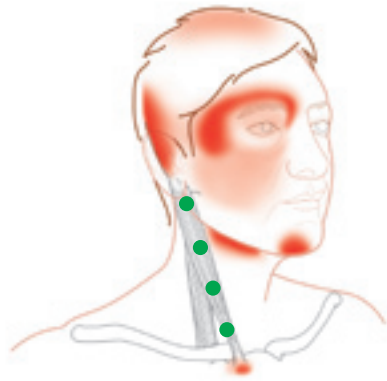
POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

SELF-HELP TECHNIQUE
For experienced trigger point users only.
1. Use flat-finger technique to apply pressure on trigger points at front side of throat and push backward toward vertebral column.
2. Use deep breathing, as they can cause a sharp pain toward the hand. The points are often mistaken for lymph nodes.
3. Go easily, as they are often tender.
4. If you are unsure or new to trigger point work, please use stretches.



STERNOCLEIDOMASTOIDEUS (SCM)





Sternal head

Clavicular head

Greek *sternon*, chest; *kleis*, key, clavicle; *mastos*, breast; Latin *mastoides*, breast shaped

This muscle is a long strap muscle with two heads. It is sometimes injured at birth, and may be partly replaced by fibrous tissue that contracts to produce a torticollis (wry neck). A hugely important muscle for trigger point therapists.

ORIGIN

Sternal head: anterior surface of manubrium of sternum.
Clavicular head: upper surface of medial third of clavicle.

INSERTION

Outer surface of mastoid process of temporal bone. Lateral third of superior nuchal line of occipital bone.

ACTION

Contraction of both sides together: flexes neck and draws head forward, as in raising head from a pillow. Raises sternum, and consequently ribs, superiorly during deep inhalation.
Contraction of one side: tilts head toward same side. Rotates head to face opposite side (and also upward as it does so).

NERVE

Accessory **X1** nerve, with sensory supply for proprioception from cervical nerves C2 and C3.

BASIC FUNCTIONAL MOVEMENT

Examples: turning head to look over shoulder; raising head from pillow.

REFERRED PAIN PATTERNS

Sternal head: pain in occiput, radiating anteriorly to eyebrow, cheek, and throat (eye and sinus).
Clavicular head: frontal headache, earache, mastoid pain (dizziness and spatial awareness).

OVERVIEW

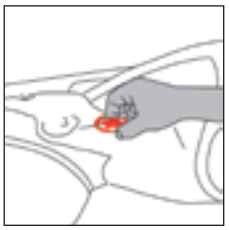
INDICATIONS
Tension headache, whiplash, stiff neck, atypical facial neuralgia, hangover headache, postural dizziness, altered SNS symptoms to half of face, lowered spatial awareness, ptosis. Associated with (existing) persistent dry, tickling cough, sinusitis and chronic sore throats, increased eye tearing and reddening, popping sounds in the ear (one sided), balance problems, and veering to one side when driving.

CAUSES
Anxiety, stress, pillow height, allergies, weight lifting, RTA, car sickness, trauma, incorrect swimming styles, tight shirt collars, work posture and ergonomics.

DIFFERENTIAL DIAGNOSIS
Trigeminal neuralgia. Facial neuralgia. Vestibulocochlear problems. Lymphadenopathy. Levator scapulae. Upper trapezius. Splenius capitis.

CONNECTIONS
Trapezius, masseter, platysma, scalenes, levator scapulae, sternalis, temporalis, pectoralis major.

PRACTITIONER HANDS ON TECHNIQUES



✓	✓	Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

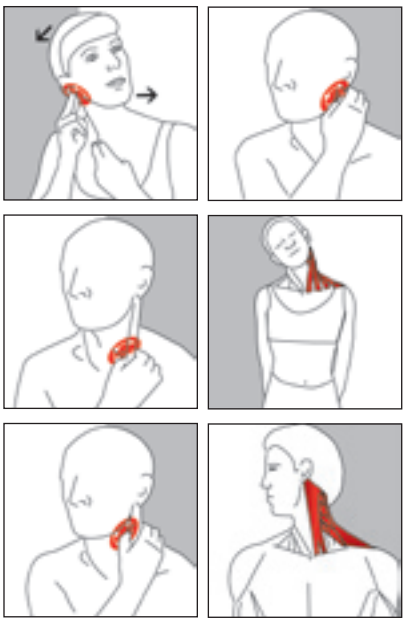
SELF HELP

BREATHING
Hyperventilation syndrome is strongly associated with SCM problems. Breathing techniques from yoga and Butyeko method are worth exploring.

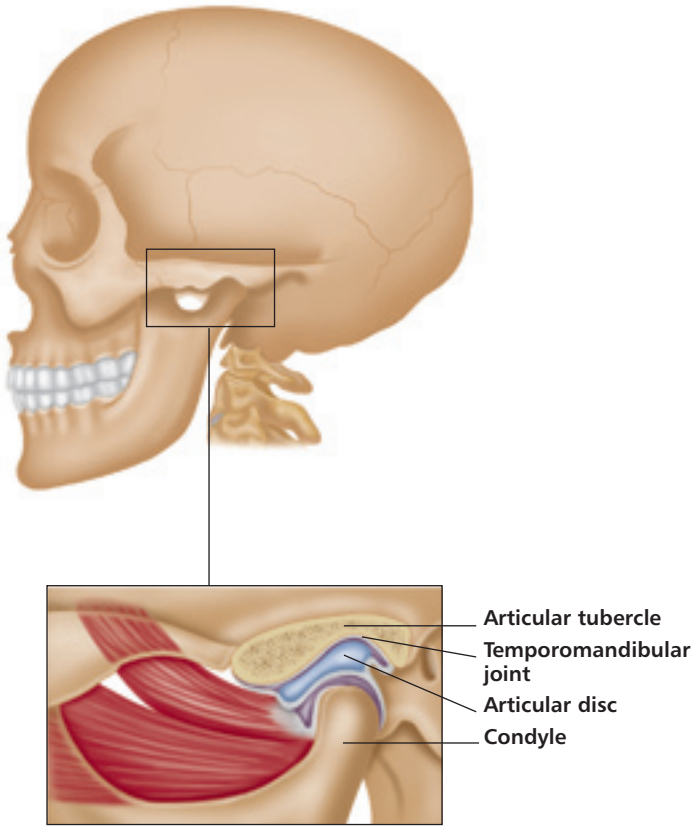
ADVICE
Breathing efficacy. Number of pillows. Work posture. Head posture. TV posture.

POSTURE
Head forward or upper crossover patterns can be treated by a range of manual and trigger point therapists.

SELF-HELP TECHNIQUE
For experienced trigger point users only.
1. Use thumb pincer-grip technique to apply pressure on trigger points at front side of neck, and hold the tender points, going slowly (think Mr. Spock).
2. Use deep breathing, as they can cause a sharp pain toward the hand.



TEMPOROMANDIBULAR JOINT (TMJ)



Trigger points are commonly found in the muscles that move and stabilize the TMJ. People often clench the jaw muscles in response to stress, anxiety, and/or tension. TMJ syndrome can be defined as "chronic pain and/or dysfunction of the TMJ and its muscles." The most commonly accepted theory is that there is a "temporary anterior displacement (of the joint) with or without reduction"; this leads to repetitive micro- and macrotrauma of muscles, and chronic inflammation of the joint membranes. Trigger points often develop in the muscles which support and operate the joint. The main symptoms are facial pain, especially around the ear, popping sounds, and headaches, but may include nausea and tinnitus. Patients are often driven to distraction by the pain, and have been known to seek exotic and expensive remedies. Trigger point release can be a very useful therapeutic intervention along with identifying and addressing any underlying causes.

TMJ syndrome is multifactorial, and the following list covers some of the common differential diagnostic criteria:

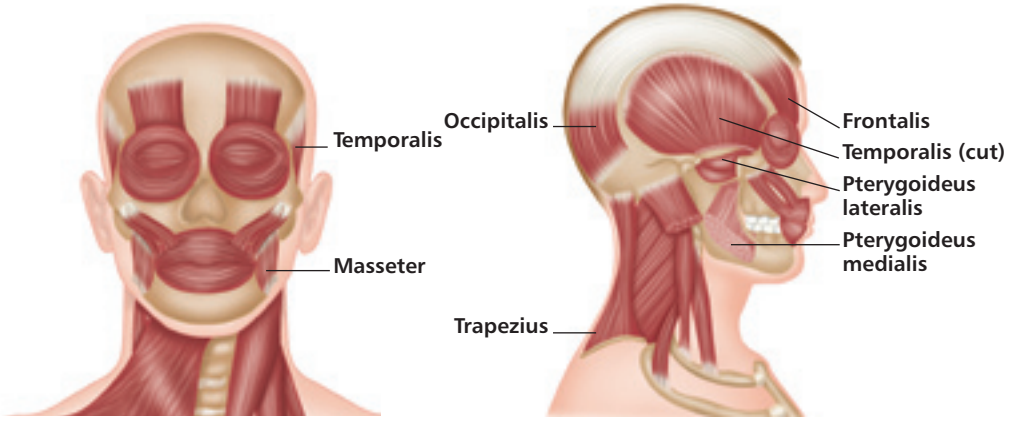
- "Under," "over," lateral bite, or malocclusion
- Dislocation on yawning, popping, and/or crepitus
- Ear pain
- Cervical spine disorders
- Type/shape of synovial joint; several anatomical variations occur
- Gum chewing
- Masticating food unilaterally
- Chronic dental problems
- Problems with wisdom teeth
- Tooth grinding; bruxism
- Clenching in response to stress/anxiety
- Depression and bipolar disorder
- Arthritis (osteo- and rheumatoid)
- Dentures

The primary muscles directly associated with the TMJ are the temporalis, masseter, and pterygoideus lateralis and medialis. The secondary muscles are the mylohyoid and the anterior digastricus. Chronic trigger points in any of these muscles may lead to an increase in muscular stiffness, fatigue, and dysfunction. Symptoms may be unilateral and/or bilateral, and are rarely seen in the under-20 age group. Further, satellite trigger points may be located in the upper trapezius, upper semispinalis capitis, suboccipitalis, and SCM.

Indications

This debilitating condition is characterized by pain, stiffness, and aching in the jaw muscles, especially in the region of the ear. It may be primary, as the result of anomalous jaw or bite formation, such as malocclusion or a variation in jaw joint anatomy; or it may be secondary to a variety of conditions, such as tooth clenching or grinding. It is always worth getting a proper opinion and diagnosis from a qualified dental practitioner. However, the following treatments may help reduce the severity and chronicity of TMJ pain.

STEP 1 Study the anatomy and direction of the muscle fibers.



STEP 2 Sitting ICT to:

Upper trapezius

Posterior cervical muscles

Splenius cervicis

STEP 3 Massage area generously.

STEP 4 Supine ICT to:

Masseter

Temporalis (especially at the muscle–tendon junction) (STP)

Lateral and medial pterygoids

Digastricus

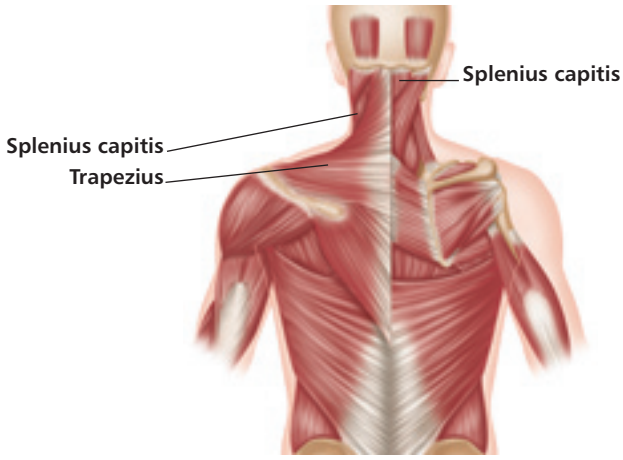
Epicranius (occipitofrontalis)

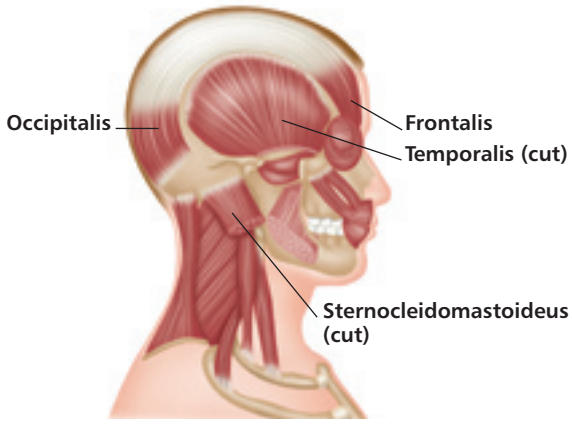
HEADACHE

Indications

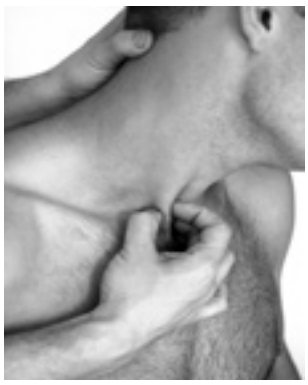
Headaches may occur for a variety of reasons and can manifest in many different ways. If you have a severe or unrelenting headache, it is always worth consulting your doctor. Most headaches, however, have an associated element of muscular tension, which may well benefit from treatment of the trigger points.

STEP 1 Study the anatomy and direction of the muscle fibers.





STEP 2



Sitting ICT to SCM (delicately find and press on trigger points). Head should be in a nodding forward position, and rotated toward the side of the pressure. Remember that there are a lot of delicate blood vessels and structures in this area of the neck.

Sitting ICT to trigger points within upper trapezius.

STEP 3 Massage area generously.

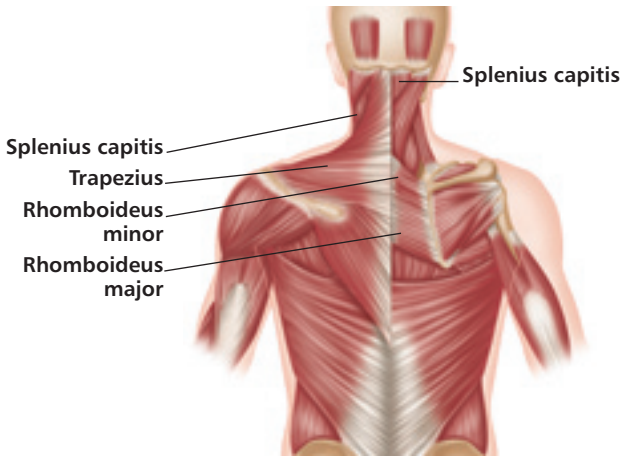
STEP 4 Supine ICT to:
cervical erector spinae, and temporalis.

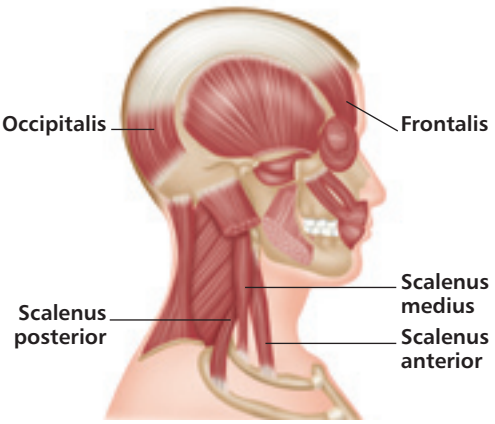
STEP 5 With patient still supine, finish with ICT on posterior points of epicranius (occipitofrontalis).

Indications

Chronic tension and neck ache, stress headache, cervical spine pain, and whiplash. Trigger point therapy can be very effective for this region. These muscles often have multiple trigger points, and finding the correct ones is essential.

STEP 1 Study the anatomy and direction of the muscle fibers.





STEP 2

Sitting ICT to upper and middle trapezius (STP).

Slide down the rhomboids (downward), only pausing on trigger points.

Move up to trigger points within the splenius capitis.

Finally locate and inhibit trigger points in the scalenes group.

STEP 3 Massage area generously.

STEP 4 Dragging massage technique to cervical erector spinae:

With patient supine, stand on opposite side. Place fingertips under muscles on opposite side of neck. Slowly drag patient toward you, while asking them to turn their head toward you. Repeat on other side.

STEP 5

With patient still supine, finish with ICT on posterior points of epicranius (occipitofrontalis), asking patient to drop the weight of their head into your fingers.

8 Muscles of the Trunk and Spine

Regional Trigger Points for Abdominal, Chest, and Back Pain

MUSCLE	PAGE REFERENCE
Biceps brachii	148
Diaphragm	120
Erector spinae	102
External oblique	110
Gluteus medius	178
Iliocostalis cervicis	102
Iliocostalis lumborum	102
Iliocostalis thoracis	102
Iliopsoas	118
Latissimus dorsi	134
Levator scapulae	126
Longissimus thoracis	102
Multifidus	106
Pectoralis major	132
Piriformis	182
Quadratus lumborum	116
Rectus abdominis	114
Rhomboids	128
Rotatores	106
Scalenes	92
Serratus anterior	130
Splenius cervicis	108
Sternocleidomastoid	94
Supraspinatus	138
Transversus abdominis	112
Trapezius	124
Triceps brachii	150

Abdominal pain
Rectus abdominis
External oblique
Transversus abdominis
Iliocostalis thoracis
Multifidus
Quadratus lumborum

(Front of) chest pain
Pectoralis major
Scalenes
Sternocleidomastoid (sternal head)
Iliocostalis cervicis
External oblique
Diaphragm

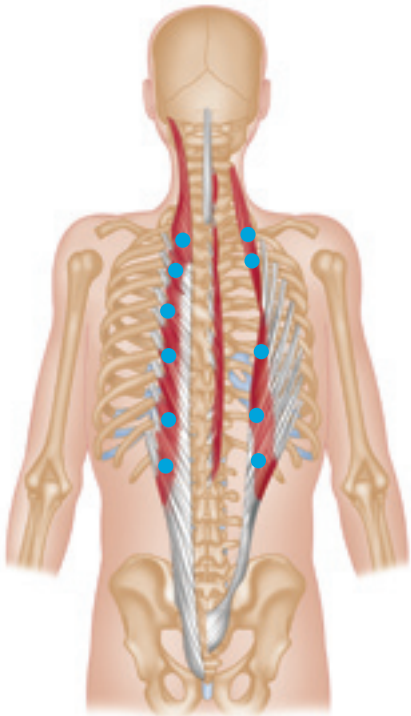
(Side of) chest pain
Serratus anterior
Latissimus dorsi
Diaphragm

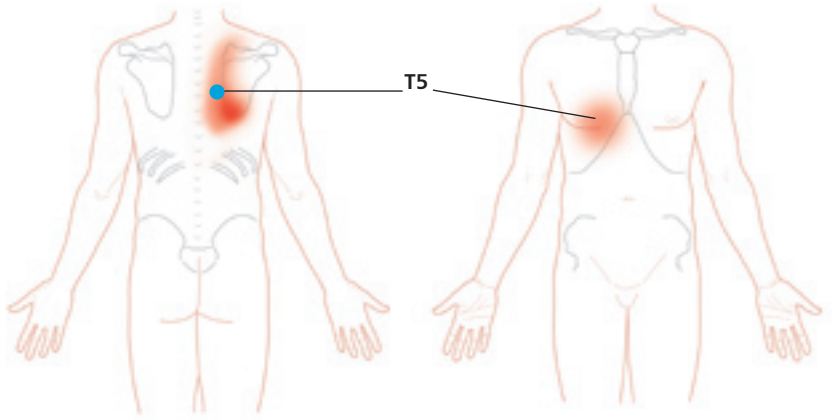
Upper back pain
Scalenes
Levator scapulae
Supraspinatus
Trapezius
Multifidus
Rhomboids
Splenius cervicis
Triceps brachii
Biceps brachii

Middle back pain
Iliopsoas
Latissimus dorsi
Iliocostalis thoracis
Multifidus
Rectus abdominis

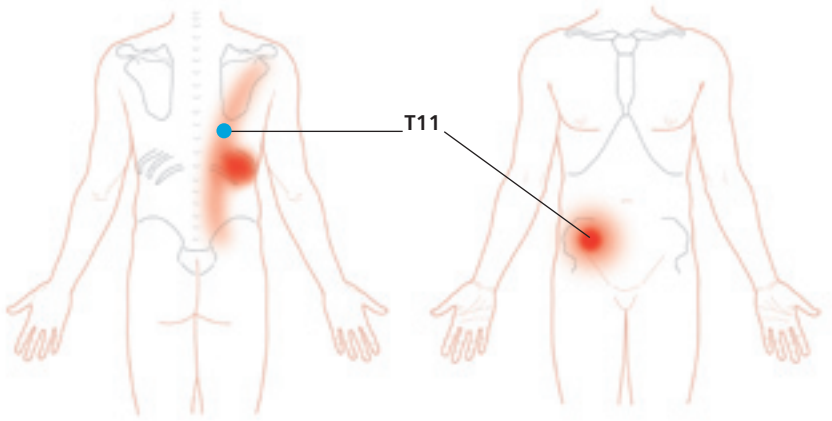
Low back pain
Gluteus medius
Iliopsoas
Longissimus thoracis
Iliocostalis thoracis
Iliocostalis lumborum
Multifidus
Rectus abdominis

ERECTOR SPINAE (SACROSPINALIS)

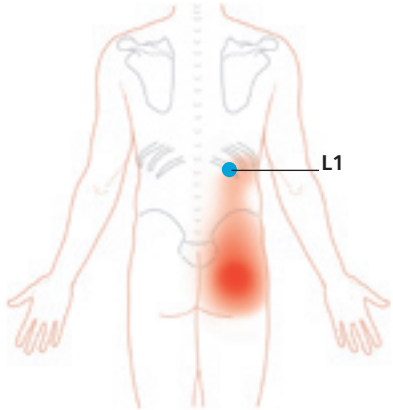




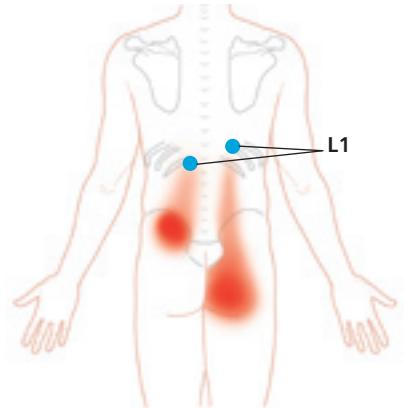
Iliocostalis thoracis



Iliocostalis thoracis



Iliocostalis lumborum



Longissimus thoracis

Latin *sacrum*, sacred; *spinalis*, spinal

The erector spinae, also called the *sacrospinalis*, comprise three sets of muscles organized in parallel columns. From lateral to medial, they are: iliocostalis, longissimus, and spinalis.

ORIGIN

Slips of muscle arising from the sacrum. Iliac crest. Spinous and transverse processes of vertebrae. Ribs.

INSERTION

Ribs. Transverse and spinous processes of vertebrae. Occipital bone.

ACTION

Extends and laterally flexes vertebral column (i.e. bending backward and sideways). Helps maintain correct curvature of spine in the erect and sitting positions. Steadies the vertebral column on the pelvis during walking.
Antagonist: rectus abdominis.

NERVE

Dorsal rami of cervical, thoracic, and lumbar spinal nerves.

BASIC FUNCTIONAL MOVEMENT

Keeps back straight (with correct curvatures), therefore maintains posture.

REFERRED PAIN PATTERNS

Thoracic spine—iliocostalis: medially toward the spine, and anteriorly toward the abdomen.
Lumbar spine—iliocostalis: mid buttock.
Thoracic spine—iliocostalis: buttock and sacroiliac area.

OVERVIEW

INDICATIONS
Low back pain (especially after lifting), reduced range of motion in the spine, low back pain (from sitting/standing/climbing stairs), low grade back ache worsening toward the end of the day.

CAUSES
Poor posture, playing musical instruments, lying on front with head propped up, poor glasses, upper crossed pattern, kyphosis, scoliosis, wear and tear, cold drafts/ air conditioning, vertebral alignment issues, certain sports (e.g. archery), tight shirt/tie, depression.

DIFFERENTIAL DIAGNOSIS
Angina. Visceral pain. Radiculopathy. Ligamentous, discogenic, sacroiliac. Piriformis. Pathological: aortic aneurysm. Visceral pathology. Space-occupying lesion. Pelvic inflammatory disease.

CONNECTIONS
Pectoralis major.

PRACTITIONER HANDS ON TECHNIQUES

✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

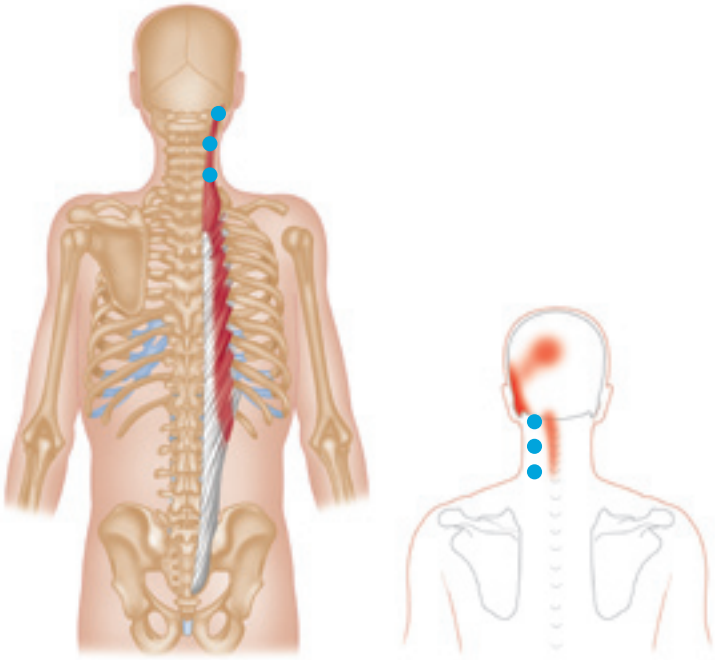
Deep Stroking Massage Technique
1. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
2. Lubricate the skin if necessary.
3. Identify and locate the trigger point or taut band.
4. Position your thumb/applicator just beyond the taut band, and reinforce with your other hand.
5. Apply sustained pressure until you feel the trigger point soften, and continue stroking in the same direction toward the attachment of the taut band. This should be experienced by the patient as discomfort and not as pain.
6. Repeat this stroking in the opposite direction.

SELF HELP

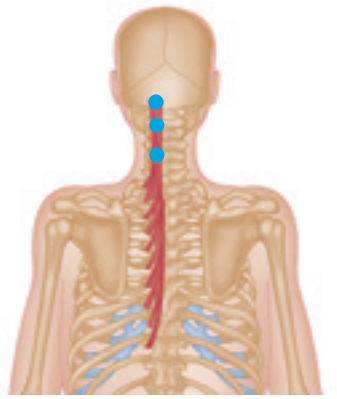
ADVICE
Avoid "sudden overload" when lifting. Do not lift when fatigued. Posture. Heat/hot baths.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run down from skull, identifying and noting painful spots and knots.
3. Run up in opposite direction toward skull.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits, and then follow stroke to the end.

POSTERIOR CERVICAL MUSCLES



Longissimus capitis



Semispinalis capitis/cervicis

Semispinalis capitis (upper)

Latin *longissimus*, longest; *capitis*, of the head; *semispinalis*, half spinal; *cervicis*, of the neck

Comprising: longissimus capitis, semispinalis capitis, and semispinalis cervicis.

ORIGIN

Longissimus capitis: transverse processes of upper five thoracic vertebrae (T1–T5). Articular processes of lower three cervical vertebrae (C5–C7).
Semispinalis cervicis: transverse processes of upper five or six thoracic vertebrae (T1–T6).
Semispinalis capitis: transverse processes of lower four cervical and upper six or seven thoracic vertebrae (C4–T7).

INSERTION

Longissimus capitis: posterior part of mastoid process of temporal bone.
Semispinalis cervicis: spinous processes 2nd to 5th cervical vertebrae (C2–C5).
Semispinalis capitis: between superior and inferior nuchal lines of occipital bone.

ACTION

Longissimus capitis: extends and rotates head. Helps maintain correct curvature of thoracic and cervical spine in the erect and sitting positions.
Semispinalis cervicis: extends thoracic and cervical parts of vertebral column. Assists rotation of thoracic and cervical vertebrae.
Semispinalis capitis: most powerful extensor of the head. Assists in rotation of head.

NERVE

Longissimus capitis: dorsal rami of middle and lower cervical nerves.
Semispinalis cervicis: dorsal rami of thoracic and cervical nerves.
Semispinalis capitis: dorsal rami of cervical nerves.

BASIC FUNCTIONAL MOVEMENT

Longissimus capitis: keeps upper back straight (with correct curvatures).
Semispinalis cervicis and capitis.
Examples: looking up; turning head to look behind.

Semispinalis capitis (middle) and cervicis

Multifidus (mid cervical)
Even though not mentioned here (see also page 106), this muscle runs up the spine as part of the erector spinae, and so is relevant as part of the posterior cervical muscles.

REFERRED PAIN PATTERNS

Several areas along the fibers, all radiating superiorly into head and skull and toward frontal region.

OVERVIEW

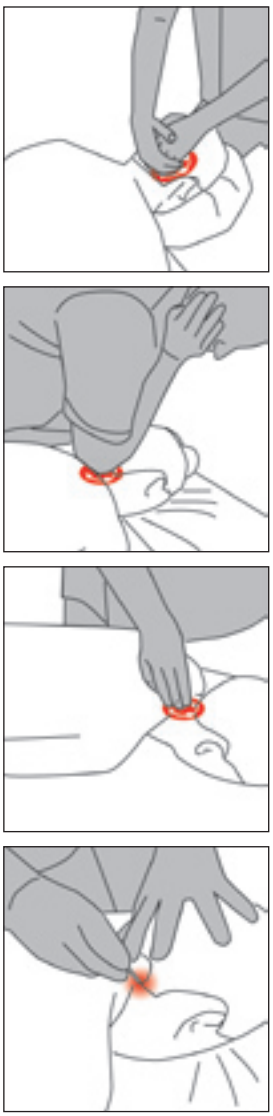
INDICATIONS
Headache, neck pain and stiffness, decreased cervical flexion, suboccipital pain, restricted neck rotation (often related to prolonged occupational positions), whiplash, pain using certain pillows, "burning" in scalp.

CAUSES
Poor posture, playing musical instruments, lying on front with head propped up, poor glasses, upper crossed pattern, kyphosis, scoliosis, wear and tear, cold drafts/air conditioning, vertebral alignment issues, certain sports (e.g. archery), tight shirt/tie, depression.

DIFFERENTIAL DIAGNOSIS
Cervical mechanical dysfunction. Spondyloarthropathy of facets. Vertebral artery syndrome. Discopathy (cervical) 1st rib dysfunction. Polymyalgia rheumatica. Rheumatoid arthritis. Osteoarthritis. Ankylosing spondylitis (seronegative spondyloarthropathy). Paget's disease. Psoriatic arthropathy.

CONNECTIONS
Trapezius, erector spinae, temporalis, digastricus, infraspinatus, levator scapulae, SCM, splenius capitis/cervicis, suboccipital muscles, occipitalis, pectoralis major.

PRACTITIONER HANDS ON TECHNIQUES



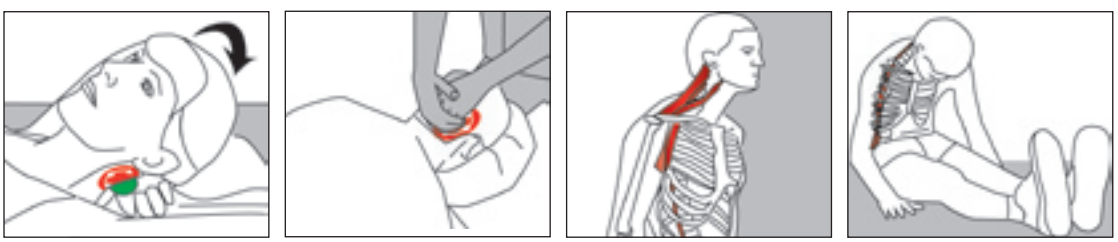
✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

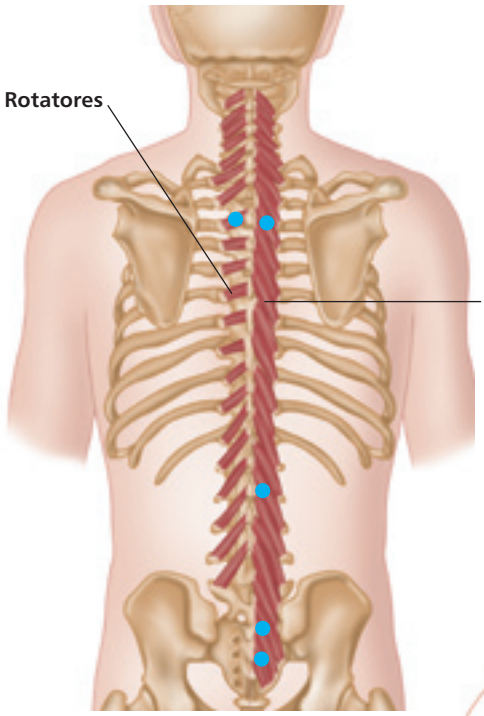
SELF HELP

ADVICE
Occupational ergonomics. Posture. Eyewear. Use of ergonomic pillows. Heat and stretch. Explore bedding/pillows.

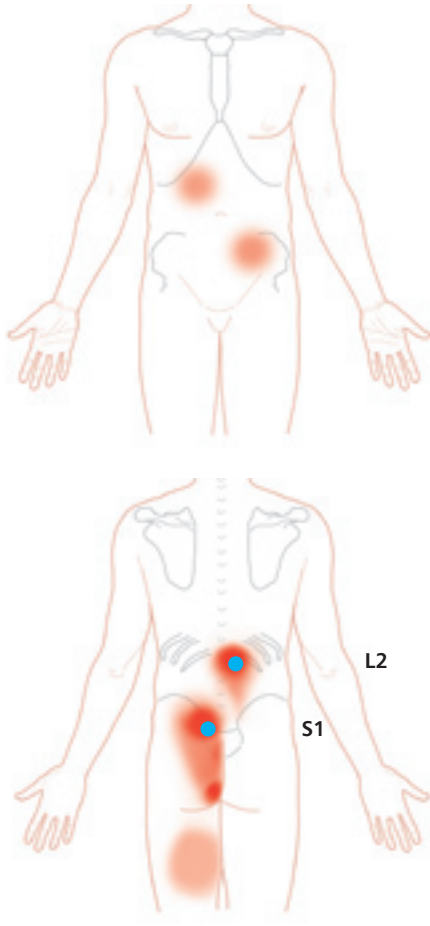
SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run down from skull, identifying and noting painful spots and knots.
3. Run up in opposite direction toward skull.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits and then follow stroke to the end.



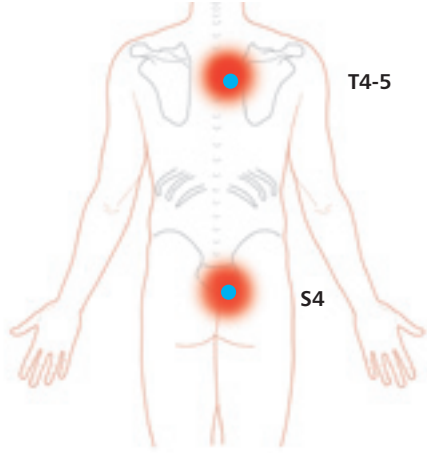
MULTIFIDUS/ROTATORES



Cervical multifidus



Multifidus



Multifidus and rotatores

Latin *multi*, many; *findere*, to split; *rota*, wheel

The multifidus is the part of the transversospinalis group, which lies in the furrow between the spines of the vertebrae and their transverse processes. It lies deep to the semispinalis and erector spinae. The rotatores are the deepest layer of the transversospinalis group.

ORIGIN

Multifidus: posterior surface of sacrum, between sacral foramina and posterior superior iliac spine. Mamillary processes (posterior borders of superior articular processes) of all lumbar vertebrae. Transverse processes of all thoracic vertebrae. Articular processes of lower four cervical vertebrae.
Rotatores: transverse process of each vertebra.

INSERTION

Multifidus: parts insert into spinous process two to four vertebrae superior to origin; overall including spinous processes of all vertebrae from 5th lumbar up to the axis (L5–C2).
Rotatores: base of spinous process of adjoining vertebra above.

ACTION

Multifidus: protects vertebral joints from movements produced by the more powerful superficial prime movers. Extension, lateral flexion, and rotation of vertebral column.
Rotatores: rotate and assist in extension of vertebral column.

NERVE

Dorsal rami of spinal nerves.

BASIC FUNCTIONAL MOVEMENT

Helps maintain good posture and spinal stability during standing, sitting, and all movements.

REFERRED PAIN PATTERNS

Multifidus: localized and anteriorly to abdomen. S1 leads to coccydynia.
Rotatores: localized to medial pain.

OVERVIEW

INDICATIONS
Deep/persistent low backache, vertebral alignment problems, facilitated segment—localized paraspinal erythema, coccydynia.

CAUSES
Poor posture, playing musical instruments, lying on front with head propped up, poor glasses, upper crossed pattern, kyphosis, scoliosis, wear and tear, cold drafts/ air conditioning, vertebral alignment issues, certain sports (e.g. archery), tight shirt/tie, depression.

DIFFERENTIAL DIAGNOSIS
Angina. Visceral pain. Radiculopathy. Ligamentous, discogenic, sacroiliac. Piriformis. Pathological: aortic aneurysm. Visceral pathology. Space-occupying lesion. Pelvic inflammatory disease.

CONNECTIONS
Pectoralis major.

PRACTITIONER HANDS ON TECHNIQUES

- ✓✓ Spray and stretch
- ✓✓ Dry needling
- ✓✓ Deep stroking massage
- ✓✓ Compression
- ✓✓ Muscle energy
- ✓✓ Positional release
- ✓✓ Wet needling

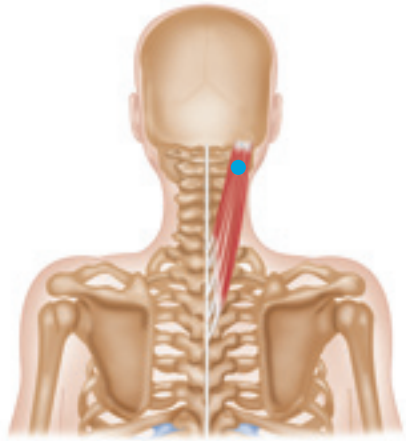
Deep Stroking Massage Technique
1. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
2. Lubricate the skin if necessary.
3. Identify and locate the trigger point or taut band.
4. Position your thumb/applicator just beyond the taut band, and reinforce with your other hand.
5. Apply sustained pressure until you feel the trigger point soften, and continue stroking in the same direction toward the attachment of the taut band. This should be experienced by the patient as discomfort and not as pain.
6. Repeat this stroking in the opposite direction.

SELF HELP

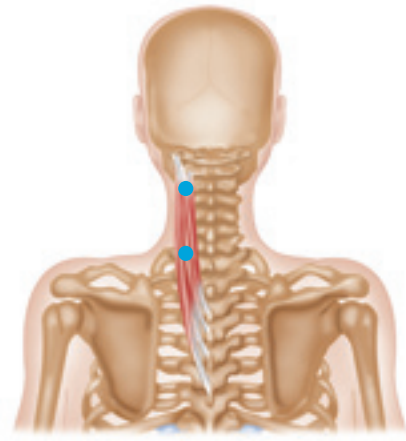
ADVICE
Posture. Kyphosis from working position. Number and type of pillows. Occupational considerations.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run down from skull, identifying and noting painful spots and knots.
3. Run up in opposite direction toward skull.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits and then follow stroke to the end.

SPLENIUS CAPITIS/SPLENIUS CERVICIS

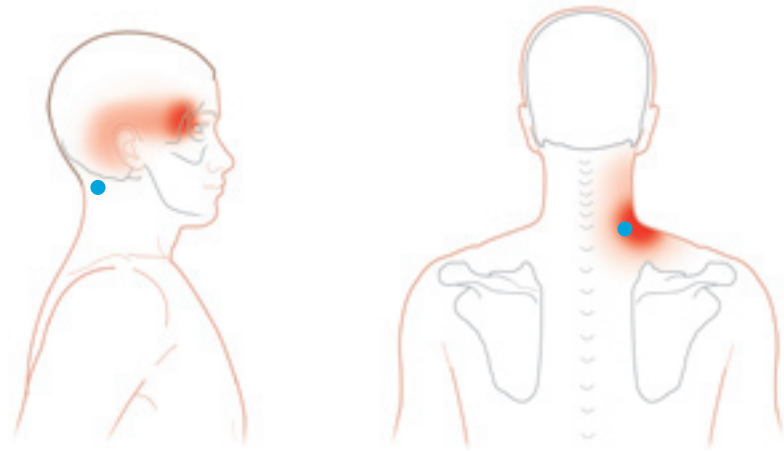


Splenius capitis



Splenius cervicis

Splenius capitis



Splenius cervicis

Greek *splenion*, bandage; Latin *capitis*, of the head; *cervicis*, of the neck

ORIGIN

Splenius capitis: lower part of ligamentum nuchae. Spinous processes of the 7th cervical vertebra (C7), and upper 3 or 4 thoracic vertebrae (T1–T4).
Splenius cervicis: spinous processes of the 3rd to 6th thoracic vertebrae (T3–T6).

INSERTION

Splenius capitis: posterior aspect of mastoid process of temporal bone. Lateral part of superior nuchal line, deep to the attachment of the SCM.
Splenius cervicis: posterior tubercles of transverse processes of the upper 2 or 3 cervical vertebrae (C1–C3).

ACTION

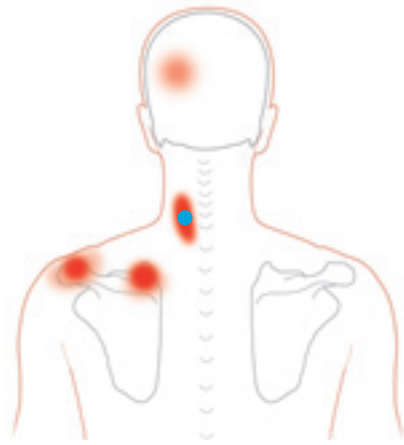
Acting together: extend head and neck.
Individually: laterally flexes neck. Rotates face to same side as contracting muscle.

NERVE

Dorsal rami of middle and lower cervical nerves.

BASIC FUNCTIONAL MOVEMENT

Examples: looking up; turning head to look behind.



Splenius cervicis

REFERRED PAIN PATTERNS

Splenius capitis: 3–5 cm zone of pain in center of vertex of skull.
Splenius cervicis: (a) upper: occipital diffuse pain, radiating via temporal region toward ipsilateral eye; (b) lower: ipsilateral pain in nape of neck.

OVERVIEW

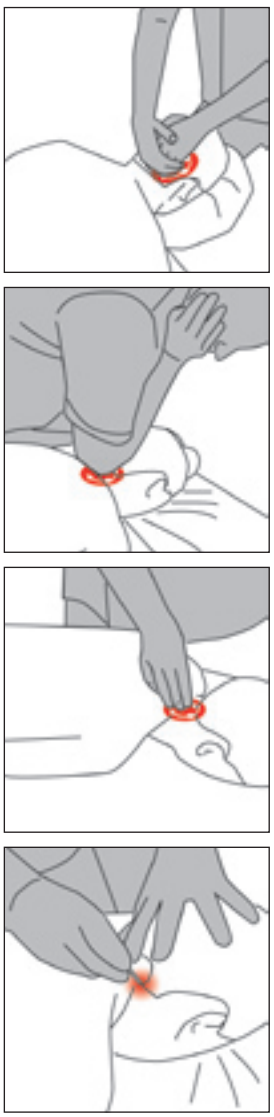
INDICATIONS
Headache, neck pain, eye pain, blurred vision (rare), whiplash, pain from draught, postural neck pain (occupational), "internal" skull pain, neck stiffness, decreased ipsilateral rotation.

CAUSES
Poor posture, playing musical instruments, lying on front with head propped up, poor glasses, upper crossed pattern, kyphosis, scoliosis, wear and tear, cold drafts/ air conditioning, vertebral alignment issues, certain sports (e.g. archery), tight shirt/tie, depression.

DIFFERENTIAL DIAGNOSIS
Other types of headache. 1st rib dysfunction. Torticollis. Optical problems (eyestrain). Neurological. Stress.

CONNECTIONS
Trapezius, SCM, masseter, temporalis, multifidus, semispinalis capitis, suboccipital muscles, occipitofrontalis, levator scapulae, pectoralis major.

PRACTITIONER HANDS ON TECHNIQUES

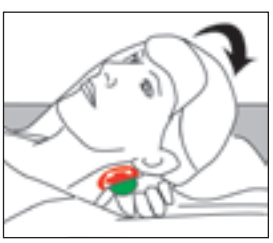


✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

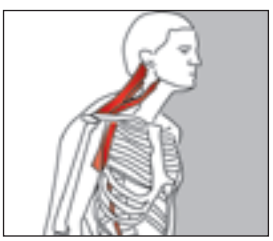
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

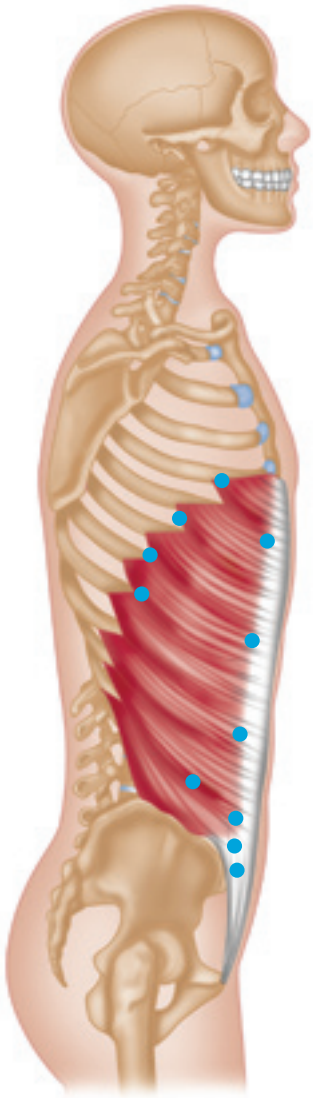
ADVICE
Avoid postural/maintaining factors, answering the telephone. Work posture. Self-stretch program. Glasses (type, try trifocals).

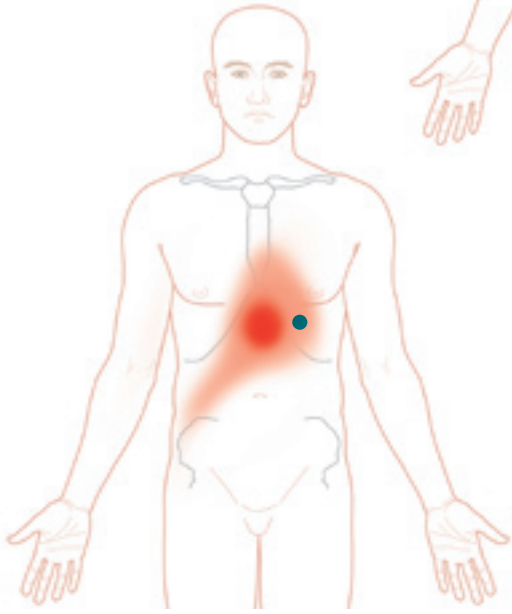


SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run down from skull, identifying and noting painful spots.
3. Run up in opposite direction toward skull.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits and then follow stroke to the end.

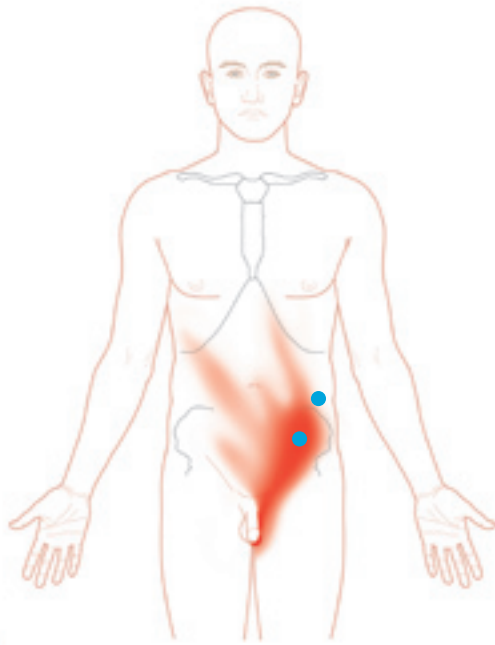


EXTERNAL OBLIQUE





Upper fibers



Lower fibers

Lateral view, upper and lower fibers

Latin *obliquus*, inclined, slanting; *externus*, external

The posterior fibers of the external oblique are usually overlapped by the latissimus dorsi, but in some cases there is a space between the two, known as the *lumbar triangle*, situated just above the iliac crest. The lumbar triangle is a weak point in the abdominal wall.

ORIGIN

Lower eight ribs.

INSERTION

Anterior half of iliac crest, and into an abdominal aponeurosis that terminates in the linea alba (a tendinous band extending downward from the sternum).

ACTION

Compresses abdomen, helping to support abdominal viscera against pull of gravity. Contraction of one side alone bends trunk laterally to that side and rotates it to opposite side.

NERVE

Ventral rami of thoracic nerves, T5–T12.

BASIC FUNCTIONAL MOVEMENT

Example: digging with a shovel.

REFERRED PAIN PATTERNS

Viscerosomatic.
Costal margin: abdominal pain to chest.
Lower lateral: testicular pain. Local pain.
Pubic rim: bladder pain. Frequency/retention (urine). Groin.

OVERVIEW

INDICATIONS
Abdominal pain and tenderness, groin pain, testicular pain, bladder pain, nausea, colic, dysmenorrhea, diarrhea, viscerosomatic pain, irritable bowel syndrome, lower crossed pattern, bedwetting in children.

CAUSES
Direct trauma (commonly from overexertion during sports), poor sit-up technique, prolonged cross-legged sitting, coughing, emotional stress, may be related to back pain, post-surgical (abdominal).

DIFFERENTIAL DIAGNOSIS
Visceral pathology including: renal, hepatic, pancreatic, diverticular disease, colitis, appendicitis, hiatus hernia, peritoneal disease—pelvic inflammatory disease, ovarian, bladder.

CONNECTIONS
Transversus abdominis, internal oblique, rectus abdominis, pyramidalis.

PRACTITIONER HANDS ON TECHNIQUES

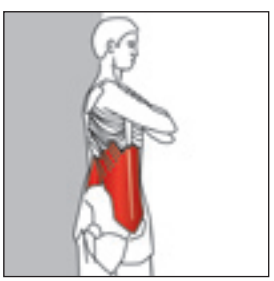
✓		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

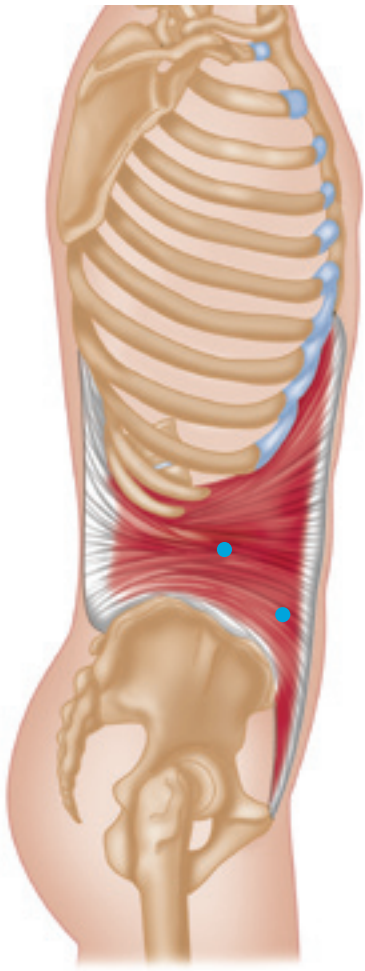
SELF HELP

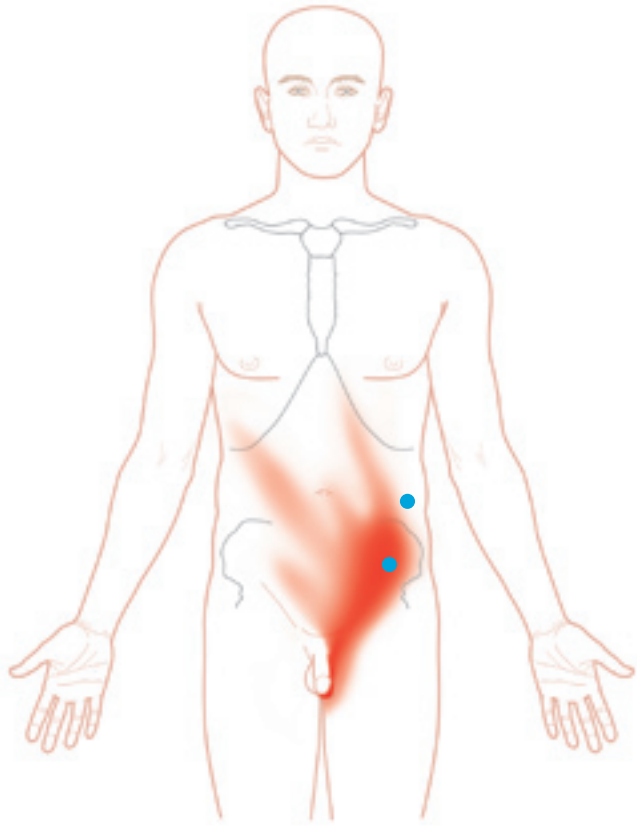
ADVICE
Occupational. Sports. Diet. Breathing. Pelvic floor and core stability exercises.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run downward from rib cage, identifying and noting painful spots and knots.
3. Work using thumbs, with small scooping movements.
4. Pause on painful knots until pain remits and then follow stroke to the end.



TRANSVERSUS ABDOMINIS





Lateral abdominals

Latin *transversus*, across, crosswise; *abdominis*, of the belly/stomach

ORIGIN
Anterior two-thirds of iliac crest. Lateral third of inguinal ligament. Thoracolumbar fascia. Costal cartilages of lower six ribs. Fascia covering iliopsoas.

INSERTION
Xiphoid process and linea alba via an abdominal aponeurosis, the lower fibers of which ultimately attach to the pubic crest and pecten pubis via the conjoint tendon.

ACTION
Compresses abdomen, helping to support abdominal viscera against pull of gravity.

NERVE
Ventral rami of thoracic nerves, T7–T12, ilioinguinal and iliohypogastric nerves.

BASIC FUNCTIONAL MOVEMENT
Important during forced expiration, sneezing, and coughing. Helps maintain good posture.

REFERRED PAIN PATTERNS
Costal margin: local quadrant pain, often radiating into anterior abdomen.
Suprapubic: local pain, often radiating medially and inferiorly to testes.

OVERVIEW

INDICATIONS
Groin pain, testicular pain, heartburn, nausea, vomiting, bloating, diarrhea, discogenic pain from the lumbar spine, lower crossed pattern, bedwetting in children.

CAUSES
Direct trauma (commonly from overexertion during sports), poor sit-up technique, prolonged cross-legged sitting, coughing, emotional stress, may be related to back pain, post-surgical (abdominal).

DIFFERENTIAL DIAGNOSIS
Visceral pathology including: renal, hepatic, pancreatic, diverticular disease, colitis, appendicitis, hiatus hernia, peritoneal disease—pelvic inflammatory disease, ovarian, bladder, testicular pathology, e.g. varicocele, nonspecific urethritis.

CONNECTIONS
External oblique, internal oblique, rectus abdominis, pyramidalis.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

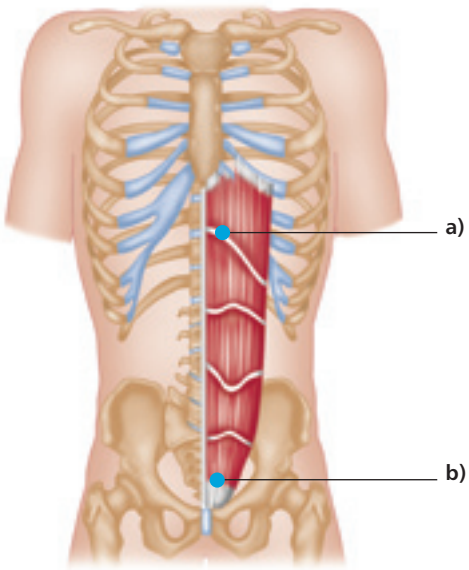
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

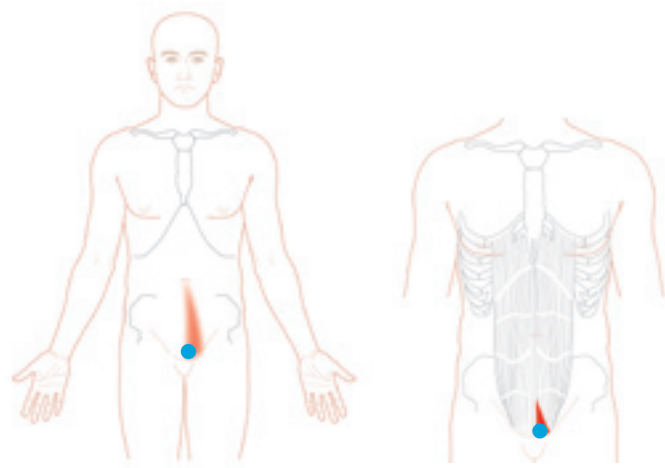
SELF HELP

ADVICE
Self-stretch and strengthen to stabilize lumbar spine and support vascular activities. Posture and tone.

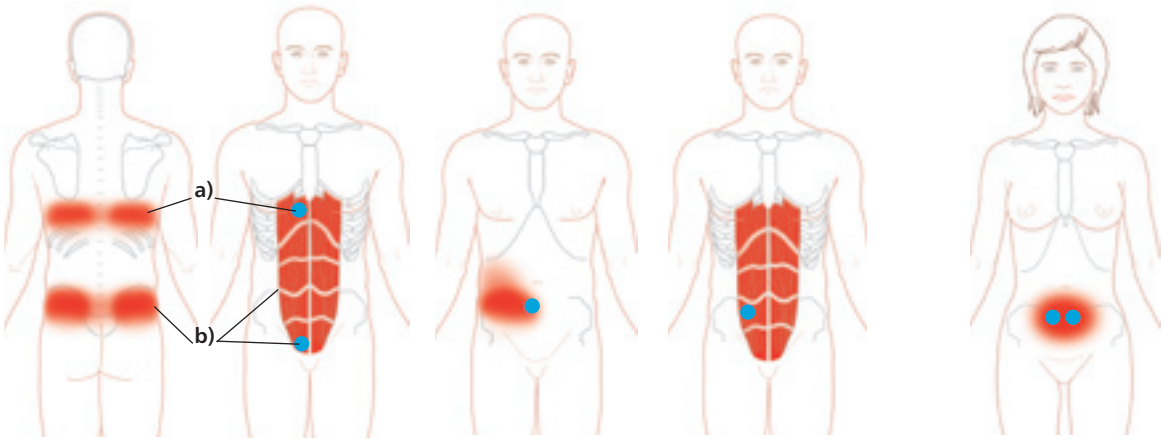
SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run downward from rib cage, identifying and noting painful spots and knots.
3. Work using thumbs, with small scooping movements.
4. Pause on painful knots until pain remits and then follow stroke to the end.

RECTUS ABDOMINIS

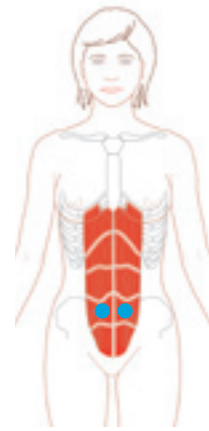




Pyramidalis



McBurney's point



Points for dysmenorrhoea

Latin *rectus*, straight; *abdominis*, of the belly/stomach

The rectus abdominis is divided by tendinous bands into three or four bellies, each sheathed in aponeurotic fibers from the lateral abdominal muscles. These fibers converge centrally to form the linea alba. Situated anterior to the lower part of the rectus abdominis is a frequently absent muscle called the *pyramidalis*, which arises from the pubic crest and inserts into the linea alba. It tenses the linea alba, for reasons unknown.

ORIGIN
Pubic crest and symphysis pubis (front of pubic bone).

INSERTION
Anterior surface of xiphoid process. 5th, 6th, and 7th costal cartilages.

ACTION
Flexes lumbar spine. Depresses rib cage. Stabilizes pelvis during walking.
Antagonist: erector spinae.

NERVE
Ventral rami of thoracic nerves, T5–T12.

BASIC FUNCTIONAL MOVEMENT
Example: initiating getting out of a low chair.

REFERRED PAIN PATTERNS
Upper fibers: horizontal mid-back pain; heartburn and indigestion.
Lower fibers: pain between pubis and umbilicus, causing dysmenorrhea.
Lateral fibers: pseudoappendicitis; McBurney's point.

OVERVIEW

INDICATIONS
Heartburn, colic, dysmenorrhea, nausea, vomiting, sense of being full, horizontal back pain, lower crossed pattern, rib pain, testicular pain, diaphragm and breathing issues.

CAUSES
Direct trauma, postural, visceroptosis (commonly from overexertion during sports), poor sit-up technique, prolonged cross-legged sitting, coughing, emotional stress, may be related to back pain, post-surgical (abdominal).

DIFFERENTIAL DIAGNOSIS
Visceral pathology including: renal, hepatic, pancreatic, diverticular disease, colitis, appendicitis, hiatus hernia, peritoneal disease—pelvic inflammatory disease, ovarian, bladder. Appendicitis. Gynecological disease. Umbilical/incisional—hernia. Latissimus dorsi.

CONNECTIONS
Transversus abdominis, internal oblique, external oblique, pyramidalis.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

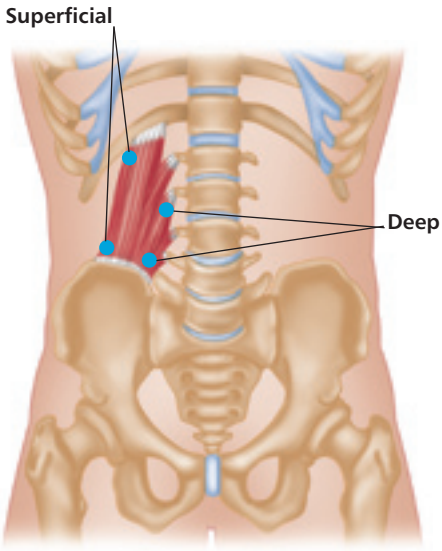
Isolytic (Eccentric) Contraction Technique
Indications: tight fibrotic muscles/chronic settings
1. Position the muscle at the restriction barrier.
2. Ask the patient to actively contract the muscle for 2–4 seconds at about 10–25%, while you resist.
3. Overcome this resistance, actively pushing against the muscle into eccentric contraction towards the physiological barrier for 15–30 seconds.
4. Repeat 3–5 times.

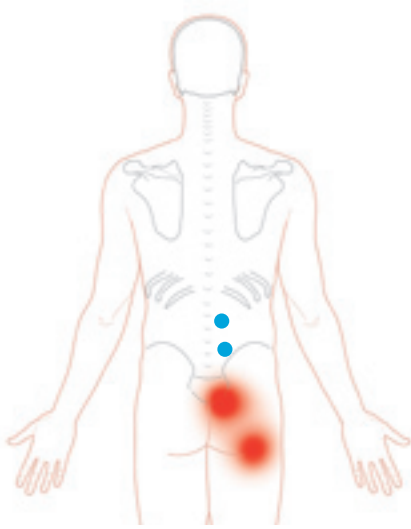
SELF HELP

ADVICE
Weight.

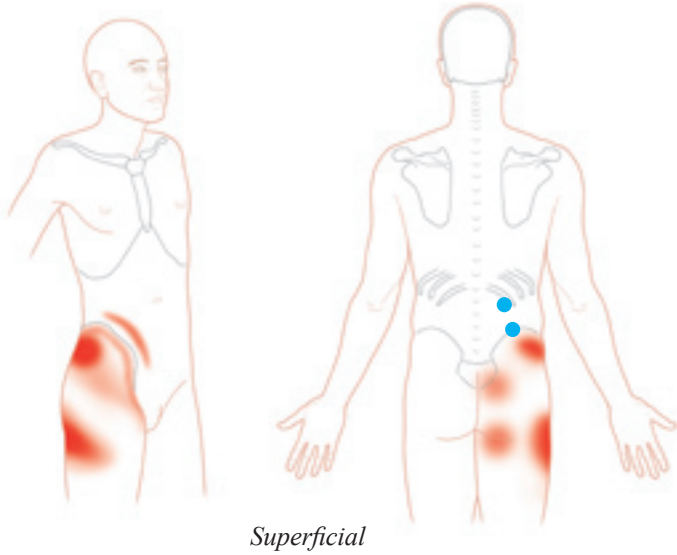
SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run downward from rib cage, identifying and noting painful spots and knots.
3. Work using thumbs, with small scooping movements.
4. Pause on painful knots until pain remits and then follow stroke to the end.

QUADRATUS LUMBORUM





Deep



Superficial

Latin *quadratus*, squared; *lumbus*, loin

ORIGIN
Posterior part of iliac crest. Iliolumbar ligament.

INSERTION
Medial part of lower border of 12th rib. Transverse processes of upper four lumbar vertebrae (L1–L4).

ACTION
Laterally flexes vertebral column. Fixes 12th rib during deep respiration (e.g. helps stabilize diaphragm for singers exercising voice control). Helps extend lumbar part of vertebral column, and gives it lateral stability.

NERVE
Ventral rami of the subcostal nerve and upper three or four lumbar nerves, T12, L**1**, **2**, **3**.

BASIC FUNCTIONAL MOVEMENT
Example: bending sideways from sitting to pick up an object from the floor.

REFERRED PAIN PATTERNS
Several "zones" of pain at: lower abdomen, sacroiliac joint (upper pole), lower buttock, upper hip, and greater trochanter.

OVERVIEW

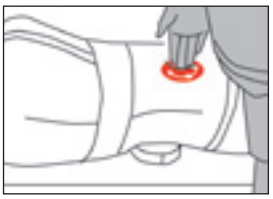
INDICATIONS
Renal tubular acidosis, discogenic list scoliosis, mechanical low back pain, walking stick/cast for fracture, hip and buttock pain, greater trochanteric pain (on sleep), pain turning in bed, pain standing upright, persistent deep lower backache at rest, pain on coughing and sneezing (Valsalva's maneuver), pain on sexual intercourse, patient presents with a functional list to one side, may be associated with acute low back pain and radiations into leg(s), post kidney stone treatment, sciatica.

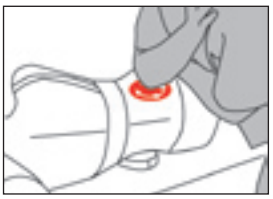
CAUSES
Disc problems in lower back, or facet or spinal joint issues (such as degeneration, sacroiliac joint issues, and spondylolisthesis or spondylolysis in lumbar spine), repetitive strain, gardening, putting on shoes/socks while standing, housework, occupational positions, soft mattress, trauma, weak abdominals, short leg on one side (PSLE).

DIFFERENTIAL DIAGNOSIS
Sacroiliitis. Bursitis of hip. Radiculopathy (lumbar). Disc pain (lumbar). Ligamentous pain (iliolumbar/lumbosacral). Spondylosis. Spondyloarthropathy. Stenosis (spinal). Spondylolisthesis. Rib dysfunction (lower).

CONNECTIONS
Gluteus medius/minimus/maximus, TFL, pyramidalis, iliopsoas, pelvic floor, sciatica, hernia, testicular/scrotal, transversus abdominis, external oblique, diaphragm.

PRACTITIONER HANDS ON TECHNIQUES





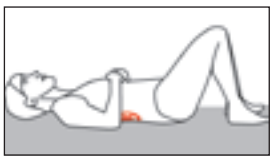
✓	✓	Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

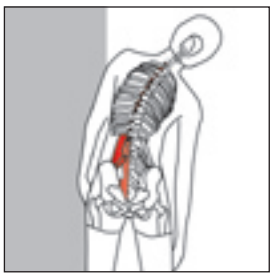
Isolytic (Eccentric) Contraction Technique
Indications: tight fibrotic muscles/chronic settings
1. Position the muscle at the restriction barrier.
2. Ask the patient to actively contract the muscle for 2–4 seconds at about 10–25%, while you resist.
3. Overcome this resistance, actively pushing against the muscle into eccentric contraction towards the physiological barrier for 15–30 seconds.
4. Repeat 3–5 times.

SELF HELP

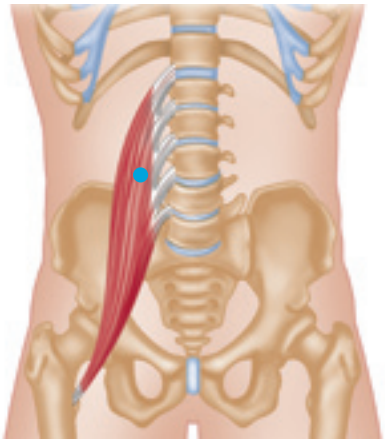
ADVICE
Correct any leg length discrepancy. Change mattress. Occupational advice (mechanical). Hobbies (gardening). Strengthen abdominal (core) stability. Avoid leaning on one leg. Take care when twisting. Emotional component.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Sitting or side lying.
3. Run downward from rib cage, identifying and noting painful spots and knots.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits and then follow stroke to the end.

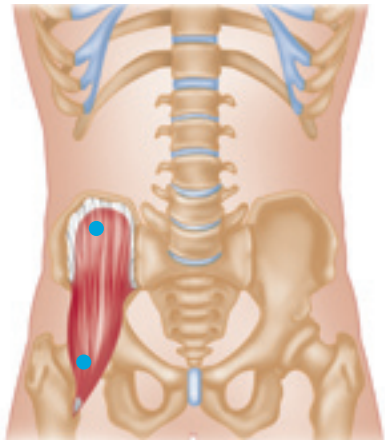




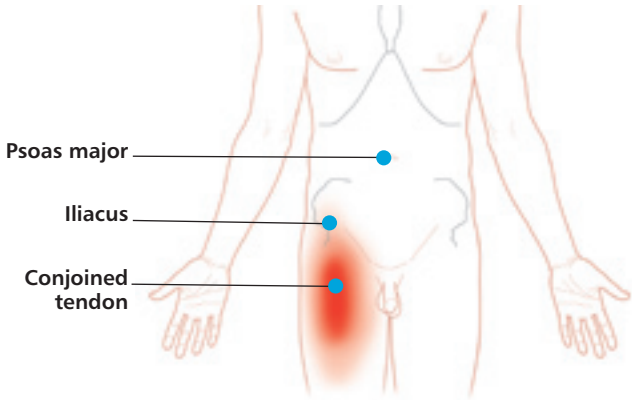
ILIOPSOAS (PSOAS MAJOR/ILIACUS)



Psoas major



Iliacus



Posterior referred pain distribution

Greek *psoa*, loin muscle; Latin *major*, larger; *ilia*, the flanks

The psoas major and iliacus are considered part of the posterior abdominal wall because of their position and cushioning role for the abdominal viscera. However, based on their action of flexing the hip joint, it would also be relevant to place them with the hip muscles. Note that some upper fibers of the psoas major may insert by a long tendon into the iliopubic eminence to form the psoas minor, which has little function and is absent in about 40% of people. Bilateral contracture of this muscle will increase lumbar lordosis.

ORIGIN

Psoas major: bases of transverse processes of all lumbar vertebrae, (L1–L5). Bodies of 12th thoracic and all lumbar vertebrae, (T12–L5). Intervertebral discs above each lumbar vertebra.
Iliacus: superior two-thirds of iliac fossa. Internal lip of iliac crest. Ala of sacrum and anterior ligaments of lumbosacral and sacroiliac joints.

INSERTION

Psoas major: lesser trochanter of femur.
Iliacus: lateral side of tendon of psoas major, continuing into lesser trochanter of femur.

ACTION

Main flexor of hip joint (flexes and laterally rotates thigh, as in kicking a football). Acting from its insertion, flexes trunk, as in sitting up from the supine position.
Antagonist: gluteus maximus.

NERVE

Psoas major: ventral rami of lumbar nerves, L**1**, **2**, **3**, **4** (psoas minor innervated from L**1**, **2**).
Iliacus: femoral nerve, L**1**, **2**, **3**, **4**.

BASIC FUNCTIONAL MOVEMENT

Examples: going up a step; walking up an incline.

REFERRED PAIN PATTERNS

(a) Strong vertical ipsilateral paraspinal pain along lumbar spine, diffusely radiating laterally 3–7 cm; (b) Strong zone of pain 5–8 cm top of anterior thigh, within diffuse zone from anterior superior iliac spine (ASIS) to upper half of thigh.

OVERVIEW

INDICATIONS
Low back pain, groin pain, increased (hyper) lordosis of lumbar spine, anterior thigh pain, pain prominent in lying to sitting up, scoliosis, asymmetry (pelvic).

CAUSES
Pregnancy (abortion), emotional overload, large lordosis, disc problems in lower back, or facet or spinal joint issues (such as degeneration, sacroiliac joint issues, and spondylolisthesis or spondylolysis in lumbar spine), running, repetitive strain, gardening, putting on shoes/socks while standing, housework, occupational positions, soft mattress, trauma, weak abdominals, abdominal surgery, sexual activity, short leg on one side (PSLE).

DIFFERENTIAL DIAGNOSIS
Osteoarthritis of hip. Appendicitis. Femoral neuropathy. Meralgia paresthetica. L4–5 disc. Bursitis. Quadriceps injury. Mechanical back dysfunction. Hernia (inguinal/femoral). Gastrointestinal. Rheumatoid arthritis. Space-occupying lesions.

CONNECTIONS
Quadratus lumborum, multifidus, erector spinae, quadriceps, hip rotators, pectineus, TFL, adductors (longus/brevis), femoropatellar joint, diaphragm, rectus abdominis, obliques, pyramidalis.

PRACTITIONER HANDS ON TECHNIQUES

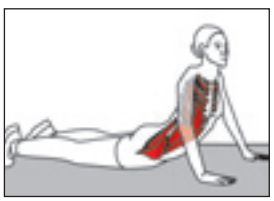
☐ ☐	Spray and stretch
✓ ☐	Dry needling
✓ ☐	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ☐	Wet needling

Positional Release Technique
1. Position knee in flexion
2. Locate trigger point in psoas
3. Ask patient to slide foot down slowly while you maintain steady pressure on trigger point
4. Pause as barrier meets your fingers
5. Repeat until knee is flat

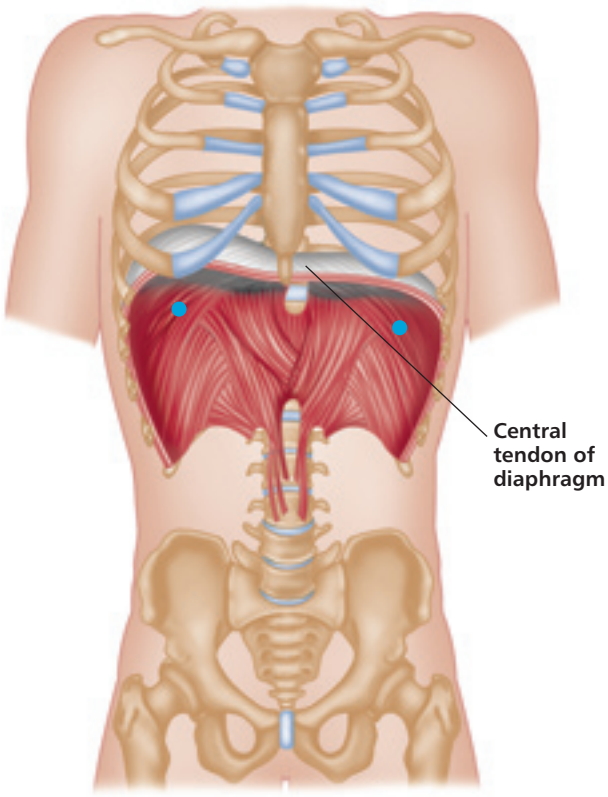
SELF HELP

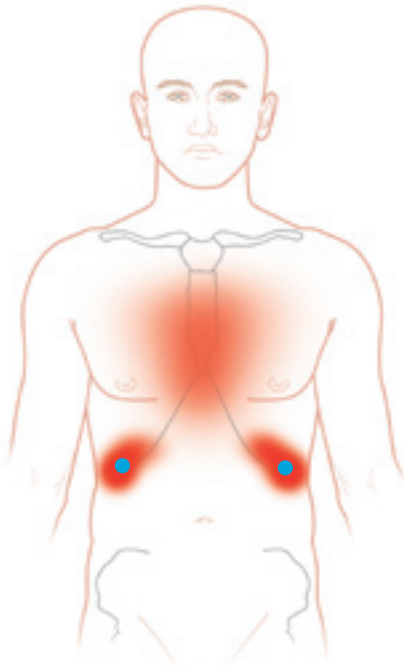
ADVICE
Avoid prolonged sitting. Avoid sleeping in fetal position. Treat low back. Avoid overuse in sit-ups. Strengthen transversus abdominis. Stretching exercises.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Lie on back with knees bent and resting on a pillow.
3. Run downward four fingers to side of belly button, deep into stomach toward spine.
4. Identify and note painful spots and knots (check by lifting up knee toward chest).
5. Pause on painful knots until pain remits, then follow stroke to the end, let knee down, and stretch.



DIAPHRAGM





Greek *dia*, across; *phragma*, partition, wall

ORIGIN
Back of xiphoid process (lower tip of sternum). Lower six ribs and their costal cartilages. Upper two or three lumbar vertebrae (L1–L3).

INSERTION
All fibers converge and attach onto a central tendon, i.e. this muscle inserts upon itself.

ACTION
Forms floor of thoracic cavity. Pulls its central tendon downward during inhalation, thereby increasing volume of thoracic cavity.

NERVE
Phrenic nerve (ventral rami), C3, **4**, 5.

BASIC FUNCTIONAL MOVEMENT
Produces about 60% of the breathing capacity.

OVERVIEW

INDICATIONS
"Stitch" pain on running, heart/lung issues, anxiety and hyperventilation syndrome, asthma, chronic obstructive pulmonary disease (COPD).

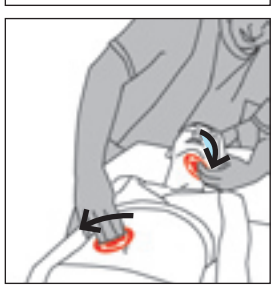
CAUSES
Asthma, pregnancy (abortion), emotional overload, disc problems in the lower back, running, occupational positions, trauma, weak abdominals, abdominal surgery, anxiety and hyperventilation syndrome, smoking, slumped postures.

CONNECTIONS
Serratus anterior, intercostals, upper part rectus abdominis, arcuate ligaments, obliques.

SELF HELP

SELF-HELP TECHNIQUE

1. Stand and lean slightly forward (slumped posture).
2. Reach under lower ribs.
3. Dig under ribs.
4. Perform deep stroking massage from front to sides—can be painful.
5. Try it again with breathing out.
6. Stretch out diaphragm.



DIAPHRAGM AND BREATHING

Nothing in the body happens in isolation, and an exploration of breathing mechanics exemplifies this. Breathing involves many sequences of coordinated muscular and visceral co-contractions. Trigger points can often be palpated along the anterior inferior costochondral margin. These trigger points should be contextualized with other relationships such as:

- Submandibular inferior margin (often on the opposite side to the diaphragm trigger points)
- Abdominal visceral fascia (greater and lesser omenta)
- Spinal muscles (especially mid lumbar)
- Abdominal muscles (especially transversus and rectus abdominis)
- Pelvic floor muscles (pelvic diaphragm)
- Thoracic spine and rib mobility
- Intercostal muscles
- Serratus musculature
- 1st rib mechanics
- Scalenes, levator scapulae, and upper trapezius

Breathing patterns are often aberrant; hyperventilation syndrome, panic attacks, and postural habit are increasingly diagnosed. If untreated, these syndromes also have ongoing physiological consequences, such as respiratory alkalosis (too much carbon dioxide is exhaled by overbreathing). Paradoxically, this situation is one of the key factors in the development of chronic myofascial trigger points throughout the body. It may be interesting to note here that cranial osteopaths talk about eight diaphragms which all coordinate together in breathing: the diaphragma sellae, under the pituitary gland; the submandibular myofascial raphe, bilaterally; the thoracic inlet/outlet, bilaterally; the abdominal diaphragm; and the pelvic floor, bilaterally.

ABERRANT BREATHING AND TRIGGER POINT FORMATION

Garland (1994) suggested a sequence of musculoskeletal changes that may develop over time as a result of chronic upper chest respiration:

- Restriction in thoracic spine mobility (secondary to aberrant rib mechanics)
- Trigger point formation in scalenes group, upper trapezius, and levator scapulae
- Tight and stiff cervical spine
- Changes in tone of abdominal diaphragm and transversus abdominis (Hodges et al. 2001; McGill et al. 1995)
- Imbalance between weakened abdominal muscles and hypertonic erector spinae
- Pelvic floor weakness

Trigger point therapy can be a useful tool in releasing the musculoskeletal component of respiratory dysfunction and is especially useful when combined with other modalities, such as yoga, Feldenkrais, meditation, the Buteyko method and "breath therapy."

PRACTITIONER HANDS ON TECHNIQUES

☐ ☐	Spray and stretch
☐ ☐	Dry needling
✓ ☐	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
☐ ☐	Wet needling

Diaphragm and Mandibular Raphe Balanced Release Technique

1. Position knees in flexion and place pillow or block underneath
2. Locate trigger point along bottom of rib cage, start centrally
3. Locate trigger point in opposite ramus of jaw, start centrally
4. Ask patient to breath deeply while you maintain steady pressure on trigger points until you feel a relaxation
5. Pause as barrier meets your fingers, then move laterally to next point
6. Repeat on opposite side

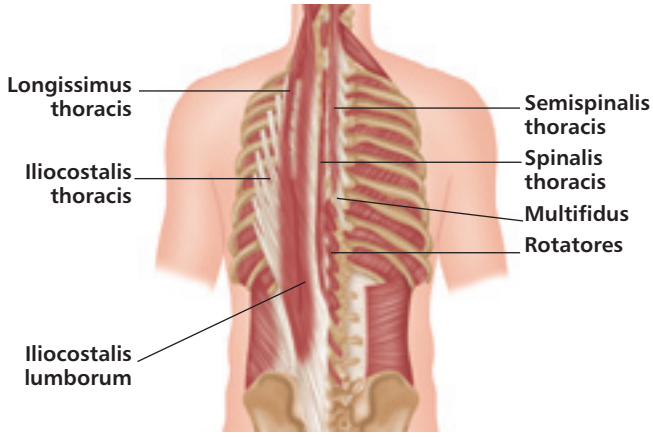
LOW BACK PAIN

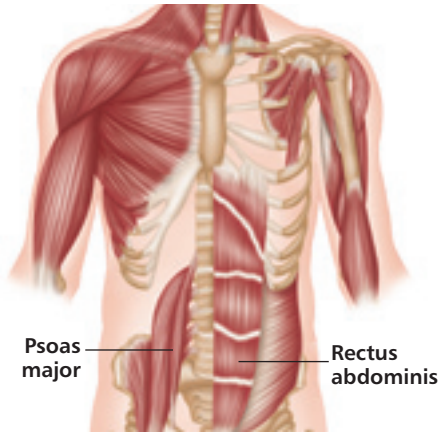
Indications

Low back pain is ubiquitous, affecting seven out of ten people at one time in their life, and costs the US economy more than $50bn every year in lost productivity and healthcare. Furthermore, it can be acute or chronic (over four months' duration), and symptoms may vary in duration, region, and intensity.

Trigger point release can be an extremely effective component in the treatment and management of acute and chronic low back pain. I humbly offer a simple trigger point formula that works for me time after time. In combination with this soft tissue release, I have found the following very helpful: vertebral adjustments, somatic emotional release, and a thorough analysis of gait, posture (including working posture), and sporting activity (or lack of it).

STEP 1 Study the anatomy and direction of the muscle fibers.





STEP 2 Prone ICT to: Gluteus medius (STP)

STEP 3 Massage (cross fiber) low back region generously.

STEP 4 Prone ICT to: Multifidus Lumbar erector spinae

STEP 5 Massage spinal muscles.

STEP 6 Supine ICT to: Anterior ramus of diaphragm (costochondral margin) Rectus abdominis (outside edge)

STEP 7 Repeat all these steps 3 times.

9 Muscles of the Shoulder and Upper Arm

Regional Trigger Points for Shoulder and Upper Arm Pain

MUSCLE	PAGE REFERENCE
Biceps brachii	148
Deltoideus	136
Infraspinatus	140
Latissimus dorsi	134
Levator scapulae	126
Pectoralis major	132
Scalenes	92
Subscapularis	144
Supraspinatus	138
Teres major	146
Teres minor	142
Trapezius	124
Triceps brachii	150

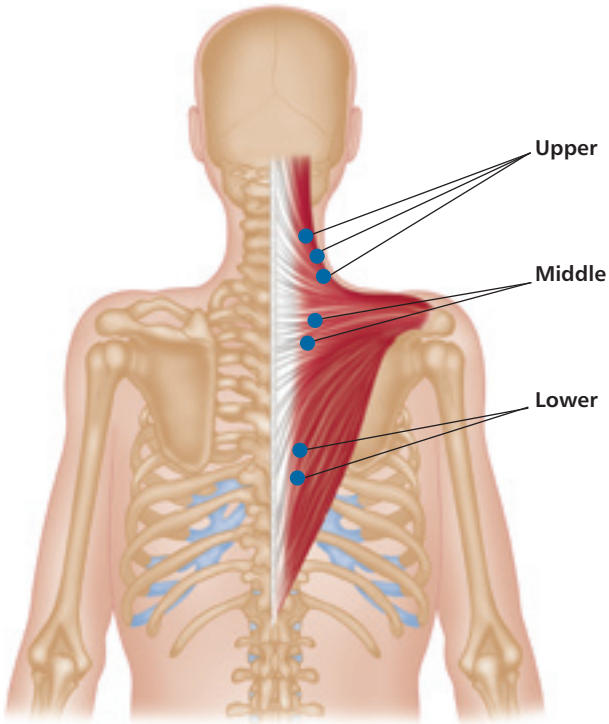
(Front of) shoulder pain
Anterior deltoid
Supraspinatus
Infraspinatus
Pectoralis major
Biceps brachii
Long head of triceps brachii
Latissimus dorsi
Scalenes

(Back of) shoulder pain
Teres minor
Supraspinatus
Teres major
Posterior deltoid
Levator scapulae
Subscapularis
Latissimus dorsi
Triceps brachii
Trapezius

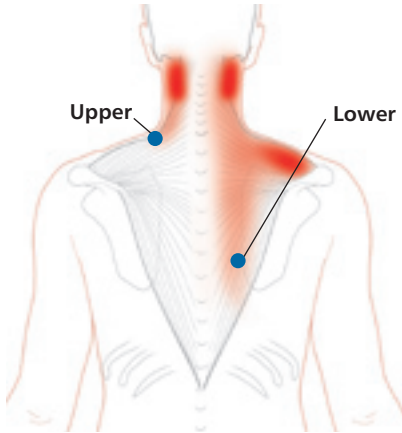
(Front of) arm pain
Scalenes
Infraspinatus
Supraspinatus
Biceps brachii
Triceps brachii
Brachialis
Anterior deltoid

(Back of) arm pain
Scalenes
Subscapularis
Supraspinatus
Biceps brachii
Triceps brachii
Posterior deltoid
Latissimus dorsi
Teres minor
Teres major

TRAPEZIUS



Upper



Middle

Greek *trapezoeides*, table shaped

The left and right trapezius viewed as a whole create a trapezium in shape, thus giving this muscle its name.

ORIGIN

Medial third of superior nuchal line of occipital bone. External occipital protuberance. Ligamentum nuchae. Spinous processes and supraspinous ligaments of 7th cervical vertebra (C7) and all thoracic vertebrae (T1–T12).

INSERTION

Posterior border of lateral third of clavicle. Medial border of acromion. Upper border of crest of spine of scapula, and tubercle on this crest.

ACTION

Upper fibers: pull shoulder girdle up (elevation). Helps prevent depression of shoulder girdle when a weight is carried on shoulder or in hand.
Middle fibers: retract (adduct) scapula.
Lower fibers: depress scapula, particularly against resistance, as when using hands to get up from a chair.
Upper and lower fibers together: rotate scapula, as in elevating arm above head.
Antagonist: serratus anterior.

NERVE

Motor supply: accessory **X1** nerve.
Sensory supply (proprioception): ventral ramus of cervical nerves, C2, **3**, **4**.

BASIC FUNCTIONAL MOVEMENT

Example (upper and lower fibers working together): painting a ceiling.

REFERRED PAIN PATTERNS

Upper fibers: pain and tenderness, posterior and lateral aspect of upper neck. Temporal region and angle of jaw.
Middle fibers: local pain, radiating medially to spine.
Lower fibers: posterior cervical spine, mastoid area, area above spine of scapula.

OVERVIEW

INDICATIONS
Chronic tension and neck ache, stress headache, cervical spine pain, whiplash, tension/cluster headache, facial/jaw pain, neck pain and stiffness, upper shoulder pain, mid-back pain, dizziness, eye pain, emotional stress, depression.

CAUSES
Habitual postures, work, stress, neck problems, shoulder muscle weakness, telephone to ear, scoliosis, sports related (e.g. tennis, golf), playing musical instruments.

DIFFERENTIAL DIAGNOSIS
Capsular-ligamentous apparatus. Articular dysfunction (facet).

CONNECTIONS
SCM, masseter, temporalis, occipitalis, levator scapulae, semispinalis, iliocostalis, clavicular part of SCM, neck/jaw/shoulder joint muscles.

PRACTITIONER HANDS ON TECHNIQUES

✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

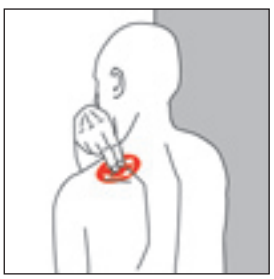
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

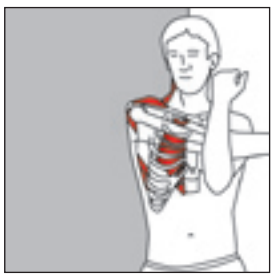
SELF HELP

Self-massage techniques can be helpful; you can use balls and pressure tools, such as TOLA. Stretching is excellent for disabling trigger points in trapezius.

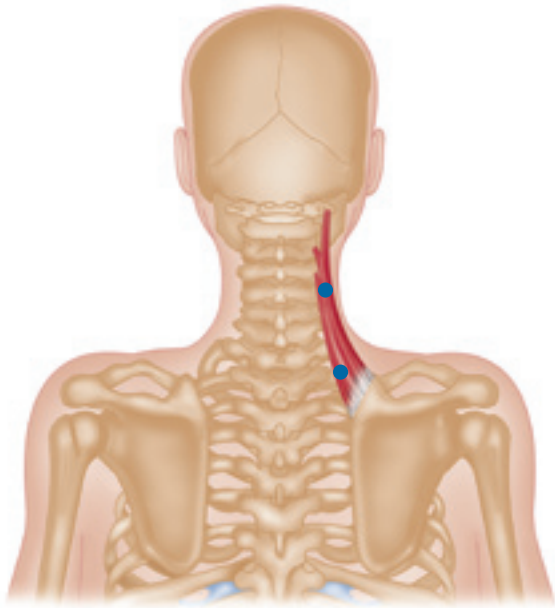
ADVICE
Posture standing and at work. Stress management. Bra straps. Pectoralis minor tension (round shoulders).

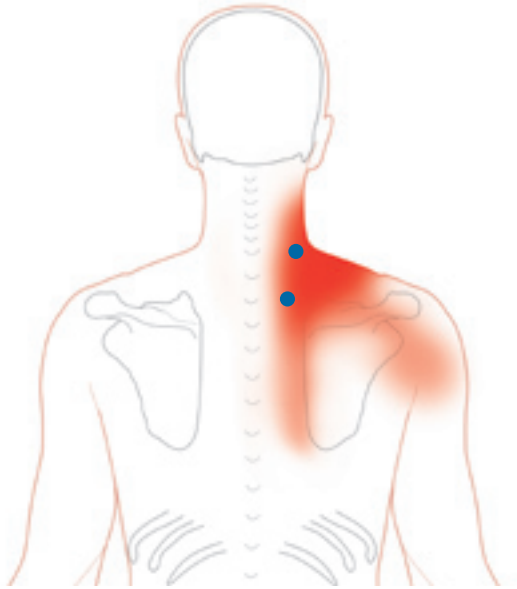
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Run downward from neck to shoulder until you hit trigger point.
4. Pause/pinch on trigger point until it softens.
5. Continue to end of muscle (insertion).





LEVATOR SCAPULAE





Latin *levare*, to lift; *scapulae*, shoulders, shoulder blades

The levator scapulae is deep to the SCM and the trapezius. It is named after its action of elevating the scapula.

ORIGIN
Posterior tubercles of transverse processes of first three or four cervical vertebrae (C1–C4).

INSERTION
Medial (vertebral) border of scapula between superior angle and spine of scapula.

ACTION
Elevates scapula. Helps retract scapula. Helps bend neck laterally.

NERVE
Dorsal scapular nerve, C**4**, **5**, and cervical nerves, C**3**, **4**.

BASIC FUNCTIONAL MOVEMENT
Example: carrying a heavy bag.

REFERRED PAIN PATTERNS
Triangular pattern from top of scapula to nape of neck. Slight overspill to medial border of scapula and posterior glenohumeral joint.

OVERVIEW

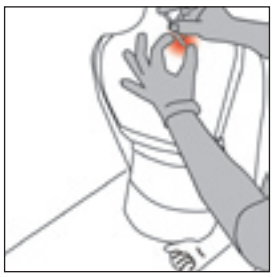
INDICATIONS
Stiff and painful neck with limited rotation of cervical spine, long-term use of walking stick, neck pain and stiffness, problems turning neck (e.g. driving).

CAUSES
RTA, holding telephone ear to shoulder, side sleeping with wrong pillows, backpacks, poor posture, sustained habits or occupation, TV/monitor position, stress and tension, cold/flu or cold sores, sports (swimming front crawl).

DIFFERENTIAL DIAGNOSIS
Scapulothoracic joint dysfunction; winging of scapula. Apophysitis and capsular-ligamentous apparatus. Shoulder impingement syndromes.

CONNECTIONS
Trapezius, rhomboids, splenius cervicis, erector spinae, scalenes, SCM.

PRACTITIONER HANDS ON TECHNIQUES



✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

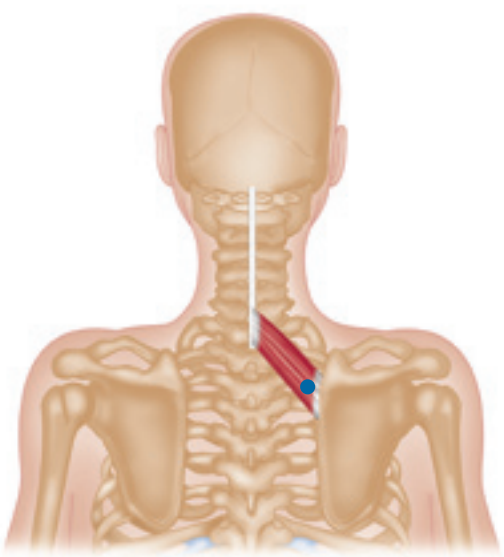
SELF HELP

Self-massage techniques can be very helpful; you can use balls and pressure tools.

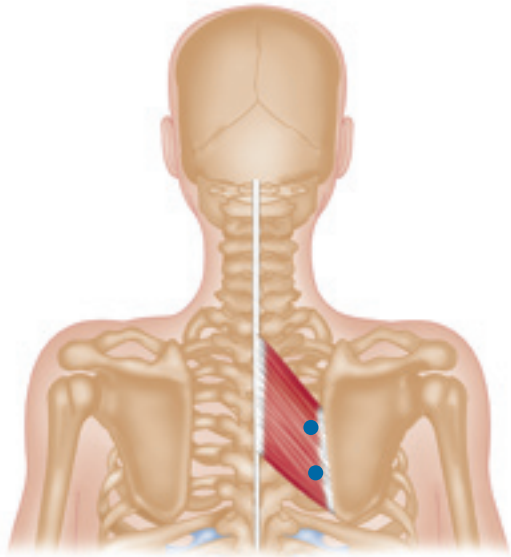
ADVICE
Hold telephone shoulder to ear. Stress. Occupation. Air conditioning. Passive stretching. Heat and warmth. Scarf. Change walking stick position.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. Massage area afterwards.

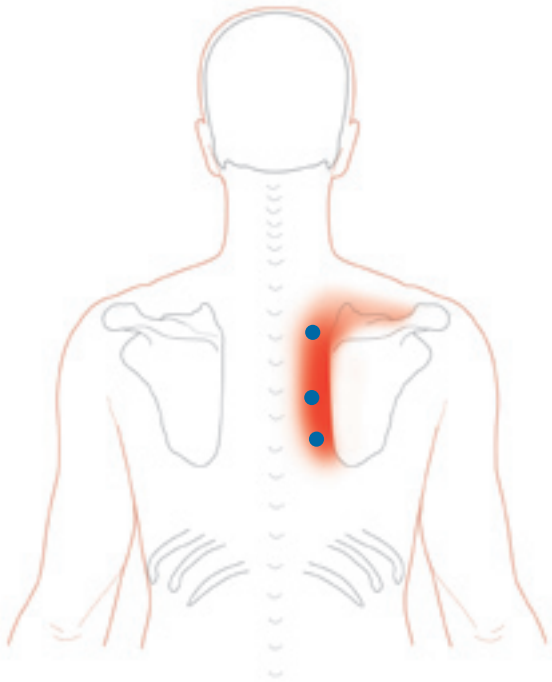
RHOMBOIDEUS (MINOR AND MAJOR)



Rhomboid minor



Rhomboid major



Greek *rhomboiedes*, parallelogram-shaped with oblique angles (and only the opposite sides equal); Latin *minor*, smaller; *major*, larger

So named because of its shape.

ORIGIN
Spinous processes of 7th cervical vertebra and upper five thoracic vertebrae (C7–T1).

INSERTION
Medial (vertebral) border of scapula.

ACTION
Retracts (adducts) scapula. Stabilizes scapula. Slightly assists in outer range of adduction of arm (i.e. from arm overhead to arm at shoulder level).
Antagonist: serratus anterior.

NERVE
Dorsal scapular nerve, C4, 5.

BASIC FUNCTIONAL MOVEMENT
Example: pulling something toward you, such as opening a drawer.

REFERRED PAIN PATTERNS
Medial border of scapula, wrapping around superior aspect of spine of scapula toward acromion process.

OVERVIEW

INDICATIONS
Localized pain/chronic aching (C7–T5) region—medial or periscapular, scapulothoracic joint grinding/grating/crunching, shoulder snapping/grating/clicking, aching across spinal border of shoulder blade, round shoulders, postural.

CAUSES
Chronic poor posture (round shouldered), shortened pectoralis minor, sports and overhead throwing, posture and habits.

DIFFERENTIAL DIAGNOSIS
Scapulocostal syndrome.
Fibromyalgia.

CONNECTIONS
Levator scapulae, middle trapezius, infraspinatus, scalenes, latissimus dorsi, serratus posterior inferior.

PRACTITIONER HANDS ON TECHNIQUES

✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓	Muscle energy
✓	Positional release
✓	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
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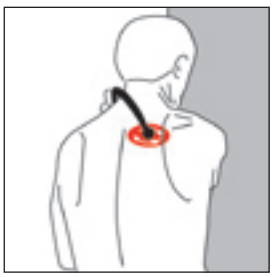
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

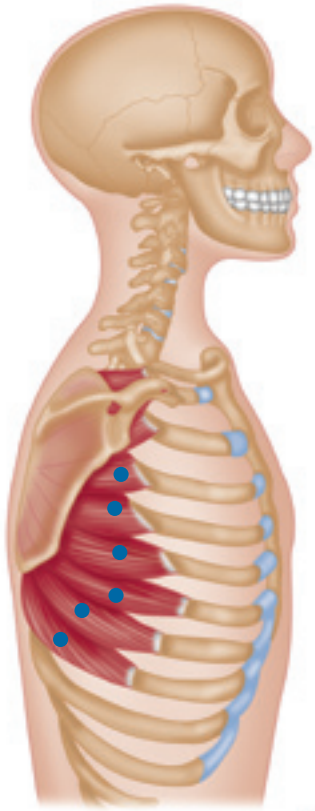
Self-massage techniques can be very helpful; you can use balls and pressure tools.

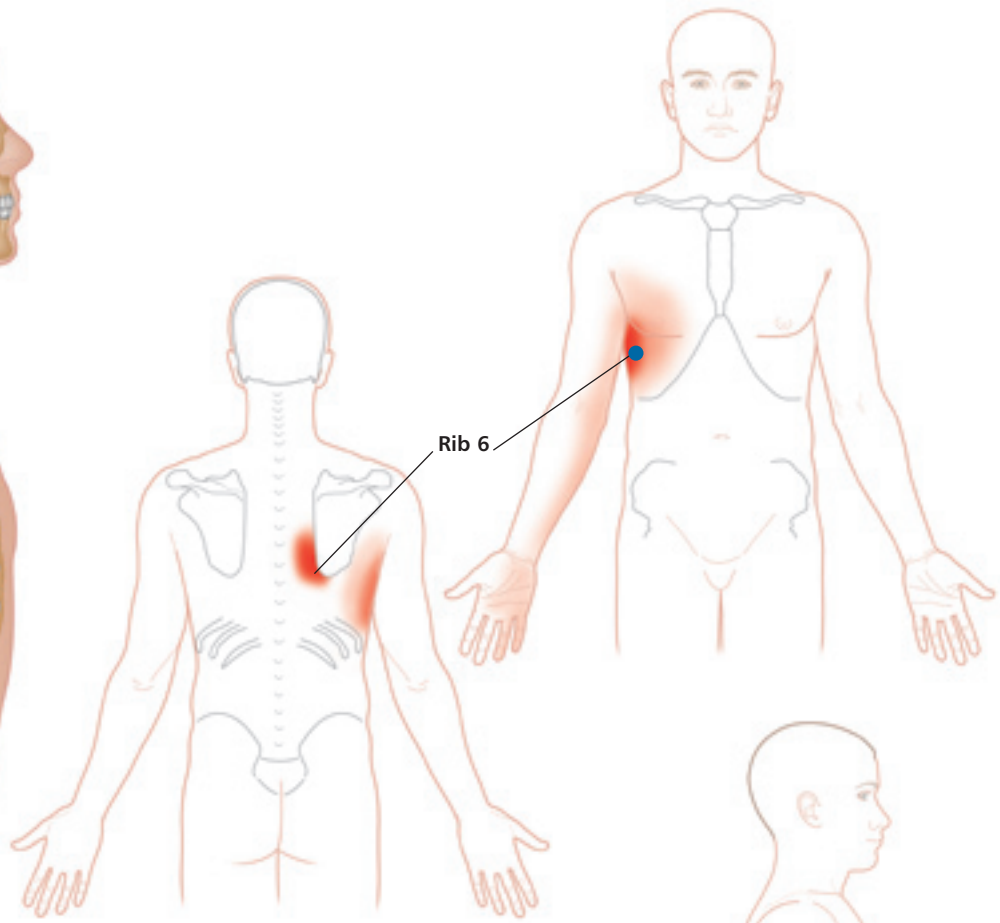
ADVICE
Posture. Tight pectorals. Round shoulders. Occupational posture.

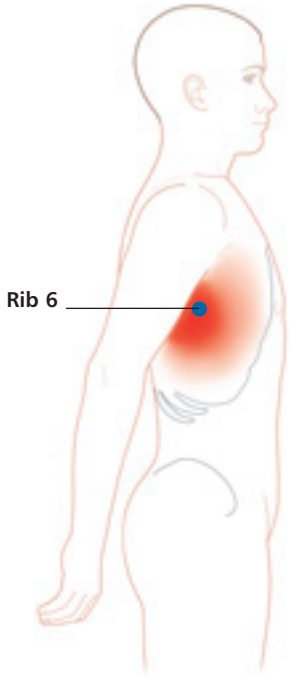
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. Massage area afterwards.



SERRATUS ANTERIOR







Latin *serratus*, serrated; *anterior*, before

The serratus anterior forms the medial wall of the axilla, along with the upper five ribs. It is a large muscle composed of a series of finger-like slips. The lower slips interdigitate with the origin of the external oblique.

ORIGIN

Outer surfaces and superior borders of upper eight or nine ribs, and fascia covering their intercostal spaces.

INSERTION

Anterior (costal) surface of medial border of scapula and inferior angle of scapula.

ACTION

Rotates scapula for abduction and flexion of arm. Protracts scapula (pulls it forward on chest wall and holds it closely to chest wall), facilitating pushing movements such as push-ups or punching.
Antagonists: rhomboids, trapezius.

NERVE

Long thoracic nerve, C**5**, **6**, **7**, **8**.

Note: A lesion of the long thoracic nerve will result in the medial border of the scapula falling away from the posterior chest wall, resulting in a "winged scapula" (resembling an angel's wing). A weak muscle will also produce a winged scapula, especially when holding a weight in front of the body.

BASIC FUNCTIONAL MOVEMENT

Example: reaching forward for something barely within reach.

REFERRED PAIN PATTERNS

Local: where each digitation attaches to rib.
Central: rib (6–8), localized pain, radiating anteriorly and posteriorly in a 5–10 cm patch. Pain inferior angle of scapula. Pain in ulnar aspect of upper extremity.

OVERVIEW

INDICATIONS
Chest pain which does not abate with rest, breast pain and sensitivity, panic attacks, dyspnea, chronic cough, asthma, renal tubular acidosis, scapula winging, chronic "stitch" on running, stress, "stitch" in the side of rib cage, pain on deep breathing, breast sensitivity, heart attack-type pain.

CAUSES
Severe coughing attack (maybe correlated with emphysema), overuse in sports (e.g. tennis, swimming, boxing, pull-ups and push-ups, weight lifting, gymnastics), prolonged lifting of large heavy objects, anxiety.

DIFFERENTIAL DIAGNOSIS
T7/T8 intercostal nerve entrapment. Herpes zoster. Local vertebral alignment. Rib lesions. Breast pathologies. Reflex-sympathetic dystrophy.

CONNECTIONS
Pectoralis major, SCM, scalenus medius, trapezius, rhomboids, diaphragm, external oblique.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
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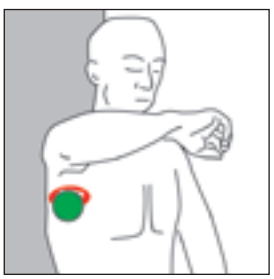
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

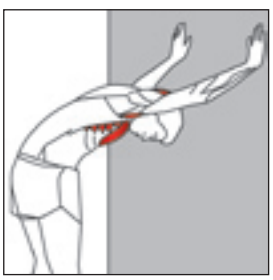
SELF HELP

Self-massage techniques can be very helpful; you can use balls and pressure tools, such as TOLA.

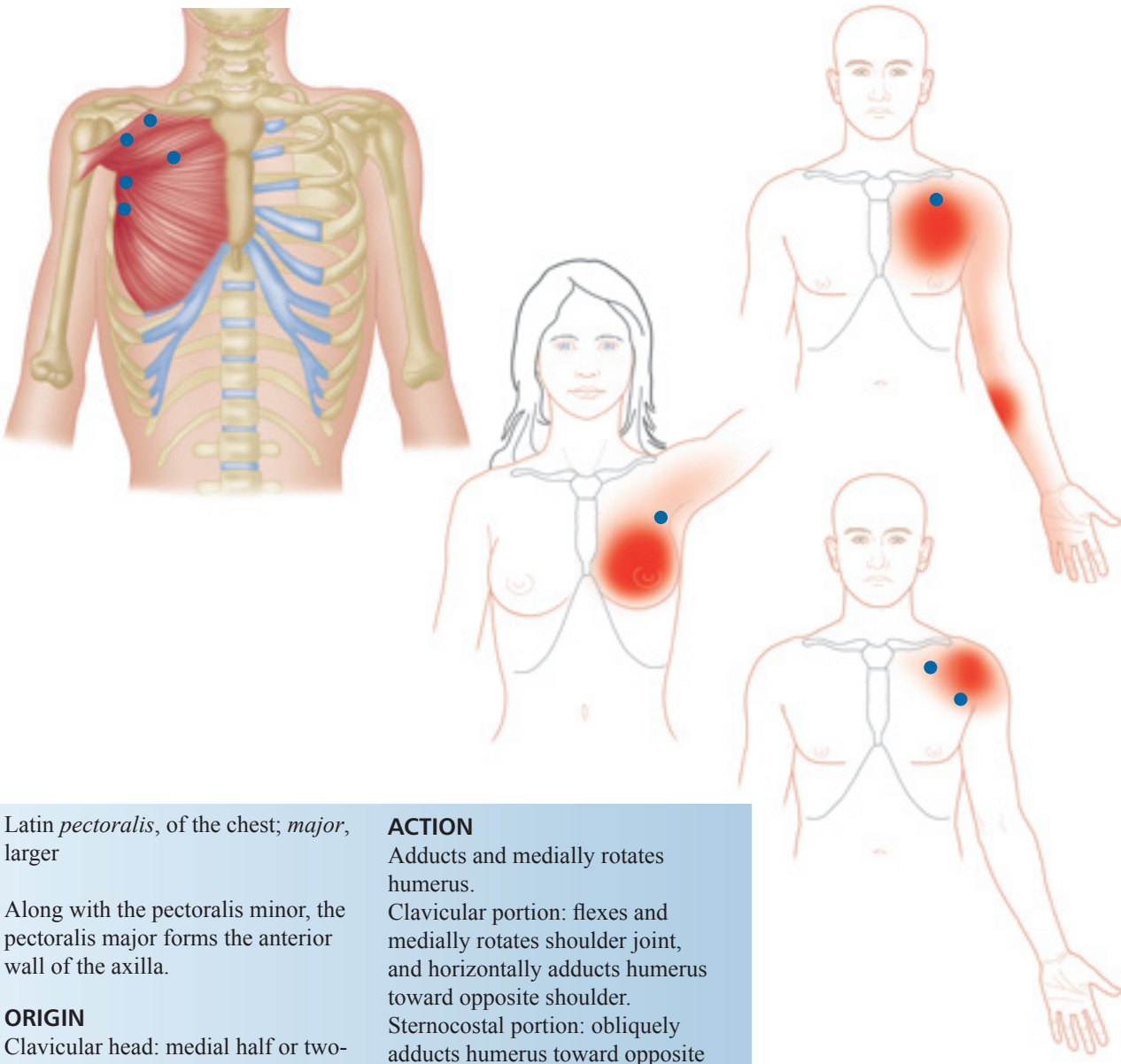
ADVICE
Avoid cars with heavy steering. Take care with weight training, especially push-ups and bench presses. Avoid stress. Try meditation/relaxation.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. Massage area afterwards.





PECTORALIS MAJOR



Latin *pectoralis*, of the chest; *major*, larger

Along with the pectoralis minor, the pectoralis major forms the anterior wall of the axilla.

ORIGIN

Clavicular head: medial half or two-thirds of front of clavicle.
Sternocostal portion: front of manubrium and body of sternum. Upper six costal cartilages. Rectus sheath.

INSERTION

Crest below greater tubercle of humerus. Lateral lip of intertubercular sulcus (bicipital groove) of humerus.

ACTION

Adducts and medially rotates humerus.
Clavicular portion: flexes and medially rotates shoulder joint, and horizontally adducts humerus toward opposite shoulder.
Sternocostal portion: obliquely adducts humerus toward opposite hip.
Pectoralis major is one of the main climbing muscles, pulling the body up to the fixed arm.

NERVE

Nerve to upper fibers: lateral pectoral nerve, C5, 6, 7.
Nerve to lower fibers: lateral and medial pectoral nerves, C6, 7, 8, T1.

BASIC FUNCTIONAL MOVEMENT

Clavicular portion: brings arm forward and across body, e.g. as in applying deodorant to opposite armpit.
Sternocostal portion: pulling something down from above, e.g. a rope in bell ringing.

REFERRED PAIN PATTERNS

Clavicular portion: local pain, radiating to anterior deltoid and long head of biceps brachii area.
Sternal portion: "acute" back pain into anterior chest wall in a 10–20 cm patch of diffuse pain around medial border of upper extremity. Stronger pain below medial epicondyle in a 5 cm patch, diffuse pain into 4th and 5th digits.
Costal portion: 5th and 6th ribs leads to severe cardiac referral (even at night). Intense breast pain (10–15 cm patch). Diffuse radiations into axillary tail, and into axilla.

OVERVIEW

INDICATIONS
Post myocardial infarct rehabilitation, cardiac arrhythmia, mid-scapular back pain, breast pain and hypersensitivity, thoracic outlet syndrome, anterior shoulder pain, golfer's and tennis elbow, round-shouldered postures, chest pain, chronic fatigue, hyperventilation syndrome.

CAUSES
Poor posture while sitting, round-shouldered postures, heavy lifting, chilling of muscle in air conditioning, immobilization of shoulder or arm in cast or sling, anxiety and poor breathing, sports overload (e.g. weight training, rowing, boxing, push-ups).

DIFFERENTIAL DIAGNOSIS
C5–C6 radiculopathy. Biceps tendonitis. Rotator cuff muscle lesions. Intrathoracic pathology. Esophageal pathology. Tietze's syndrome. Ischemic heart disease (angina). Thoracic outlet syndrome.

CONNECTIONS
Latissimus dorsi, subscapularis, teres minor, infraspinatus, trapezius (middle fibers), serratus anterior, scalenes, deltoid, coracobrachialis, sternalis, SCM, paraspinals.

PRACTITIONER HANDS ON TECHNIQUES

✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

(Inhibition) Compression Technique
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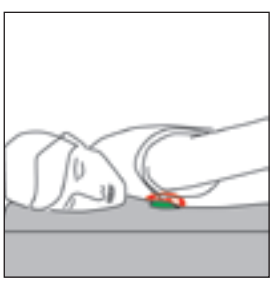
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

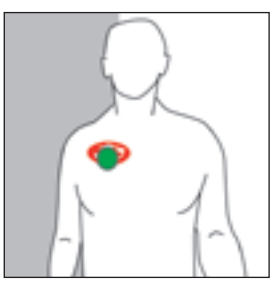
SELF HELP

Self-massage techniques can be very helpful; you can use balls and pressure tools.

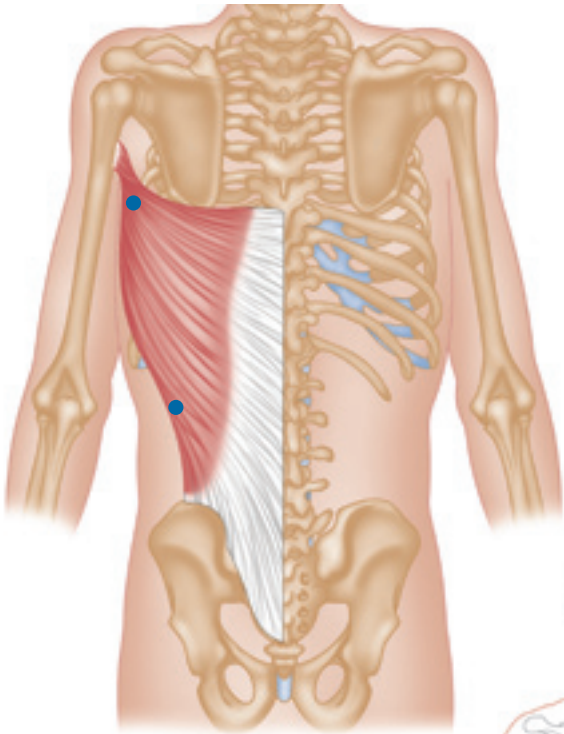
ADVICE
Round-shouldered posture leads to shortening. Work sitting posture is key. Sleeping posture, especially hands folded over chest or hands above head. Bra type and support may be relevant.

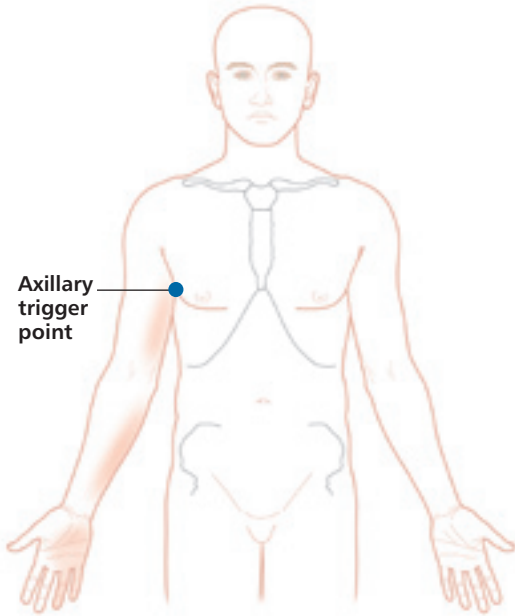
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. Massage area afterwards.

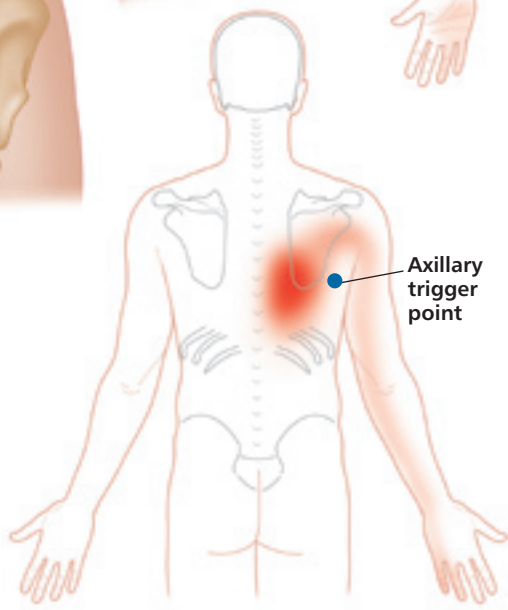


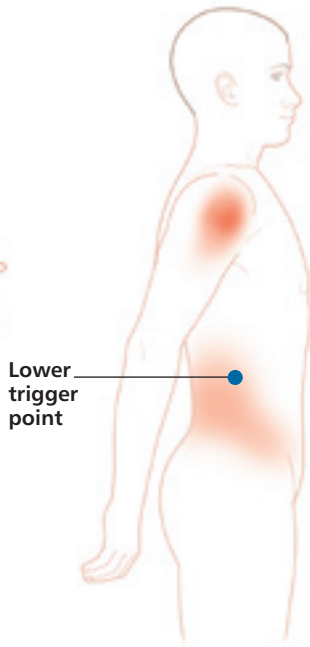


LATISSIMUS DORSI









Latin *latissimus*, widest; *dorsi*, of the back

Along with the subscapularis and the teres major, the latissimus dorsi forms the posterior wall of the axilla.

ORIGIN

Thoracolumbar fascia, which is attached to spinous processes of lower six thoracic vertebrae and all lumbar and sacral vertebrae, (T7–S5) and to intervening supraspinous ligaments. Posterior part of iliac crest. Lower three or four ribs. Inferior angle of scapula.

INSERTION

Floor of intertubercular sulcus (bicipital groove) of humerus.

ACTION

Extends flexed arm. Adducts and medially rotates humerus.
It is one of the chief climbing muscles, since it pulls shoulders downward and backward, and pulls trunk up to the fixed arms (therefore also active in swimming front crawl). Assists in forced inspiration by raising lower ribs.
Antagonists: deltoid, trapezius.

NERVE

Thoracodorsal nerve, C6, 7, 8, from posterior cord of brachial plexus.

BASIC FUNCTIONAL MOVEMENT

Example: pushing on arms of a chair to stand up.

REFERRED PAIN PATTERNS

Axillary trigger point: a 5–10 cm zone of pain at inferior angle of scapula, with diffuse pain radiating into medial upper extremity into ulnar aspect of hand.
Lower lateral trigger point: triangular pattern from trigger point into brim of pelvis and regimental badge area.

OVERVIEW

INDICATIONS
"Thoracic" back pain that is constant in nature and unrelated to activity, frozen shoulder, thoracic outlet syndrome, back pain turning in bed, dull ache under shoulder blade, sharp pain in back of shoulder when resting on elbows, pain when reaching up to a shelf or changing a light bulb.

CAUSES
Golf, racquet sports, swimming, baseball, cricket, rowing, heavy lifting, gym related, gardening, poor-fitting bra.

DIFFERENTIAL DIAGNOSIS
C7 neuropathy. Ulnar neuropathy. Subscapular nerve entrapment. Axillary neuropathy. Thoracic outlet syndrome. Cardiopulmonary diseases.

CONNECTIONS
Rhomboids, trapezius (middle fibers), teres major, scalenes, subscapularis, iliocostalis, serratus anterior, serratus posterior inferior.

PRACTITIONER HANDS ON TECHNIQUES

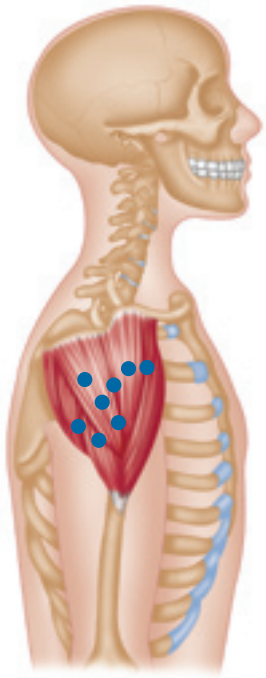
✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓		Muscle energy
✓		Positional release
✓		Wet needling

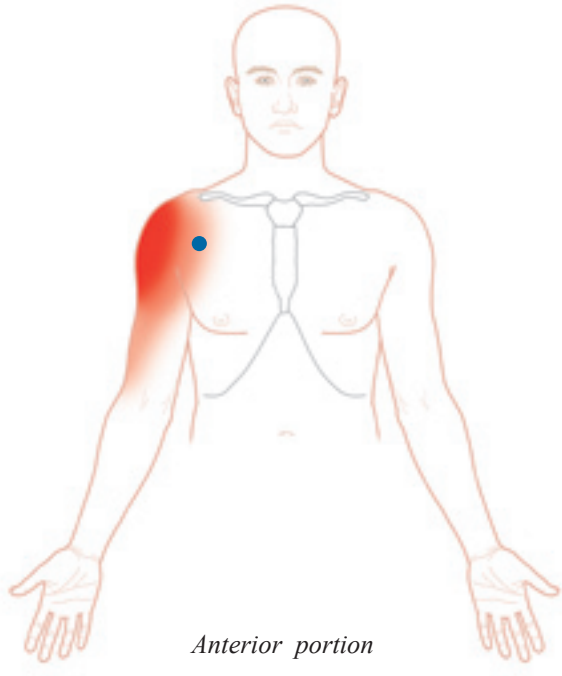
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

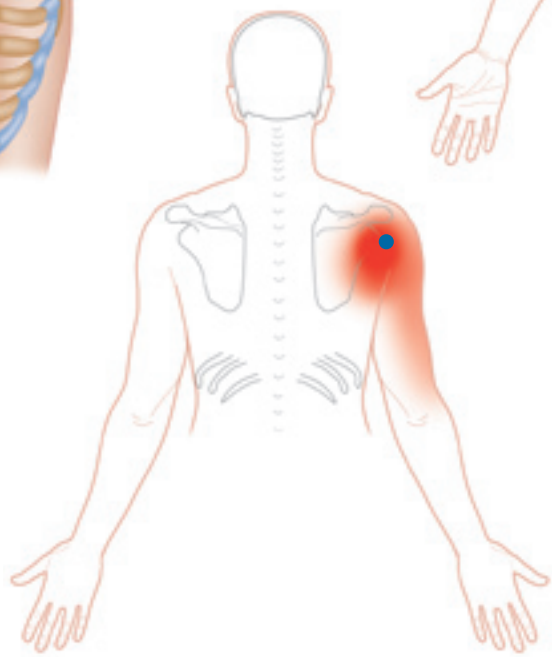
ADVICE
Avoid overloading, e.g. pulling objects down from above head.

DELTOIDEUS





Anterior portion



Posterior portion

Lateral portion

Greek *deltoeides*, shaped like Greek letter delta (triangular)

The deltoid is composed of three parts: anterior, middle, and posterior. Only the middle part is multipennate, probably because its mechanical disadvantage of abduction of the shoulder joint requires extra strength.

ORIGIN
Clavicle, acromion process, and spine of scapula.

INSERTION
Deltoid tuberosity situated halfway down lateral surface of shaft of humerus.

ACTION
Anterior fibers: flex and medially rotate humerus.
Middle fibers: abduct humerus at shoulder joint (only after the movement has been initiated by supraspinatus).
Posterior fibers: extend and laterally rotate humerus.
Antagonist: latissimus dorsi.

NERVE
Axillary nerve, C**5**, **6**, from posterior cord of brachial plexus.

BASIC FUNCTIONAL MOVEMENT
Examples: reaching for something out to the side; raising arm to wave.

REFERRED PAIN PATTERNS
Generally localized to trigger point and within a 5–10 cm zone.

OVERVIEW

INDICATIONS
Post-trauma rehabilitation, shoulder pain, decreased range of motion (especially in abduction), shoulder pain which worsens with motion and eases at rest, reduced range of motion and some loss of strength above 90 degrees.

CAUSES
Swimming, weight lifting, soccer (blows), basketball, jerky and vigorous repetitive movements, fishing, power tools, sudden blows, rifle rebound, skiing falls, injections into shoulder, dislocations, holding small baby.

DIFFERENTIAL DIAGNOSIS
Impingement syndromes. Sub-acromial bursitis. C5 radiculopathy. Rotator cuff tendinopathy. Osteoarthritis of glenohumeral or acromioclavicular joint.

CONNECTIONS
Supraspinatus, infraspinatus, biceps brachii, teres minor, subscapularis, pectoralis major (clavicular head), rotator cuff issues, tendonitis, arthritis, C5 nerve issues, neck problems, often satellite trigger points from other problems (e.g. scalenes, pectoralis major), long head biceps brachii tendon problems.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

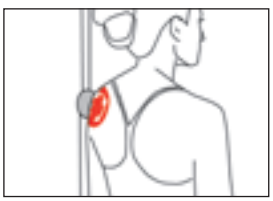
Deep Stroking Massage Technique
1. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
2. Lubricate the skin if necessary.
3. Identify and locate the trigger point or taut band.
4. Position your thumb/applicator just beyond the taut band, and reinforce with your other hand.
5. Apply sustained pressure until you feel the trigger point soften, and continue stroking in the same direction toward the attachment of the taut band. This should be experienced by the patient as discomfort and not as pain.
6. Repeat this stroking in the opposite direction.

SELF HELP

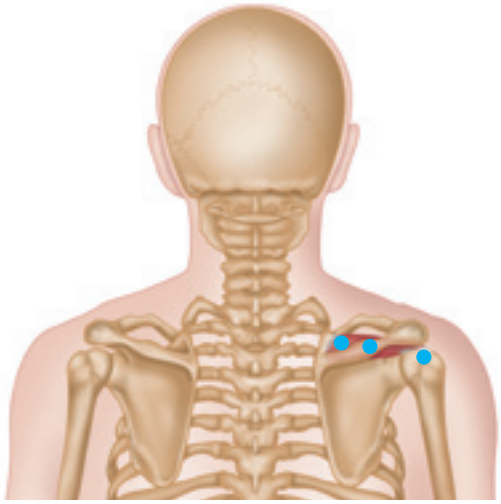
Self-massage techniques can be helpful; you can use balls and pressure tools, such as TOLA.

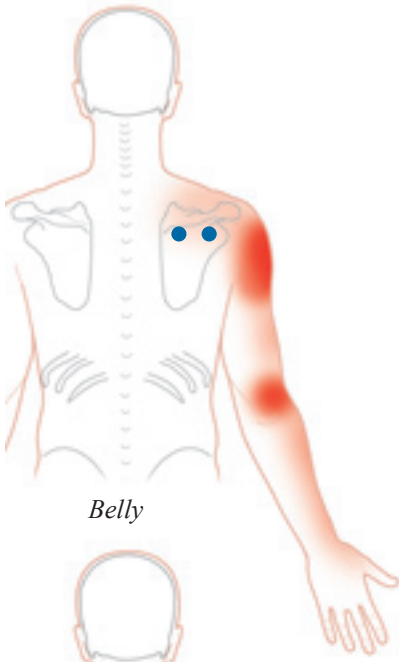
ADVICE
Stretching (daily). Drive vehicle with two hands. Examine technique with overhead sports, such as tennis.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Start at elbow and work upward toward shoulder.
4. Pause on trigger point until it softens and/or the pain eases.
5. Continue to massage upward to tip of shoulder (imagine squeezing toothpaste out of a tube).
6. Repeat 3 times slowly.

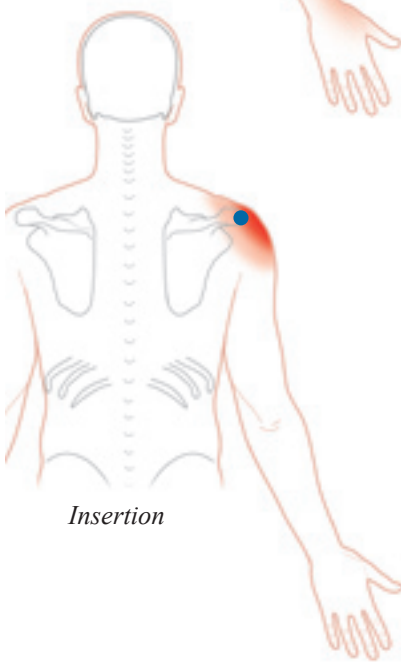


SUPRASPINATUS





Belly



Insertion

Latin *supra*, above; *spina*, spine

A member of the rotator cuff, which comprises the supraspinatus, infraspinatus, teres minor, and subscapularis. The rotator cuff helps hold the head of the humerus in contact with the glenoid cavity (fossa, socket) of the scapula during movements of the shoulder, thus helping to prevent dislocation of the joint.

ORIGIN

Supraspinous fossa of scapula.

INSERTION

Upper aspect of greater tubercle of humerus. Capsule of shoulder joint.

ACTION

Initiates process of abduction at shoulder joint, so that deltoid can take over at later stages of abduction.
Antagonists: infraspinatus, teres minor, pectoralis major, latissimus dorsi.

NERVE

Suprascapular nerve, C**4**, **5**, **6**, from upper trunk of brachial plexus.

BASIC FUNCTIONAL MOVEMENT

Example: holding a shopping bag away from side of body.

REFERRED PAIN PATTERNS

Belly: deep ache in regimental badge area (4–6 cm). Ellipse leads to zone of pain in lateral epicondyle/radial head. Diffuse pain into lateral forearm.
Insertion: localized zone of pain 5–8 cm over deltoid.

OVERVIEW

INDICATIONS
Loss of power in abduction, painful arc syndrome, night pain/ache, subacromial bursitis, rotator cuff tendinopathy, deep aching in shoulder which can extend to elbow (i.e. tennis elbow) and occasionally to thumb side of wrist, can be confused with De Quervain's tenosynovitis, pain on initiation of lifting shoulder sideways, inability to reach behind back, moderately restricted range of shoulder motion, clicking/snapping sounds in shoulder joint.

CAUSES
Carrying heavy objects (e.g. bags, laptops, suitcases) over long distances, heavy lifting from floor to trunk of car, carrying with arms above head, sleeping positions with arms above head, dogs pulling on leash, falls on outstretched arm (e.g. skiing), washing/combing hair, moving heavy furniture, repetitive strain injury (RSI), prolonged computer keyboard use.

DIFFERENTIAL DIAGNOSIS
Phase 1 capsulitis. C5–C6 radiculopathy. Subacromial bursitis (adhesive). Calcific tendonitis. Calcium boils. Rotator cuff tendinopathy.

CONNECTIONS
Subscapularis, infraspinatus, deltoid, trapezius, latissimus dorsi, rotator cuff issues, biceps tendonitis. Self-massage techniques can be helpful; you can use balls and pressure tools, such as TOLA.

PRACTITIONER HANDS ON TECHNIQUES

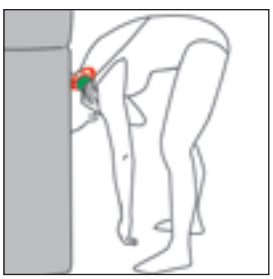
✓	✓	Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

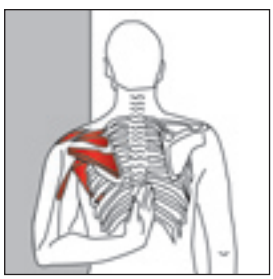
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

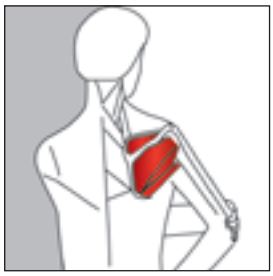
SELF HELP

ADVICE
Avoid heavy carrying. Avoid sleeping with arms above head. Use heat/hot showers.

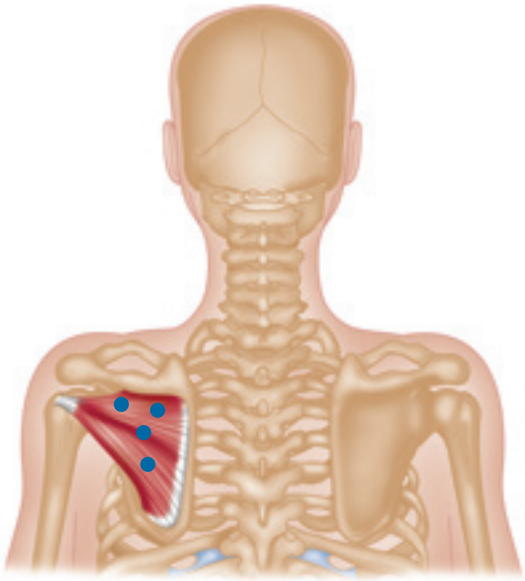
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. This can take up to 5 minutes.
5. Massage area afterwards.

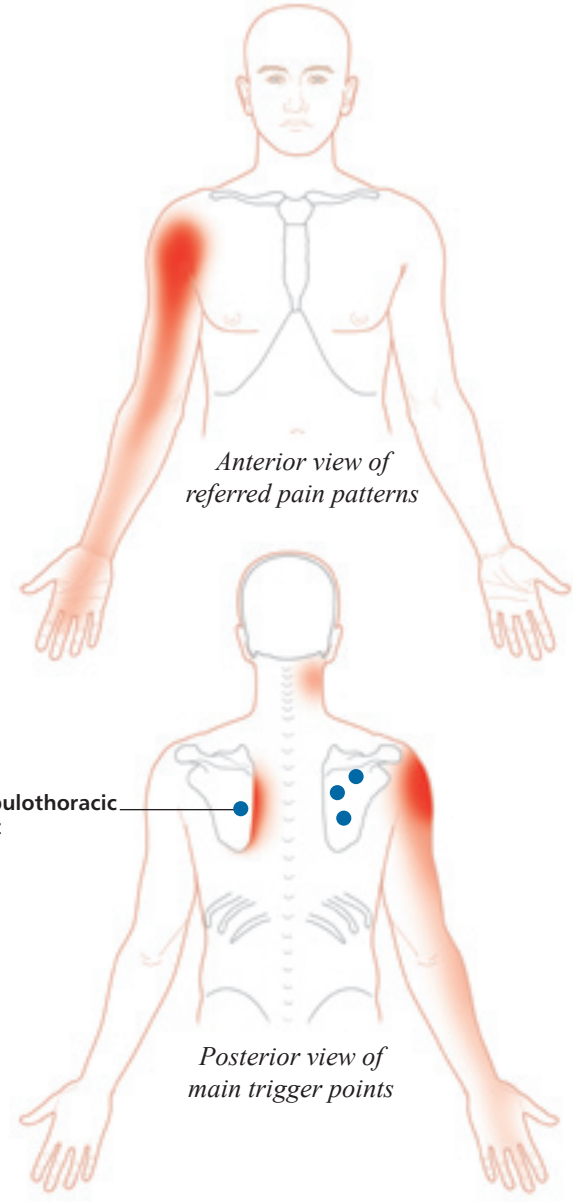






INFRASPINATUS





Latin *infra*, below; *spina*, spine

A member of the rotator cuff, which comprises the supraspinatus, infraspinatus, teres minor, and subscapularis. The rotator cuff helps hold the head of the humerus in contact with the glenoid cavity (fossa, socket) of the scapula during movements of the shoulder, thus helping to prevent dislocation of the joint.

ORIGIN
Infraspinous fossa of scapula.

INSERTION
Middle facet on greater tubercle of humerus. Capsule of shoulder joint.

ACTION
As a rotator cuff muscle, helps prevent posterior dislocation of shoulder joint. Laterally rotates humerus.
Antagonists: subscapularis, pectoralis major, latissimus dorsi.

NERVE
Suprascapular nerve, C(4), **5**, **6**, from upper trunk of brachial plexus.

BASIC FUNCTIONAL MOVEMENT
Example: brushing hair back.

REFERRED PAIN PATTERNS
Middle/upper cervical spine: deep anterior shoulder joint zone of 3–4 cm in region of long head of biceps brachii, radiating into biceps belly then into forearm—diffuse symptoms in median nerve distribution.
Medial/scapula: to medial border of scapula.

OVERVIEW

INDICATIONS
Decreased range of motion in Apley scratch test (behind back), hemiplegia, rotator cuff tendinopathy, frozen shoulder syndrome, pain in back and front of shoulder, night-time shoulder pain when sleeping on same/opposite side, dead-arm sensations, pain undoing bra, shoulder girdle fatigue, weakness of grip, loss of arm strength, changes in sweating (usually increased), "mouse arm" from computer mouse overuse.

CAUSES
Overuse activities with arm unsupported (e.g. computer mouse, driving, tennis, weight training, water sports, ski poles), pulling objects behind body, sudden trauma from fall on outstretched arm/catching yourself when trying to stop a fall, prolonged holding of heavy objects.

DIFFERENTIAL DIAGNOSIS
Biceps tendonitis. C5–C6 neuropathy. Suprascapular nerve dysfunction.

CONNECTIONS
Infraspinatus, subscapularis, levator scapulae, pectoralis minor/major, long head biceps brachii, biceps brachii, anterior deltoid, teres major, latissimus dorsi, rotator cuff issues, biceps tendonitis.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

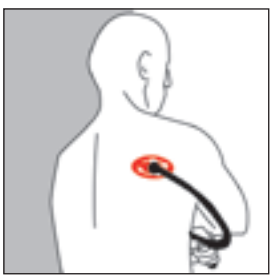
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

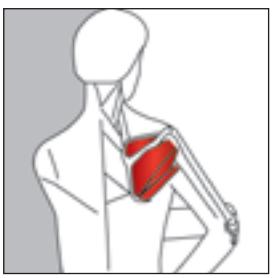
SELF HELP

Self-massage techniques can be very helpful; you can use balls and pressure tools.

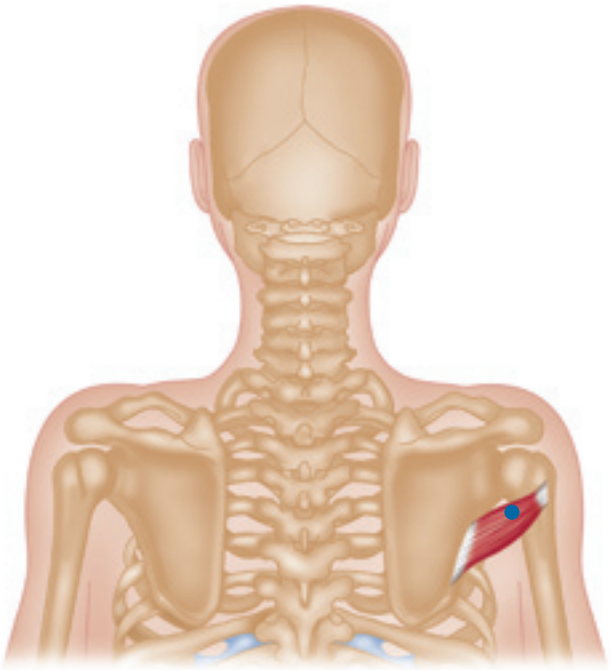
ADVICE
Avoid reaching into back seat of car. Heat can be beneficial. Support arm on pillow for relief.

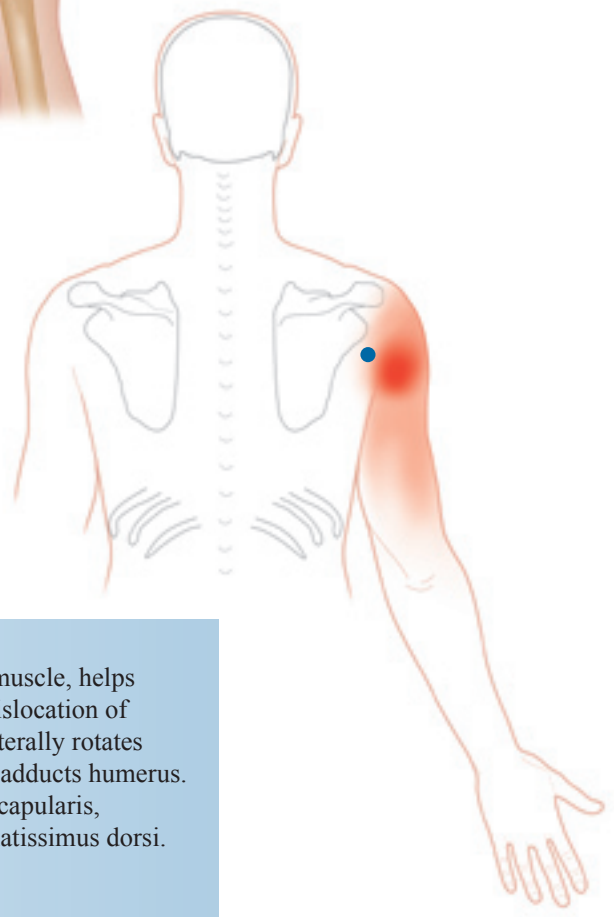
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. This can take up to 5 minutes.
5. Massage area afterwards.





TERES MINOR





Latin *teres*, rounded, finely shaped; *minor*, smaller

A member of the rotator cuff, which comprises the supraspinatus, infraspinatus, teres minor, and subscapularis. The rotator cuff helps hold the head of the humerus in contact with the glenoid cavity (fossa, socket) of the scapula during movements of the shoulder, thus helping to prevent dislocation of the joint.

ORIGIN
Upper two-thirds of lateral border of dorsal surface of scapula.

INSERTION
Lower facet on greater tubercle of humerus. Capsule of shoulder joint.

ACTION
As a rotator cuff muscle, helps prevent upward dislocation of shoulder joint. Laterally rotates humerus. Weakly adducts humerus. Antagonists: subscapularis, pectoralis major, latissimus dorsi.

NERVE
Axillary nerve, C5, 6, from posterior cord of brachial plexus.

BASIC FUNCTIONAL MOVEMENT
Example: brushing hair back.

REFERRED PAIN PATTERNS
Localized zone (2–5 cm) of intense pain in regimental badge area, with a more diffuse elliptical zone of pain spreading in posterolateral upper extremity (above elbow).

OVERVIEW

INDICATIONS
Shoulder pain (especially posterior), frozen shoulder syndrome, rotator cuff rehabilitation, subacromial bursitis, biceps tendonitis, shoulder pain at top outer section of shoulder blade near posterior deltoid, often associated with other shoulder problems (especially rotator cuff issues), numbness/tingling in 4th and 5th fingers.

CAUSES
Reaching above 90 degrees and/or reaching behind back, gripping steering wheel in RTA, holding heavy object for long time, computer/mouse overuse syndromes.

DIFFERENTIAL DIAGNOSIS
C8–T1 radiculopathy. Rotator cuff tendinopathy. Shoulder–wrist–hand syndrome. Subacromial/deltoid bursitis. Shoulder impingement syndromes (painful arc). Acromioclavicular joint dysfunction.

CONNECTIONS
Infraspinatus.

PRACTITIONER HANDS ON TECHNIQUES

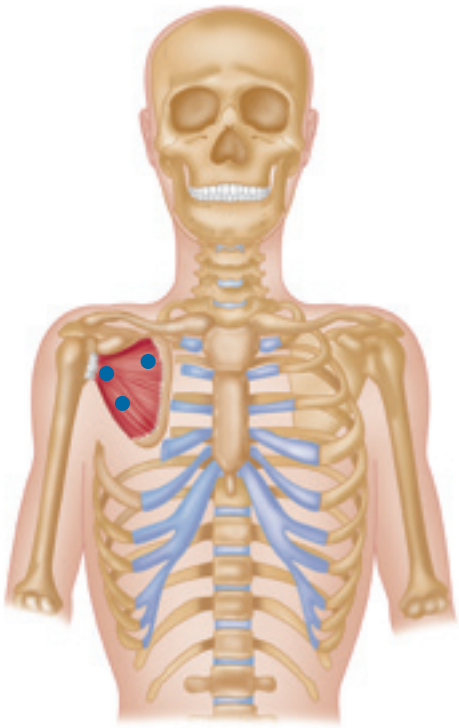
✓	✓	Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

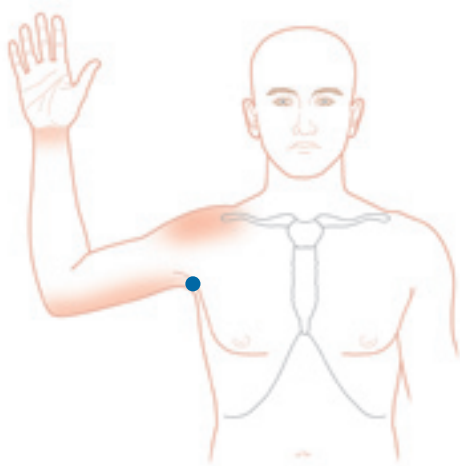
SELF HELP

ADVICE
Posture (round shouldered). Arm position during sleep. Avoid overload. Self-stretch.

SUBSCAPULARIS



Posterior view of referred pain patterns



Latin *sub*, under; *scapularis*, pertaining to the scapula

A member of the rotator cuff, which comprises the supraspinatus, infraspinatus, teres minor, and subscapularis. The rotator cuff helps hold the head of the humerus in contact with the glenoid cavity (fossa, socket) of the scapula during movements of the shoulder, thus helping to prevent dislocation of the joint. The subscapularis constitutes the greater part of the posterior wall of the axilla.

ORIGIN

Subscapular fossa and groove along lateral border of anterior surface of scapula.

INSERTION

Lesser tubercle of humerus. Capsule of shoulder joint.

ACTION

As a rotator cuff muscle, stabilizes glenohumeral joint, mainly preventing head of humerus being pulled upward by deltoid, biceps, and long head of triceps. Medially rotates humerus.
Antagonists: infraspinatus, teres minor.

NERVE

Upper and lower subscapular nerves, C5, 6, 7, from posterior cord of brachial plexus.

BASIC FUNCTIONAL MOVEMENT

Example: reaching into back pocket.

REFERRED PAIN PATTERNS

Axillary trigger point: strong zone (5–8 cm) of pain in posterior glenohumeral joint, with a peripheral diffuse zone. Also radiating down posterior aspect of arm and anteroposterior carpals of wrist.

OVERVIEW

INDICATIONS
Rotator cuff tendinopathy, adhesive capsulitis (frozen shoulder), decreased external rotation with abduction, severe pain over back of shoulder, restricted range of shoulder movement, inability to reach behind back, pain on throwing, clicking/popping shoulders, stroke (hemiplegia).

CAUSES
Sports related (especially swimming crawl, repeated forceful overhead lifting, baseball pitching/catching, cricket), post shoulder fracture/dislocation, frozen shoulder syndrome, sudden unexpected loading of shoulder (e.g. fall), post-fracture, prolonged immobility (sling).

DIFFERENTIAL DIAGNOSIS
Impingement syndromes. Rotator cuff dysfunctions. Thoracic outlet syndromes. Cervical radiculopathy (C7). Cardiopulmonary pathology.

CONNECTIONS
Infraspinatus, pectorals, teres minor, latissimus dorsi, triceps brachii, posterior deltoid, supraspinatus.

PRACTITIONER HANDS ON TECHNIQUES

☐	☐	Spray and stretch
✓	✓	Dry needling
☐	☐	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	☐	Wet needling

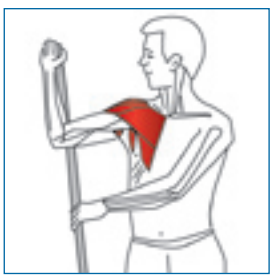
Reciprocal Inhibition (RI) Technique
Indications: acute settings
1. Identify the affected/host muscle and take it into relaxation.
2. Ask the patient to contract the antagonist muscle against 35–45% isometric resistance.
3. Manual therapy of the antagonist will have a reciprocal inhibition effect.

SELF HELP

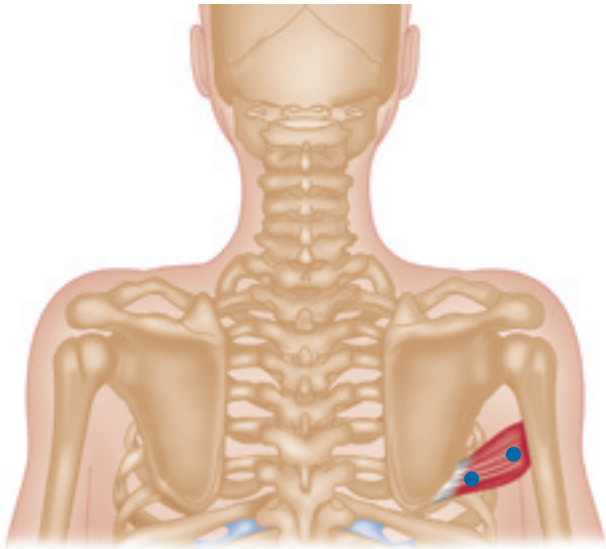
Subscapularis is mostly hidden but self-massage techniques can be helpful for part of muscle that is exposed in and around armpit.

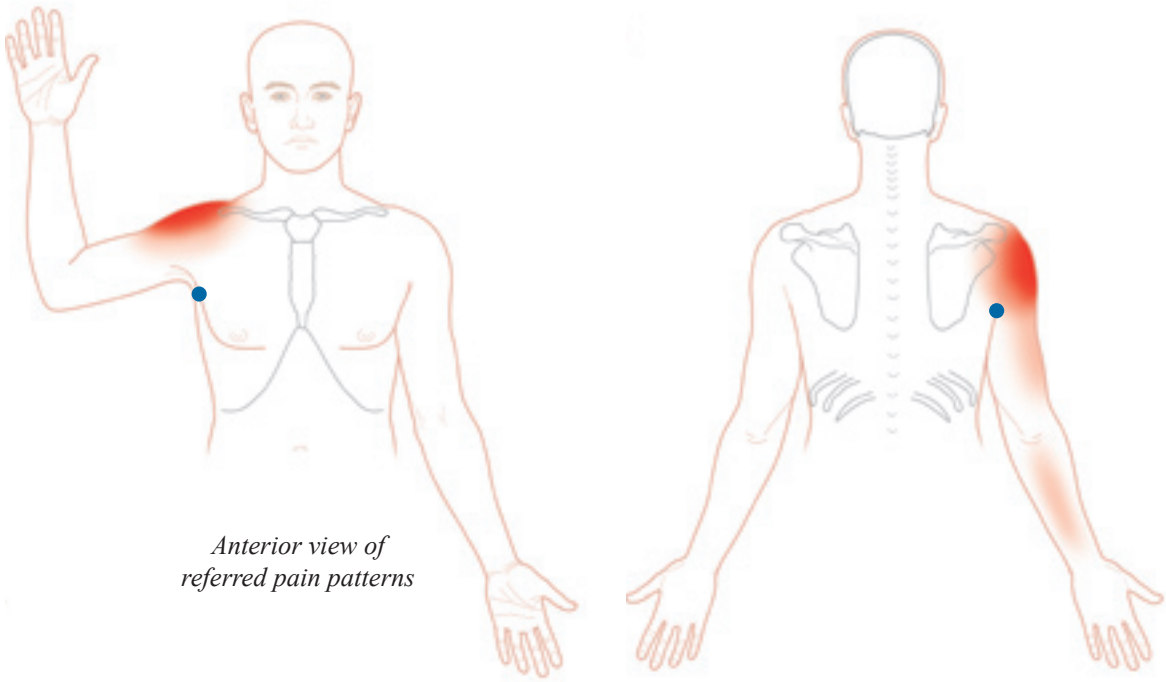
ADVICE
Round-shouldered postures. Walking posture.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. This can take up to 5 minutes.



TERES MAJOR





Anterior view of referred pain patterns

Latin *teres*, rounded, finely shaped; *major*, larger

The teres major, along with the tendon of the latissimus dorsi, which passes around it, and the subscapularis, forms the posterior fold of the axilla.

ORIGIN
Oval area on lower third of posterior surface of lateral border of scapula.

INSERTION
Medial lip of intertubercular sulcus (bicipital groove) of humerus.

ACTION
Adducts humerus. Medially rotates humerus. Extends humerus from flexed position.

NERVE
Lower subscapular nerve, C5, **6**, 7, from posterior cord of brachial plexus.

BASIC FUNCTIONAL MOVEMENT
Example: reaching into back pocket.

REFERRED PAIN PATTERNS
Deep pain into posterior glenohumeral joint and an oval zone (5–10 cm) of pain in posterior deltoid area (can radiate strongly to long head of biceps brachii). Diffuse pain into dorsum of forearm.

OVERVIEW

INDICATIONS
Frozen shoulder syndrome, pain on reaching above head, slight pain on rest, pain when driving, impingement syndromes, sometimes misdiagnosed as thoracic outlet syndrome.

CAUSES
Sports related—forceful overhead lifting, post shoulder fracture/dislocation, frozen shoulder syndrome, sudden unexpected loading of shoulder (e.g. fall), post-fracture, prolonged immobility (sling).

DIFFERENTIAL DIAGNOSIS
Impingement syndromes. Rotator cuff tendinopathy. Cervical neuropatterns (C6–C7). Thoracic outlet syndrome. Supraspinatus calcification.

CONNECTIONS
Rhomboids, long head triceps brachii, latissimus dorsi, teres minor, pectorals, posterior deltoid, triceps brachii, C6 or C7 neck disc issue, subdeltoid bursitis.

PRACTITIONER HANDS ON TECHNIQUES

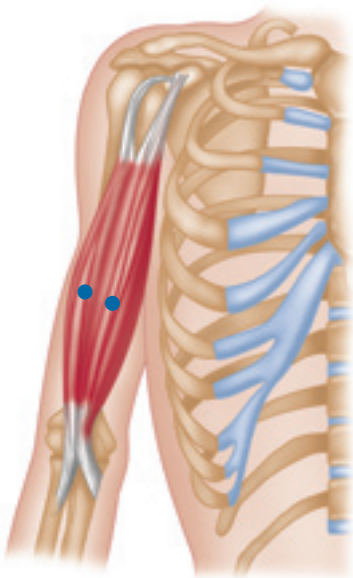
✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓	Wet needling

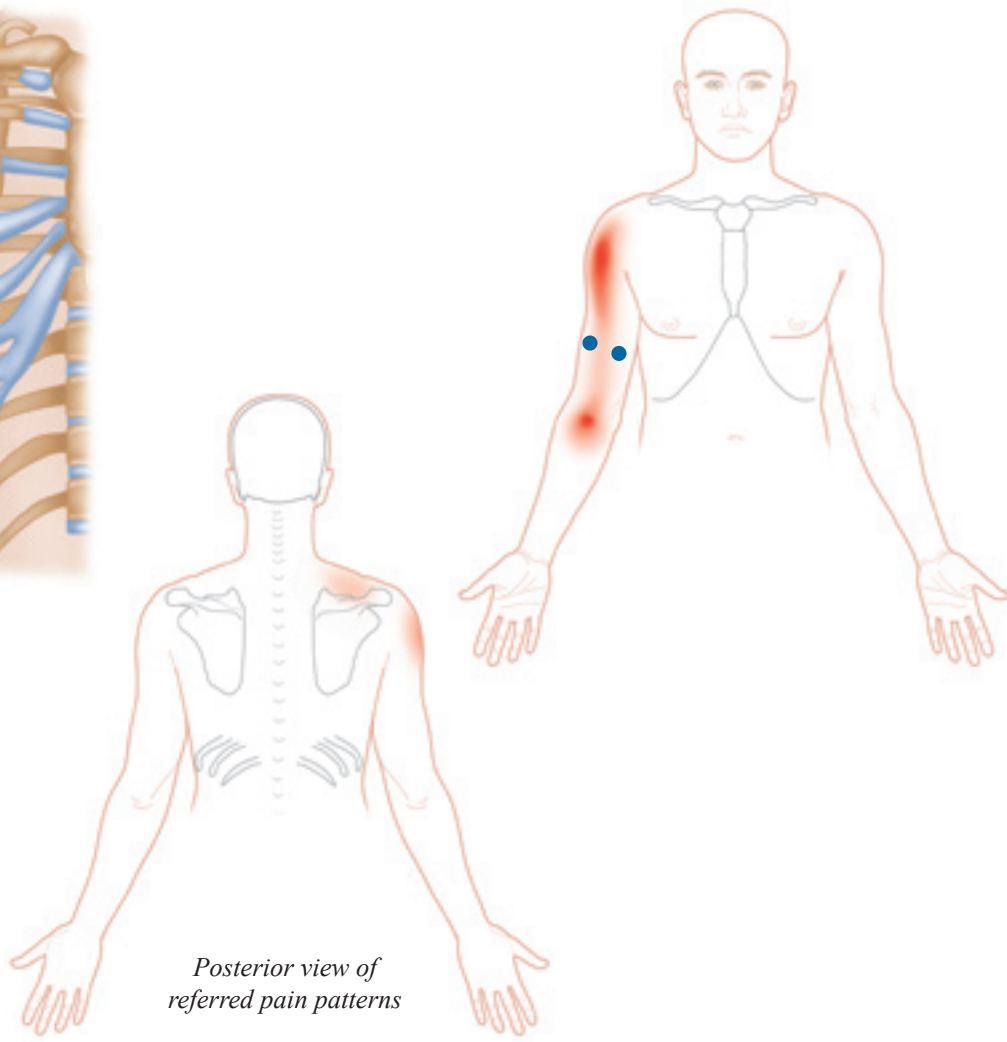
Contract Relax, Antagonist Contract (CRAC) Technique
1. Find the joint/soft tissue restriction or 'biting point'.
2. Contract agonist. Relax (agonist).
3. Contract antagonist. Stretch agonist.
4. Hold stretch for 15–30 seconds.
5. Repeat 3 times.

SELF HELP

ADVICE
Use heat/warmth, especially hot showers. Avoid heavy steering (wheels). Monitor gym activities. Use pillow at night (to hug). Plenty of self-stretching.

BICEPS BRACHII





Posterior view of referred pain patterns

Latin *biceps*, two-headed; *brachii*, of the arm

The biceps brachii operates over three joints. It has two tendinous heads at its origin and two tendinous insertions. Occasionally it has a third head, originating at the insertion of the coracobrachialis. The short head forms part of the lateral wall of the axilla, along with the coracobrachialis and the humerus.

ORIGIN

Short head: tip of corocoid process of scapula.
Long head: supraglenoid tubercle of scapula.

INSERTION

Posterior part of radial tuberosity. Bicipital aponeurosis, which leads into deep fascia on medial aspect of forearm.

ACTION

Flexes elbow joint. Supinates forearm. (It has been described as the muscle that puts in the corkscrew and pulls out the cork.) Weakly flexes arm at shoulder joint. Antagonist: triceps brachii.

NERVE

Musculocutaneous nerve, C**5**, **6**.

BASIC FUNCTIONAL MOVEMENT

Examples: picking up an object; bringing food to mouth.

REFERRED PAIN PATTERNS

Localized pain with intense ellipse superficially located over long head tendon. Referred pain into anterior cubital fossa.

OVERVIEW

INDICATIONS
Anterior shoulder pain with decreased arm extension, biceps tendonitis, reduced extension of arms, reduced Apley scratch test maneuver, frozen shoulder syndrome, aching pain over front of shoulder, weakness in turning palm face upward, shoulder aching.

CAUSES
Repetitive motion injury, throwing/sports induced (e.g. basketball, tennis), repeated actions with arm, lifting heavy objects with palm upward (e.g. weight training), musical instrument playing (e.g. violin, guitar).

DIFFERENTIAL DIAGNOSIS
Glenohumeral osteoarthritis. Acromioclavicular osteoarthritis. Subscapularis. Infraspinatus. Subacromial bursitis. Biceps tendonitis. C5 radiculopathy.

CONNECTIONS
Subscapularis, infraspinatus, brachialis, supinator, upper trapezius, coracobrachialis, triceps brachii, anterior deltoid.

PRACTITIONER HANDS ON TECHNIQUES

- ✓ ✓ Spray and stretch
- ✓ ✓ Dry needling
- ✓ ✓ Deep stroking massage
- ✓ ✓ Compression
- ✓ ✓ Muscle energy
- ✓ ✓ Positional release
- ✓ ✓ Wet needling

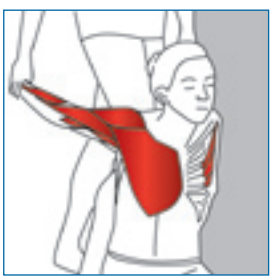
Contract Relax, Antagonist Contract (CRAC) Technique
1. Find the joint/soft tissue restriction or 'biting point'.
2. Contract agonist. Relax (agonist).
3. Contract antagonist. Stretch agonist.
4. Hold stretch for 15–30 seconds.
5. Repeat 3 times.

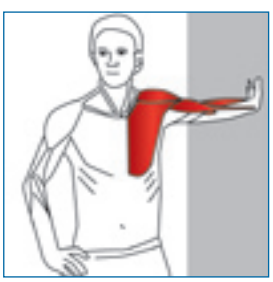
SELF HELP

Self-massage techniques can be helpful; you can use balls and pressure tools.

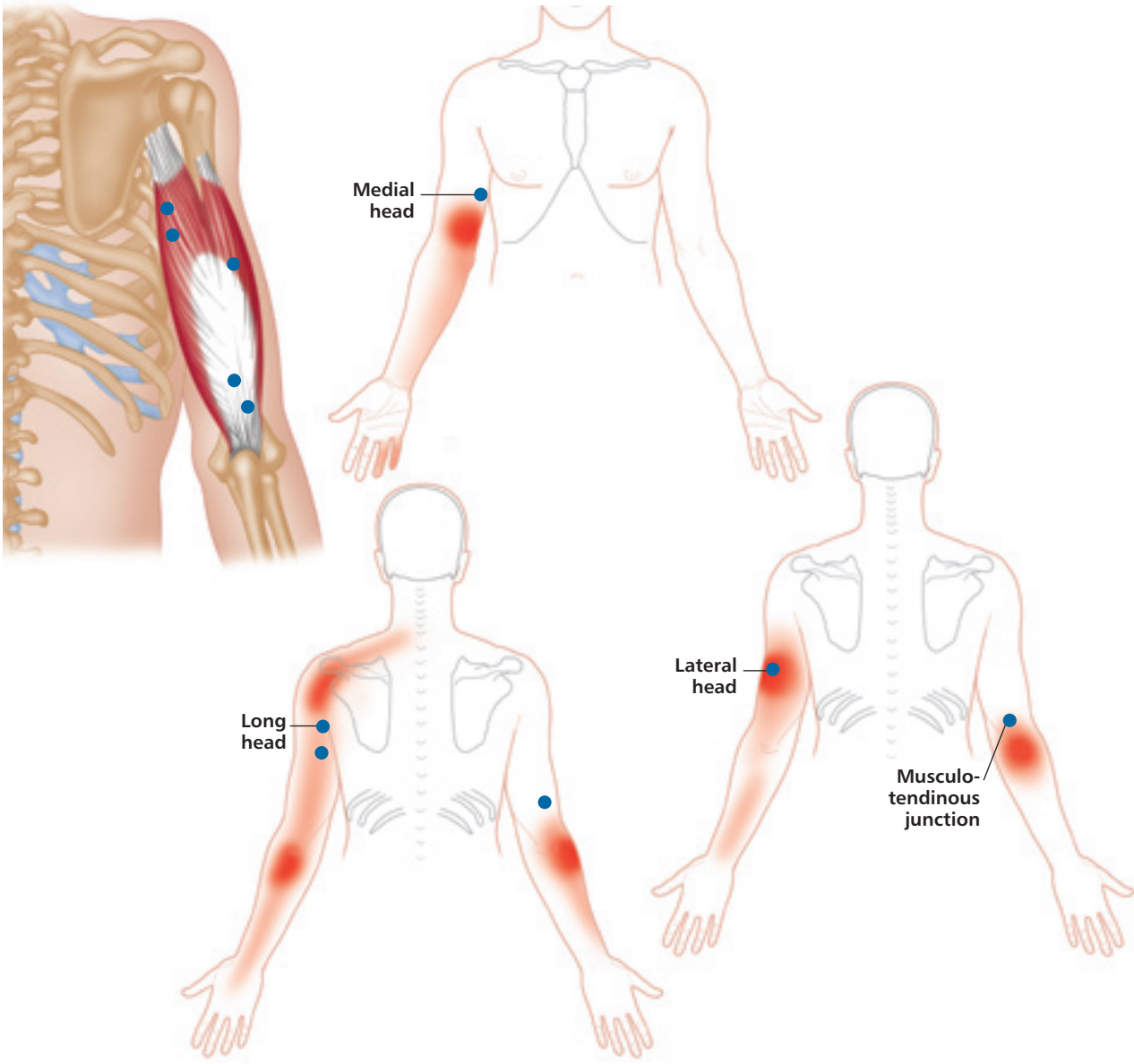
ADVICE
Exercise antagonists (triceps brachii). Reduce load on biceps brachii when carrying with bent arm. Sleeping position. Work posture.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point until it softens and/or the pain eases.
4. Massage area afterwards.





TRICEPS BRACHII



Latin *triceps*, three-headed; *brachii*, of the arm

The triceps originates from three heads and is the only muscle on the back of the arm.

ORIGIN

Long head: infraglenoid tubercle of scapula.
Lateral head: upper half of posterior surface of shaft of humerus (above and lateral to radial groove).
Medial head: lower half of posterior surface of shaft of humerus (below and medial to radial groove).

INSERTION

Posterior part of olecranon process of ulna.

ACTION

Extends (straightens) elbow joint. Long head can adduct humerus and extend it from flexed position. Stabilizes shoulder joint. Antagonist: biceps brachii.

NERVE

Radial nerve, C6, **7**, **8**, T1.

BASIC FUNCTIONAL MOVEMENT

Examples: throwing objects; pushing door shut.

REFERRED PAIN PATTERNS

(a) Long head: pain at superolateral border of shoulder, radiating diffusely down posterior upper extremity with strong zone of pain around olecranon process, and then vaguely into posterior forearm; (b) medial head: 5 cm patch of pain in medial epicondyle, radiating along medial border of forearm to 4th and 5th digits; (c) lateral head: strong midline pain into upper extremity, radiating vaguely into posterior forearm.

OVERVIEW

INDICATIONS
Golfer's/tennis elbow, arthritis of elbow/shoulder, chronic use of crutches/walking stick, repetitive mechanical activities of arms, racquet sports, aching pain over front of shoulder, weakness in turning palm face upward, shoulder aching.

CAUSES
Repetitive motion injury, throwing/sports induced (e.g. basketball, tennis), repeated actions with arm, lifting heavy objects with palm upward (e.g. triceps-focused weight training), musical instrument playing (e.g. violin, drums, guitar).

DIFFERENTIAL DIAGNOSIS
Radial nerve injury. Ulnar neuropathy. C7 neuropathy (cervical disc).

CONNECTIONS
Teres minor/major, latissimus dorsi, anconeus, supinator, brachioradialis, extensor carpi radialis longus, anterior deltoid.

PRACTITIONER HANDS ON TECHNIQUES

✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

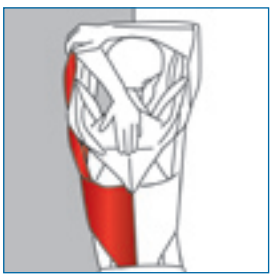
Contract Relax, Antagonist Contract (CRAC) Technique
1. Find the joint/soft tissue restriction or 'biting point'.
2. Contract agonist. Relax (agonist).
3. Contract antagonist. Stretch agonist.
4. Hold stretch for 15–30 seconds.
5. Repeat 3 times.

SELF HELP

Self-massage techniques can be helpful; you can use the balls and pressure tools. Stretching is excellent for disabling trigger points in arm muscles.

ADVICE
Review arm positions for repetitive manual work. Take regular breaks. New tennis racquet/widen grip. Avoid overhead activities.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Run downward from shoulder until you hit trigger point.
4. Pause on trigger point until it softens.
5. Continue to end of muscle (insertion).

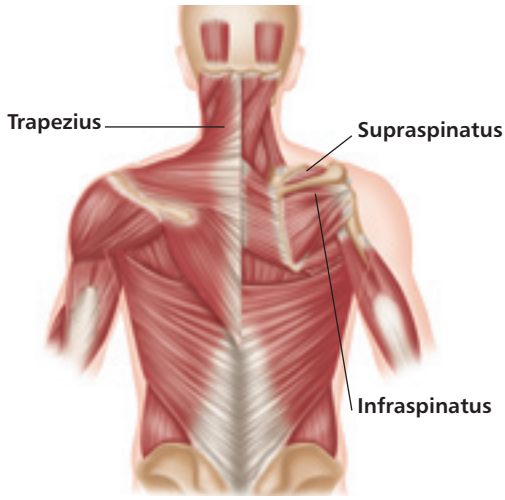


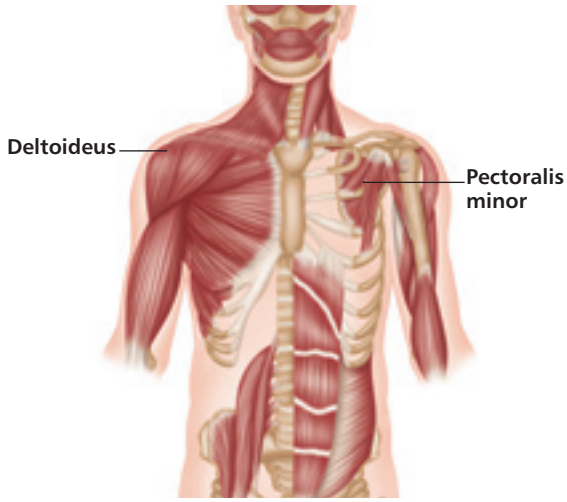
SHOULDER PAIN

Indications

Shoulder problems affect 25% of the population. Trigger point therapy can be very effective for treating a range of shoulder problems, including rotator cuff tendinopathy, tendonitis, bursitis, and frozen shoulder syndrome. Here I present a basic shoulder protocol, which should yield good results for most problems.

STEP 1 Study the anatomy and direction of the muscle fibers.





STEP 2 Sitting ICT to:

Supraspinatus

Upper trapezius

STEP 3 Massage area generously.

STEP 4 Side-lying ICT to:

Deltoid—stroking upward only and pausing on trigger points

Teres minor—letting hand fall off the bed

STEP 5 Supine ICT to: Pectoralis minor, and to infraspinatus (STP). Initially this can be very painful, but ask patient to let their shoulder gently fall backward onto your applicator, with deep breathing.

10 Muscles of the Forearm and Hand

Regional Trigger Points for Shoulder and Upper Arm Pain

MUSCLE PAGE REFERENCE
Adductor pollicis 168
Brachioradialis 160
Extensor carpi radialis longus 162
Extensor carpi ulnaris 162
Extensor digitorum 164
Flexor carpi radialis brevis 158
Flexor carpi ulnaris 158
Flexor digitorum superficialis 158
Opponens pollicis 168
Palmaris longus 156
Pectoralis major 132
Pronator teres 154
Serratus anterior 130
Small hand muscles 170
Supinator 166
Supraspinatus 138
Triceps brachii 150
Wrist extensors 162
Wrist flexors 158

(Outside of) elbow/forearm pain
Supinator
Brachioradialis
Extensor carpi radialis longus
Triceps brachii
Supraspinatus

(Inside of) elbow/forearm pain
Wrist flexors
Serratus anterior
Triceps brachii
Pectoralis major/minor
Palmaris longus
Extensor digitorum

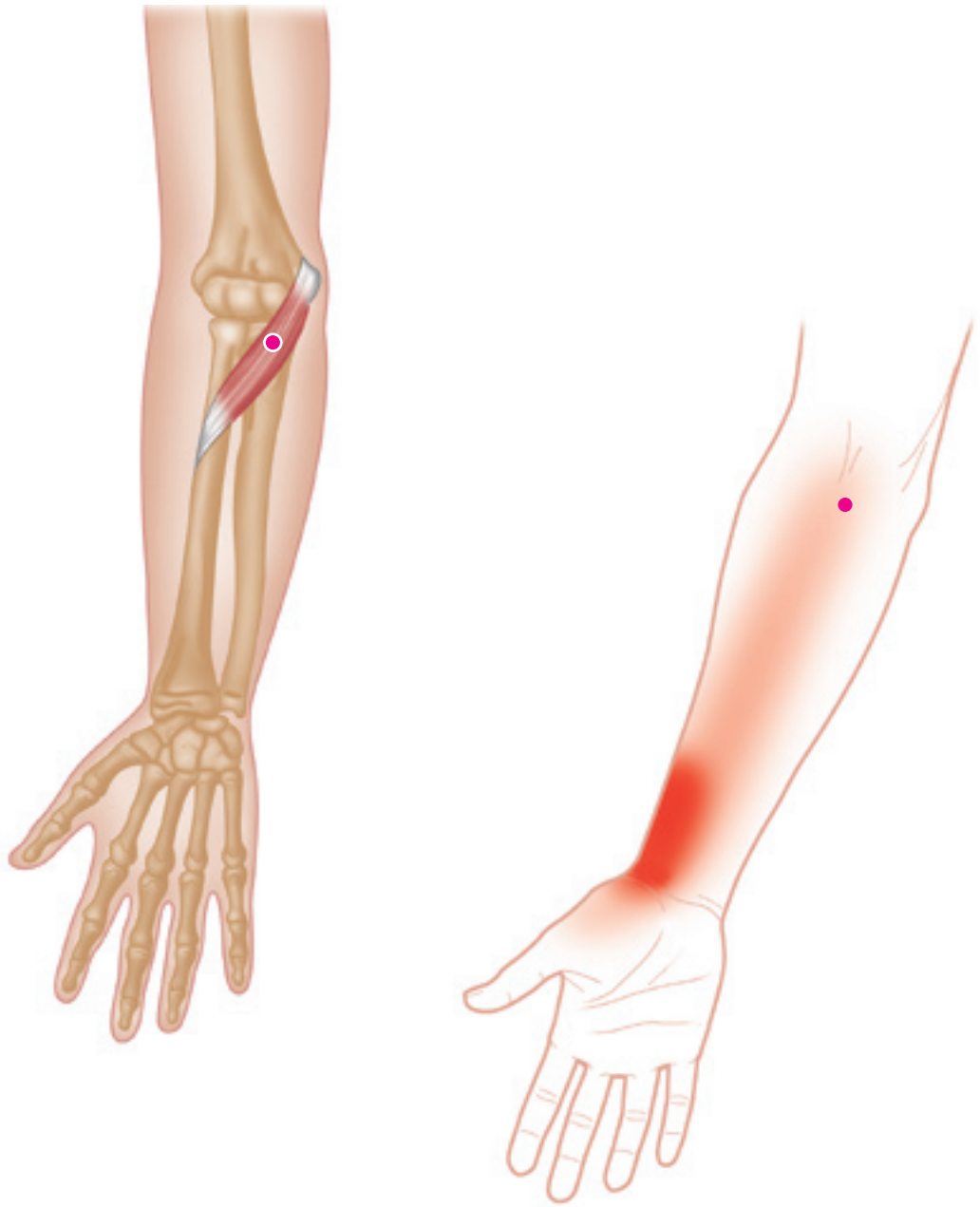
(Outside of) wrist pain
Pronator teres
Extensor carpi ulnaris
(Extensor digitorum)
Supinator
Opponens pollicis
Adductor pollicis

(Inside of) wrist pain
Flexor carpi ulnaris
Extensor carpi radialis longus

Hand and finger pain
Palmaris longus
Flexor carpi radialis brevis
Flexor digitorum superficialis
Small hand muscles

Thumb pain
Brachioradialis
Extensor carpi radialis longus
Extensor digitorum
Supinator
Opponens pollicis
Adductor pollicis

PRONATOR TERES



Latin *pronare*, to bend forward; *teres*, rounded, finely shaped

ORIGIN
Humeral head: lower third of medial supracondylar ridge and common flexor origin on anterior aspect of medial epicondyle of humerus.
Ulnar head: medial border of coronoid process of ulna.

INSERTION
Mid-lateral surface of radius (pronator tuberosity).

ACTION
Pronates forearm. Assists flexion of elbow joint.
Antagonist: supinator.

NERVE
Median nerve, C**6**, 7.

BASIC FUNCTIONAL MOVEMENT
Examples: pouring liquid from a container; turning a doorknob.

REFERRED PAIN PATTERNS
Strong pain "deep" into palmar region of wrist (lateral), radiating up anterolateral forearm.

OVERVIEW

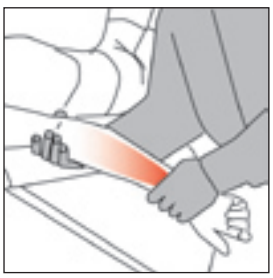
INDICATIONS
Pain in wrist (lateral), pain on supination, hairdressers (overuse of scissors), inability to "cup" hands together (especially "cupping" and extension of wrist), shoulder pain (compensatory), wrist pain on driving.

CAUSES
Prolonged gripping, massaging, wrist fractures or falls, casts, sports (e.g. forehand spin with racquet, using ski poles), occupational.

DIFFERENTIAL DIAGNOSIS
De Quervain's tenosynovitis. Carpal tunnel swelling. Osteoarthritis of proximal thumb joint. Distal radioulnar discopathy. Epicondylitis.

CONNECTIONS
Finger flexors, scalenes, pectoralis major, pronator quadratus.

PRACTITIONER HANDS ON TECHNIQUES



✓	✓	Spray and stretch
✓		Dry needling
		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓		Positional release
✓		Wet needling

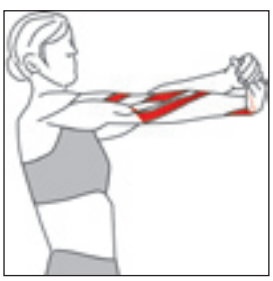
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

SELF HELP

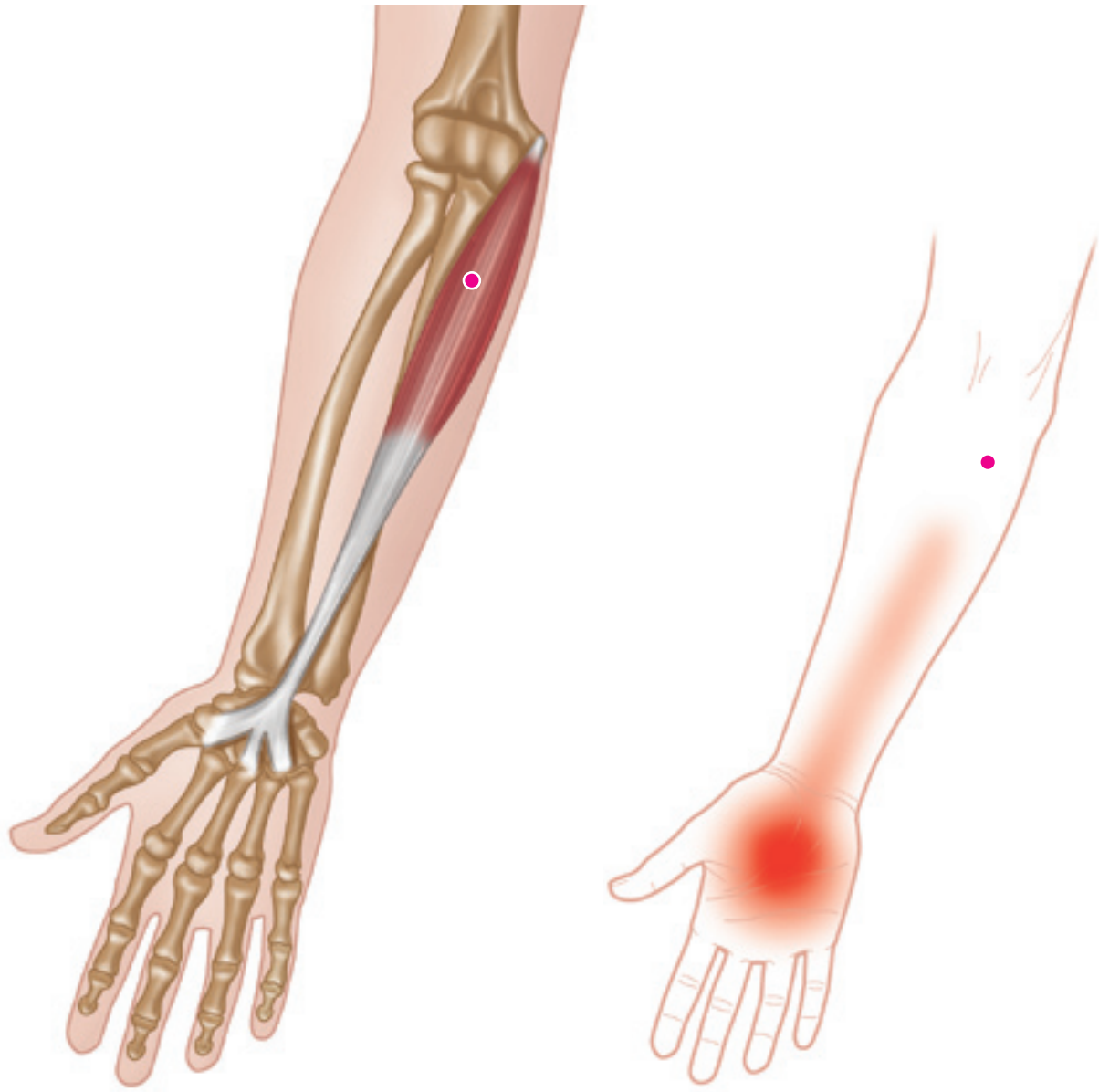
Self-massage techniques can be helpful.

ADVICE
Stretching techniques. Self-massage. Change grip and techniques in tennis/golf. Review driving posture and grip on steering wheel.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.



PALMARIS LONGUS



Latin *palmaris*, pertaining to the palm; *longus*, long

Part of the superficial layer, which also includes the pronator teres, flexor carpi radialis, and flexor carpi ulnaris. The palmaris longus muscle is absent in 13% of the population.

ORIGIN
Common flexor origin on anterior aspect of medial epicondyle of humerus.

INSERTION
Superficial (front) surface of flexor retinaculum and apex of palmar aponeurosis.

ACTION
Flexes wrist. Tenses palmar fascia. Antagonists: extensor carpi radialis brevis, extensor carpi radialis longus, extensor carpi ulnaris.

NERVE
Median nerve, C(6), **7**, **8**, T1.

BASIC FUNCTIONAL MOVEMENT
Examples: grasping a small ball; cupping palm to drink from hand.

REFERRED PAIN PATTERNS
Diffuse pain in anterior forearm; intense pain zone 2–3 cm in palm of hand, surrounded by a superficial zone of prickling and needle-like sensations.

OVERVIEW

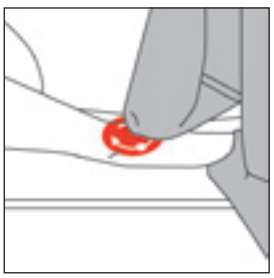
INDICATIONS
Pain and "soreness" in palm of hand, tenderness in hand/palm, functional loss of power in grip, tennis elbow.

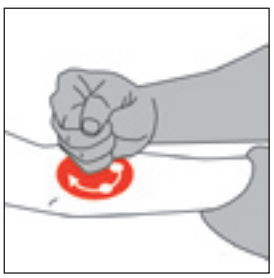
CAUSES
Direct trauma (e.g. fall on outstretched arm), occupational, racquet sports, digging in palm.

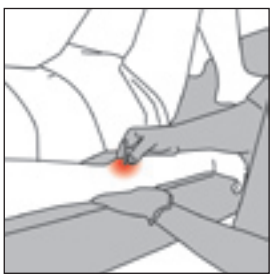
DIFFERENTIAL DIAGNOSIS
Neurogenic pain. Dupuytren's contracture. Carpal tunnel syndrome. Complex regional pain syndrome (reflex-sympathetic dystrophy). Scleroderma. Dermatomyositis.

CONNECTIONS
Flexor carpi radialis, brachialis, pronator teres, wrist joints (carpals), often associated with middle head of triceps brachii.

PRACTITIONER HANDS ON TECHNIQUES







✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

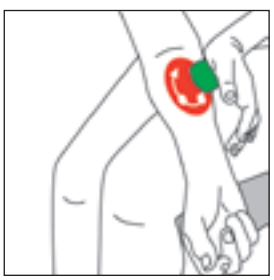
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

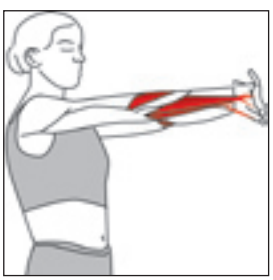
SELF HELP

Self-massage techniques can be helpful, especially using balls.

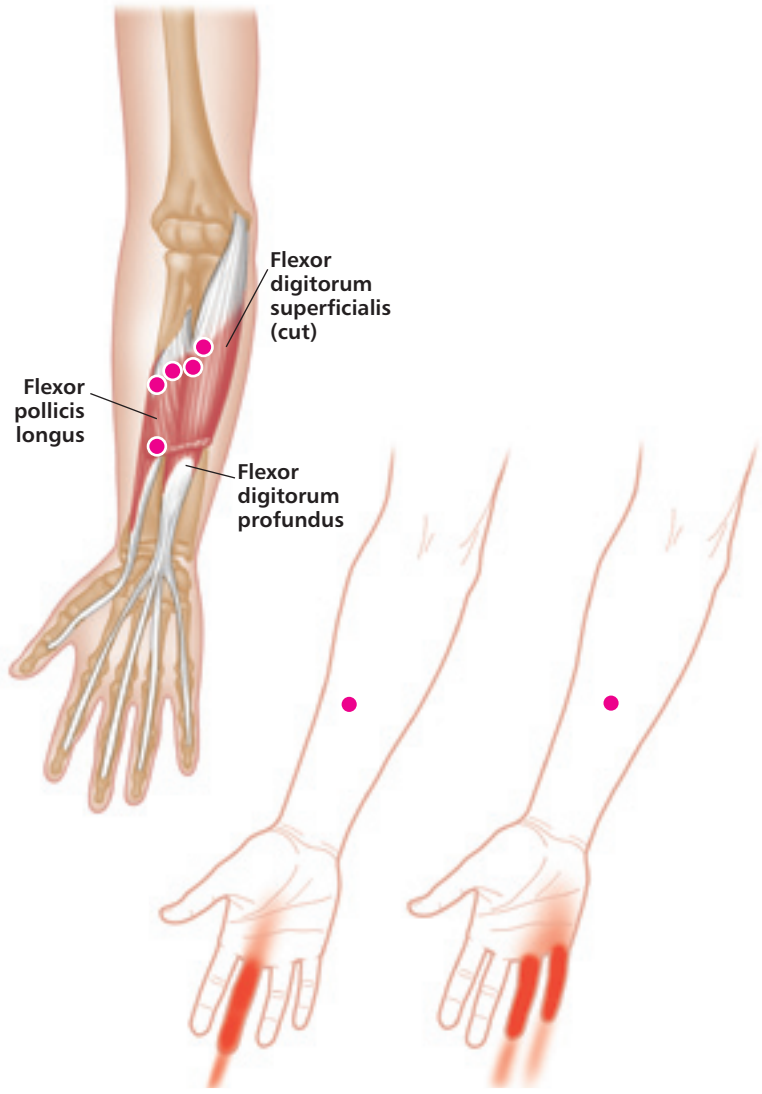
ADVICE
Avoid prolonged "gripping," especially of power tools or during massage therapy. Stretching and heat. Regular breaks.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.





WRIST FLEXORS



Flexor digitorum superficialis and profundus

Flexor carpi ulnaris

Flexor carpi radialis

Latin *flectere*, to bend; *carpi*, of the wrist; *radius*, staff, spoke of wheel; *ulnaris*, of the elbow/arm; *digitus*, finger; *superficialis*, on the surface; *profundus*, deep

Comprising: flexor carpi radialis, flexor carpi ulnaris, flexor digitorum superficialis, and flexor digitorum profundus.

ORIGIN
Common flexor origin on anterior aspect of medial epicondyle of humerus (i.e. lower medial end of humerus).

INSERTION
Carpals, metacarpals, and phalanges.

ACTION
Flexes wrist joint. (Flexor carpi radialis also abducts wrist joint; flexor carpi ulnaris also adducts wrist joint).
Antagonists: extensor carpi radialis brevis, extensor carpi radialis longus, extensor carpi ulnaris, extensor digitorum.

NERVE
Median nerve, C6, 7, 8, T1.

BASIC FUNCTIONAL MOVEMENT
Examples: pulling a rope in toward you; wielding an axe or hammer; pouring liquid from a bottle; turning a door handle.

REFERRED PAIN PATTERNS
Individual muscles refer to lower arm, wrist, hand, and fingers (see diagrams).

OVERVIEW

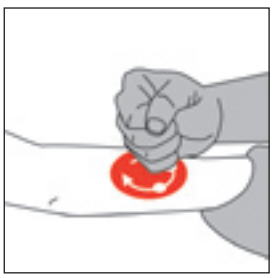
INDICATIONS
Hand/wrist/finger pain, trigger finger, cutting with scissors, gripping, golfer's elbow, RSI, hairdressers, turning hand to cupping action, tense finger flexors.

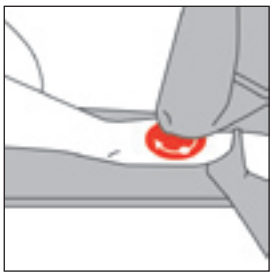
CAUSES
Prolonged gripping, massaging, wrist fractures or falls, casts, sports (e.g. forehand spin with racquet, using ski poles), occupational, trigger finger (flexor digitorum).

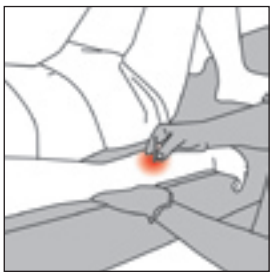
DIFFERENTIAL DIAGNOSIS
Ulnar neuritis. Cervical neuropathies. Carpal bone dysfunctions. De Quervain's tenosynovitis. RSI. Osteo- and rheumatoid arthritis. Radioulnar disc (distal) problems. Carpal tunnel syndrome. Medial epicondylitis.

CONNECTIONS
Shoulder/upper arm muscles, scalenes, flexor pollicis longus.

PRACTITIONER HANDS ON TECHNIQUES







✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

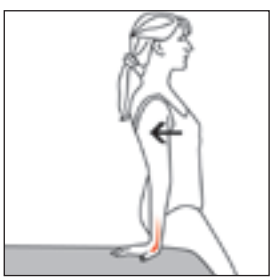
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

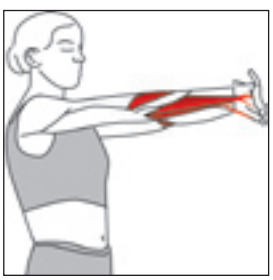
SELF HELP

Self-massage techniques can be helpful.

ADVICE
Avoid prolonged gripping. Avoid repeated twisting (screwdriver). Change golf grip. Regular breaks. Regular finger stretching.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.





BRACHIORADIALIS

Latin *brachialis*, relating to the arm; *radius*, staff, spoke of wheel

The brachioradialis is part of the superficial group and forms the lateral border of the cubital fossa. The muscle belly is prominent when working against resistance.

ORIGIN
Upper two-thirds of anterior aspect of lateral supracondylar ridge of humerus (i.e. lateral part of shaft of humerus, 5–7.5 cm (2–3") above elbow joint).

INSERTION
Lower lateral end of radius, just above styloid process.

ACTION
Flexes elbow joint. Assists in pronating and supinating forearm when these movements are resisted.

NERVE
Radial nerve, C**5**, **6**.

BASIC FUNCTIONAL MOVEMENT
Example: turning a corkscrew.

REFERRED PAIN PATTERNS
Lateral epicondyle area 3–4 cm patch with vague arm pain (radius border), localizing into strong pain in dorsum of thumb.

OVERVIEW

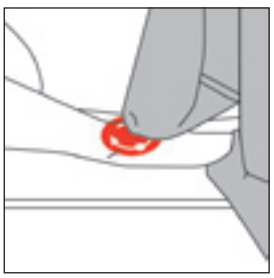
INDICATIONS
Elbow pain, pain in thumb (dorsum), tennis elbow, weakness of grip, RSI.

CAUSES
RSI, prolonged mouse use, racquet sports, poor stretching, playing musical instruments.

DIFFERENTIAL DIAGNOSIS
De Quervain's tenosynovitis.
Osteoarthritis of thumb (trapezium).

CONNECTIONS
Biceps brachiii, brachialis, extensor carpi radialis longus/brevis, supinator, extensor digitorum.

PRACTITIONER HANDS ON TECHNIQUES



✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

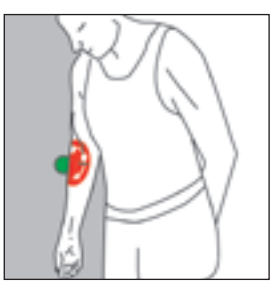
(Inhibition) Compression Technique (Pincer Grip)
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

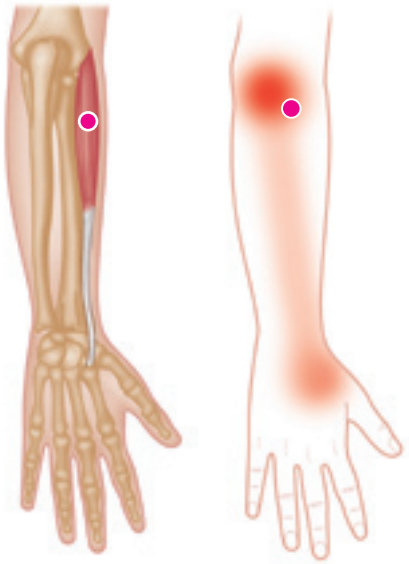
Self-massage techniques can be helpful.

ADVICE
Avoid prolonged standing and carrying (briefcases). Take regular breaks when typing. Use wrist supports. Change grip on tennis racquet.

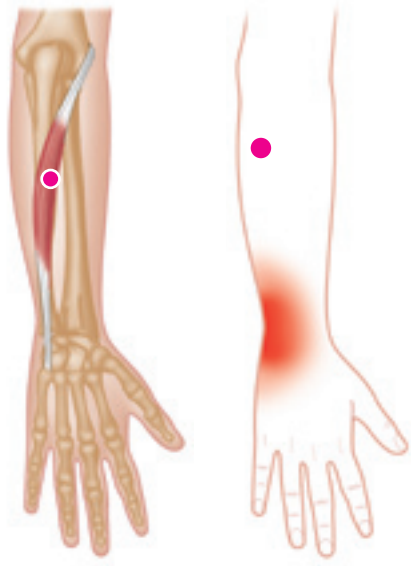
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.



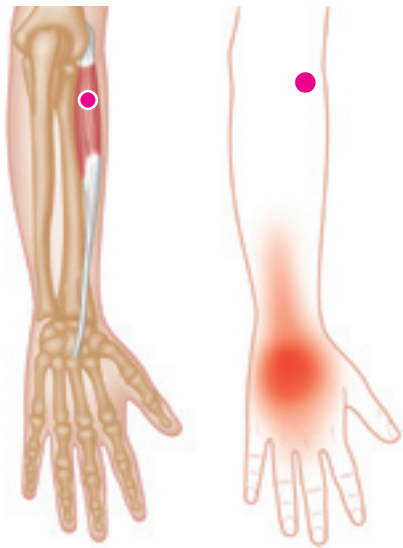
WRIST EXTENSORS



Extensor carpi radialis longus



Extensor carpi ulnaris



Extensor carpi radialis brevis

Latin *extendere*, to extend; *carpi*, of the wrist; *radius*, staff, spoke of wheel; *longus*, long; *brevis*, short; *ulnaris*, of the elbow

Comprising: extensor carpi radialis longus/brevis, and extensor carpi ulnaris.

ORIGIN

Common extensor tendon from lateral epicondyle of humerus (i.e. lower lateral end of humerus).

INSERTION

Dorsal surface of metacarpal bones.

ACTION

Extends wrist joint (extensor carpi radialis longus/brevis also abduct wrist joint; extensor carpi ulnaris also adducts wrist joint).
Antagonists: flexor carpi radialis, flexor carpi ulnaris.

NERVE

Radialis longus/brevis: radial nerve, C5, 6, 7, 8.
Extensor carpi ulnaris: deep radial (posterior interosseous) nerve, C5, 6, 7, 8.

BASIC FUNCTIONAL MOVEMENT

Examples: kneading dough; typing; cleaning windows.

REFERRED PAIN PATTERNS

Extensor carpi radialis longus: strong 2–3 cm zone over lateral epicondyle, diffusely radiating to dorsum of hand above thumb.
Extensor carpi radialis brevis: strong zone of pain 3–5 cm over dorsum of hand.
Extensor carpi ulnaris: strong, localized, specific referral to dorsal ulnar surface of hand and bulk of wrist.

OVERVIEW

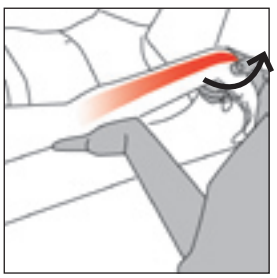
INDICATIONS
Forearm/elbow/wrist/hand pain, finger stiffness, painful/weak grip, tennis elbow, pain on gripping and twisting, seen in musicians/athletes/long-distance drivers, loss of control (fine) on gripping activities.

CAUSES
Computer mouse/keyboard, prolonged repetitive gripping (e.g. writing, ironing, using tools, throwing, massaging), wrist fractures or falls (extensor carpi ulnaris), casts, sports (e.g. racquet—tennis elbow, poles—skiing), occupational, playing musical instruments (piano, violin, drum).

DIFFERENTIAL DIAGNOSIS
Epicondylitis. C5–C6 radiculopathy. De Quervain's tenosynovitis. Articular dysfunction of wrist. Osteoarthritis. Carpal tunnel syndrome.

CONNECTIONS
Supinator, brachioradialis, extensor digitorum, triceps brachii, biceps brachii, anconeus.

PRACTITIONER HANDS ON TECHNIQUES



✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

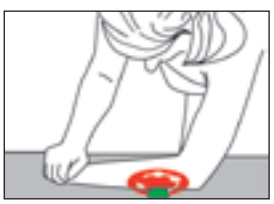
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

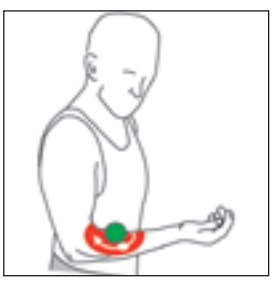
SELF HELP

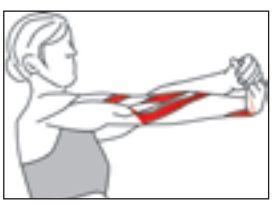
Self-massage techniques can be helpful.

ADVICE
Take regular breaks from typing, stretch muscles out, change mouse every six months. Avoid "over" gripping in sports. Take regular breaks/rests when gardening/driving. Explore occupational factors/ergonomics. Home stretching/exercises. Change grip width in golf/tennis. Use of wrist splints.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.







EXTENSOR DIGITORUM

Middle finger extensor

Ring finger extensor

Latin *extendere*, to extend; *digitus*, finger

Part of the superficial group. Each tendon of the extensor digitorum, over each metacarpophalangeal joint, forms a triangular membranous sheet called the *extensor hood* or *extensor expansion*, into which insert the lumbricales and interossei of the hand. The extensor digiti minimi and extensor indicis also insert into the extensor expansion.

ORIGIN

Common extensor tendon from lateral epicondyle of humerus (i.e. lower lateral end of humerus).

INSERTION

Dorsal surfaces of all phalanges of four fingers.

ACTION

Extends fingers (metacarpophalangeal and interphalangeal joints). Assists abduction (divergence) of fingers away from middle finger. Antagonists: flexor digitorum superficialis, flexor digitorum profundus.

NERVE

Deep radial (posterior interosseous) nerve, C**6**, **7**, **8**.

BASIC FUNCTIONAL MOVEMENT

Example: letting go of objects held in the hand.

REFERRED PAIN PATTERNS

Diffuse pain from forearm, becoming more intense in the appropriate finger (proximal metacarpal). Pain in lateral epicondyle.

OVERVIEW

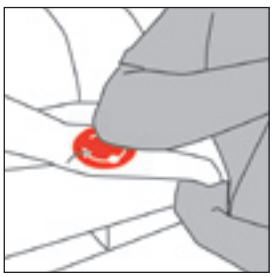
INDICATIONS
Finger/hand/wrist/elbow pain, stiffness/pain/weakness (decreased grip) in fingers, tennis elbow, pain on forceful gripping, often seen in professional musicians (especially guitarists).

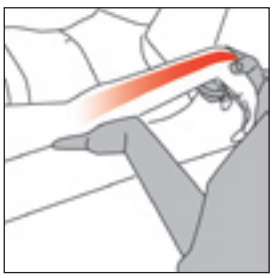
CAUSES
Computer mouse/keyboard, prolonged repetitive gripping (e.g. writing, ironing, using tools, throwing, massaging), wrist fractures or falls, casts, sports (e.g. racquet—tennis elbow, poles—skiing), occupational, playing musical instruments (e.g. piano, violin, drum), sleeping with hands curled under head/pillow.

DIFFERENTIAL DIAGNOSIS
Radiculopathy (cervical). Epicondylitis (tennis elbow). Osteoarthritis of fingers. De Quervain's tenosynovitis. Mechanical wrist pain (carpals).

CONNECTIONS
Brachioradialis, supinator, extensor carpi radialis longus, extensor indicis.

PRACTITIONER HANDS ON TECHNIQUES





✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

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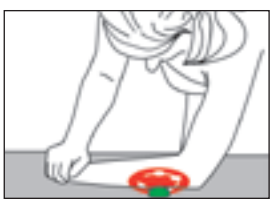
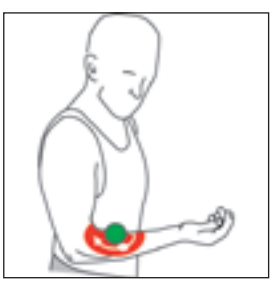
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

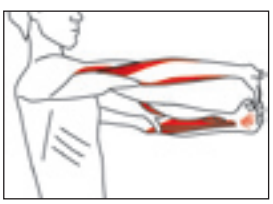
SELF HELP

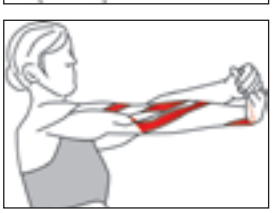
ADVICE
Take regular breaks from typing, stretch the muscles out, change mouse every six months. Home exercise program. Self-stretch. Avoid sustained gripping. Explore work posture/arrangement with reference to computer keyboards/mouse. Avoid habitual postures, such as sleeping with hands folded under head/pillow.

SELF-HELP TECHNIQUE
1. Review anatomy
2. Identify trigger point
3. Use stroking massage downward
4. Pause on trigger point until it softens
5. Continue massage to end of muscle
6. Repeat 3 times

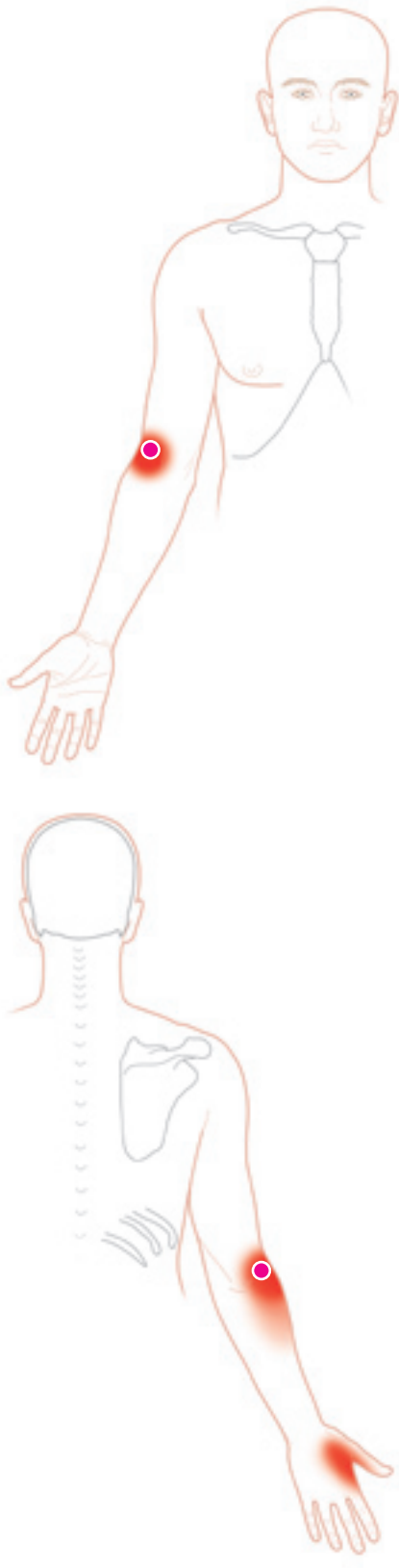








SUPINATOR



Latin *supinus*, lying on the back

Part of the deep group. The supinator is almost entirely concealed by the superficial muscles.

ORIGIN
Lateral epicondyle of humerus. Radial collateral (lateral) ligament of elbow joint. Annular ligament of superior radioulnar joint. Supinator crest of ulna.

INSERTION
Dorsal and lateral surfaces of upper third of radius.

ACTION
Supinates forearm (for which it is probably main prime mover, with biceps brachii being an auxiliary). Antagonists: pronator teres, pronator quadratus.

NERVE
Deep radial nerve, C5, **6**, (7).

BASIC FUNCTIONAL MOVEMENT
Example: turning a door handle or screwdriver.

REFERRED PAIN PATTERNS
Localized 3–5 cm strong zone of pain at lateral epicondyle and at web of thumb (dorsum).

OVERVIEW

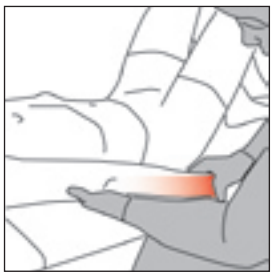
INDICATIONS
Tennis elbow, thumb joint pain, elbow pain (when carrying and at rest), pain turning doorknobs, localized pain on supination, chronic use of walking stick, pain on handshake.

CAUSES
Repetitive motions with straight arm (e.g. tennis, dog walking, carrying heavy case), repetitive motions (e.g. twisting, massaging, driving, ironing), trauma/strain, racquet sports.

DIFFERENTIAL DIAGNOSIS
De Quervain's tenosynovitis. Lateral epicondylitis (tendo-osseous, musculotendinous, intramuscular). Radial head dysfunction.

CONNECTIONS
Common extensors, biceps brachii, triceps brachii (insertion), anconeus, brachialis, palmaris longus, brachioradialis, extensor carpi radialis longus.

PRACTITIONER HANDS ON TECHNIQUES



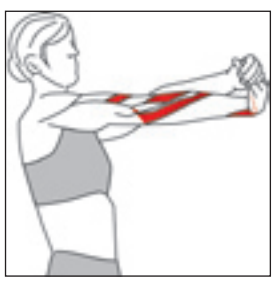
✓	✓	Spray and stretch
✓		Dry needling
		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

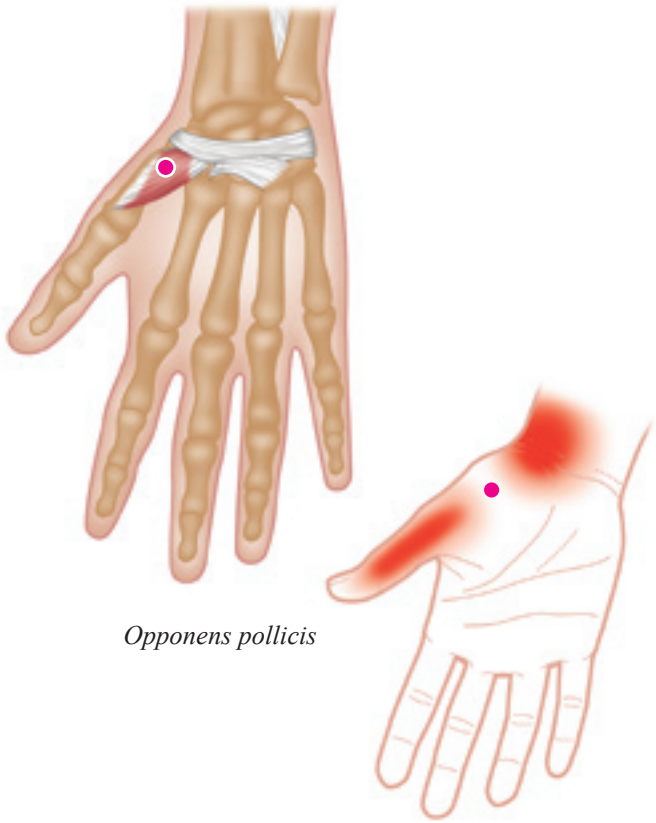
SELF HELP

Supinator is a deep muscle and is hard to differentiate from brachioradialis, so stretching is the best self-help procedure.

ADVICE
Take regular breaks from typing, stretch the muscles out, change hands regularly when dog walking. Elasticated supports may help. Change tennis style (keep wrists dorsiflexed). Change grip size. Avoid prolonged gripping/carrying. Change walking stick side regularly. Use pressure bandage/strap. Use backpack.



OPPONENS POLLICIS/ADDUCTOR POLLICIS



Opponens pollicis

Adductor pollicis

Latin *opponens*, opposing; *pollicis*, of the thumb; *adducere*, to lead toward

Opponens pollicis is part of the thenar eminence, usually partly fused with the flexor pollicis brevis, and is deep to the abductor pollicis brevis.

ORIGIN

Opponens pollicis: flexor retinaculum. Tubercle of trapezium.
Adductor pollicis: oblique fibers: anterior surfaces of 2nd and 3rd metacarpals, capitate, and trapezoid. Transverse fibers: palmar surface of 3rd metacarpal bone.

INSERTION

Opponens pollicis: entire length of radial border of 1st metacarpal.
Adductor pollicis: ulna (medial) side of base of proximal phalanx of thumb.

ACTION

Opponens pollicis: opposes (i.e. abducts, then slightly medially rotates, followed by flexion and adduction) thumb so that pad of thumb can be drawn into contact with pads of fingers.
Adductor pollicis: adducts thumb.
Antagonists: abductor pollicis longus, abductor pollicis brevis.

NERVE

Opponens pollicis: median nerve (C6, 7, 8, T1).
Adductor pollicis: deep ulnar nerve, C8, T1.

BASIC FUNCTIONAL MOVEMENT

Examples: picking up a small object between thumb and fingers (opponens pollicis); gripping a jam jar lid to screw it on (adductor pollicis).

REFERRED PAIN PATTERNS

Opponens pollicis: palmar wrist pain at distal radial head and into palmar aspect of thumb.
Adductor pollicis: dorsal and palmar surfaces of thumb, localized around metacarpophalangeal joint and radiating to web of thumb and thenar eminence.

OVERVIEW

INDICATIONS
"Weeder's thumb," thumb pain on activity, difficulty maintaining pincer movement, "texter's/video gamer's thumb," pain sewing/writing/opening jars, loss of fine motor control (e.g. buttoning, sewing, writing, painting).

CAUSES
Post wrist/thumb fracture, wrist splinting, grasping with thumb, carrying shopping, texting, holding e-reader/tablet, massaging, fine handiwork (e.g. writing, sewing, knitting, artwork, painting, airbrushing), playing musical instruments.

DIFFERENTIAL DIAGNOSIS
De Quervain's tenosynovitis. Osteoarthritis of thumb (saddle joint). Rheumatoid arthritis. Carpal tunnel syndrome. "Trigger thumb." Discopathy of distal radioulnar joint. Carpal bones dysfunction. Mechanical dysfunction. Fracture. Subluxation.

CONNECTIONS
Abductor pollicis brevis, flexor pollicis brevis/longus.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

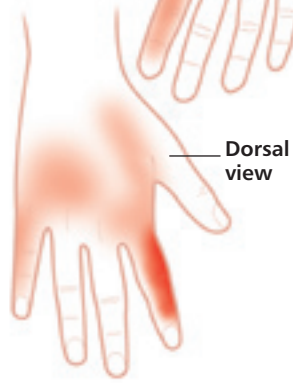
Self-massage/pressure techniques can be really helpful. Simply locating trigger point and pressing with other thumb can be enough; remember to hold trigger point until it softens. Alternatively, a range of pressure devices can be used.

ADVICE
Home stretching exercises. Take regular breaks. Ergonomic pens, etc. Use warmth.

SMALL HAND MUSCLES

Dorsal interossei

Lumbricales



First dorsal interosseous

Dorsal view
Second dorsal interosseous

Abductor digiti minimi

Dorsal view
Abductor digiti minimi

Latin *dorsum*, back; *interosseus*, between bones; *lumbricus*, earthworm; *abducere*, to lead away from; *digitus*, finger; *minimi*, smallest

Comprising: dorsal interossei, lumbricales, and abductor digiti minimi. The four dorsal interossei are about twice the size of the palmar interossei. The lumbricales are composed of small cylindrical muscles, one for each finger. The abductor digiti minimi is the most superficial muscle of the hypothenar eminence.

ORIGIN

Dorsal interossei: by two heads, each from adjacent sides of metacarpals.
Lumbricales: tendons of flexor digitorum profundus in palm.
Abductor digiti minimi: pisiform bone. Tendon of flexor carpi ulnaris.

INSERTION

Dorsal interossei: into extensor expansion and to base of proximal phalanx.
Lumbricales: lateral (radial) side of corresponding tendon of extensor digitorum, on dorsum of respective digits.
Abductor digiti minimi: ulna (medial) side of base of proximal phalanx of little finger.

ACTION

Dorsal interossei: abduct fingers away from middle finger.
Assist in flexion of fingers at metacarpophalangeal joints.
Antagonist: palmar interossei.
Lumbricales: extend interphalangeal joints and simultaneously flex metacarpophalangeal joints of fingers.
Abductor digiti minimi: abducts little finger.

NERVE

Dorsal interossei: ulnar nerve, C**8**, T**1**.
Lumbricales: lateral—median nerve, C(6), 7, **8**, T**1**; medial—ulnar nerve, C(7), **8**, T**1**.
Abductor digiti minimi: ulnar nerve, C(7), **8**, T**1**.

BASIC FUNCTIONAL MOVEMENT

Examples: spreading fingers; cupping hand; holding a large ball.

REFERRED PAIN PATTERNS

1st dorsal interossei: strong finger pain in dorsum of index finger (lateral half), with vague pain on palmar surface and dorsum of hand.
Other dorsal interossei: referred pain to specific associated finger.
Lumbricales: pattern is similar to interossei.
Abductor digiti minimi: pain in dorsum of little finger.

OVERVIEW

INDICATIONS
Finger pain/stiffness, pain when pinching/gripping, associated with Heberden's node(s) (e.g. in professional musicians, especially pianists), "arthritic" finger pain, also seen in artists/sculptors, Bouchard's nodes (middle knuckles).

CAUSES
Repetitive grasping, occupational, computer mouse, post wrist fracture and/or splinting, grasping, carrying shopping, typing, massaging, fine handiwork (e.g. writing, sewing, knitting, artwork, painting, airbrushing), playing musical instruments (e.g. piano, violin, guitar), sports (e.g. golf, archery, fencing).

DIFFERENTIAL DIAGNOSIS
Cervical radiculopathy. Ulnar neuritis. Thoracic outlet syndrome. Digital nerve entrapment. Articular dysfunction.

CONNECTIONS
Intrinsic thumb muscles, scalenes, latissimus dorsi, long finger flexors/extensors, pectoralis major, lateral/medial head triceps brachii.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

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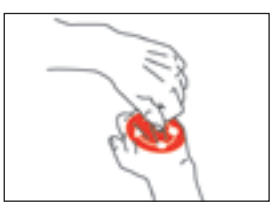
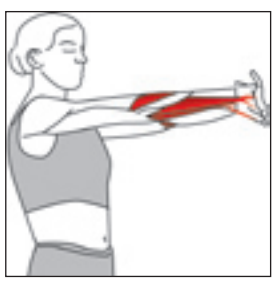
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

Self-massage/pressure techniques can be really helpful. Simply locating trigger points and pressing with other thumb can be enough; remember to hold trigger point until it softens. Alternatively, a range of pressure devices can be used, or even a pencil with a rubber.

ADVICE
Take a break from repetitive activities and stretch out. Stretching and exercising. Examine work postures/ergonomics. Explore sporting activities (e.g. grip in golf). Use of ergonomic pens/cutlery.



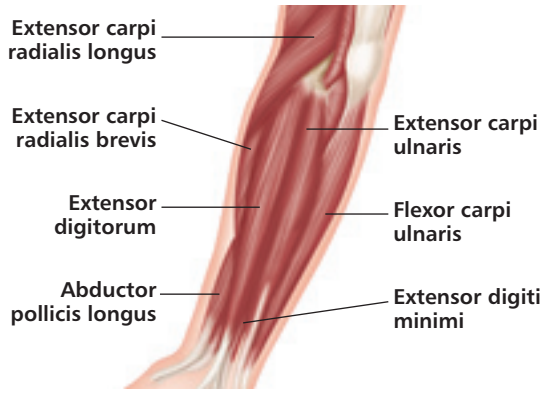


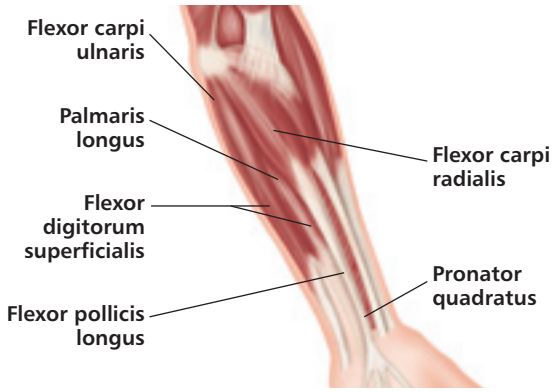
WRIST PAIN

Indications

Wrist pain can be a frustrating and debilitating problem for both sufferer and therapist. Repetitive jobs, computer-based work postures, and poor workplace ergonomics are leading to an ever-increasing incidence of RSI and occupational overuse syndrome (see Chapter 2 for the proper work set-up). Symptoms may include recurring pain (myalgia) or soreness in the neck, shoulders, upper back, wrists, or hands; tingling, numbness, coldness, or loss of sensation; loss of grip strength; lack of endurance; and weakness. It is important to view the hand and wrist in context. Chronic poor posture and problems in the head, neck, and shoulder should all be taken into account. There are often many trigger points to be found in the wrist flexors and extensors, all of which will need to be documented and addressed.

STEP 1 Study the anatomy and direction of the muscle fibers.





STEP 2 Sitting ICT to:

Scalenes group (STP)

Upper trapezius

Slow sliding massage downward onto rhomboids, pausing on trigger points.

STEP 3 Massage area generously.

STEP 4

Infraspinatus, wrist flexors, wrist flexor common origin (sustained), wrist extensors, common wrist extensor origin (sustained), palmaris longus (may be absent), interosseous membrane of radius and ulna, and small muscles of hand.

STEP 5 Apply gentle and thorough massage from elbows to hands.

11 Muscles of the Hip and Thigh

Regional Trigger Points for Hip, Thigh, and Knee Pain

MUSCLE PAGE REFERENCE
Adductor brevis 186
Adductor longus 186
Adductor magnus 186
Biceps femoris 184
Fibularis (peroneus) longus 202
Flexor digitorum brevis ... 216
Gastrocnemius 204
Gluteus maximus 174
Gluteus medius 178
Gluteus minimus 180
Iliocostalis thoracis 102
Iliopsoas 118
Pectineus 188
Piriformis 182
Popliteus 210
Quadratus lumborum 116
Rectus abdominis 114
Rectus femoris 192
Sartorius 190
Semimembranosus 184
Semitendinosus 184
Soleus 208
Vastus lateralis 192
Vastus medialis 192

(Outside of) thigh and hip pain
Gluteus minimus
Vastus lateralis
Piriformis
Quadratus lumborum
Tensor fasciae latae
Vastus intermedius
Gluteus maximus
Rectus femoris

(Inside of) thigh pain
Pectineus
Vastus medialis
Gracilis
Adductor magnus
Sartorius

(Front of) thigh pain
Rectus femoris
Vastus medialis
Adductor longus
Adductor brevis

(Back of) thigh pain
Gluteus minimus
Semitendinosus
Semimembranosus
Biceps femoris
Piriformis

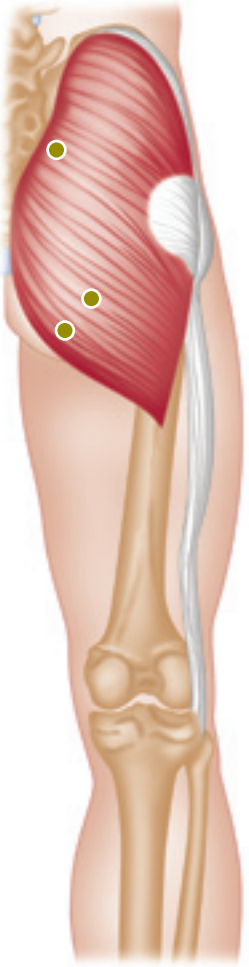
(Outside of) knee pain
Gluteus minimus (anterior portion)
Biceps femoris
Vastus lateralis
Peroneus longus
Gastrocnemius (lateral head)

(Inside of) knee pain
Gracilis
Vastus medialis
Rectus femoris
Sartorius
Adductor longus
Adductor brevis
Semimembranosus
Semitendinosus
Gastrocnemius (medial head)

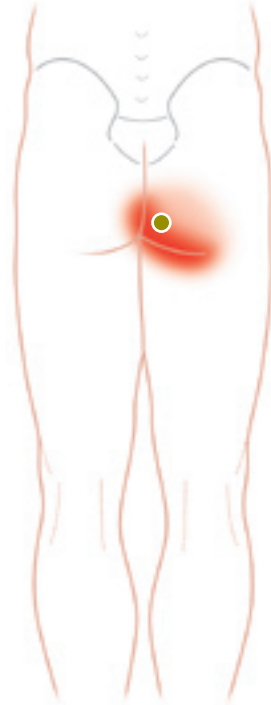
(Front of) knee pain
Quadriceps expansion (Ligamentum patellae)
Rectus femoris
Adductor longus
Adductor brevis
Vastus medialis

(Back of) knee pain
Popliteus
Soleus
Gastrocnemius (lateral head)
Gastrocnemius (medial head)
Biceps femoris
Semimembranosus
Semitendinosus

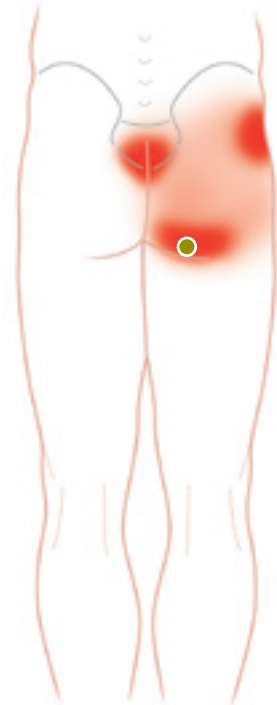
GLUTEUS MAXIMUS



Middle superior



Medial inferior



Middle inferior

Greek *gloutos*, buttock; Latin *maximus*, biggest

The gluteus maximus is the most coarsely fibered and heaviest muscle in the body, forming the bulk of the buttock.

ORIGIN

Outer surface of ilium behind posterior gluteal line and portion of bone superior and posterior to it. Adjacent posterior surface of sacrum and coccyx. Sacrotuberous ligament. Aponeurosis of erector spinae.

INSERTION

Deep fibers of distal portion: gluteal tuberosity of femur.
Remaining fibers: IT tract of fascia lata.

ACTION

Upper fibers: laterally rotate hip joint. May assist in abduction of hip joint.
Lower fibers: extend and laterally rotate hip joint (forceful extension as in running or rising from sitting). Extend trunk. Assists in adduction of hip joint.
Through its insertion into IT tract, helps to stabilize knee in extension.
Antagonist: iliopsoas.

NERVE

Inferior gluteal nerve, L**5**, S**1**, **2**.

BASIC FUNCTIONAL MOVEMENT

Examples: walking upstairs; rising from sitting.

REFERRED PAIN PATTERNS

Three to four strong zones of pain in buttock, with intercommunicating diffuse pain, occasionally just below (5–8 cm) gluteal fold.

OVERVIEW

INDICATIONS
Pain on sitting/climbing stairs/walking (uphill), pain on flexion, buttock pain in cold water/when swimming/after a fall or trip, night pain, restricted hip/thigh flexion, listing gait, cramping in cold, pain in tailbone (coccyx zone), feels like "sitting on a nail" when on hard seat, low back pain, stiff hips.

CAUSES
Sitting on wallet in back pocket, prolonged occupational driving/sitting (especially when leaning back), sleeping on one side, swimming, trauma (e.g. fall), intramuscular injection, short leg (PSLE), spinal anomaly, sacroiliac joint dysfunction, climbing, certain office chairs/car seats.

DIFFERENTIAL DIAGNOSIS
Coccydynia. Pelvic inflammatory disease. Lower lumbar discopathy. Sacroiliitis. Bursitis (ischial tuberosity/trochanteric). Mechanical low back pain.

CONNECTIONS
Other gluteal muscles, quadratus lumborum, pubococcygeus, hamstrings (attachment trigger points), abdominals.

PRACTITIONER HANDS ON TECHNIQUES

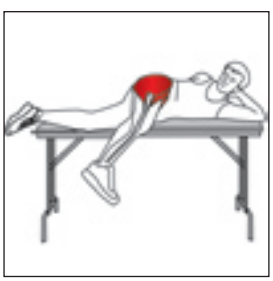
✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

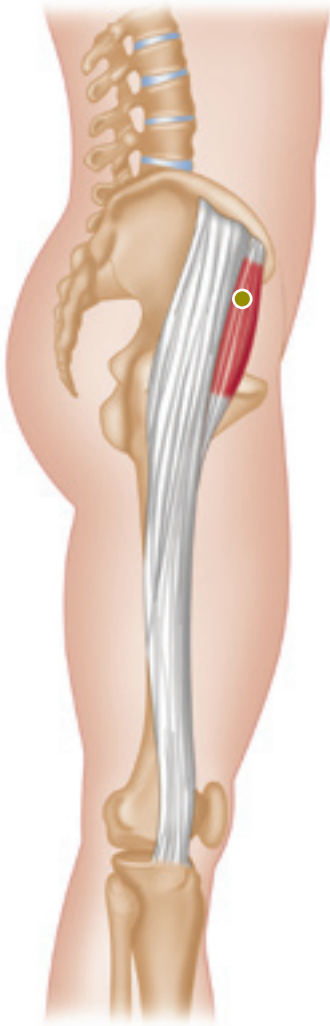
SELF HELP

Slow, deep trigger point massage can be helpful. Pressure products, balls and foam rollers are excellent for this muscle. Also try the compression inhibition technique and/or deep stroking massage.

ADVICE
Warmth and stretching. Gait and posture analysis. Pillow between/under knees when sleeping. Stretching program. Swimming (not crawl). Avoid crossing legs. Bend legs and keep back straight when lifting. Do not sit for more than 25 minutes at a time. Do not sleep on affected side.



TENSOR FASCIAE LATAE (TFL)



Latin *tendere*, to stretch; *fasciae*, of the band; *latae*, broad

This muscle lies anterior to the gluteus maximus, on the lateral side of the hip.

ORIGIN
Anterior part of outer lip of iliac crest, and outer surface of ASIS.

INSERTION
Joins IT tract just below level of greater trochanter.

ACTION
Flexes, abducts, and medially rotates hip joint. Tenses fascia lata, thus stabilizing knee joint. Redirects rotational forces produced by gluteus maximus.

NERVE
Superior gluteal nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT
Example: walking.

REFERRED PAIN PATTERNS
Strong elliptical zone of pain from greater trochanter inferolaterally toward fibula.

OVERVIEW

INDICATIONS
Hip/knee pain (lateral), pain on side lying/fast walking/sitting with knees flexed up, hip-replacement rehabilitation, fracture of neck of femur rehabilitation, a.m. hip stiffness.

CAUSES
Foot pronation when running (compensating for foot problems), short leg, bursitis of hip, sacroiliac joint dysfunction, poor sit-up technique, climbing, lifting heavy loads, being overweight.

DIFFERENTIAL DIAGNOSIS
Trochanteric bursitis. Osteoarthritic hip. Sacroiliitis. Lumbar spondylosis.

CONNECTIONS
Gluteals, vastus lateralis, rectus femoris, sartorius, quadratus lumborum, iliopsoas, paraspinals.

PRACTITIONER HANDS ON TECHNIQUES

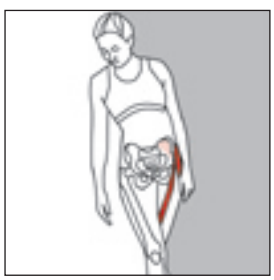
✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

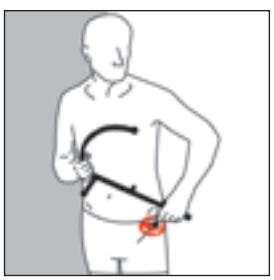
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

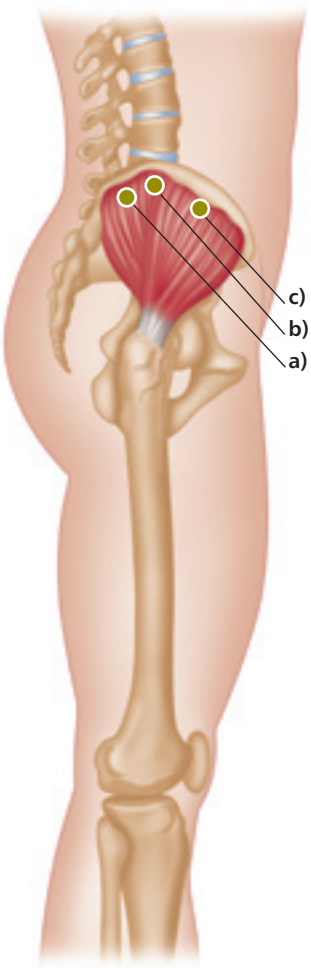
ADVICE
Avoiding prolonged positions (flexion). Avoid habitual postures (crossed legs, or standing on one leg). Pillow between knees at night. Running style, gait, and posture assessment. Warm up. Stretch regularly.

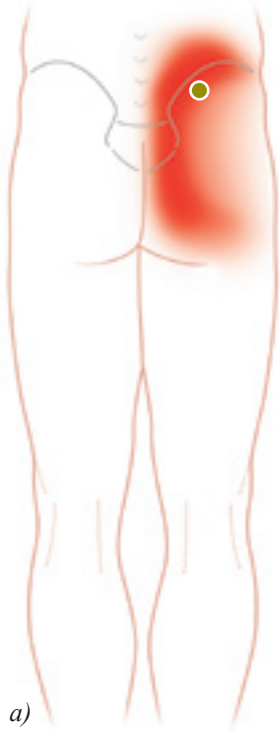
SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run down from top of pelvis toward to front of thigh, identifying and noting painful spots and knots.
3. Run up in opposite direction toward pelvis.
4. Work using thumbs, with small scooping movements.
5. Pause on painful knots until pain remits and then follow stroke to end of muscle.

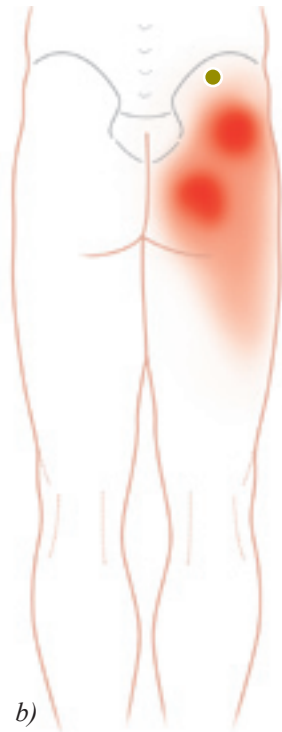




GLUTEUS MEDIUS







Greek *gloutos*, buttock; Latin *medius*, middle

This muscle is mostly deep to and obscured therefore by the gluteus maximus, but appears on the surface between the gluteus maximus and the TFL. During walking, this muscle, along with the gluteus minimus, prevents the pelvis from dropping toward the non-weight-bearing leg.

ORIGIN
Outer surface of ilium inferior to iliac crest, between posterior gluteal line and anterior gluteal line.

INSERTION
Oblique ridge on lateral surface of greater trochanter of femur.

ACTION
Abducts hip joint. Anterior fibers medially rotate and may assist in flexion of hip joint. Posterior fibers slightly laterally rotate hip joint. Antagonists: lateral rotator group.

NERVE
Superior gluteal nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT
Example: stepping sideways over an object, such as a low fence.

REFERRED PAIN PATTERNS
Low back, medial buttock, and sacral and lateral hip, radiating somewhat into upper thigh.

OVERVIEW

INDICATIONS
Pain and tenderness in low back/buttocks (e.g. heavy lifting), night pain, pain on side lying, post hip or spinal surgery, sitting on wallet, leg length discrepancy, hip/back pain in bed, arthritic hip, hip pain, post hip fracture/surgery, pregnancy.

CAUSES
Sports injury (tennis, running, aerobics, upright biking), trauma from fall, motorcycling, injections in buttocks, standing on one leg, sitting cross-legged.

DIFFERENTIAL DIAGNOSIS
Radiculopathy (lumbosacral). Sacroiliitis. Hip joint dysfunction. Coccydynia. Greater tuberosity bursitis. Mechanical low back pain. Intermittent claudication.

CONNECTIONS
Quadratus lumborum, other gluteal muscles, pubococcygeus, TFL, IT band, piriformis, lumbar erector spinae.

PRACTITIONER HANDS ON TECHNIQUES

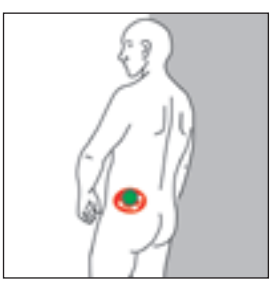
- ✓✓ Spray and stretch
- ✓✓ Dry needling
- ✓✓ Deep stroking massage
- ✓✓ Compression
- ✓✓ Muscle energy
- ✓✓ Positional release
- ✓✓ Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

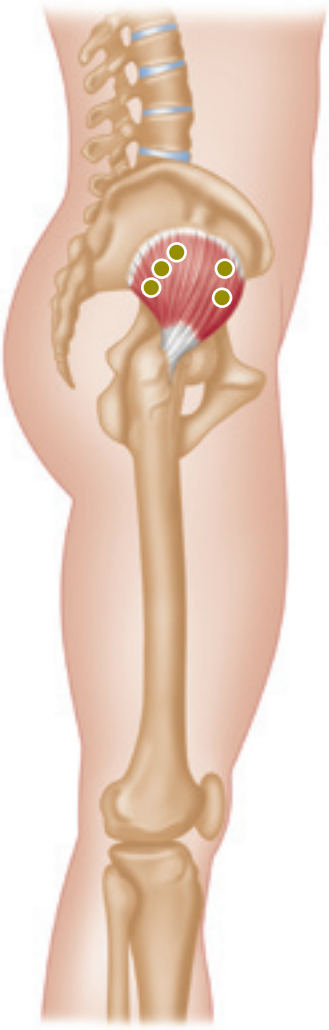
SELF HELP

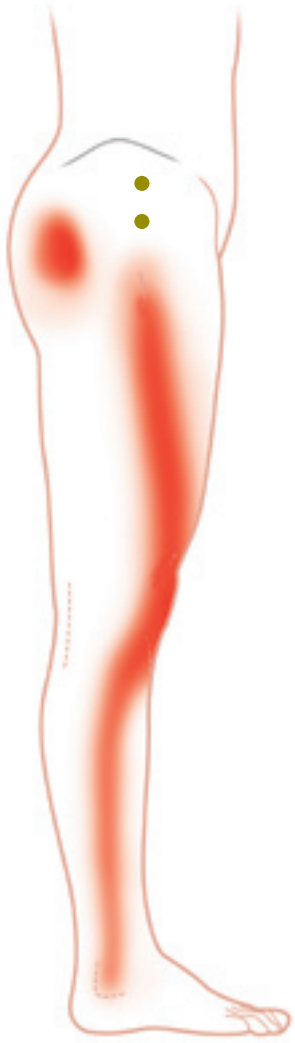
ADVICE
Gait and posture analysis. Pillow between knees. Habitual postures. Stretching techniques.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy.
2. Run downward from rim of pelvis toward front of thigh, identifying and noting painful spots and knots.
3. Work using thumbs, with small scooping movements.
4. Pause on painful knots until pain subsides—you may want to increase pressure, even up to someone else using an elbow.
5. Follow stroke to end of muscle.

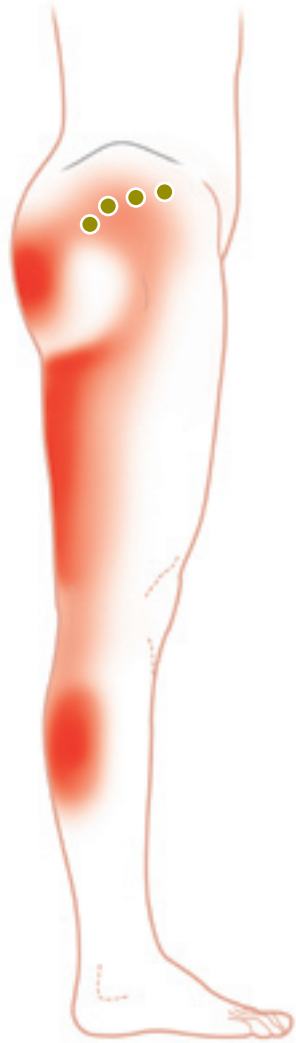


GLUTEUS MINIMUS





Anterior portion



Multiple trigger points

Greek *gloutos*, buttock; Latin *minimus*, smallest

The gluteus minimus is situated anteroinferior and deep to the gluteus medius, whose fibers obscure it.

ORIGIN
Outer surface of ilium between anterior and inferior gluteal lines.

INSERTION
Anterior border of greater trochanter.

ACTION
Abducts, medially rotates, and may assist in flexion of hip joint.
Antagonists: lateral rotator group.

NERVE
Superior gluteal nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT
Example: stepping sideways over an object, such as a low fence.

REFERRED PAIN PATTERNS
A multipennate muscle with multiple anterior, middle, and posterior trigger points referring strong pain in lower buttock, hip, and lateral lower extremity beyond knee to ankle and calf.

OVERVIEW

INDICATIONS
Pain sitting to standing, pain at rest/walking/side lying, night pain (may wake), hip replacement, sciatica/pseudosciatica, leg length discrepancy, postural issues, hip pain in bed, arthritic hip, post hip surgery.

CAUSES
Sitting on wallet, sports injury (tennis, running, biking), trauma from fall, motorcycling, standing on one leg, sitting cross-legged, hip/knee/ankle injury/fracture, leg casts.

DIFFERENTIAL DIAGNOSIS
Radiculopathy (lumbar). Sacroiliitis. Hip joint dysfunction. Sciatic irritation. Hip bursitis.

CONNECTIONS
TFL, other gluteal muscles, vastus lateralis, IT band, quadratus lumborum, peroneal muscles, piriformis, pelvic alignment.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

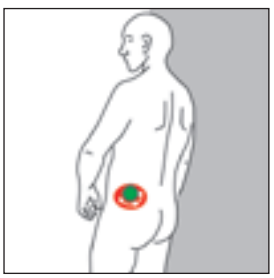
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

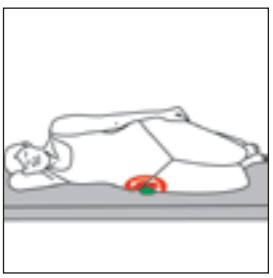
SELF HELP

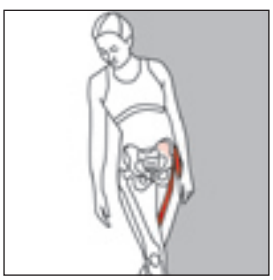
A huge percentage of leg pain, including sciatica, has a connection to gluteus minimus and hamstrings.

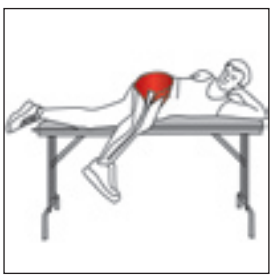
ADVICE
Gait and posture. Habitual postures. Overload. Allow legs to "hang" off bed.

SELF-HELP TECHNIQUE
1. Observe muscle fiber directions in anatomy; remember, it is deeper and smaller than gluteus medius.
2. Run downward from rim of pelvis toward hip joint, identifying and noting painful spots and knots.
3. Pause on painful knots until pain subsides—you may want to increase pressure, even up to someone else using an elbow.
4. Follow stroke to end of muscle.
5. Repeat.

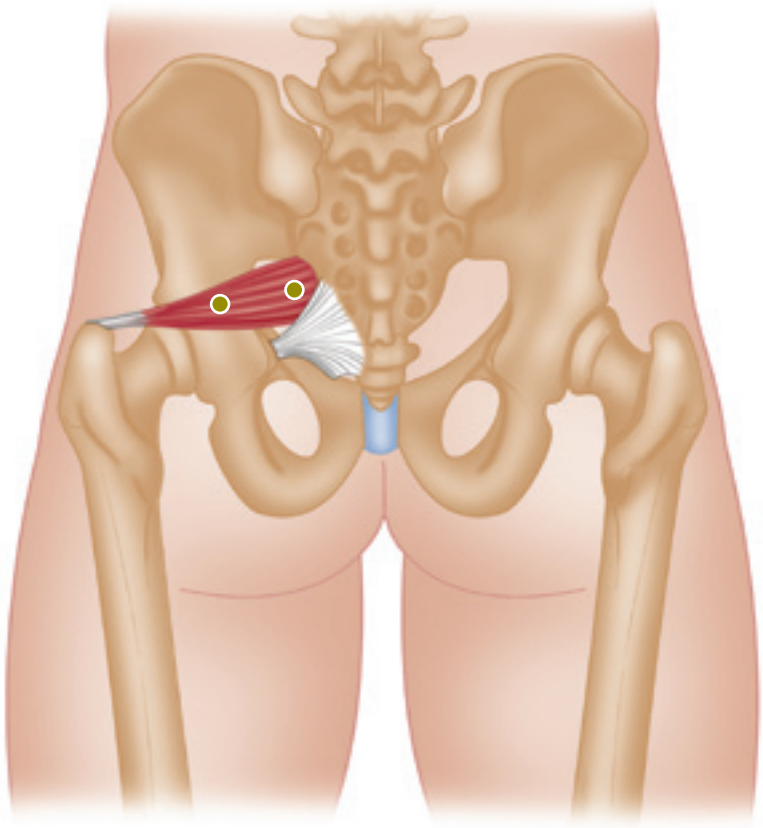


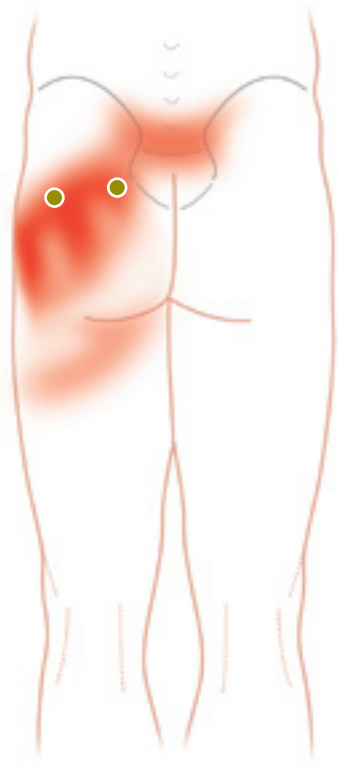






PIRIFORMIS





Latin *pirum*, pear, *forma*, shape

The piriformis leaves the pelvis by passing through the greater sciatic foramen.

ORIGIN
Internal surface of sacrum. Sacrotuberous ligament.

INSERTION
Superior border of greater trochanter of femur.

ACTION
Laterally rotates hip joint. Abducts thigh when hip is flexed. Helps hold head of femur in acetabulum.

NERVE
Ventral rami of lumbar nerve, L(5) and sacral nerves, S**1**, **2**.

BASIC FUNCTIONAL MOVEMENT
Example: taking first leg out of a car.

REFERRED PAIN PATTERNS
Two strong zones of pain: (1) 3–4 cm zone lateral to coccyx; (2) 7–10 cm zone posterolateral buttock/hip joint. Also broad spillover of diffuse pain between (1) and (2) and down thigh to above the knee.

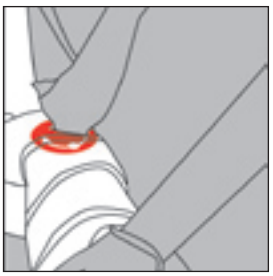
OVERVIEW

INDICATIONS
Constant "deep" ache in buttock, sciatica (pseudosciatica), vascular compression posterior legs, low back/buttock pain (worse when sitting), often starts after a fall or sitting on wallet when driving, foot/rectal/sacroiliac pain, sexual dysfunction (dyspareunia), piriformis syndrome (sciatica, local, and pelvic pain)—up to six times more common in women, pain worse on sitting.

CAUSES
Prolonged driving, trauma from fall, cycling/motorcycling, standing on one leg, hip surgery, sitting cross-legged, hip/knee/ankle injury/fracture, leg casts, high-heeled shoes, pelvic inflammatory disease (PID), sexual intercourse position, childbirth, arthritic hip, sacroiliac joint dysfunction, PSLE, improper/old orthotics.

DIFFERENTIAL DIAGNOSIS
Sacroiliitis. Lumbar radiculopathy. Coccydynia. Osteoarthritic hip. HLA (human leukocyte antigen)—B27 condition. Spinal stenosis. Discopathy (lumbar).

PRACTITIONER HANDS ON TECHNIQUES



CONNECTIONS
Leg length discrepancy, gluteal muscles, quadratus lumborum, attachment trigger point (origin) hamstrings, gemelli, obturators, quadratus femoris, levator ani, coccygeus.

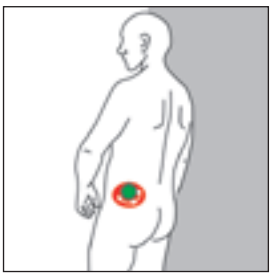
✓		Spray and stretch
✓	✓	Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓	✓	Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

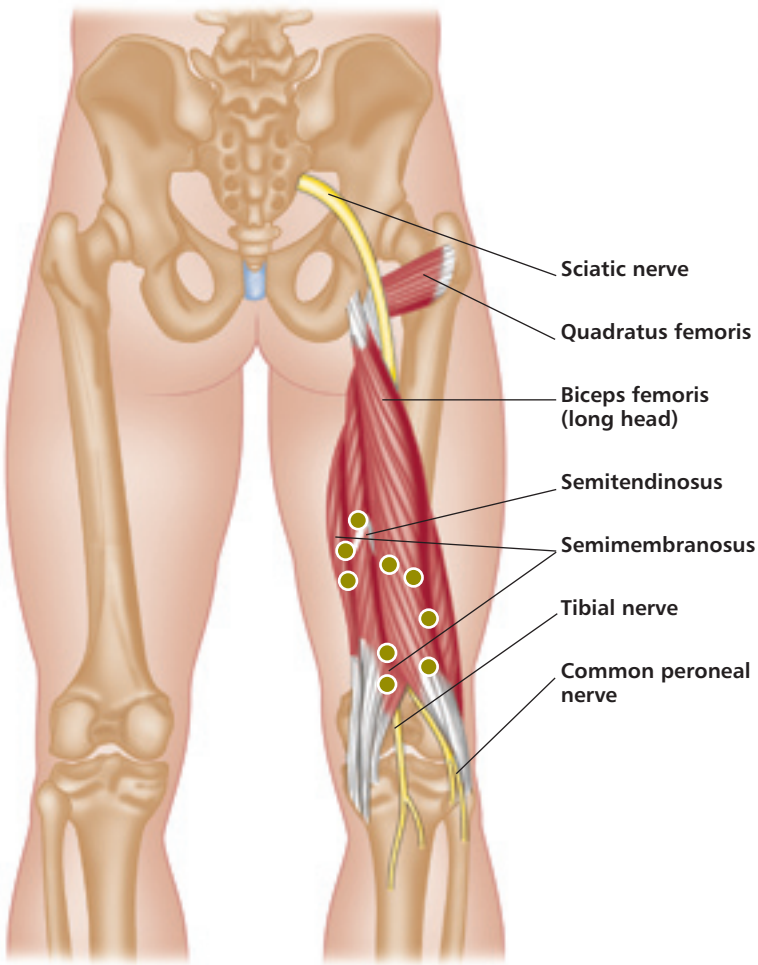
SELF HELP

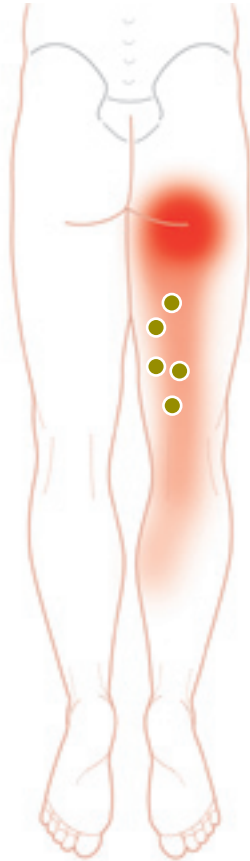
Piriformis is a deep muscle, and when it is irritated can take some time to settle down. It is best treated, however, with stretching by a therapist; balls can be extremely helpful in many cases.

ADVICE
Avoid habitual postures (e.g. sitting cross-legged). Gait and posture analysis with reference to foot position. Driving position (foot). Self-stretch. Use of self-massage tools.

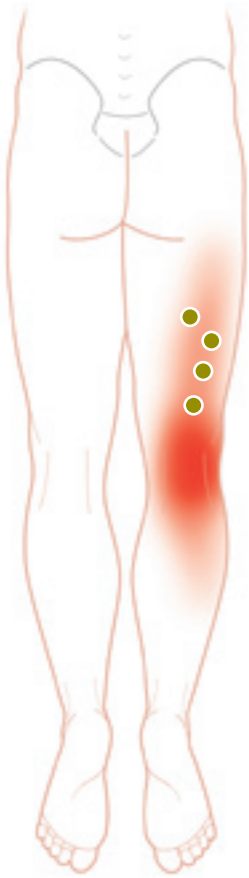


HAMSTRINGS





Semimembranosus/ Semitendinosus



Biceps femoris (short and long heads)

German *hamme*, back of leg; Latin, *stringere*, to draw together

The hamstrings consist of three muscles. From medial to lateral they are the semimembranosus, semitendinosus, and biceps femoris.

ORIGIN

Ischial tuberosity (sitting bone). Biceps femoris also originates from back of femur.

INSERTION

Semimembranosus: back of medial condyle of tibia (upper side part of tibia).
Semitendinosus: upper medial surface of shaft of tibia.
Biceps femoris: lateral side of head of fibula. Lateral condyle of tibia.

ACTION

Flex knee joint. Extend hip joint. Semimembranosus and semitendinosus also medially rotate (turn in) lower leg when knee is flexed.
Biceps femoris laterally rotates (turns out) lower leg when knee is flexed.
Antagonists: quadriceps.

NERVE

Branches of sciatic nerve, L4, **5**, S**1**, **2**, 3.

BASIC FUNCTIONAL MOVEMENT

During running, the hamstrings slow down leg at end of its forward swing and prevent trunk from flexing at hip joint.

REFERRED PAIN PATTERNS

Semimembranosus and semitendinosus: strong 10 cm zone of pain, inferior gluteal fold, with diffuse pain posteromedial legs to Achilles tendon area.
Biceps femoris: diffuse pain posteromedial legs, with strong 10 cm zone posterior to knee joint.

OVERVIEW

INDICATIONS
Posterior thigh pain sitting/walking (worse at night), tenderness in back of legs may cause limping, pain worse on sitting, post back surgery, hamstring pain cycling/soccer/basketball/tennis/football.

CAUSES
Prolonged driving, improper sitting/work chair that digs into back of thighs, hip surgery, sitting cross-legged, hip/knee/ankle injury/fracture, leg casts, high-heeled shoes, PSLE, sacroiliac joint dysfunction, improper stretching before/after sport.

DIFFERENTIAL DIAGNOSIS
Sciatica. Radiculopathy. Muscle tears. Osteitis. Bursitic osteoarthritis of knee. Knee joint dysfunction. Tenosynovitis.

CONNECTIONS
Piriformis, popliteus, gluteal muscles, obturator internus, vastus lateralis, plantaris, gastrocnemius, thoracolumbar paraspinal muscles.

PRACTITIONER HANDS ON TECHNIQUES

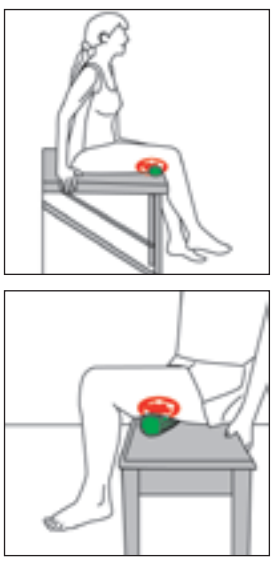
- ✓ ✓ Spray and stretch
- ✓ ✓ Dry needling
- ✓ ✓ Deep stroking massage
- ✓ ✓ Compression
- ✓ ✓ Muscle energy
- ✓ ✓ Positional release
- ✓ ✓ Wet needling

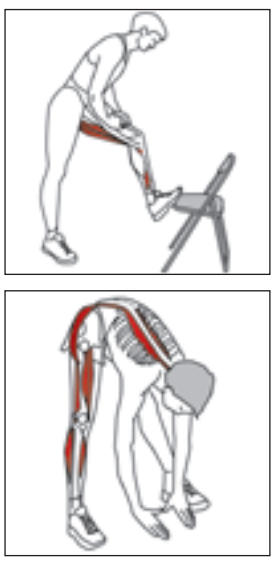
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

SELF HELP

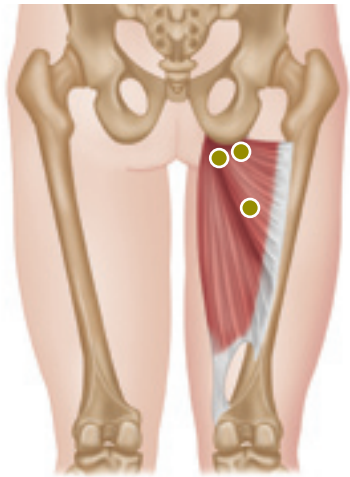
Trigger points in hamstrings often occur from improper stretching before and after sports. It is very important to get the stretching techniques down pat. Balls and foam rollers can be very good for relieving pain and stiffness when you are at home.

ADVICE
Regular stretching with hot and/or cold. Warm up before and cool down after exercise. Hot showers/baths. Car seat posture. Work posture. Cycling positions.

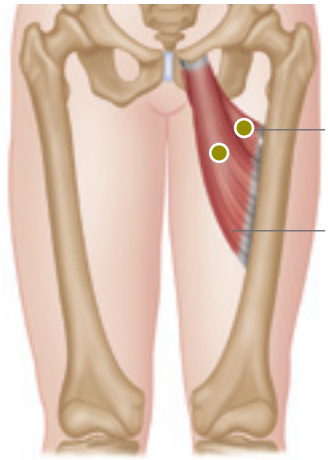


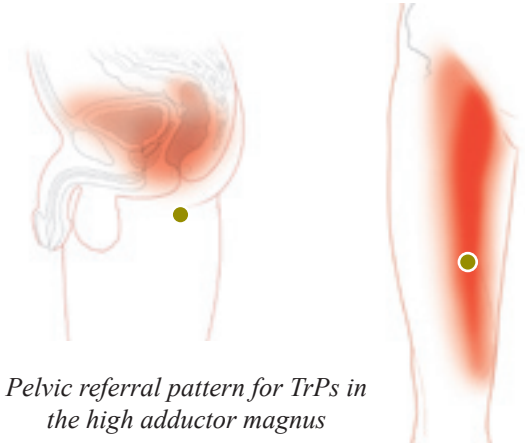


ADDUCTORS



Adductor magnus posterior view





Pelvic referral pattern for TrPs in the high adductor magnus

Adductor brevis and adductor longus

Latin *adducere*, to lead toward; *magnus*, large; *brevis*, short; *longus*, long

The adductor magnus is the largest of the adductor muscle group, which also includes the adductor brevis and adductor longus. The adductor longus is the most anterior of the three. The adductor brevis lies anterior to the adductor magnus. The lateral border of the upper fibers of the adductor longus form the medial border of the femoral triangle (the sartorius forms the lateral boundary; the inguinal ligament forms the superior boundary).

ORIGIN

Anterior part of pubic bone (ramus). Adductor magnus also takes origin from ischial tuberosity.

INSERTION

Whole length of medial side of femur, from hip to knee.

ACTION

Adduct and laterally rotate hip joint. Adductors longus/brevis also flex extended femur and extend flexed femur.

NERVE

Magnus: posterior division of obturator nerve L2, **3**, **4**. Tibial portion of sciatic nerve, L**4**, 5, S1.
Brevis: anterior division of obturator nerve, (L2–L4). Sometimes the posterior division also supplies a branch to it.
Longus: anterior division of obturator nerve, L**2**, **3**, **4**.

BASIC FUNCTIONAL MOVEMENT

Example: bringing second leg in or out of a car.

REFERRED PAIN PATTERNS

There are several zones of referred pain: (1) two zones localized around anterior hip 5–8 cm, and above knee 5–8 cm; (2) whole anteromedial thigh from inguinal ligament to medial knee joint; (3) medial thigh from hip to knee.

OVERVIEW

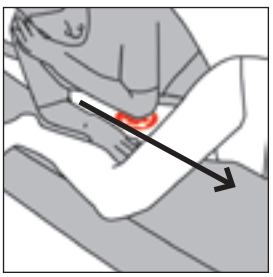
INDICATIONS
Deep pain/tenderness in medial thigh, hip/leg stiffness on abduction, pain on weight bearing/rotating hip, "clicky" hip, hot/stinging pain under thigh, groin strain, post hip-replacement/fracture rehabilitation, renal tubular acidosis, swollen legs, osteoarthritis of hip.

CAUSES
Leg splint/cast, foot/ankle problems, sudden overload due to gymnastics, football/ice skating injury, horse riding, skiing, cross-legged sitting.

DIFFERENTIAL DIAGNOSIS
Avulsion. Pubic symphysis dysfunction. Neuropathy. Lymphadenopathy. Hernia. Knee pain (mechanical). Osteoarthritic hip. Femoral herniation.

CONNECTIONS
Pectineus, vastus medialis, iliopsoas, vastus lateralis, sartorius (lower end).

PRACTITIONER HANDS ON TECHNIQUES



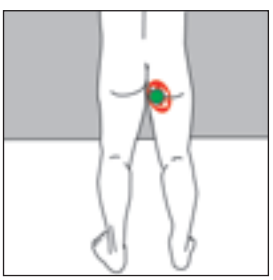
✓		Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

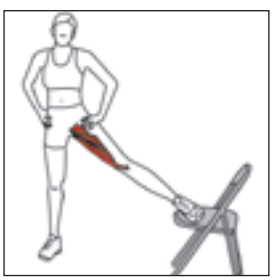
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

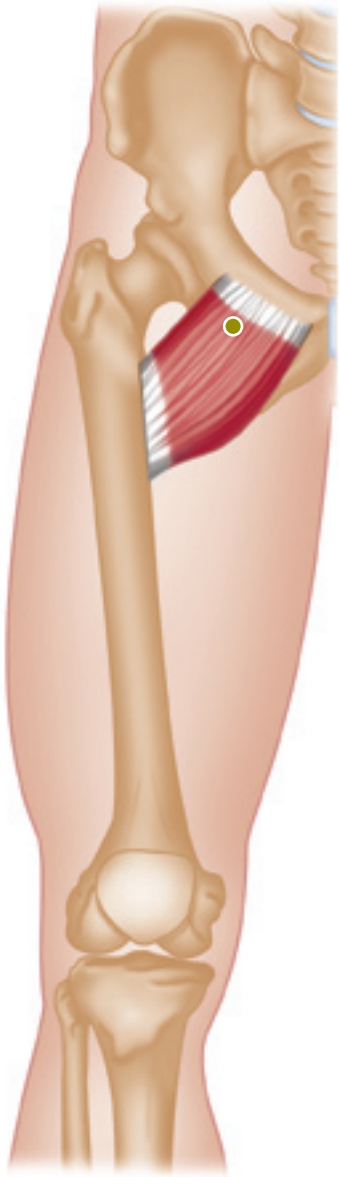
Use direct finger pressure, balls, and/or a Theracane.

ADVICE
Modify activities until trigger points diminish. Home stretch program. Avoid overuse at gym. Explore habitual postures. Skiing/cycling techniques. Vitamin/mineral deficiency.





PECTINEUS



Latin *pectinatus*, comb shaped

The pectineus is sandwiched between the psoas major and the adductor longus.

ORIGIN
Pecten of pubis, between iliopubic (iliopectineal) eminence and pubic tubercle.

INSERTION
Pectineal line, from lesser trochanter to linea aspera of femur.

ACTION
Adducts hip joint. Flexes hip joint.

NERVE
Femoral nerve, L**2**, **3**, **4**.
Occasionally receives an additional branch from obturator nerve, L3.

BASIC FUNCTIONAL MOVEMENT
Example: walking along a straight line.

REFERRED PAIN PATTERNS
Strong 8–12 cm zone of pain in anterior groin, with more diffuse radiations in an oval, toward the anteromedial thigh.

OVERVIEW

INDICATIONS
Persistent "internal" groin pain, groin strain, hip pain, post hip-replacement rehabilitation, post hip fracture, pregnancy, postpartum, pain during sexual intercourse/ hip adduction exercises (gym), osteoarthritis of hip.

CAUSES
Leg splint/cast, foot/ankle problems, sudden overload due to gymnastics, football/ice skating injury, horse riding, skiing, cross-legged sitting.

DIFFERENTIAL DIAGNOSIS
Inguinal hernia. Femoral hernia. Lymphadenopathy. Meralgia paresthetica. Lumbar radiculopathy. Vascular incompetence.

CONNECTIONS
Adductor longus/brevis, iliopsoas, leg length discrepancy.

PRACTITIONER HANDS ON TECHNIQUES

✓		Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

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Indications: subacute to chronic settings
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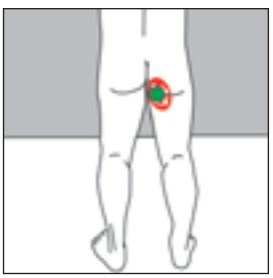
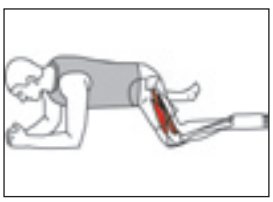
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

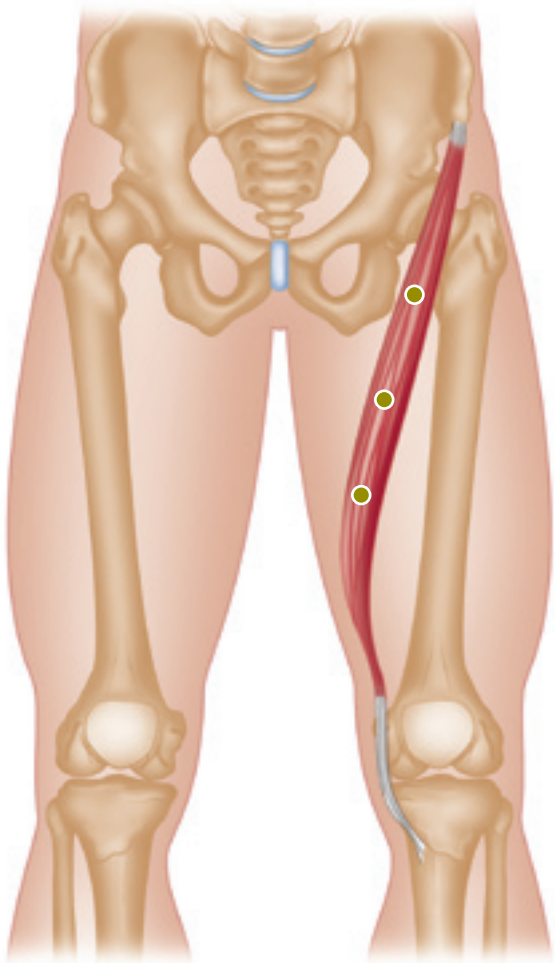
Use direct finger pressure, stretching techniques, balls, and/or a Theracane.

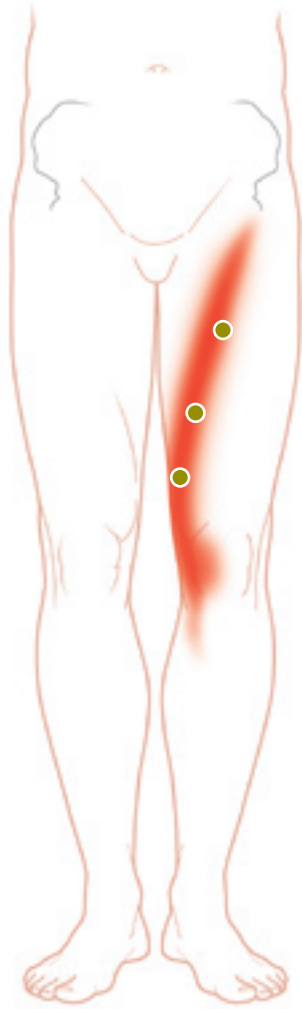
ADVICE
Modify activities until trigger points diminish. Avoid repetitive hip adduction/flexion, such as yoga positions (lotus). Avoid sitting cross-legged.





SARTORIUS





Latin *sartor*, tailor

The sartorius is the most superficial muscle of the anterior thigh, and also the longest strap muscle in the body. The medial border of the upper third of this muscle forms the lateral boundary of the femoral triangle (the adductor longus forms the medial boundary; the inguinal ligament forms the superior boundary). The action of the sartorius is to put the lower limbs in the cross-legged seated position of the tailor (hence its name from the Latin).

ORIGIN
ASIS and area immediately below it.

INSERTION
Upper part of medial surface of tibia, near anterior border.

ACTION
Flexes hip joint (helping to bring leg forward in walking or running). Laterally rotates and abducts hip joint. Flexes knee joint. Assists in medial rotation of tibia on femur after flexion. These actions may be summarized by saying that it places heel on knee of opposite limb.

NERVE
Two branches from femoral nerve, L**2**, **3**, (4).

BASIC FUNCTIONAL MOVEMENT
Example: sitting cross-legged.

REFERRED PAIN PATTERNS
Vague tingling from ASIS anteromedial medially across thigh toward medial knee joint.

OVERVIEW

INDICATIONS
Ache in anterior thigh, sharp/tingling pain from hip to medial knee, pain after a twisting fall.

CAUSES
Gait/posture issues, sudden overload due to gymnastics, football/ice skating injury, horse riding, skiing, falling.

DIFFERENTIAL DIAGNOSIS
Meralgia paresthetica. Knee joint pathology. Lumbar radiculopathy. Inguinal lymphadenopathy. Vascular pathology. Inguinal and/or femoral hernia.

CONNECTIONS
Vastus medialis, biceps femoris, gracilis, pectineus, TFL.

PRACTITIONER HANDS ON TECHNIQUES

✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

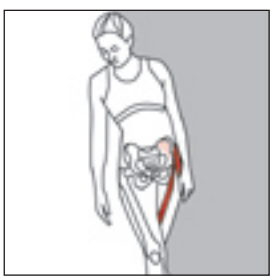
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

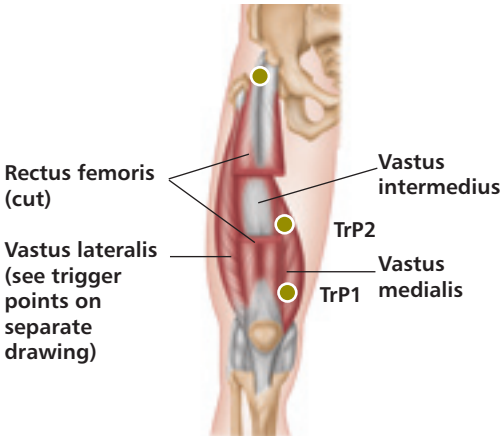
Self-massage is the best option as it can be a painful and quite delicate area. Take care not to bruise if you are on any blood-thinning medication.

ADVICE
Gait and posture analysis. Prolonged sitting positions with knees crossed. Habitual postures. Can be overactive, secondary to obesity and/or exercise (e.g. running with foot everted). Stretching exercises. Pillow between knees.

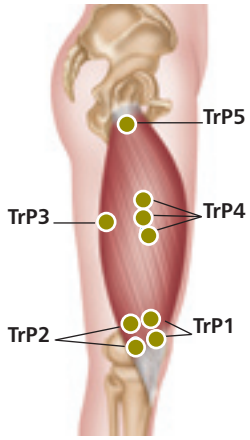
SELF-HELP TECHNIQUE
1. Identify muscle.
2. Starting at inner thigh, work down muscle with sliding/ stroking massage until you locate trigger point.
3. Apply sustained pressure until trigger point yields.
4. Continue stroking massage until knee insertion.



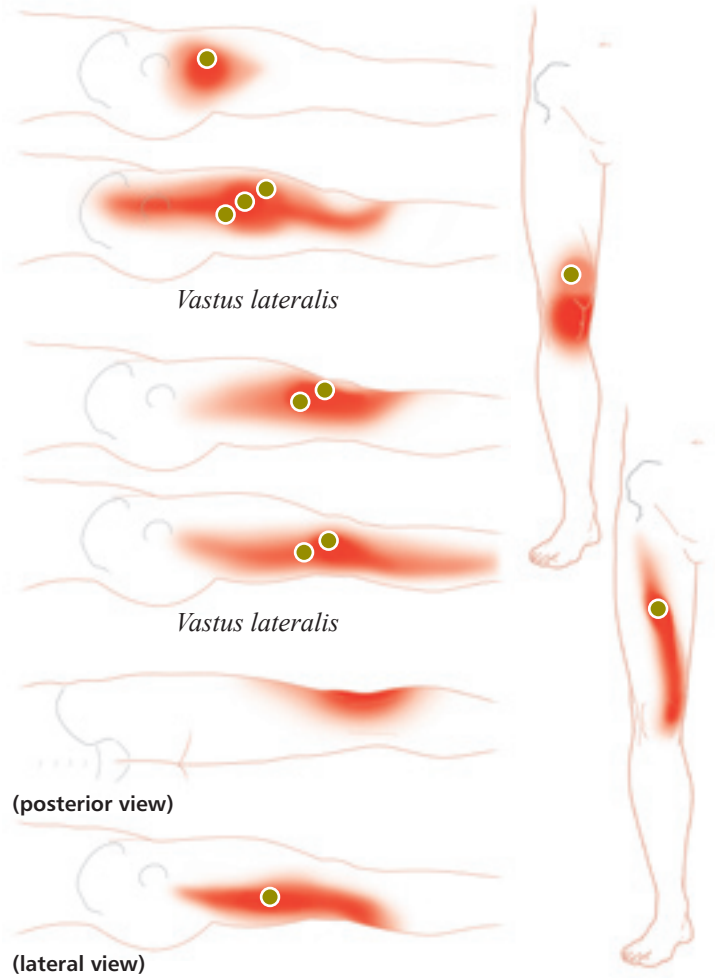
QUADRICEPS



Front view



You will need to move the knee cap out of the way to get to TrP1 points



Latin *quadriceps*, four-headed; *rectus*, straight; *femoris*, of the thigh; *vastus*, great or vast; *lateralis*, pertaining to the side; *medialis*, in the middle; *intermedius*, intermediate

Comprising: rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius. All four quadriceps muscles cross the knee joint, but the rectus femoris is the only one having two heads of origin and also crossing the hip joint. The quadriceps straighten the knee when rising from sitting, during walking, and climbing. The vasti muscles as a group pay out to control sitting-down movements.

ORIGIN

Vastus group: upper half of shaft of femur.
Rectus femoris: front part of ilium (AIIS). Area above hip socket.

INSERTION

Patella, then via patellar ligament into upper anterior part of tibia (tibial tuberosity).

ACTION

Vastus group: extends knee joint.
Rectus femoris: extends knee joint, and flexes hip joint (particularly in combination, as in kicking a ball).
Antagonists: hamstrings.

NERVE

Femoral nerve, L2, 3, 4.

BASIC FUNCTIONAL MOVEMENT

Examples: walking up stairs; cycling.

Vastus intermedius *Rectus femoris*

REFERRED PAIN PATTERNS

Anterior, medial, and/or lateral thigh pain. Vastus lateralis has many points of pain referral.

OVERVIEW

INDICATIONS
Pain/weakness in thigh, "giving way" of knee, night pain, pain on knee extension, post hip fracture/femoral fracture and splinting, decreased femoropatellar joint "glide," pain on weight bearing, unexplained knee pain in young, pain/weakness descending stairs (rectus femoris), "toothache pain" near knee joint and "buckling" of knee (vastus medialis/intermedius), patellar tracking issues—chondromalacia patellae (vastus lateralis), jumper's/runner's knee, restless leg syndrome, meniscus pain.

CAUSES
Hamstring problems, sport/gym overloading or improper technique (especially skiing, soccer, and squats), poor foot/ankle biomechanics, child/prolonged pressure on the lap.

DIFFERENTIAL DIAGNOSIS
IT band syndrome, femoropatellar joint dysfunction, quadriceps expansion injury, tendonitis, lumbar radiculopathy, femoral nerve pathology, knee problems/dysfunction (multipennate).

CONNECTIONS
Iliopsoas, TFL, gluteal muscles, sartorius.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
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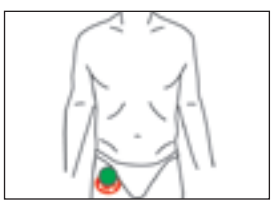
✓	✓	Positional release
✓	✓	Wet needling

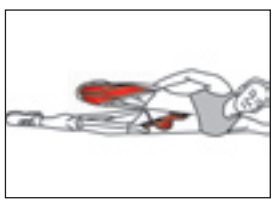
Contract Relax, Antagonist Contract (CRAC) Technique
This is a combination of PIR and RI
1. Contract agonist
2. Relax
3. Contract antagonist
4. Stretch
5. Originally concentric agonist contraction and eccentric antagonist contraction
6. Now isometric contraction is just as easily used, especially in painful, awkward regions
7. Hold stretch for 15–30 seconds
8. Repeat 3 times

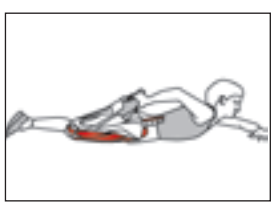
SELF HELP

Balls, foam rollers, or Theracanes are excellent self-massage tools for quadriceps trigger point issues.

ADVICE
Correct lifting techniques. Tubigrip. Avoid prolonged immobility. Home self-stretch. Gait and posture assessment. Avoid heavy "squats" in gym. Moist heat, cold or hot bath, and stretch. Resting periods for cycling. Avoid habitual sitting (i.e. on feet, tucked under). Sleep with pillow between knees.



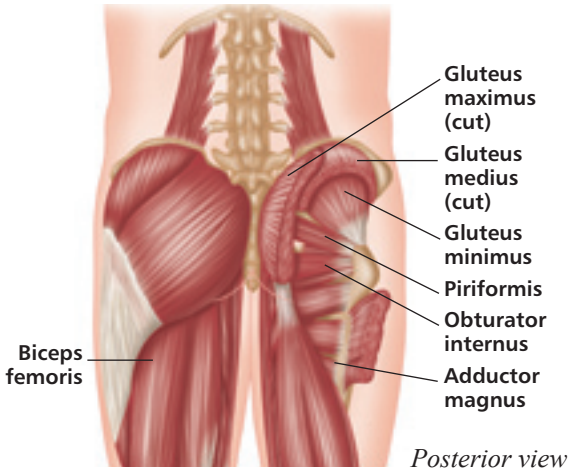




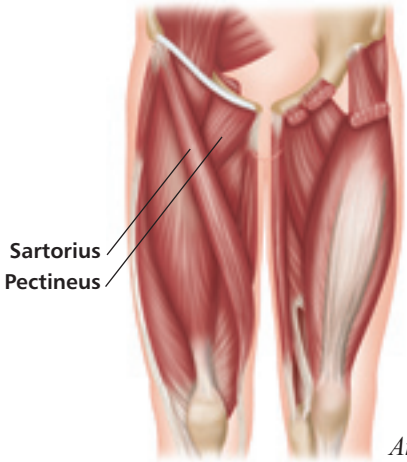
Indications

Symptoms include pain during sexual intercourse, cramping or sharp pains, heaviness or a feeling of pressure inside the pelvis, extreme and constant pain, intermittent pain, a dull ache, pain during bowel movements, and dysmenorrhea. Trigger point self-management and treatment can provide a useful and noninvasive intervention.

STEP 1 Study the anatomy and direction of the muscle fibers.



Posterior view

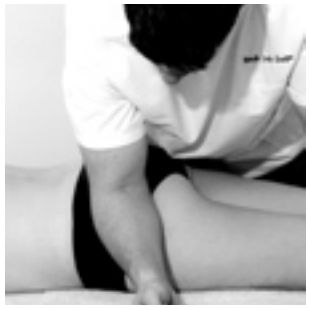


Anterior view

STEP 2 Prone ICT to:

Gluteus maximus, medial inferior, middle inferior

Piriformis



Biceps femoris origin

Spinal muscles
Pelvic floor muscles

STEP 3 Side-lying ICT to:
Pectineus (on affected side)
Adductor magnus (origin)

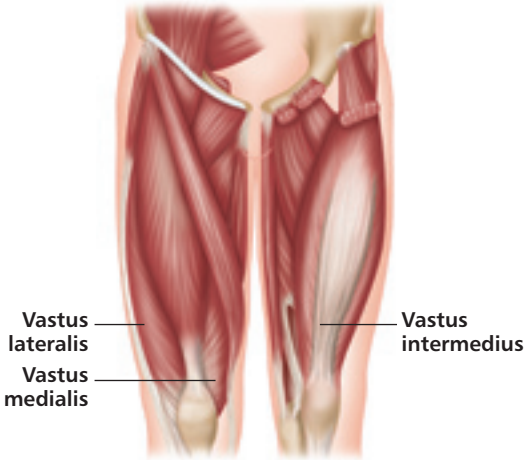
STEP 4 Thorough supine ICT to:

Rectus abdominis (lower) (STP)—see diagram
Psoas major, with knee flexed on same side
Flexor digitorum brevis (sole of foot)
Sartorius tendon (insertion)
Obturator internus/externus (knee bent)

Indications

The signs and symptoms of knee problems can vary widely. The knee is an extremely complex joint, involving many bones, articulations, and soft tissues. Add to this the amount of use it gets over a lifetime and its vulnerability to a range of injuries and diseases, and it becomes readily evident that the knee can be a common source of pain. Common injuries include ligament strains, meniscus damage, bursitis, and tendon injuries. Careful investigation as to the cause of the pain is essential. However, I have found the following protocol extremely effective for a wide range of knee problems.

STEP 1 Study the anatomy and direction of the muscle fibers.



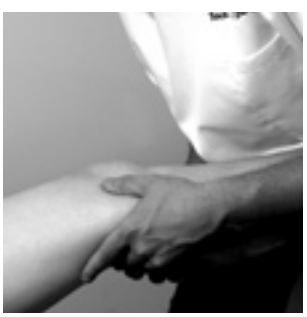
STEP 2 Prone ICT to:

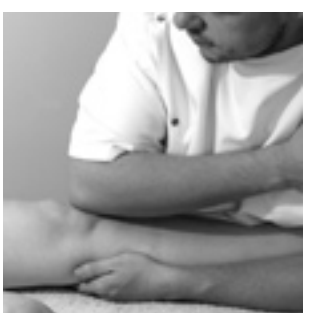
Popliteus

STEP 3 Deep stroking—massage area generously, upward only.

STEP 4 Supine. Medial and lateral gapping articulation to knee joint, with knee in slight flexion.

Then ICT to:
Vastus medialis and/or lateralis insertion
Quadriceps expansion—just above patella
Ligamentum patellae, just below patella (STP)





12 Muscles of the Leg and Foot

Regional Trigger Points for Lower Leg, Ankle, and Foot Pain

MUSCLE PAGE REFERENCE
Abductor digiti minimi 216
Abductor hallucis 216
Adductor brevis 186
Adductor hallucis 218
Adductor longus 186
Extensor digitorum brevis 216
Extensor digitorum longus 200
Extensor hallucis longus ..200
Fibularis group 202
Flexor digitorum brevis ...216
Flexor digitorum longus ..212
Flexor hallucis brevis 218
Gastrocnemius 204
Gluteus minimus 180
Interossei 218
Plantaris 206
Popliteus 210
Quadratus plantae 218
Semimembranosus 184
Semitendinosus 184
Soleus 208
Tibialis anterior 198
Tibialis posterior 214
Vastus lateralis 192

(Front of) leg pain
Tibialis anterior
Adductor longus
Adductor brevis

(Back of) leg pain
Soleus
Gluteus minimus
Gastrocnemius
Semitendinosus
Semimembranosus
Soleus
Flexor digitorum longus
Tibialis posterior
Plantaris

(Side of) leg pain
Gastrocnemius
Gluteus minimus
Peroneus longus
Peroneus brevis
Vastus lateralis

(Front of) ankle pain
Tibialis anterior
Peroneus tertius
Extensor digitorum longus
Extensor hallucis longus

(Back of) ankle pain
Tibialis posterior
Soleus

(Side of) ankle pain
Peroneus longus } Fibularis group
Peroneus brevis
Peroneus tertius

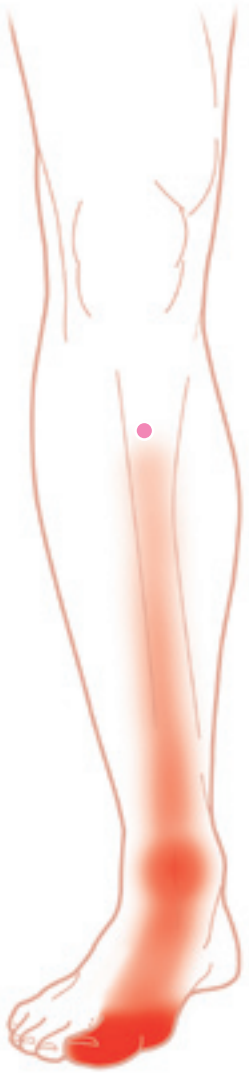
(Inside of) ankle pain
Abductor hallucis
Flexor digitorum longus

(Top of) foot pain
Extensor digitorum brevis
Extensor hallucis brevis
Extensor digitorum longus
Extensor hallucis longus
Flexor hallucis brevis
Interossei
Tibialis anterior

(Bottom of) foot pain
Soleus
Gastrocnemius (medial head)
Flexor digitorum longus
Tibialis posterior
Abductor hallucis
Interossei

Heel pain
Soleus
Quadratus plantae
Abductor hallucis
Tibialis posterior

TIBIALIS ANTERIOR



Latin *tibia*, pipe or flute/shinbone; *anterior*, before

ORIGIN
Lateral condyle of tibia. Upper half of lateral surface of tibia. Interosseous membrane.

INSERTION
Medial and plantar surface of medial cuneiform bone. Base of 1st metatarsal.

ACTION
Dorsiflexes ankle joint. Inverts foot. Antagonists: fibularis longus, gastrocnemius, soleus, plantaris, tibialis posterior.

NERVE
Deep peroneal nerve, L4, **5**, S1.

BASIC FUNCTIONAL MOVEMENT
Example: walking and running (helps prevent foot from slapping onto ground after heel strikes; lifts foot clear of ground as leg swings forward).

REFERRED PAIN PATTERNS
Anteromedial vague pain along shin, with zone of pain 3–5 cm in ankle joint (anterior), culminating in great-toe pain (whole toe).

OVERVIEW

INDICATIONS
Ankle pain/tenderness, pain in great toe, shin splints (anterior tibial compartment syndrome), foot dragging, ankle weakness (children), gout toe, turf toe, falls, balance issues.

CAUSES
Direct trauma, twisted ankle, ill-fitting boots/shoes, poor orthotics, walking on uneven surfaces, stubbing great toe, overload (e.g. walking, car pedals).

DIFFERENTIAL DIAGNOSIS
Lumbar discopathy. Arthritic toes. Anterior tibial compartment syndrome. Shin splints (anterior). Varicose veins.

CONNECTIONS
Extensor hallucis longus, peroneus tertius, extensor hallucis brevis, extensor digitorum brevis/longus, flexor hallucis longus, 1st dorsal interosseous.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

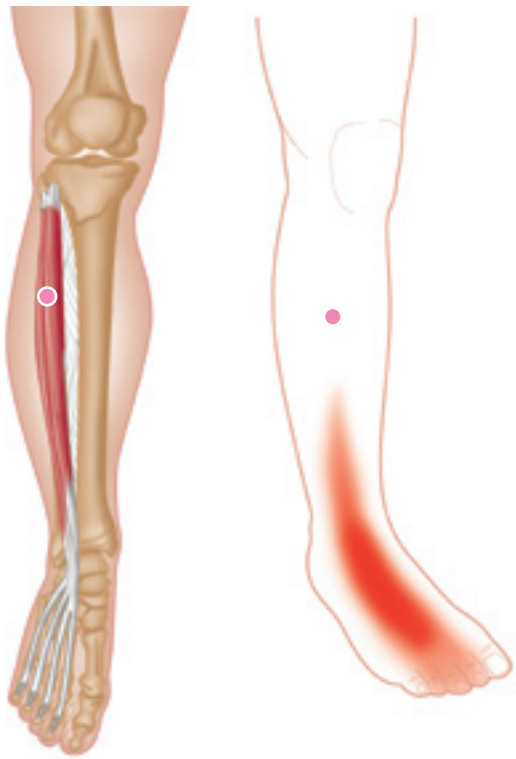
SELF HELP

Self-massage techniques can be helpful. Be careful if there are varicose veins. Balls, hooks, and pressure tools can also be used, as the muscle is fairly superficial.

ADVICE
Avoid long car journeys and use of pedals. Change running surface/shoes. Avoid walking (prolonged) on sloping surfaces. Have stretch program (heat/warmth/cold). Adjust car seat. Use wedge under heel of foot for car pedal.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.

EXTENSOR DIGITORUM LONGUS/EXTENSOR HALLUCIS LONGUS



Extensor digitorum longus

Latin *extendere*, to extend; *digitus*, toe; *hallux*, great toe; *longus*, long

Like the corresponding tendons in the hand, the extensor digitorum longus forms extensor hoods on the dorsum of the proximal phalanges of the foot. These hoods are joined by the tendons of the lumbricales and extensor digitorum brevis, but not by the interossei. The extensor hallucis longus lies between and deep to the tibialis anterior and extensor digitorum longus.

ORIGIN

Extensor digitorum longus: lateral condyle of tibia. Upper two-thirds of anterior surface of fibula. Upper part of interosseous membrane.
Extensor hallucis longus: middle half of anterior surface of fibula and adjacent interosseous membrane.

INSERTION

Extensor digitorum longus: along dorsal surface of four lateral toes. Each tendon divides to attach to bases of middle and distal phalanges.
Extensor hallucis longus: base of distal phalanx of great toe.

ACTION

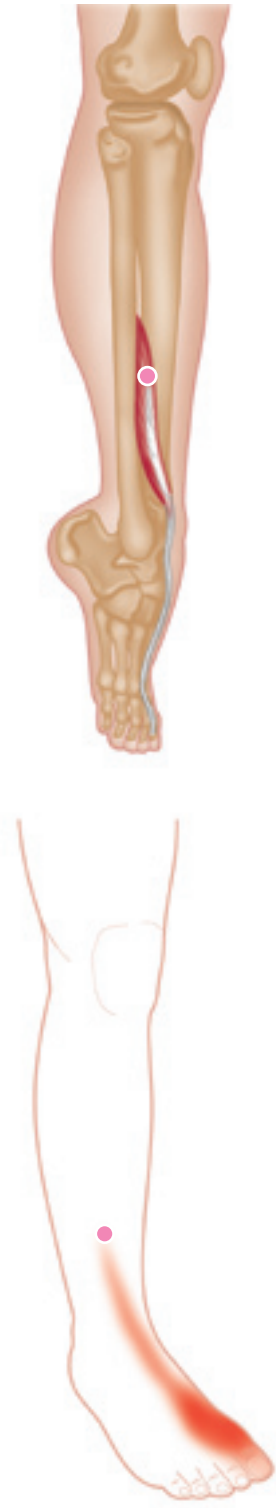
Extensor digitorum longus: extends toes at metatarsophalangeal joints. Assists extension of interphalangeal joints. Assists in dorsiflexion of ankle joint and eversion of foot. Antagonists: flexor digitorum longus/brevis.
Extensor hallucis longus: extends all joints of great toe. Dorsiflexes ankle joint. Assists in inversion of foot. Antagonists: flexor hallucis longus/brevis.

NERVE

Fibular (peroneal) nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT

Example: walking up stairs (ensuring toes clear the steps).



Extensor hallucis longus

REFERRED PAIN PATTERNS

Extensor digitorum longus: pain in dorsum of foot, extending to middle three toes.
Extensor hallucis longus: pain over great-toe dorsum.

EXTENSOR DIGITORUM LONGUS/EXTENSOR HALLUCIS LONGUS

OVERVIEW

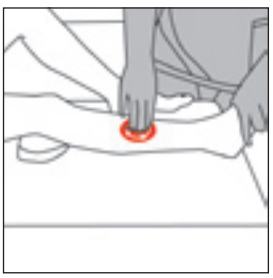
INDICATIONS
Dorsal foot pain, metatarsalgia, great-toe pain (pain is "persistent"), night cramps, anterior compartment syndrome, hammer/claw toe.

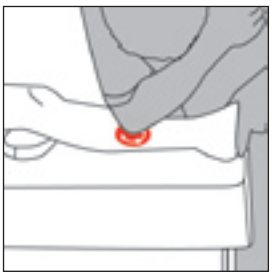
CAUSES
Direct trauma, twisted ankle, ill-fitting boots/shoes, poor orthotics, walking on uneven surfaces, stress fracture, splinting, stubbing great toe, sports (e.g. soccer, cycling, climbing).

DIFFERENTIAL DIAGNOSIS
Hammer/claw toes. Bunions. Lesions of fibular head. Compartment syndromes. Foot drop (upper motor neurone). Tendonitis. Tendon damage.

CONNECTIONS
Peroneal muscles, tibialis anterior.

PRACTITIONER HANDS ON TECHNIQUES





✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

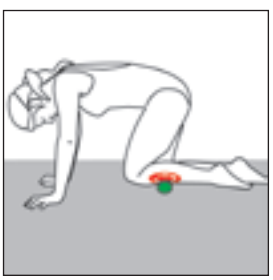
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

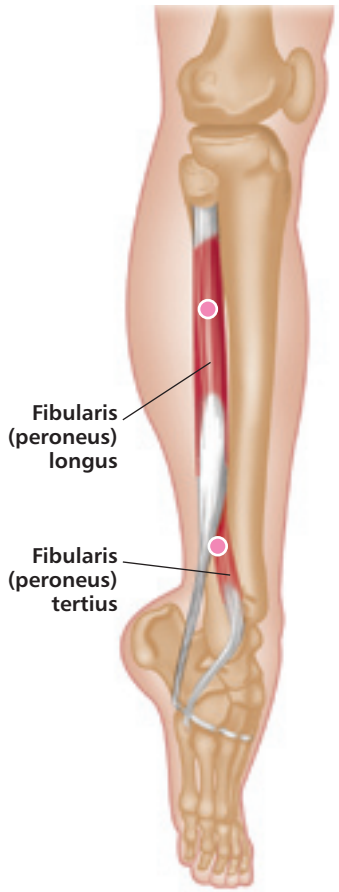
Self-massage techniques can be helpful. Balls and pressure tools should not be used, as the muscles are deep.

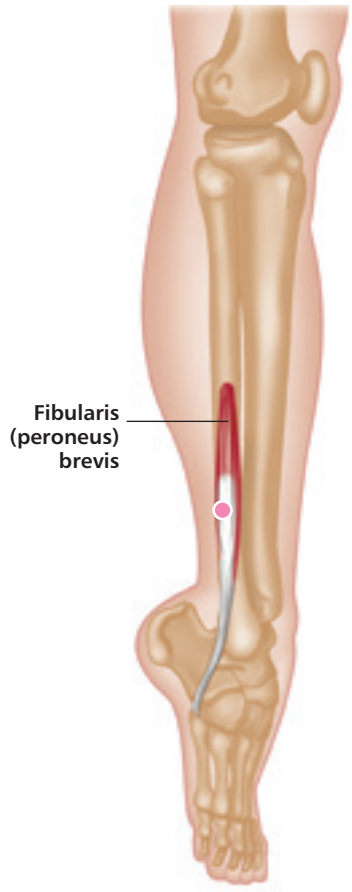
ADVICE
Footwear. Gait. Foot position during driving/sleeping. Orthotics. Review weight-bearing exercises. Occupational postures.

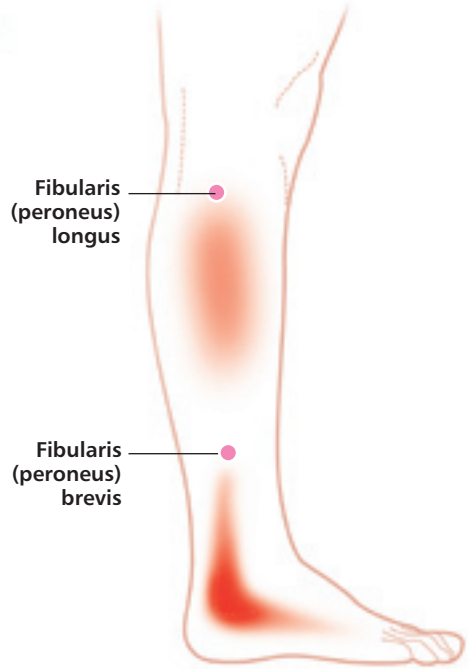
SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.

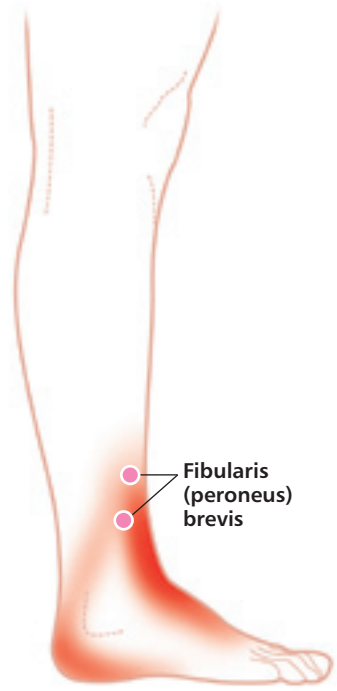


FIBULARIS (PERONEUS) LONGUS, BREVIS, TERTIUS









Latin *fibula*, pin/buckle; *longus*, long; *brevis*, short; *tertius*, third

The course of the tendon of the insertion of the fibularis longus helps maintain the transverse and lateral longitudinal arches of the foot. A slip of muscle from the fibularis brevis often joins the long extensor tendon of the little toe, whereupon it is known as *peroneus digiti minimi*. The fibularis tertius is a partially separated lower lateral part of the extensor digitorum longus.

ORIGIN

Longus: upper two-thirds of lateral surface of fibula. Lateral condyle of tibia.
Brevis: lower two-thirds of lateral surface of fibula. Adjacent intermuscular septa.
Tertius: lower third of anterior surface of fibula and interosseous membrane.

INSERTION

Longus: lateral side of medial cuneiform. Base of 1st metatarsal.
Brevis: lateral side of base of 5th metatarsal.
Tertius: dorsal surface of base of 5th metatarsal.

ACTION

Longus: everts foot. Assists plantar flexion of ankle joint. Antagonist: tibialis anterior.
Brevis: everts ankle joint.
Tertius: dorsiflexes ankle joint. Everts foot.

NERVE

Fibular (peroneal) nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT

Examples: walking and running; walking on uneven surfaces.

REFERRED PAIN PATTERNS

Mainly over lateral malleolus, anteriorly and posteriorly in a linear distribution. Laterally along foot, occasionally vague pain in middle third of lateral aspect of lower leg.

OVERVIEW

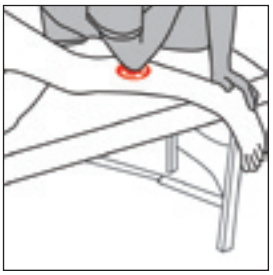
INDICATIONS
Pronation of feet, repetitive inversion/eversion injury, tenderness around malleolus, ankle weakness, post-fracture (and casting) rehabilitation, foot problems (e.g. calluses, verrucae, neuromas), osteoarthritis of toes, metatarsalgia, ankle stiffness, lateral compartment syndrome.

CAUSES
Direct trauma, post-fracture, twisted ankle, ill-fitting boots/shoes, poor orthotics, walking on uneven surfaces, splinting (cast), sports (e.g. running, soccer, cycling, climbing, swimming), footwear (high heels), tight socks, prolonged crossed legs, sleeping on stomach with pointed toes.

DIFFERENTIAL DIAGNOSIS
Rupture. Fracture of foot. Fracture of 1st metatarsal (styloid process). Foot problems. Fibular head dysfunction (common peroneal nerve). Toe problems. Ankle problems (arthritis). Gait dysfunction. Compartment syndromes (lateral). Osteoarthritis of hip.

CONNECTIONS
TFL, gluteus minimus, extensor digitorum longus/brevis, extensor hallucis brevis.

PRACTITIONER HANDS ON TECHNIQUES



✓ ✓	Spray and stretch
✓ ✓	Dry needling
✓ ✓	Deep stroking massage
✓ ✓	Compression
✓ ✓	Muscle energy
✓ ✓	Positional release
✓ ✓	Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
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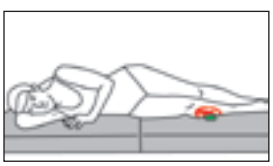
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

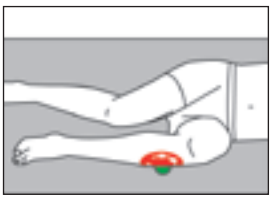
SELF HELP

Self-massage techniques can be helpful. Balls and pressure tools may be used, as the muscles are superficial.

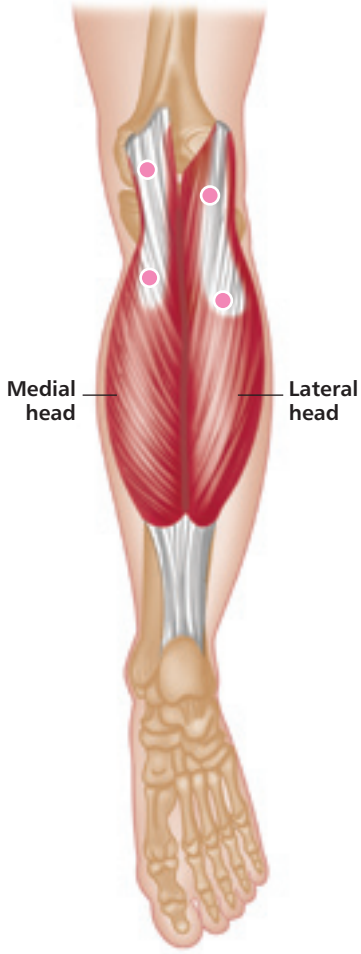
ADVICE
Avoid high-heeled/flat shoes. Regular stretching with hot and/or cold. Strapping/ankle support. Use of heel wedges and/or orthotics. Posture and gait advice. Examine shoes.

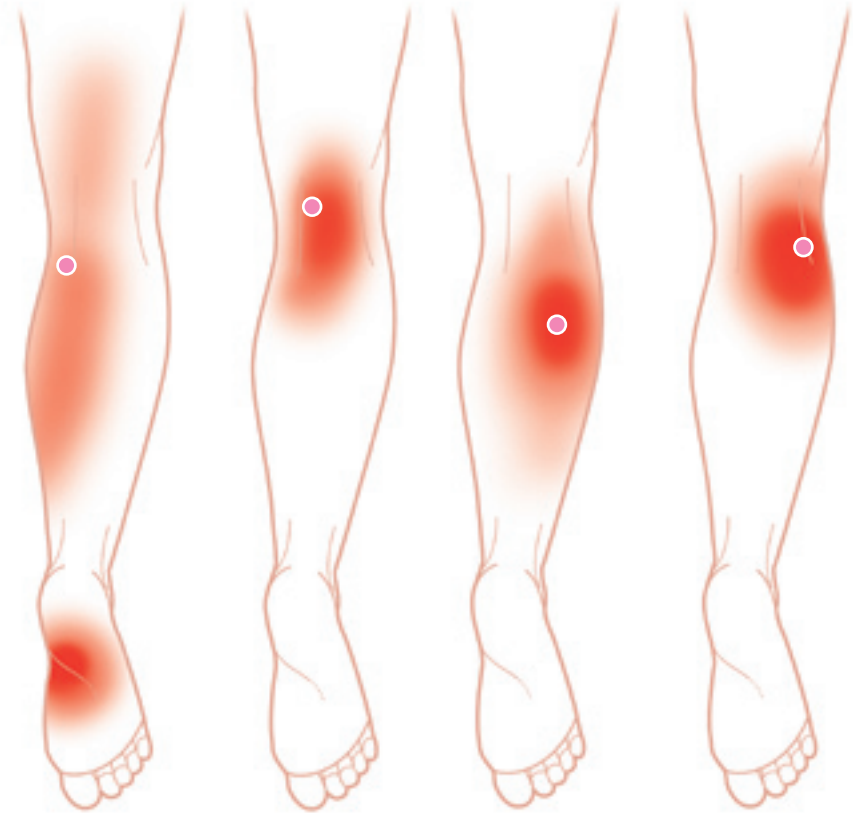


SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Use stroking massage downward.
4. Pause on trigger point until it softens.
5. Continue massage to end of muscle.
6. Repeat 3 times.



GASTROCNEMIUS





Medial head *Lateral head*

Greek *gaster*, stomach; *kneme*, leg

The gastrocnemius is part of the composite muscle known as the *triceps surae*, which forms the prominent contour of the calf. The triceps surae comprises the gastrocnemius, soleus, and plantaris. The popliteal fossa at the back of the knee is formed inferiorly by the bellies of the gastrocnemius and plantaris, laterally by the tendon of the biceps femoris, and medially by the tendons of the semimembranosus and semitendinosus.

ORIGIN
Medial head: popliteal surface of femur above medial condyle.
Lateral head: lateral condyle and posterior surface of femur.

INSERTION
Posterior surface of calcaneus (via tendo calcaneus, a fusion of tendons of gastrocnemius and soleus).

ACTION
Plantar flexes foot at ankle joint. Assists in flexion of knee joint. A main propelling force in walking and running.
Antagonist: tibialis anterior.

NERVE
Tibial nerve, S1, 2.

BASIC FUNCTIONAL MOVEMENT
Example: standing on tiptoes.

REFERRED PAIN PATTERNS
Several trigger points in each muscle belly, and attachment trigger point at ankle. The four most common points are indicated diagrammatically for medial and lateral heads.

OVERVIEW

INDICATIONS
Calf pain/stiffness, nocturnal cramps, foot pain (instep), pain in back of knee on mechanical activity, flat footed (dropped arches).

CAUSES
Direct trauma, post-fracture, twisted ankle, ill-fitting boots/shoes, poor orthotics, walking on uneven surfaces (uphill), splinting (cast), prolonged driving, occupational, (squatting) sports (e.g. running, soccer, cycling, climbing, swimming), footwear (high heels), tight socks, prolonged crossed legs, sleeping on stomach with pointed toes, calf cramps, biochemical (vitamin/mineral), drug-induced (side effects).

DIFFERENTIAL DIAGNOSIS
Thrombophlebitis. Deep vein thrombosis (varicose veins, intermittent claudication). S1 radiculopathy. Baker's cyst. Posterior tibial compartment syndrome. Achilles tendonitis. Sever's disease. Bursitis.

CONNECTIONS
Soleus, plantaris, tibialis anterior/posterior, toe flexors (long), toe extensors.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓	✓	Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
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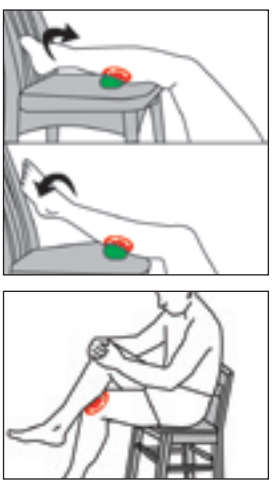
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

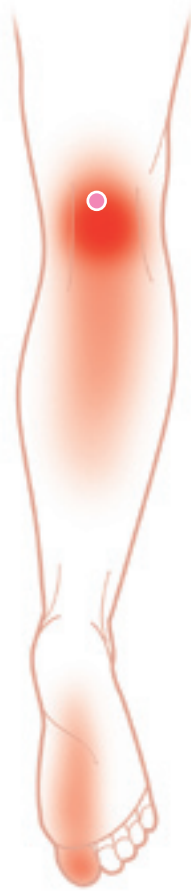
Self-massage techniques can be helpful; you can even use the opposite knee. Balls and pressure tools may be used, as the muscles are superficial. Stretching is excellent for disabling trigger points in the calf muscles.

ADVICE
Avoid high-heeled shoes. Regular stretching. Warm up and warm down when exercising. Use cold and stretch/warmth and stretch. Change running shoes regularly. Posture.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point with opposite knee until it softens.



PLANTARIS



Latin *planta*, sole of the foot

Part of the triceps surae. Its long slender tendon is equivalent to the tendon of the palmaris longus in the arm.

ORIGIN
Lower part of lateral supracondylar ridge of femur and adjacent part of its popliteal surface. Oblique popliteal ligament of knee joint.

INSERTION
Posterior surface of calcaneus (or sometimes into medial surface of tendo calcaneus).

ACTION
Plantar flexes ankle joint. Feebly flexes knee joint.
Antagonist: tibialis anterior.

NERVE
Tibial nerve, L4, **5**, S**1**, (2).

BASIC FUNCTIONAL MOVEMENT
Example: standing on tiptoes.

REFERRED PAIN PATTERNS
Popliteal fossa pain in 2–3 cm zone, radiating 5–10 cm inferiorly into calf.

OVERVIEW

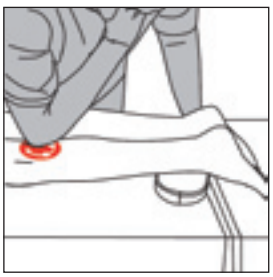
INDICATIONS
Calf/heel/posterior knee pain, chronic and long-term use of high-heeled shoes, flat footed (dropped arches), shin splints, pain ascending stairs, growing pains in children.

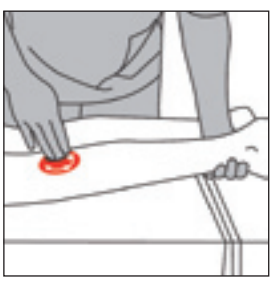
CAUSES
Post-fracture, poor orthotics, prolonged driving, sports (e.g. running, soccer, cycling, climbing, swimming), footwear (high heels), tight socks, sitting with leg resting on chair/table, PSLE.

DIFFERENTIAL DIAGNOSIS
Achilles tendonitis. Compartment syndrome. Vascular disease. Heel spur. Fasciitis. Subtalar joint problems. Venous pump mechanisms. Tendon rupture. Baker's cyst. Shin splints. Stress fracture. Leg length discrepancy.

CONNECTIONS
Popliteus, gastrocnemius, tibialis posterior, quadratus plantae (of foot), abductor hallucis (of foot), gluteus minimus.

PRACTITIONER HANDS ON TECHNIQUES





☐	☐	Spray and stretch
✓	☐	Dry needling
☐	☐	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
☐	☐	Wet needling

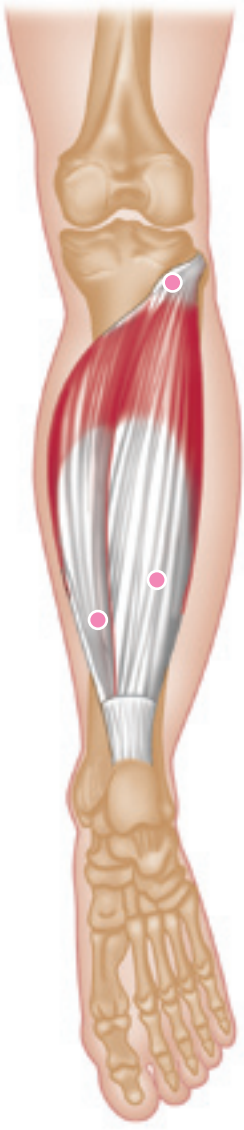
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

Balls and pressure tools should not be used by the novice, because the muscle is deep and there are many superficial and deep veins in the area. Stretching is excellent for disabling trigger points in the calf muscles.

ADVICE
Change footwear. Change and vary running techniques/running surface. Change/avoid high-heeled shoes. Regular stretching. Leg rests at home and at work. Use of cold. Massage after sports, and warm up before and cool down after. Posture.

SOLEUS



Latin *solea*, sole (fish)

Part of the triceps surae. The soleus is so called because its shape resembles a fish. The calcaneal tendon of the soleus and gastrocnemius is the thickest and strongest tendon in the body.

ORIGIN

Posterior surfaces of head of fibula and upper third of body of fibula. Soleal line and middle third of medial border of tibia. Tendinous arch between tibia and fibula.

INSERTION

With tendon of gastrocnemius into posterior surface of calcaneus.

ACTION

Plantar flexes ankle joint. Frequently in contraction during standing, to prevent body falling forward at ankle joint, i.e. to offset line of pull through body's center of gravity, thus helping to maintain upright posture.
Antagonist: tibialis anterior.

NERVE

Tibial nerve, L5, S**1**, **2**.

BASIC FUNCTIONAL MOVEMENT

Example: standing on tiptoes.

REFERRED PAIN PATTERNS

Pain in distal Achilles tendon and heel to posterior half of foot. Calf pain from knee to just above Achilles tendon origin. 4–5 cm zone of pain in ipsilateral sacroiliac region (rare).

OVERVIEW

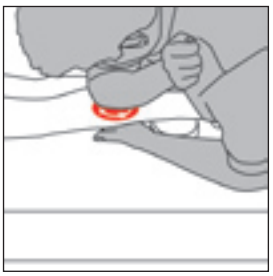
INDICATIONS
Calf/heel/posterior knee pain, chronic/long-term use of high-heeled shoes, planter fasciitis, chronic calf shortening, calf pain walking stairs, low back pain, leg cramps.

CAUSES
Post-fracture splinting, poor orthotics, prolonged driving, sports (e.g. running, soccer, cycling, climbing, skiing, rowing machine), footwear (high heels), PSLE, occupational standing, direct blow/trauma, pressure on calf.

DIFFERENTIAL DIAGNOSIS
Achilles tendonitis. Compartment syndrome. Vascular disease. Heel spur. Fasciitis. Subtalar joint problems. Venous pump mechanisms. Tendon rupture. Baker's cyst. Shin splints. Stress fracture. Leg length discrepancy.

CONNECTIONS
Popliteus, gastrocnemius, tibialis posterior, quadratus plantae (of foot), abductor hallucis (of foot), piriformis, occasionally to jaw.

PRACTITIONER HANDS ON TECHNIQUES



✓	✓	Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

Self-massage techniques can be helpful; you can even use the opposite knee. Balls and pressure tools may be used but not by the novice, as the muscle is deep and there are many superficial and deep veins in the area. Stretching is excellent for disabling trigger points in the calf muscles. Use of foam rollers can be effective.

ADVICE
Change footwear. Change and vary running techniques/running surface. Change/avoid high-heeled shoes. Regular stretching. Leg rests at home and at work. Use of cold. Massage after sports, and warm up before and cool down after. Posture.

SELF-HELP TECHNIQUE
1. Review anatomy.
2. Identify trigger point.
3. Pause on trigger point with opposite knee until it softens.

POPLITEUS

Latin *poples*, ham

The tendon from the origin of the popliteus lies inside the capsule of the knee joint.

ORIGIN
Lateral surface of lateral condyle of femur. Oblique popliteal ligament of knee joint.

INSERTION
Upper part of posterior surface of tibia, superior to soleal line.

ACTION
Laterally rotates femur on tibia when foot is fixed on ground. Medially rotates tibia on femur when leg is not weight bearing. Assists flexion of knee joint (popliteus "unlocks" extended knee joint to initiate flexion of leg). Helps reinforce posterior ligaments of knee joint.

NERVE
Tibial nerve, L**4**, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT
Example: walking.

REFERRED PAIN PATTERNS
Localized 5–6 cm zone of pain (posterior and central knee joint), with some spreading of diffuse pain, radiating in all directions, especially inferiorly.

OVERVIEW

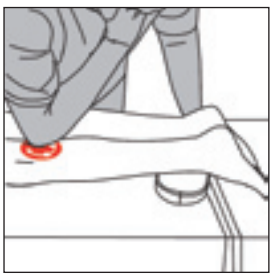
INDICATIONS
Pain in back of knee squatting/crouching/walking/running, pain behind knee/calf walking uphill and descending stairs, stiff knee on passive flexion/extension, planter fasciitis, chronic calf shortening, low back pain, leg cramps.

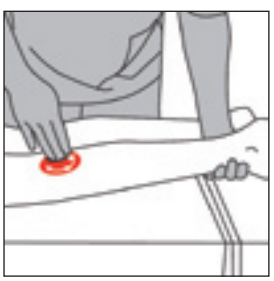
CAUSES
Post-fracture, splinting, poor orthotics, prolonged driving, twisting sports (e.g. soccer, climbing, skiing, baseball, football), associated with many knee problems.

DIFFERENTIAL DIAGNOSIS
Avulsion. Cruciate ligaments (instability). Baker's cyst. Osteoarthritis. Tendonitis. Cartilage (meniscus) injury. Vascular (deep vein thrombosis, thrombosis). Tenosynovitis.

CONNECTIONS
Hamstrings (biceps femoris), gastrocnemius (ligamentum patellae), plantaris.

PRACTITIONER HANDS ON TECHNIQUES





☐	☐	Spray and stretch
✓	☐	Dry needling
☐	☐	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
☐	☐	Wet needling

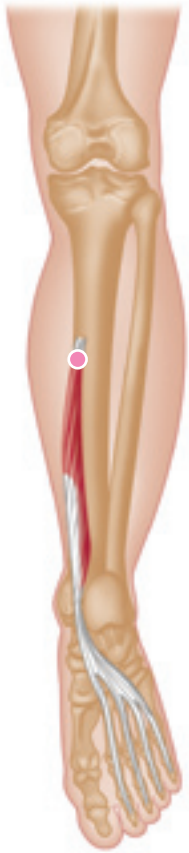
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

Self-massage techniques can be helpful. Balls and pressure tools may be used but not by the novice, as the muscle is deep and there are many superficial and deep veins in the area. Stretching is excellent for disabling trigger points in the calf muscles.

ADVICE
Avoid "overload" on weight-bearing activities. Shoe orthotics. Stretching program. Cycling position.

FLEXOR DIGITORUM LONGUS/FLEXOR HALLUCIS LONGUS



Flexor digitorum longus

Flexor hallucis longus

Flexor digitorum longus

Flexor hallucis longus

Latin *flectere*, to bend; *digitus*, toe; *longus*, long; *hallux*, great toe

The insertion of the tendons of the flexor digitorum longus into the lateral four toes parallels the insertion of the flexor digitorum profundus in the hand. The flexor hallucis longus helps maintain the medial longitudinal arch of the foot.

ORIGIN

Flexor digitorum longus: medial part of posterior surface of tibia, below soleal line.
Flexor hallucis longus: lower two-thirds of posterior surface of fibula. Interosseous membrane. Adjacent intermuscular septum.

INSERTION

Flexor digitorum longus: bases of distal phalanges of 2nd through 5th toes.
Flexor hallucis longus: base of distal phalanx of great toe.

ACTION

Flexor digitorum longus: flexes all joints of lateral four toes. Helps to plantar flex ankle joint and invert foot. Antagonist: extensor digitorum longus, extensor digitorum brevis.
Flexor hallucis longus: flexes all joints of great toe, and is important in final propulsive thrust of foot during walking. Helps to plantar flex ankle joint and invert foot. Antagonist: extensor hallucis longus.

NERVE

Tibial nerve, L**5**, S**1**, (2).

BASIC FUNCTIONAL MOVEMENT

Walking/pushing off surface in walking (especially bare foot on uneven ground). Standing on tiptoes.

REFERRED PAIN PATTERNS

Flexor digitorum longus: vague linear pain in medial aspect of calf, with main symptoms of plantar forefoot pain.
Flexor hallucis longus: strong pain in great toe, both plantar and into 1st metatarsal head.

FLEXOR DIGITORUM LONGUS/FLEXOR HALLUCIS LONGUS

OVERVIEW

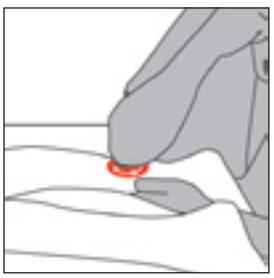
INDICATIONS
Foot pain on weight bearing/uneven surfaces, great-toe pain, leg cramps, numbness under great toe.

CAUSES
Arthritic (great) toes, poor footwear/orthotics, sports (e.g. walking, jogging, running), hypomobile ankles, flat feet, gout toe.

DIFFERENTIAL DIAGNOSIS
Shin splints. Compartment syndromes. Tendon ruptures. Instability of foot/ankle (medial). Stress (march) fracture. Morton's neuroma. Hammer toe/claw toe. Hallux valgus. Metatarsalgia. Osteoarthritis of 1st metatarsophalangeal joint. Gout. Plantar fasciitis.

CONNECTIONS
Superficial/deep intrinsic foot muscles, tibialis posterior, long/short extensors of toes.

PRACTITIONER HANDS ON TECHNIQUES



✓	✓	Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
		Wet needling

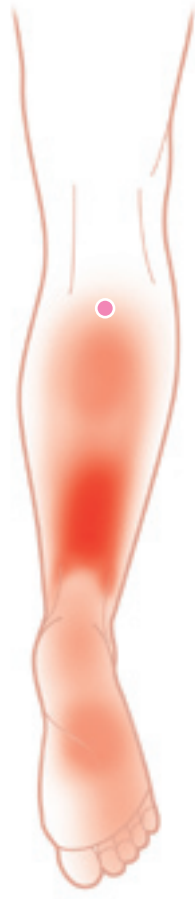
Post-Isometric (PIR) Technique
Indications: subacute to chronic settings
1. Identify the trigger point.
2. Position the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Using 10–25% of their power, ask the patient to contract the affected/host muscle at its maximal pain-free length, while applying isometric resistance for 3–10 seconds; stabilize the body part to prevent muscle shortening.
4. Ask the patient to relax the muscle or "let it go."
5. During this relaxation phase, gently lengthen the muscle by taking up the slack to the point of resistance (passive)—note any changes in length.
6. Repeat several times (usually three).

SELF HELP

Stretching is excellent for disabling trigger points in calf muscles. Swimming is a good exercise for toe muscles.

ADVICE
Examine/change in footwear. Gait and posture analysis. Regular stretching. Advice on running technique (e.g. run on flat surface).

TIBIALIS POSTERIOR



Latin *tibia*, pipe or flute/shinbone; *posterior*, behind

The tibialis posterior is the deepest muscle on the back of the leg. It helps maintain the arches of the foot.

ORIGIN
Lateral part of posterior surface of tibia. Upper two-thirds of posterior surface of fibula. Most of interosseous membrane.

INSERTION
Tuberosity of navicular. By fibrous expansions to sustentaculum tali, three cuneiforms, cuboid, and bases of 2nd, 3rd, and 4th metatarsals.

ACTION
Inverts foot. Assists in plantar flexion of ankle joint.
Antagonist: tibialis anterior.

NERVE
Tibial nerve, L(4), **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT
Examples: standing on tiptoes; pushing down car pedals.

REFERRED PAIN PATTERNS
Vague calf pain, with increased intensity along Achilles tendon to heel/sole of foot.

OVERVIEW

INDICATIONS
Achilles tendonitis, calf/heel pain, plantar fasciitis, pain running/ walking on uneven surface, Morton's neuroma, foot numbness in patch around metatarsals, toe cramps, hammer/claw toe, tarsal tunnel syndrome.

CAUSES
Arthritic toes, poor footwear (heels) or orthotics, sports (e.g. walking, jogging, running, sprinting), hypomobile ankles, flat feet, prolonged driving (pedals).

DIFFERENTIAL DIAGNOSIS
Shin splints. Posterior tibial compartment syndrome (deep). Tendon rupture. Tenosynovitis. Cardiovascular. Achilles tendonitis. Deep vein thrombosis.

CONNECTIONS
Flexor digitorum longus, peroneal muscles, flexor hallucis longus, foot mechanics.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
		Wet needling

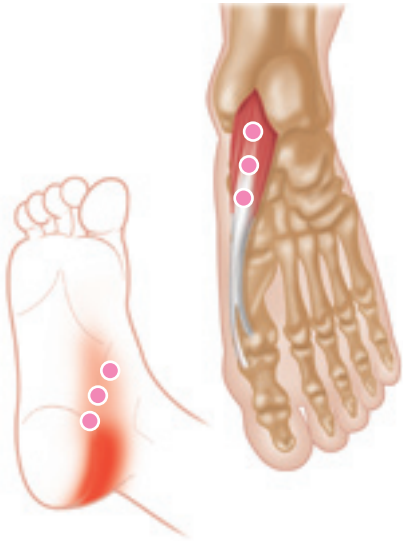
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

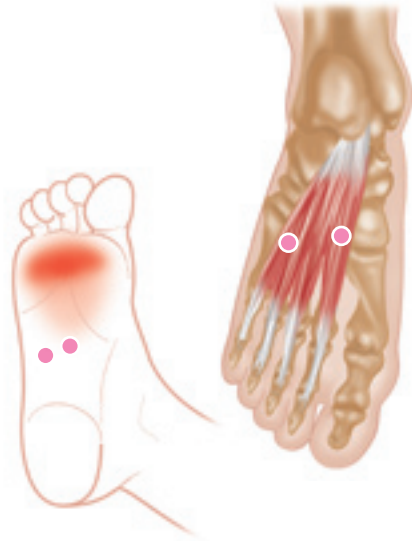
Stretching is excellent for disabling trigger points in calf muscles. Swimming is a good exercise for this muscle, although self-pressure or pressure tools are not recommended, as it is a deep muscle and there are many delicate veins in the area.

ADVICE
Arch supports/orthotics. Change running shoes/running surface. Home stretching program. Use of cold and stretch.

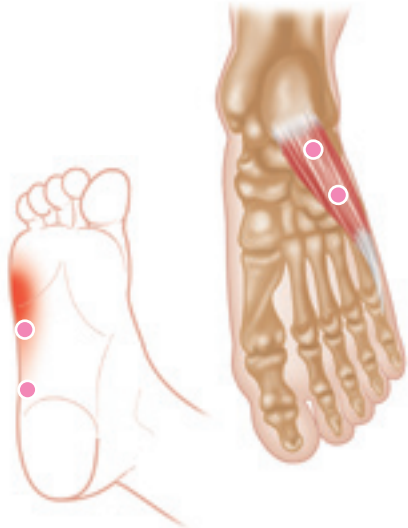
SUPERFICIAL MUSCLES OF THE FOOT



Abductor hallucis



Flexor digitorum brevis



Abductor digiti minimi

Latin *abducere*, to lead away from; *hallux*, great toe; *flectere*, to bend; *digitus*, toe; *brevis*, short; *minimi*, smallest; *extendere*, to extend

Comprising: abductor hallucis, flexor digitorum brevis, abductor digiti minimi, extensor digitorum brevis.

ORIGIN

Abductor hallucis: tuberosity of calcaneus. Flexor retinaculum. Plantar aponeurosis.
Flexor digitorum brevis, abductor digiti minimi: tuberosity of calcaneus. Plantar aponeurosis. Adjacent intermuscular septa.
Extensor digitorum brevis: anterior part of superior and lateral surfaces of calcaneus. Lateral talocalcaneal ligament. Inferior extensor retinaculum.

INSERTION

Abductor hallucis: medial side of base of proximal phalanx of great toe.
Flexor digitorum brevis: middle phalanges of 2nd to 5th toes.
Abductor digiti minimi: lateral side of base of proximal phalanx of 5th toe.
Extensor digitorum brevis: base of proximal phalanx of great toe. Lateral sides of tendons of extensor digitorum longus to 2nd, 3rd, and 4th toes.

ACTION

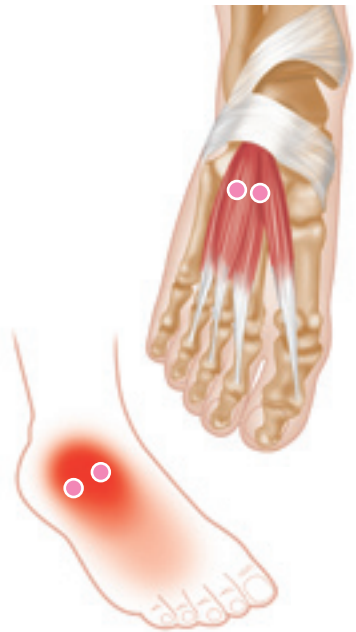
Abductor hallucis: abducts and helps flex great toe at metatarsophalangeal joint. Antagonist: adductor hallucis.
Flexor digitorum brevis: flexes all joints of lateral four toes except distal interphalangeal joints. Antagonists: extensor digitorum longus, extensor digitorum brevis.
Abductor digiti minimi: abducts 5th toe. Antagonist: flexor digiti minimi brevis.
Extensor digitorum brevis: extends joints of medial four toes. Antagonists: flexor digitorum longus, flexor digitorum brevis.

NERVE

Abductor hallucis, flexor digitorum brevis: medial plantar nerve, L4, **5**, S**1**.
Abductor digiti minimi: lateral plantar nerve, S**2**, 3.
Extensor digitorum brevis: deep fibular (peroneal) nerve, L4, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT

Examples: facilitating walking; helping foot stability and power in walking and running; helping to gather up material under foot by involving great toe.



Extensor digitorum brevis

REFERRED PAIN PATTERNS

Abductor hallucis: medial heel pain, radiating along medial border of foot.
Flexor digitorum brevis: pain in plantar aspect of foot beneath (2nd, 3rd, and 4th) metatarsal heads.
Abductor digiti minimi: pain in plantar aspect of foot beneath 5th metatarsal head.
Extensor digitorum brevis: have a strong oval overlapping zone of pain (4–5 cm) in lateral dorsum of foot just below lateral malleolus.

OVERVIEW

INDICATIONS
Foot pain (dorsal/plantar), "soreness" on walking and "aching" at rest, pain on tiptoes/weight bearing/initial standing from sitting, chronic wear of high heels, Morton's neuroma, toe cramps, hammer/claw toe, patchy foot numbness.

CAUSES
Arthritic toes, poor footwear (heels) or orthotics, sports (e.g. swimming, walking, jogging, running, sprinting), hypomobile ankles, toe clawing, trauma.

DIFFERENTIAL DIAGNOSIS
Avulsion fracture of styloid process. Hallux valgus. Flat footed. Hallux rigidus or hypermobility. Metatarsalgia. Hammer/claw toe deformity. Heel spur. Stress (march) fracture. Compartment syndromes. Varus and valgus of foot.

CONNECTIONS
Plantar interossei, quadratus plantae, adductor hallucis, extensor digitorum longus/brevis, flexor digitorum brevis, hip/knee/ankle/foot mechanics, extensor hallucis brevis, abductor hallucis.

PRACTITIONER HANDS ON TECHNIQUES

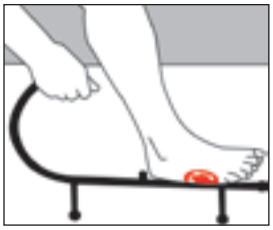
✓	✓	Spray and stretch
✓		Dry needling
✓		Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

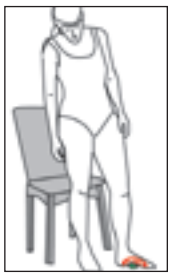
(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

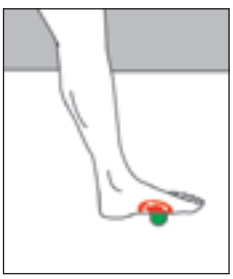
SELF HELP

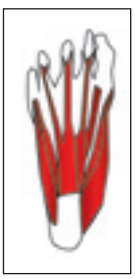
Self-pressure and/or pressure tools are recommended, as these muscles are superficial and respond well to pressure.

ADVICE
Gait/posture analysis. Footwear. Orthotics. Home stretching using golf/tennis ball or rolling pin. Use a small heel. Warmth and stretch.

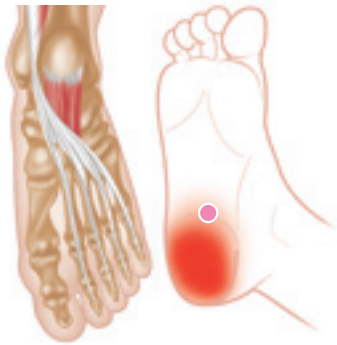




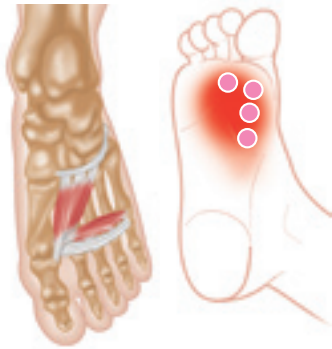




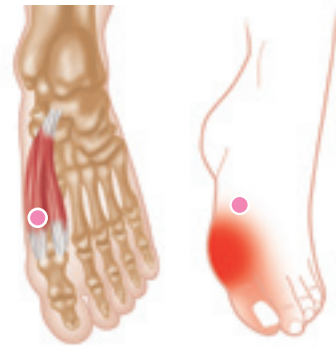
DEEP MUSCLES OF THE FOOT



Quadratus plantae



Adductor hallucis



Flexor hallucis brevis

Latin *quadratus*, squared; *planta*, sole of the foot; *adducere*, to lead toward; *hallux*, great toe; *flectere*, to bend; *brevis*, short; *dorsum*, back; *interosseus*, between bones

Comprising: quadratus plantae, adductor hallucis, flexor hallucis brevis, dorsal interossei, plantar interossei.

ORIGIN

Quadratus plantae: medial head—medial surface of calcaneus; lateral head—lateral border of inferior surface of calcaneus.
Adductor hallucis: oblique head—bases of 2nd, 3rd, and 4th metatarsals. Sheath of peroneus longus tendon; transverse head—plantar metatarsophalangeal ligaments of 3rd, 4th, and 5th toes. Transverse metatarsal ligaments.
Antagonist: abductor hallucis.
Flexor hallucis brevis: medial part of plantar surface of cuboid bone. Adjacent part of lateral cuneiform bone. Tendon of tibialis posterior.
Antagonist: extensor hallucis longus.
Dorsal interossei: adjacent sides of metatarsal bones. Antagonist: plantar interossei.
Plantar interossei: bases and medial sides of 3rd, 4th, and 5th metatarsals.
Antagonist: dorsal interossei.

INSERTION

Quadratus plantae: lateral border of tendon of flexor digitorum longus.
Adductor hallucis: lateral side of base of proximal phalanx of great toe.
Flexor hallucis brevis: medial part—medial side of base of proximal phalanx of great toe; lateral part—lateral side of base of proximal phalanx of great toe.
Dorsal interossei: bases of proximal phalanges: 1st—medial side of proximal phalanx of 2nd toe; 2nd to 4th—lateral sides of proximal phalanges of 2nd to 4th toes.
Plantar interossei: medial sides of bases of proximal phalanges of same toes.

ACTION

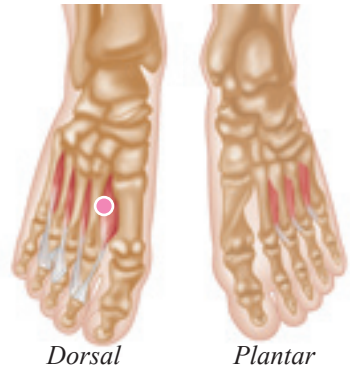
Quadratus plantae: flexes distal phalanges of 2nd to 5th toes. Modifies oblique line of pull of flexor digitorum longus tendons to bring it in line with long axis of foot.
Adductor hallucis: adducts and assists in flexing metatarsophalangeal joint of great toe.
Flexor hallucis brevis: flexes metatarsophalangeal joint of great toe.
Dorsal interossei: abduct (spread) toes. Flex metatarsophalangeal joints.
Plantar interossei: adduct (close together) toes. Flex metatarsophalangeal joints.

NERVE

Quadratus plantae, adductor hallucis, dorsal interossei, plantar interossei: lateral plantar nerve, S**1**, **2**.
Flexor hallucis brevis: medial plantar nerve, L4, **5**, S**1**.

BASIC FUNCTIONAL MOVEMENT

Examples: holding a pencil between toes and ball of foot; helping to gather up material under foot by involving great toe; making a space between great toe and adjacent toe; facilitating walking.



Dorsal interossei

Plantar interossei

Dorsal interossei

REFERRED PAIN PATTERNS

Quadratus plantae—heel pain; adductor hallucis—forefoot pain; flexor hallucis brevis—pain around 1st metatarsophalangeal joint; dorsal/plantar interossei—2nd digit pain (anteroposterior).

OVERVIEW

INDICATIONS
Foot/heel pain, pain in 1st metatarsophalangeal joint, bunions/hallux valgus, pain in 2nd toe, forefoot pain, stiffness in tissues (inability to use orthotic support), problems with walking, numbness in foot, hip/knee/ankle pain, heel spur, planter fasciitis (quadratus plantae).

CAUSES
Arthritic toes, poor footwear (heels) or orthotics, sports (e.g. swimming, walking, jogging, running, sprinting), hypomobile ankles, toe clawing, trauma, chilling in wet socks/cold water.

DIFFERENTIAL DIAGNOSIS
Morton's neuroma. Metatarsalgia. Plantar fasciitis. Heel spur. Stress fracture. Articular (joint) dysfunctions. Injured sesamoid bones. Lumbar radiculopathy (foot drop). Hallux valgus. Calcaneal compartment syndrome. Gout. Arthritis.

CONNECTIONS
Hip/knee/ankle problems, flexor digitorum brevis.

PRACTITIONER HANDS ON TECHNIQUES

✓	✓	Spray and stretch
✓		Dry needling
✓	✓	Deep stroking massage
✓	✓	Compression
✓	✓	Muscle energy
✓	✓	Positional release
✓		Wet needling

(Inhibition) Compression Technique
1. Identify the trigger point.
2. Place the patient in a comfortable position, where the affected/host muscle can undergo full stretch.
3. Apply gentle and gradually increasing pressure to the trigger point, while lengthening the affected/host muscle until you hit a palpable barrier. This should be experienced by the patient as discomfort and not as pain.
4. Apply sustained pressure until you feel the trigger point soften. This can take from a few seconds to several minutes.
5. Repeat, increasing the pressure on the trigger point until you meet the next barrier, and so on.
6. To achieve a better result, you can try to change the direction of pressure during these repetitions.

SELF HELP

Self-pressure and/or pressure tools are recommended, as these muscles respond well to pressure. Try the pencil with a rubber tip techniques.

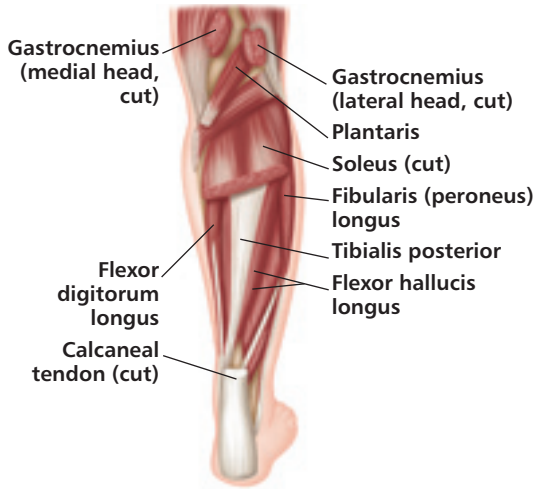
ADVICE
Stretching with cold (and/or hot). Examine footwear (is it too tight?). Treat any joint dysfunctions. Stretching exercises/home stretch over tennis/golf ball. Proper orthotics. Gait/posture analysis.

ANKLE PAIN

Indications

Recurrent inversion and eversion strains, tendonitis, tarsal tunnel syndrome, and arthritis.

STEP 1 Study the anatomy and direction of the muscle fibers.



STEP 2 Prone articulation into inversion and eversion to talocrural joint.


STEP 3 Prone ICT to:

Gastrocnemius

Soleus

Plantaris

Tibialis posterior

STEP 4 Side-lying deep stroking massage to: Fibularis (peroneus) group

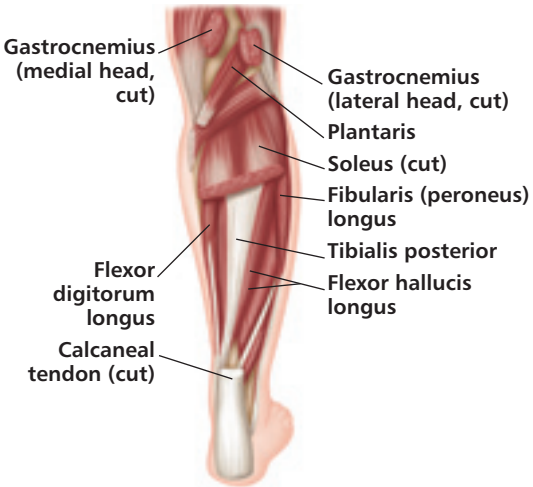
Thorough supine ICT to:

Extensor digitorum brevis
Extensor digitorum longus tendon (STP)
Anterior talocrural joint


Indications

Heel pain, metatarsalgia, plantar fasciitis, myalgia, sesamoiditis, heel spurs, soreness on walking, and soreness on rest.

STEP 1 Study the anatomy and direction of the muscle fibers.



STEP 2 Side-lying ICT to:
Gastrocnemius (medial head) Soleus (lower points)


STEP 3 Massage area generously.

STEP 4 Prone ICT to:
Tibialis posterior Flexor digitorum longus (STP)


STEP 5 Thorough supine ICT to:



Plantar fascia, starting at heel, and small muscles of foot; area around heel spur usually feels gristly and lumpy, so administer ICT to these nodules.

Glossary of Anatomical Directions

Abduction	Movement away from the midline (opposite to adduction).
Adduction	Movement toward the midline (opposite to abduction).
Anatomical position	The body upright, with the arms and hands turned forward.
Anterior	Toward the front or the ventral aspect of the body or organ (opposite to posterior).
Circumduction	Movement in which the distal end of a bone moves in a circular path, while the proximal end remains stable.
Contralateral	On the opposite side.
Coronal plane	A vertical plane at right angles to the sagittal plane, dividing the body into anterior and posterior parts. Also known as the frontal plane.
Deep	Away from the surface (opposite to superficial).
Depression	Movement of an elevated part of the body downward, to its original position.
Distal	Further away from the center of the body or from the point of attachment of a limb (opposite to proximal).
Dorsal	Relating to the back or posterior portion (opposite to ventral).
Elevation	Movement of a part of the body upward, in the coronal plane.
Eversion	Movement in which the sole of the foot is turned outward (opposite to inversion).
Extension	Movement at a joint resulting in two ventral surfaces becoming further apart (opposite to flexion).
Flexion	Movement at a joint resulting in two ventral surfaces becoming closer together (opposite to extension).
Horizontal plane	A transverse plane at right angles to the long axis of the body.
Inferior	Below, or furthest away from the head.
Inversion	Movement in which the sole of the foot is turned inward (opposite to eversion).
Ipsilateral	On the same side.
Lateral	Located away from the midline of the body or organ (opposite to medial).
Lateral decubitus	Side-lying body position.
Medial	Located close to or at the midline of the body or organ (opposite to lateral).
Median	Centrally located or situated in the middle of the body.
Opposition	Movement specific to the saddle joint of the thumb, whereby the thumb is able to touch the tips of the fingers of the same hand.
Palmar	Relating to the palm of the hand.
Plantar	Relating to the sole of the foot.
Posterior	Toward the back or the dorsal aspect of the body or organ (opposite to anterior).
Pronation	Movement in which the palm of the hand is turned down to face the floor, or away from the anatomical and fetal positions.
Prone	Body position in which the ventral surface faces down (opposite to supine).
Protraction	Movement of a part of the body forward in the transverse plane.
Proximal	Closer to the center of the body or to the point of attachment of a limb.
Retraction	Movement of a part of the body backward in the transverse plane.
Rotation	Movement around a fixed axis.
Sagittal plane	A vertical plane extending in an anteroposterior direction, dividing the body into right and left parts.
Superficial	On or near the surface (opposite to deep).
Superior	Above, or closest to the head.
Supination	Movement in which the palm of the hand is turned up to face the ceiling, or toward the anatomical and fetal positions.
Supine	Body position in which the ventral surface faces up (opposite to prone).
Ventral	Relating to the front or anterior portion (opposite to dorsal).

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