Muscle Energy Techniques

A Practical Guide for Manual Therapists

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Exam Edition

NielAsher
Advanced Trigger Point Techniques

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Contents

We are now going to employ a PIR method of MET treatment for the adductor pollicis muscle. (Pollicis relates to the thumb, or pollex). Actively abduct the thumb as far as you can so a sense of bind is achieved. Next, place the fingers of your right hand on top of the left thumb and, using an isometric contraction, adduct your thumb against the downward pressure of the fingers, so that an isometric contraction is achieved. Apply this pressure for 10 seconds. Once the time has passed, breath in and on the exhalation, passively take the thumb into further abduction (do not force the thumb).

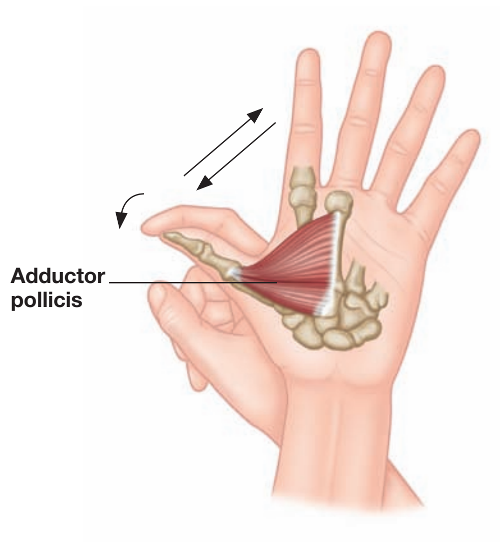

Figure 4.4: Adducting the thumb against a resistance applied by the opposite hand.

Repeat this sequence two more times and on the last repetition, hold the isometric contraction for at least 20–25 seconds. Place your hand back on the piece of paper and draw around it again; hopefully you will see that the thumb abducts further than before.

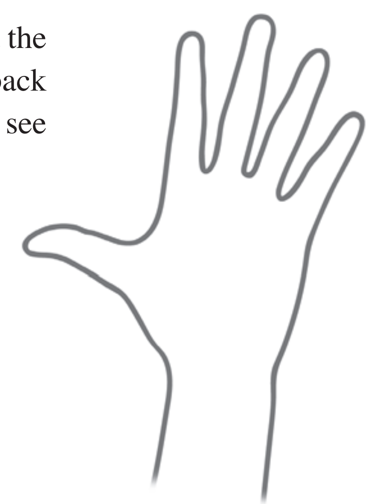

Figure 4.5: The hand redrawn after the MET treatment using PIR.

Understanding the Meaning of the Word 'Tight'

It can be very confusing for therapists to understand the meaning of the word 'tight', as it is interchangeable with the term 'short', or it may be used as an alternative to the term 'taut'. For example, an inexperienced therapist might palpate tissue and automatically say that the tissue feels tight to them; what they might not understand when they are palpating the tissue is whether the tissue has shortened and feels tight, or the tissue is on stretch and subsequently feels tight.

Let's look at this another way – I will use an example in a clinic setting. When we treat the upper trapezius, we might say that the muscle palpates as tight, due to the fact this is a postural muscle, which has a tendency to shorten and subsequently palpate as tight. When we come on to the lower fibres of the trapezius, again we might be tempted to use the word 'tight', as these fibres could feel similar to the tissues of the upper trapezius. However, what you might be palpating, in fact, is the taut tissue of the lower trapezius, due to it being in a stretched position and subsequently held in a weakened position.

In reality, if you treat the upper and lower trapezius using the same techniques, one component of the muscle might improve, whereas the other might remain the same, or even deteriorate further.

Remember that lengthening the tight shortened structure (antagonist) initially can assist in shortening the already stretched and lengthened tissue, which can have the effect of resolving the muscle imbalance.

As Kendall (2010) points out: 'Weakness permits a position of deformity, but shortness creates a position of deformity.' In other words,

> *'A tight muscle will pull the joint into a dysfunctional position and the weak muscle will allow it to happen.'*

Muscle Imbalances

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Posture can be defined as the attitude or position of the body (Thomas, 1997) and according to Martin (2002) should fulfil three functions:

- It must maintain the alignment of the body's segments in any position: supine, prone, sitting, quadruped and standing.
- It must anticipate change to allow engagement in voluntary, goal-directed movements, such as reaching and stepping.
- It must react to unexpected perturbations or disturbances in balance.

From the above, it can be seen that posture is an active as well as a purely static state and that it is synonymous with balance. Optimal posture must be maintained at all times, not only when holding static positions (e.g. sitting, standing) but also during movement.

If optimal posture and postural control is to be encouraged during exercise performance, the principles of good static posture must be fully appreciated. Once this is understood, poor posture can be identified and corrective strategies adopted.

- Good posture is the state of muscular and skeletal balance that protects the supporting structures of the body against injury or progressive deformity, irrespective of the attitude (e.g. erect, lying, squatting, stooping) in which these structures are working or resting.

- Poor posture is a faulty relationship of the various parts of the body, which produces increased strain on the supporting structures and in which there is less efficient balance of the body over its base of support.

The neuromuscular system as we know is made up of slow-twitch and fast-twitch muscle fibres, each having a different role in the body's function. Fast-twitch fibres are for powerful, gross movements, whereas slow-twitch fibres are for sustained low-level activity, such as maintaining correct posture. Muscles can also be broken down into two further categories – postural and phasic.

Postural and Phasic Muscles

Previous authors have suggested that muscles that have a stabilising function (postural) have a tendency to shorten when stressed, and other muscles that play a more active/moving role (phasic) have a tendency to lengthen and become inhibited. The muscles that tend to shorten have a primary postural role, and we can use this book to identify the shortened tight structures. There are some exceptions to the rule that certain muscles follow the pattern of becoming shortened while others become lengthened – some muscles are capable of modifying their structure.

For example, certain authors suggest that the scalenes are postural in nature and some suggest that they are phasic. We know that, depending on what dysfunction is present within the muscle framework, on specific testing one can find the scalenes to be held in a shortened position and tight, but sometimes when they are tested they can be found to be lengthened and weakened.

There is a distinction between postural and phasic muscles; however, many muscles can display characteristics of both and contain a mixture of Type I and Type II fibres. The hamstring muscles, for example, have a postural stabilising function, yet are polyarticular (cross more than one joint) and are notoriously prone to shortening.

	Postural	**Phasic**
Function	Posture	Movement
Muscle type	Type I	Type II
Fatigue	Late	Early
Reaction	Shortening	Lengthening

Table 5.1: Lengthening and shortening of muscles.

Postural Muscles

Also known as tonic muscles, these muscles have an antigravity role and are therefore heavily involved in the maintenance of posture. Slow-twitch fibres are more suited to maintaining posture; they are capable of sustained contraction and generally become shortened and subsequently tight.

Postural muscles are slow-twitch dominant, due to their resistance to fatigue, and are innervated by a smaller motor neuron. They therefore have a lower excitability threshold, which means the nerve impulse will reach the postural muscle before the phasic muscle. With this sequence of innervation, the postural muscle will inhibit the phasic (antagonist) muscle, thus reducing its contractile potential and activation.

When your muscles are placed under faulty or repetitive loading, the postural muscles will shorten and the phasic muscles will weaken. This consequently alters their length-tension relationship, which will directly affect posture, as the surrounding muscles displace the soft tissues and the skeletal system.

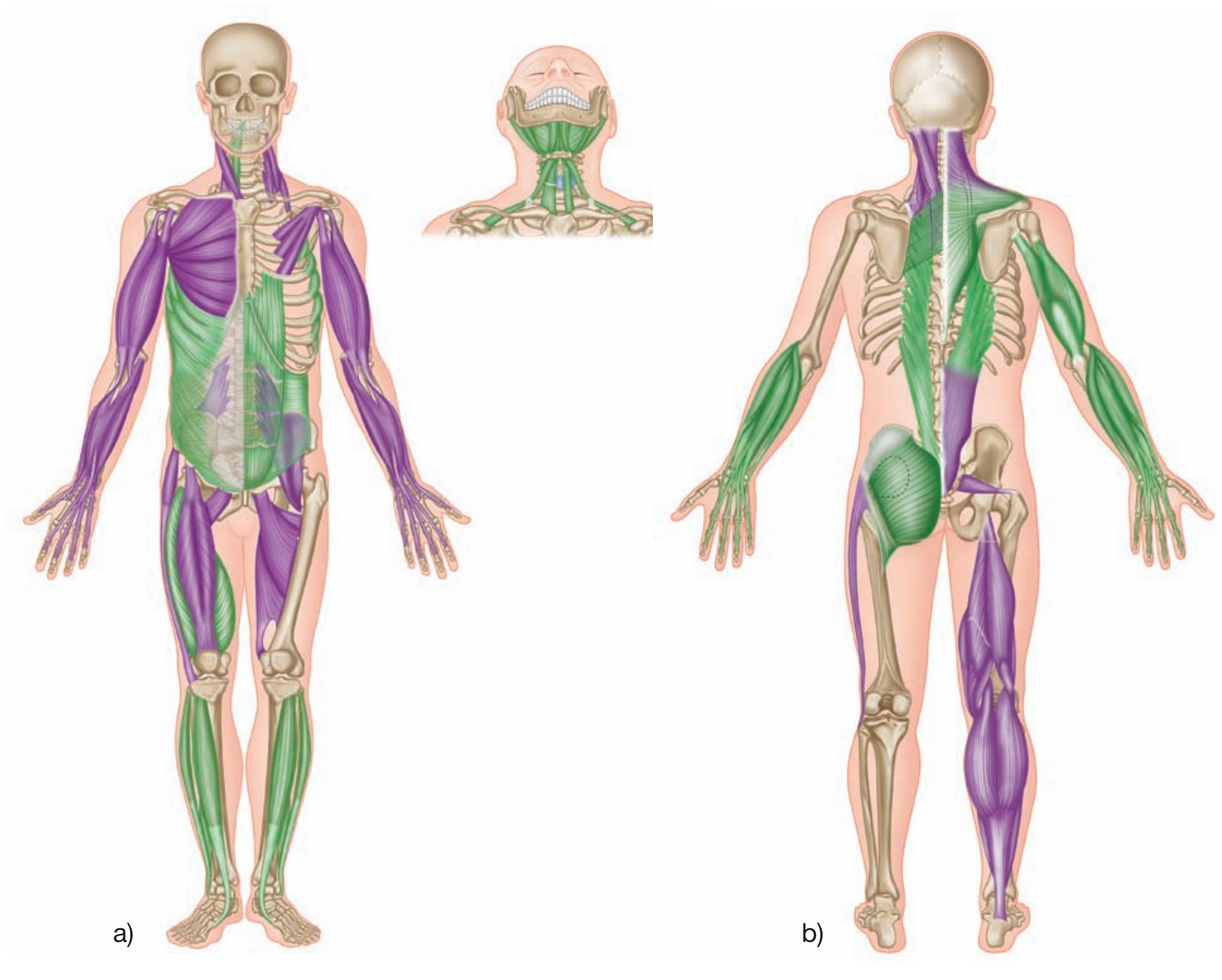

Figure 5.1: Postural-phasic muscles, a) anterior view, b) posterior view. Purple muscles predominantly postural, and green muscles predominantly phasic.

Phasic Muscles

Movement is the main function of phasic muscles. These muscles are often relatively more superficial than postural muscles and tend to span several joints (polyarticular). They are composed of predominantly fast-twitch Type II fibres and are under voluntary reflex control.

A tight muscle often results in inhibition of the phasic muscle, whose function becomes weakened as a result. The relationship between a tightness-prone muscle and its weakness-prone muscle is one way. As the tightness-prone muscle becomes tighter and subsequently stronger, this causes an inhibition of the weakness-prone muscle, resulting in its lengthening and consequent weakening. The division of the muscles into predominantly postural and predominantly phasic is shown in table 5.2.

Predominantly postural muscles	Predominantly phasic muscles
Shoulder girdle	
Pectoralis major/minor Levator scapulae Upper trapezius Biceps brachii Neck extensors: Scalenes / Cervical erectors / Sternocleido-mastoid	Rhomboids Lower trapezius Mid trapezius Seratus anterior Triceps brachii Neck flexors: Supra- and infrahyoid / Longus colli
Lower arm	
Wrist flexors	Wrist extensors
Trunk	
Lumbar and cervical erectors Quadratus lumborum	Thoracic erectors Abdominals
Pelvis	
Biceps femoris / Semitendinosus / Semimembranosus Iliopsoas ITB Rectus femoris Adductors Piriformis / Tensor fasciae latae	Vastus medialis Vastus lateralis Gluteus maximus Gluteus minimus and medius
Lower leg	
Gastrocnemius / Soleus	Tibialis anterior / Peroneals

Table 5.2: Phasic and postural muscles of the body.

Muscle Activity Before and After Stretching

Let's look at some EMG studies of trunk muscle activity before and after stretching hypertonic muscles, in this case the erector spinae.

In table 5.3 the hypertonic erector spinae are indicated as being active during trunk flexion. After stretching, the erector spinae are suppressed both in trunk flexion (which allowed greater activation of the rectus abdominis) and in trunk extension.

Muscle	First recording			Second recording		
						
Rectus abdominis						
Erector spinae						

Table 5.3: EMG recordings of muscle activity. Reproduced from Hammer, W. I. 'Functional Soft Tissue Examination and Treatment by Manual Methods.' Permission sought.

Effects of Muscle Imbalance

The research results of Janda (1983) indicate that tight or overactive muscles not only hinder the agonist through Sherrington's law of reciprocal inhibition, but also become active in movements that they are not normally associated with.

Note: This is the reason, when trying to correct a musculoskeletal imbalance, you would encourage lengthening of an overactive muscle using an MET, prior to attempting to strengthen a weak elongated muscle.

If these muscle imbalances are not addressed, the body will be forced into a compensatory position, which increases the stress placed on the musculoskeletal system, eventually leading to tissue breakdown, irritation and injury. You are now in a vicious circle of musculoskeletal deterioration as the tonic muscles shorten and the phasic muscles lengthen (figure 5.1).

Assessment of Upper Trapezius

The patient is in a sitting position for this test (figure 7.1). The therapist passively side bends the patient's neck to the right while palpating the left trapezius with their left hand (figure 7.2). The therapist needs to be aware of the bind of the tissue, rather than the patient saying that they feel a stretch. The bind is where the 'slack' is taken out of the tissue before the position of stretch is achieved – it is very important to understand this process of bind as opposed to stretch.

If a range of motion of 45 degrees is achieved, a normal length of trapezius is noted. The test is repeated on the contralateral side for comparison.

Figure 7.1: Sitting position for upper trapezius assessment.

Figure 7.2: The therapist bends the patient's head to the right while stabilising the patient's shoulder with the hand.

Alternative Assessment of Trapezius

Scapula Humeral Rhythm Test

The patient is asked to abduct the right shoulder and the movement is observed. The first 30 degrees of motion comes purely from the glenohumeral joint; after 30 degrees, the scapula starts to rotate. The ratio is generally 2:1 – that is, for every 2 degrees of motion from the glenohumeral joint, there is 1 degree of scapula rotation. For example, at 90 degrees of abduction, 60 degrees would have been performed by the glenohumeral joint and 30 degrees of scapula rotation.

A normal scapula humeral rhythm is shown in figure 7.3, whereas figure 7.4 indicates a 'reverse' scapula humeral rhythm pattern of motion, as the 'upper trapezius' on the right is seen to be overactive and assisting the motion of shoulder abduction. This altered rhythm can be seen very clearly with a condition called adhesive capsulitis or frozen shoulder.

This limited range of motion is due to restricted movement of the glenohumeral joint that can be caused by adhesive capsulitis; the scapula will be the joint of compensation and will be seen to elevate and rotate excessively.

Figure 7.3: Arm abduction – normal scapula humeral rhythm.

Figure 7.4: Arm abduction – reverse scapula humeral rhythm.

Scapula Humeral Rhythm Test With Palpation

To confirm the activation or possibly the overactivation of the upper trapezius during the motion of shoulder abduction, the therapist can place their left hand over the patient's right trapezius while the patient performs the movement (figure 7.5). The therapist notes when they feel the upper trapezius contract. If the contraction is felt within the first 30 degrees of shoulder abduction, the upper trapezius will be classified as overactive.

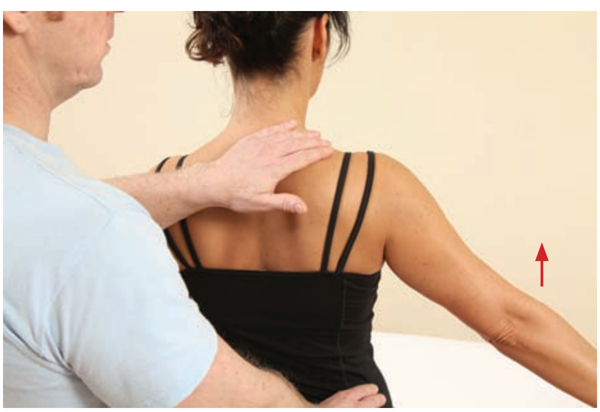

Figure 7.5: The patient abducts their right arm as the therapist palpates the upper trapezius for overactivation.

Assessment of Upper Trapezius From a Supine Position

Patient adopts a supine position with their knees bent, as this helps relax the lumbar spine (figure 7.6). Sitting at the cephalic end of the couch, the therapist places their left hand to cradle the patient's occipital bone and their right hand on top of the patient's right shoulder. Slowly, the therapist passively side bends the patient's head to the left while stabilising the motion from the right shoulder. When the therapist feels the bind from the right upper trapezius, a measurement is taken. A value less than 45 degrees would be classified as short.

Figure 7.6: Assessment of the upper trapezius from a supine position.

MET Treatment of Right Upper Trapezius

The therapist places the right upper trapezius in a position of bind, and asks the patient to either side bend the cervical spine to the right or elevate the right shoulder. Alternatively, the patient may be requested to perform both of these actions at the same time against a resistance from the therapist. Another way of communicating the technique is to ask the patient to bring the ear to the shoulder, or the shoulder to the ear, against a resistance, holding for 10 seconds.

After the 10-second contraction, the patient is asked to relax, take a breath in and on the relaxation phase the cervical spine is taken further into a left side bend. If the side bending causes any discomfort, the shoulder can be taken into further depression, as this will also have the effect of ngthening the upper trapezius.

If an RI technique is desired, the therapist takes complete control of the patient's cervical spine and shoulder as described above. From this position the patient is asked to reach slowly towards their lower right leg with their right hand, until a point of bind is felt. This approach will activate the lower trapezius as the patient is causing a depression of the right shoulder girdle. This will induce an inhibition of the right upper trapezius, allowing a safe way of lengthening as it will override the activation of the muscle spindles.