NS 50 • Functional Model of the Knee Joint

Stand 11/2008

NS 50 - Functional Model of the Knee Joint (F)

Natural size, made in SOMSO-Plast. The following movements are possible: flexion, extension, inner and outer rotation. Removable from base.

Height: 34 cm., width: 18 cm., depth: 18 cm., weight: 1 kg

Notes on how to use the model:

When the knee-joint is flexed one should note the displacement of the patella on the corresponding articular surface of the femur as well as the changes in contact of the condyles of the femur with the semilunar fibro-cartilages. When the knee-joint is flexed the lateral ligaments are relaxed whilst the crucial ligaments remain tensed. In the flexed position movements of rotation are possible. One should note, in particular, that when the leg rotates inwards against the femur the crucial ligaments twist round each other, whilst they untwist during outwards rotation.

Further informations:

http://en.wikipedia.org/wiki/Knee
http://en.wikipedia.org/wiki/Anterior_cruciate_ligament
http://en.wikipedia.org/wiki/Meniscus_(anatomy)
http://en.wikipedia.org/wiki/Patella
http://www.youtube.com/v/JCa71VShNRs
http://www.youtube.com/v/aAHpOI2ejGw
http://www.youtube.com/v/_VjeYn5HzF0
http://www.youtube.com/v/WtwE8kgDTxU
http://www.youtube.com/v/_hNMz6sWCro
http://www.youtube.com/v/MDu_MhC5jcY

Interactive !
Please click here

3D-Download for MP3 Player

Our models are produced in our workshops in Coburg. Trueness to detail and a high degree of aesthetics are features of every model conform with our philosophy to make models taking nature as our example. Should you be nterested in this model please note our trademark of the SOMSO-Sun.

SOMSO MODELLE SINCE 1876

Marcus Sommer SOMSO Modelle GmbH Geschäftsführer: Hans Sommer Friedrich-Rückert-Str.54 D-96450 Coburg Phone +49 (0)9561/8574-0 Fax +49 (0)9561/857411 www.somso.de somso@somso.de

SOMSO MODELLE

The knee-joint (Articulatio genus) is a pivot hinge-joint (Trochoginglymus) in which one can carry out movements of flexion through a transverse axis and movements of rotation through a longitudinal axis. The possibilities of rotation increase the more the knee is flexed.

Joint elements

In the knee-joint only the femur and the tibia are connected through a joint. The head of the fibula (Caput fibulae) forms its own joint a little further down with the tibia (Articulatio tibiofibularis). The femur forms two rounded projections (lateral and medial condyles), which are free at the back but connected together at the front through the facies patellaris. The apposition area is therefore larger when the knee is extended than when it is flexed. The articular surface of the tibia is virtually smooth, only interrupted by roughness in the centre for the attachment of the crucial ligaments and semilunar fibro-cartilages.

Ligamentous apparatus

As one can easily establish when moving the knee-joint, the joint elements do not fit on top of each other well (incongruency of the articular surfaces). This fact permits freer motion, but on the other hand demands a complicated ligamentous apparatus to ensure the upright gait.

Lateral ligaments

(Ligg. collaterale, fibular and tibial):

The external collateral ligament is attached to the head of the fibula and is, therefore, rounded and rather more removed from the articular capsule and the semilunar fibro-cartilages. The internal lateral ligament is, on the other hand, broader and nearer to the foint because it is adherent to the internal semilunar fibro-cartilage. In an extended position these ligaments are tensed, in a flexed position they are relaxed

Crucial ligaments

(Anterior and posterior crucial ligaments) These safeguard the flexed knee. They are situated in the interior of the joint and extend from the inner side of the condyles to the roughness of the bone in the centre of the articular surface of the tibia, crossing each other. Individual sections of these ligamentous bands tense in any knee-joint position to ensure that the joint elements hold together in every functional position.

Semilunar fibro-cartilages

(External and internal meniscus) These are crescentshaped fibro-cartilage rings inserted between the joint elements. They are attached to the tibia in the median plane, rather subject to movement to the side. In this way they can somewhat compensate for the incongruency of the joint elements and increase the pressure transmission surfaces. They are connected beneath each other at the front through a transverse ligament (Lig. transversum genus) - the external fibro-cartilage is connected at the back to the posterior crucial ligament through an obliquely ascending fibrous band, the lig. meniscofemorale post. The patella is actually an ossified piece of tendon, i.e. a sesamoid bone. It develops in the tendon of the quadriceps extensor femoris muscle which is attached to the patellar ligament at the tibia.

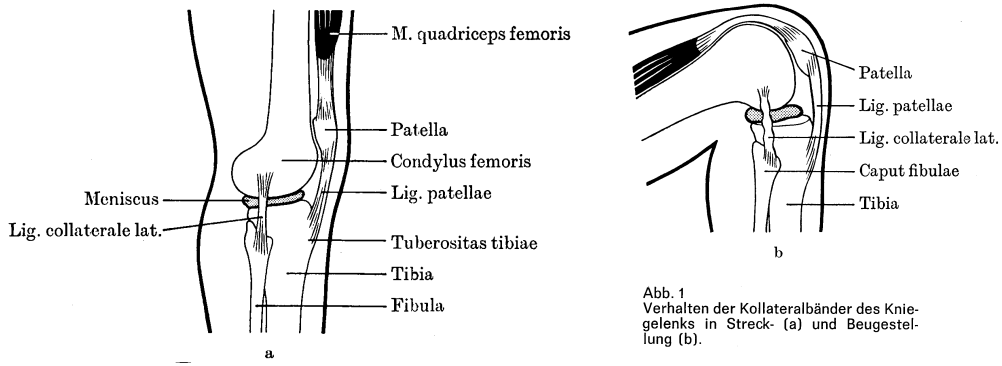


Abb. 1
Verhalten der Kollateralbänder des Kniegelenks in Streck- (a) und Beugestellung (b).

Fig. 1

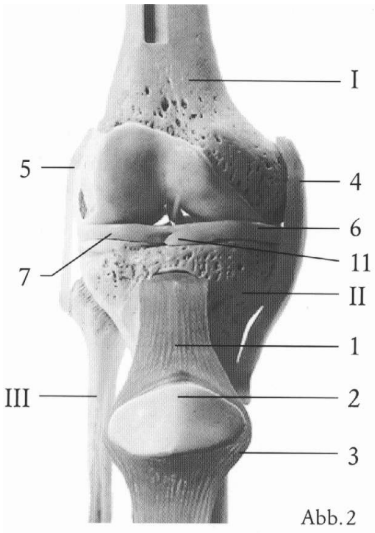


Abb. 2

Fig. 2

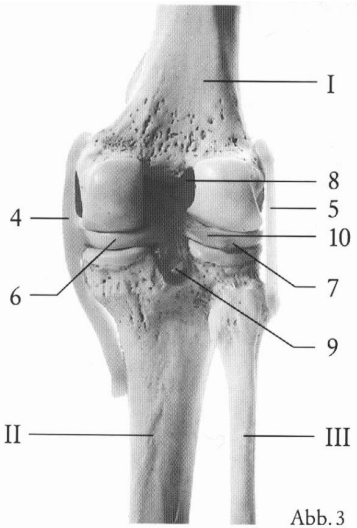
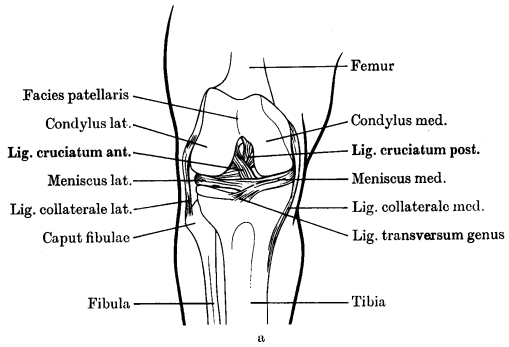


Abb. 3

Fig. 3

Explanation of the reference numbers:

1.Lig. patellae, Patellar ligament
2.Patella
3.Musc. quadriceps fem., Quadriceps femoris muscle
4.Lig. collaterale med., Internal lateral ligament
5.Lig. collaterale lat., External lateral ligament
6.Meniscus med., Internal semilunar fibro-cartilage
7.Meniscus lat., External semilunar fibro-cartilage
8.Lig. cruciatum ant., Anterior crucial ligament
9.Lig. cruciatum post., Posterior crucial ligament
10.Lig. meniscofemorale post., Posterior meniscofemoral ligament
11.Lig. transversum genus, Transverse ligament of the knee
I.Femur
II.Tibia
III.Fibula



a

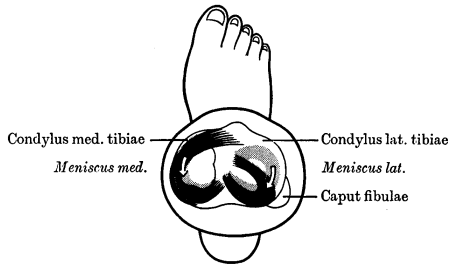
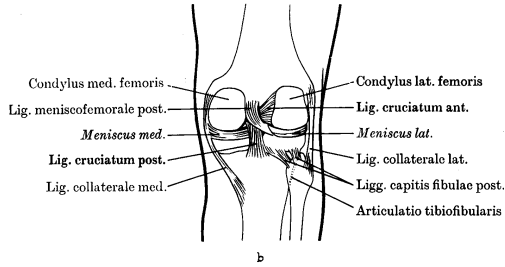


Abb. 5. Aufblick auf die Tibiakondylen mit den beiden Menisci. Lage der Menisci bei gebeugtem Knie = schwarz, bei gestrecktem = grau. Die Pfeile deuten ihre Verschiebung bei der Beugung an. Der laterale Meniscus ist beweglicher (modif. nach BENNINGHOFF).



b

Abb. 4. Bandapparat des Kniegelenkes in der Ansicht von vorne (a) und hinten (b). Man beachte besonders die Lage der Kreuzbänder sowie die Verbindung des medialen Kollateralbandes mit dem medialen Meniscus.

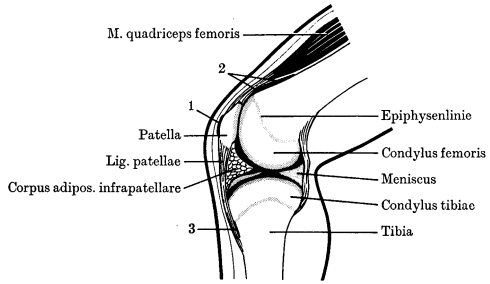


Abb. 6. Längsschnitt durch das Kniegelenk. Gelenkhöhle = schwarz, 1 = Bursa subcutanea praepatellaris, 2 = Bursa suprapatellaris, 3 = Bursa infrapatellaris profunda.

Fig. 4: Ligamentous apparatus of the knee-joint viewed from the front (a) and from the back (b). One should note in particular the position of the crucial ligaments as well as the connection between the medial collateral ligament (internal lateral ligament) and the internal semilunar fibrocartilage.

Fig. 5: The condyles of the tibia with the two semilunar fibro-cartilages viewed from above. Position of the semilunar fibro-cartilages when knee is flexed = black, when knee is extended = grey. The arrow indicates its displacement in flexion. The external semilunar fibro-cartilage is more flexible (modification by BENNING-HOFF)

Fig. 6: Longitudinal cross section through the knee-joint. Joint cavity = black, 1 = bursa subcutanea, 2 = bursa suprapatellaris, 3 = bursa infrapatellaris profunda.

Marcus Sommer SOMSO Modelle GmbH Geschäftsführer: Hans Sommer Friedrich-Rückert-Str.54 D-96450 Coburg Phone +49 (0)9561/8574-0 Fax +49 (0)9561/857411 www.somso.de somso@somso.de