

Testing procedures

Quadriceps

I start with this muscle as it is usually the one involved with knee problems. Clinical indications are pain on climbing up or down stairs or up and down an incline. Patients will often tell you that the knee gave way or feels like it will in these situations. When we take a step there is a forward propulsion force and a degree of inertia on heel strike the Quadriceps acts as a controlled brake, if there is a weakness or delay will isometric contraction of this muscle those forces are then transmitted to the knee joint causing anterior shearing force to be exerted to the soft tissues of the knee joint. If the patient tends to walk with a degree of internal or external hip rotation (toe in – toe out gait) this shear force will affect more lateral components of the knee and ankle, over a life time this can cause joint damage. Please note that when applying laser origin/insertion technique on the quadriceps that there are two areas where golgi tendon organs can be found first is superior to the patella and second is inferior to patella.

Action: Extends the leg and flexes the thigh.

Posture: Weakness allows posterior rotation of pelvis and loss of lumbar curve. Lack of anterior support for knee leads to knee hyperextension and posterior pelvic tilt.



Test: Patient supine with hip flexed 90° and knee extended 90° in other words femur is vertical and tibia is horizontal. Testing pressure is applied with a hand contact proximal to the knee, check that there is no rotation of the thigh and the knee remains flexed 90°. Test pressure is applied horizontally from superior to inferior.

Because the quadriceps is so strong the test above may miss some weakness especially in strong patients.



Alternate test: Patient supine with straight leg raised 45° above table examiner contact hand is inferior to knee on the superior tibia – do not contact the knee for this test. Test pressure is directed inferiorly toward the table.

Neurolymphatic:

Anterior- along the costochondral junction of the 8th – 11th ribs.

Posterior- T8-11 lamina

Neurovascular:

Parietal eminence, posterior aspect

Hamstrings

Works in synergy with the Quadriceps. Often weakness is associated with pelvic faults especially sacroiliac.

Action: Flexes knee, extends thigh, externally rotates the knee joint, externally rotates and adducts the thigh.

Posture: Medial hamstrings weak, allows external foot rotation. Lateral hamstring (biceps femoris) allows internal foot rotation. If bilateral, allows anterior pelvic rotation, lumbar lordosis.



Test: Patient prone with 60° knee flexion, examiner directs pressure against the lower leg just superior to the ankle, take care not to contact the ankle itself. This tests the hamstrings as a group; to test the medial and lateral hamstrings separately contact the lower leg medially for medial hamstrings and laterally for lateral hamstrings. Pressure is directed slightly medial to lateral and lateral to medial respectively.

Neurolymphatic:

Anterior- Over lesser trochanter of the femur.

Posterior- Upper sacroiliac articulation by the posterior superior iliac spine.

Neurovascular:

1 inch above lambda on skull.

Sartorius

Action: Flexes knee and hip, rotates the thigh externally. When knee is flexed rotates tibia internally. Gives medial support to knee.

Posture: Weak sartorius and/or gracilis can lead to genu valgus (Knock knees) – also affects anterior – posterior balance of pelvis.



Test: Patient supine flexes the hip and knee with abduction of the hip. Examiner directs pressure against the anterolateral leg just above the knee, in a direction that extends the knee with medial pressure and internal rotation of thigh. With the other hand gripping the lower leg above the ankle medially and at same time extends the leg.

Neurolymphatic:

Anterior- 2 inches above the umbilicus and 1 inch from the midline.

Posterior- T11, T12 bilaterally near laminae.

Neurovascular:

Lambda

Gracilis

Action: Adducts thigh, flexes knee and hip, and internally rotates the thigh and tibia.

Posture: As for sartorius



Test: Patient prone the knee is flexed to approx 45° and the thigh internally rotated. Examiner elevates the knee from the table by hip extension and supports patients thigh on examiners thigh (this helps to reduce the action of the hamstrings from the test). Pressure with the other hand is directed against the medial lower leg above the ankle in the direction of knee extension and slightly laterally to induce slight medial thigh rotation.

Neurolymphatic, Neurovascular same as Sartorius above.

Popliteus

A bilateral weakness may indicate a lower cervical fixation and recommendation to a Chiropractor /Osteopath would help long term correction.

Due to its action it is often associated with clicking/locking knees.

Action: Rotates the tibia internally on the femur or the femur externally in the tibia, depending on the one that is fixed; withdraws the meniscus during flexion, and provides rotatory stability to the femur on the tibia; brings the knee out of "screw home" position of full extension; helps with posterior stability of the knee.

Posture: Allows knee hyperextension



Test: With patient prone and knee flexed 90°, pressure is directed on the distal medial foot, with counter-pressure on the calcaneus to produce lateral rotation of the tibia on the femur. The actual testing motion is slight and can be evaluated only by observing the tibia rotating on the femur and watching for motion of the tibial tuberosity. It is quite possible for the examiner to obtain foot rotation, appearing to be a weak Popliteus; in fact, it may be a twisting of the tibia and fibula.

Neurolymphatic: Anterior- 5th intercostals space from mid-mamillary line to sternum on the right.

Posterior- Between T5-6 laminae on right.

Neurovascular: Medial aspect of knee at meniscus.

Tensor Facia Lata (TFL)

Action: Thigh flexion, abduction, and internal rotation. TFL along with gluteus maximus, pulling on the iliotibial band helps stabilise the knee laterally.

Postural: Genu varus and pelvic elevation on weak side. Works in conjunction with Gluteus maximus.



Test: Patient supine with the leg in a position of abduction, slight internal rotation, elevated approx 30°, with the knee straight and locked. Testing pressure is directed against the lower leg medially and inferiorly. Note the knee must remain locked in hyperextension during the test.

Neurolymphatic: Anterior- anterolateral thigh bilaterally.

Posterior- triangular area with apexes at L2, L4 and the crest of the Ilium.

Neurovascular: Parietal eminence at the posterior aspect

Gastrocnemius

Action: Plantar flexes the foot

Postural: hyperextension of knee



Test: This test must be correlated with the hamstrings as they are significantly synergistic in this test. For both medial and lateral heads of the Gastrocnemius the patient lies supine with knee flexed at approx 110° and with maximum plantar flexion of foot examiner stabilises the knee while extending it by pulling on the heel. Medial head can be tested with internal rotation and the lateral head with external rotation.

Neurolymphatic: Anterior- 2 inches above umbilicus and 1 inch from midline

Posterior- between T11, T12 bilaterally near laminae.

Neurovascular: Lambda

These are muscles that act over the knee joint directly the next group of muscles have a direct influence on the knee.

Adductors

Action: Adduction of the femur, some connections of the adductors also assist in hip flexion.

Postural: Genu Varus on weak side. Pelvic elevation on opposite side.



Test: patient supine with both legs together and lateral to the midline. Examiner contact is inferior to knees and attempts to separate legs by pulling medial leg toward midline. The medial leg is the side of adductor muscle test.

Neurolymphatic: Anterior- behind the areola, not in the breast tissue. If the patient is female have her lift her breast out of the way. Be careful to inform the patient of your intent and get their consent before proceeding. If there is any concern having another female present like a staff member can diffuse any fear of impropriety.

Posterior- Below inferior angle of scapula.

Neurovascular: On lambdoidal suture between Lambda and asterion.

Gluteus Maximus

Action: Extends hip, assists in externally rotating the thigh.

Postural: Provide3s posterior pelvic, lateral knee support. Weakness leads to lumbar lordosis, facet syndrome and knee instability.



Test: patient is supine with knee flexed 90° and elevated. Examiner applies pressure inferiorly on the lower 1/3 of femur. Examiner must not allow patient to straighten the knee (an attempt to recruit the hamstrings on a weak muscle.) or to allow thigh abduction during test.

Neurolymphatic: Anterior- Anterolateral thigh (TFL)

Posterior- Between posterior superior iliac spine and L5 spinous.

Neurovascular: On lambdoidal suture between Lambda and asterion.

Gluteus medius/minimus

Action: Abducts thigh and rotates it internally. Works in conjunction with gluteus minimus

Postural: lateral stability of pelvis. Weakness leads to elevation of hip, shoulder, head on side of weakness.



Test: patient is supine with leg straight abducted and slightly elevated. Examiner applies a slightly inferior pressure in direction of adduction. Contact is on lower leg for leverage. Direction of testing pressure is lateral to medial.

Neurolymphatic: Anterior- Upper symphysis pubis.

Posterior- Between posterior superior iliac spine and L5 spinous.

Neurovascular: Parietal eminence at the posterior aspect.

Psoas

Action: Flexes and gives minimal action in external rotation and abduction of the thigh.

Postural: Toe in of foot with a tendency to pronation on side of weakness. Elevates pelvis with lumbar deviation away from weakness.



Test: The supine patient flexes, abducts, and externally rotates a straight leg, examiner contacts inferior to the knee and directs pressure down and out while stabilising the anterior part of the pelvis on the opposite side. Move your contact hand closer to the ankle on stronger patients.

Neurolymphatic: Anterior- 1 inch above umbilicus and 1 inch from the midline.

Posterior- T12-L1 between spinous and transverse processes.

Neurovascular: 1 ½ inches lateral to external occipital protuberance.

LILT procedures

This may differ from other practitioners, and is not presented as the definitive guide but only to represent my current understanding of the application of LILT. So, please, if you have any variations or improvements or would like to present a variation on the procedure please contact me.

With patient prone I apply the 60x probe to popliteal fossa in two sessions first slightly superior and the other inferior. This is to maximise lymphatic drainage Dose is set to 1 min or 6 J/cm² each. I like to use the multipulse function and set to 20/10/2.5Hz. On some chronic arthritic knees there is also lymph build up in the anterior bursa, if this is the case then I apply LILT as above to both medial and lateral compartments – for clinic evaluation and record keeping I use a cloth tailors tape to measure the initial diameter of a swollen knee to determine effectiveness of treatment protocols. Then using the 5 x 820nm by 200mW Cluster Probe, I work along the medial and lateral meniscus as well as the inferior and superior patella tendons. Often there is involvement with the fibula head with can often get misplaced posteriorly this can be confirmed by tenderness around the fibula head. This will usually also lead to tenderness in the lateral malleolus as this develops a torque along the fibula. LILT should also be applied to this area. Dose per point is 15 sec or 24 J/cm². If patient describes pain down into their shin this is often the cause. Look for trigger points along the anterior –lateral shin these can be treated with the 820nm by 200mW Single Probe at a dose of 25 sec or 24J/cm² and a frequency of 145Hz.

If you found this interesting or helpful or have anything to add or discuss please feel free to contact me Dr T Scott D.C. Prestatyn Chiropractic Centre, 88 high St, Prestatyn, LL19 9BE. Or email to tom@prestatynchiro.co.uk. This article is not all inclusive of the treatment options available to the Laser therapist but was written to offer a general guide to the application of AK and the chiropractic perspective to the treatment of knee injury.

Most of this information is available from the text

APPLIED KINESIOLOGY

Synopsis 2nd edition

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