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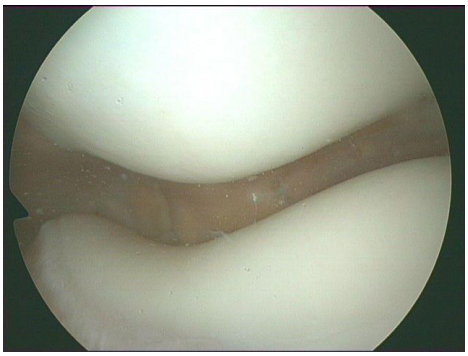
Medial Patello-Femoral Ligament (MPFL) Reconstruction

Patient Information

Introduction

When you bend your knee, the kneecap (patella) usually runs up and down the centre of a groove (trochlea) on the front of the thigh bone (femur). This coordinated movement is largely controlled by the hip and thigh muscles but depends on the anatomy (shape/position) of the bones and various ligaments.



Normal patella (above) on the front of the femoral groove (below)

This leaflet should give you some understanding as to how the kneecap usually works and how it sometimes it may tend to not track down the groove but slip to the side (subluxation/dislocation) and what operation(s) may be recommended to improve this.

Normal kneecap movements

Normal kneecap movement depends on the shape and position of the bones, in particular the shape and depth of the groove and where the kneecap usually sits in relation to this groove with the leg straight. The kneecap and groove usually have a complimentary shape. If the kneecap sits 'high' above the groove it is more likely to miss the groove when the leg is flexed. In addition, if the attachment of the thigh muscles onto the shin bone (tibial tuberosity) is situated more to the outside than inside, this could also predispose to the kneecap being pulled to the side and not run down the groove.

The muscles on the thigh (quadriceps) and the buttocks (gluteals) are key to the movement of the kneecap because the kneecap is actually a bone embedded within the tendon of the quadriceps muscle. The inner part of the quadriceps known as the VMO (Vastus Medialis Oblique) attaches directly to the inner aspect of the kneecap and strengthening this muscle plays a key role in treating kneecap instability.
More recently, studies have revealed that there is sometimes a slightly unusual attachment of the quadriceps muscle on the kneecap with the muscle sitting towards the outer aspect of the thigh. This

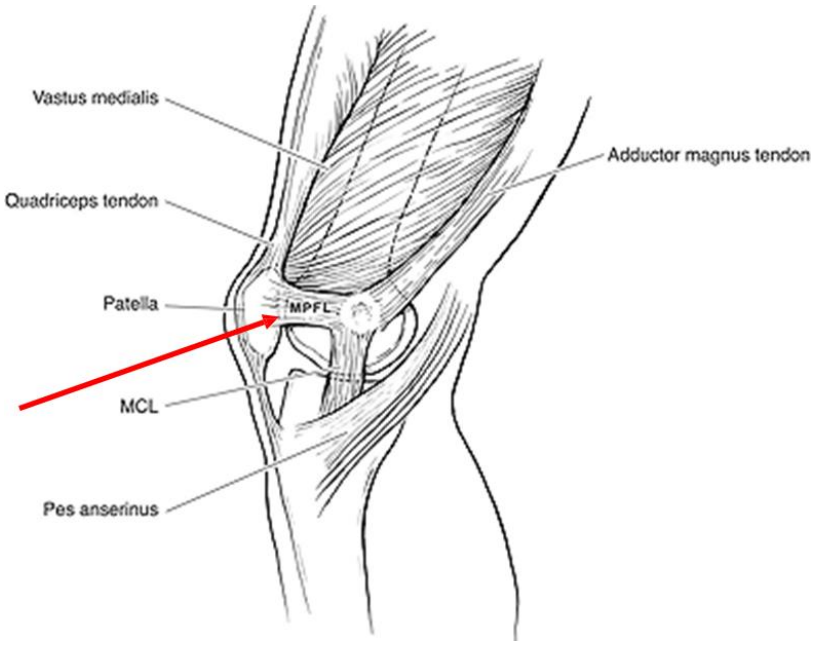
may require some surgical realignment of the muscle attachments.
The other factor that is involved in kneecap movements are the ligaments. These are 'check reigns' to excessive movement rather than movement controls. If an individual has generalized ligamentous laxity ("double jointed") then the movement allowed may be slightly increased. However, if the kneecap does dislocate, it can stretch or tear the medial patella-femoral ligament which may predispose to further such episodes.

When assessing patients with kneecap instability, all the above contributors to instability must be considered before a decision is made regarding which procedure to undertake. Not infrequently more than one factor is involved. If the bony 'set up' is normal then a 'soft tissue' procedure may be suggested, such as a reconstruction of the medial patella-femoral ligament in isolation.

If a non-operative approach has not been successful – strengthening programme, strapping the knee-cap, balance exercises etc – then an operation may be recommended.

What is the medial patello-femoral ligament (MPFL)?

The inner (medial) aspect of the patella has attachments to both ligaments (the MPFL) and part of the quadriceps muscle (the vastus medialis obliquus or VMO). The MPFL provides approximately 60% of the restraint to lateral patella movement at the start of knee flexion (0-30°). This tends to be the position of the knee when the patella dislocates. The ligament attaches to the upper third of the patella and the inner aspect of the femur (thigh bone) as shown below.



The MPF ligament is approximately 55mm long and approximately 28mm wide with obvious variations depending on the patient size and local anatomy.

How is the MPFL injured?

Patella dislocation typically occurs when turning or twisting on the leg. When the patella dislocates it usually moves towards the outside (lateral aspect) of the knee. The result is usually a stretching and/or tearing of the inner supporting structures, including the MPFL. The ligament may either tear off of the bony attachments or 'fail' in the middle of the ligament itself.

How is the tear diagnosed?

Following a patella dislocation and MPFL tear there will be some healing/scarring of the supporting structures. However, following such injury there is (typically) some increased laxity ('glide') of the kneecap joint which can be detected on clinical examination. If the patient becomes aware of some movement or slipping of the patella after a suitable strengthening programme then this is referred to as instability of the patella joint. Operations should only be done for 'symptomatic instability' – a patient's awareness of the patella slipping / moving sideways.

Investigations will include x-rays of the knee and kneecap and an MRI scan to better delineate the soft tissue elements (ligaments and cartilages) around the knee. This may show the MPFL although it is often difficult to clearly visualise. If the instability is more complex, then assessment may include CT scans - to investigate the hip and ankle anatomy - and arthroscopy of the knee joint.

Patella sitting towards the outer
(lateral) aspect of the femoral groove

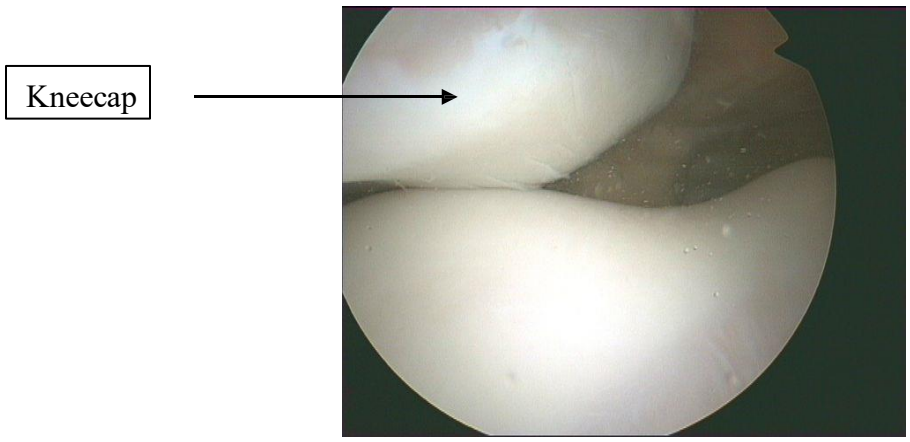
Unless the initial dislocation causes a fracture of the patella an early operation is not recommended. At present there is no evidence that an early 'repair' of the torn structures improves the longer-term patella stability. However, up to 50% of patients will experience recurrent instability (depending on age and activities) and some may require operative treatment.

Initial treatment should always be 'non-operative' - usually coordinated by a physiotherapist – and will include strengthening of the quadriceps and gluteal muscles, patella strapping and proprioceptive (balance) exercises. If symptoms persist, operative stabilization may be considered.

Surgical treatment of the MPFL

If problems persist, 'delayed' ligament repair is not recommended and the MPFL will need to be replaced by an alternative structure, either re-routing a piece of a nearby tendon or by obtaining a graft from another area. The hamstring tendons from the back of the knee are commonly used grafts and the gracilis tendon tends to be an appropriate size to use for the MPFL. This is harvested through a 3cm wound on the upper, inner aspect of the tibia.

Following anaesthesia a tight inflatable band (tourniquet) is wrapped around your thigh which restricts bleeding into and around the knee during the operation. A telescope with a camera (arthroscope) is then introduced into your knee through 3 small incisions – 2 on the front and one above - which allows a thorough examination of the knee joint and assessment of the patella tracking (movements).



View through the arthroscope (from above) before reconstruction. Patella 'sitting' towards the outer (lateral) aspect of the femoral groove.

Once the arthroscopy has been done the graft (hamstring tendon) is harvested, usually from the same leg. Two small tunnels are created in the upper third of the kneecap with a drill and both ends of the tendon are passed and fixated into these tunnels with small absorbable screws. The key to success is establishing the correct point of fixation for the femoral end of the graft. An incision is made over the inner aspect of the knee and a blind ending tunnel is created with a drill. The graft is fed into the tunnel and fixed with a screw 'jamming' the tendon against the tunnel walls. The patella movements are then reassessed by arthroscopy.

The wounds are closed with sutures and a wool / crepe dressing applied to the knee.

What should I expect from the surgery?

The aim of the surgery is to prevent further episodes of dislocation and allow you to return to normal function including sports, with confidence. However, the knee may still feel permanently ‘different’ from the unoperated knee and some people may never regain the confidence required for vigorous sports activity.

All surgical procedures on the front of the knee cause some post-operative discomfort, which will cause some wasting of the thigh muscle. The early post-operative period will be focused on controlling this pain, regaining a full range of movement and restoring the strength of the quadriceps.

The new ligament is stronger than the original but further injury may still occur, although this is uncommon. As with all ligament reconstructions, physiotherapy (strengthening) is essential to ensure the best outcome.

Potential risks and complications of MPFL reconstruction

- **Post-operative bruising**

Due to the nature of the operation some bruising of the lower leg is inevitable and there may be discomfort on the posterior aspect of the thigh where the hamstring is taken from.

- **Altered wound healing / sensation**

There are at least 3 wounds on the front of the knee and 3 smaller stab incisions. This may cause some alteration of the sensation on the front of the knee which improves with time but may never fully recover.

- **Wound infection**

Despite the routine use of antibiotics wound infections may occasionally occur. Another operation may be required to wash out the infected wound.

- **Anterior knee pain / Quadriceps wasting**

Surgery involving the patella frequently causes anterior knee pain, with subsequent wasting of the quadriceps muscle. This may cause some difficulty with kneeling, squatting etc. Your physiotherapist will use techniques to reduce this pain and strengthen the muscles.

Approx. 1-5 / 100 patients

- **Blood clots (Deep Vein Thrombosis)**

These can occur in the lower legs following such surgery and can occasionally enlarge and move through the blood stream to the lungs (pulmonary embolus). Having drilled bony tunnels the use of blood thinning agents will also significantly increase the risk of post-operative bruising and are avoided.

- **Swelling / Bleeding into the knee**

Post operatively blood can collect in the knee joint. In most cases it will be absorbed by the joint itself. Occasionally excess fluid/blood may require an operation to drain the joint.

Approx. 1-5 /1000 patients

- **Damage to the skin under the tourniquet**

There may be numbness of the skin which is usually temporary.

- **Graft rupture**

Although not a surgical complication, the graft may rupture after further trauma.

- **Loss of balance / proprioception**

Despite it being functionally stable, the knee may feel different for quite sometime. Regular balance exercises and a tubigrip may reduce this feeling.

- **Stiff Knee**

Although rare, stiffness may occur following surgery. In some patients a manipulation and arthroscopy may be required to restore knee movement.

- **Severe pain**

Pain, stiffness and loss of use of the knee (complex regional pain syndrome) is rare and the cause is

unknown. If this happens you may need further treatment including painkillers and physiotherapy. The knee can take months or years to fully recover.

Post-operative rehabilitation (guidelines)

Day of operation

Return with wool / crepe dressing. Change dressing to Tubigrip prior to discharge
Encourage full active extension
Static quads exercises, proceed to SLR (assist to prevent lag)
Mobilise FWB with crutches (brace if poor quads control)

Week 1

Goals: Protect fixation and surrounding tissues
Diminish swelling / inflammation
Regain active quadriceps / VMO control
Regain / maintain full knee extension & hyperextension
At least 45° knee flexion
Patient education regarding rehab process

Week 2 Suture removal / assess quads control and active ROM Weeks 2-4

Goals: Control swelling / inflammation
Gradual increase in ROM (within limits of pain) At least 90° knee flexion by end of week 2
At 120° knee flexion by end of week 4 Quadriceps strengthening (especially VMO)

Weeks 5-6

Goals: Full flexion
Good activation of quadriceps and SLR with NO lag

Week 6 clinic review

Weeks 7-12

Goals: Eliminate any joint swelling
Increase quadriceps and VMO control (restoration of proper patella tracking)
Improve muscular strength / control / endurance without exacerbation of symptoms
Avoid overstressing fixation site
Normal gait pattern Functional exercise

Week 12 clinic review

Weeks 12–16

Goals: Work towards symmetrical knee extension strength & endurance of leg musculature
Functional activity drills
Good active patella control with no evidence of lateral tracking or instability

Weeks 16+

Goals: Full painfree ROM
Continued improvement in quadriceps strength (80% or greater of contra lateral leg)
Improve functional strength and proprioception
Maximise patient confidence in returning to appropriate activity level
Functional return to work / sport

** Return to sports dictated by particular sport, ability, fitness and confidence – minimum 4 months (with guidance from physiotherapist and surgeon)

Week 24 clinic review: Sport return discussion

Week 52 clinic final review: Discussion re outcome and future