

Medial patellofemoral ligament (MPFL) reconstruction

Introduction

Mal-tracking (when the knee cap doesn't move smoothly in the groove below) and instability of the patella (knee cap) are frequent causes of 'anterior knee pain' and episodes of 'giving way'. This can be the result of abnormal joint anatomy, sometimes including the hip joint i.e. the 'way you have been made', ligament tears and/or weakness of the quadriceps (thigh) muscle. Not infrequently more than one factor is involved.

When a patella dislocation ("coming out of joint") has occurred the normal 'restraining' structures (ligaments) on the inner aspect of the patella may be stretched or torn, making that patient more likely to experience similar episodes when stressing the knee in the future.

If a 'non operative' approach e.g. strengthening programme, strapping the knee cap, balance exercises etc. has not been successful – then an operation may be recommended. The particular operation will depend on the underlying bony anatomy and integrity of the ligaments which is often detailed on x-ray, CT and/or MRI scans.

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



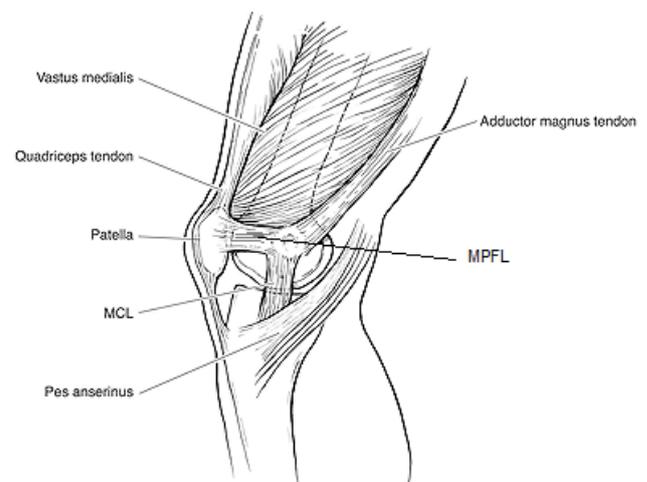
What is the medial patellofemoral ligament (MPFL)?

The inside of the kneecap (patella) has attachments to both ligaments (MPFL) and muscle (the inner aspect of the quadriceps). These attachments stabilise the kneecap and prevent maltracking and dislocation. The ligament attaches to the upper third of the patella and the inner aspect of the femur (thigh bone) as shown.

The MPFL ligament is approximately 55mm long and approximately 28mm wide but this will vary between individuals.

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? What are the options for treatment?

If an early diagnosis is made and the knee immobilized (kept stable) there could be a chance for some healing of the MPFL. However, typically there is some resulting increased medial laxity ('glide') of the patella joint which can be detected on clinical examination, usually in comparison to the other, unaffected knee. If the patient becomes aware of some movement or slipping of the patella then this is referred to as instability of the patella joint. Operations should be done for 'symptomatic instability' – a patient's awareness of the patella slipping / moving sideways.

Investigations will include x-rays of the knee and knee cap and an MRI scan to better depict 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 in order to gain more information about any underlying rotational bony problems – 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 and/or articular cartilage, an early operation is not recommended. There is no evidence that early 'repair' improves the longer term patella stability. Unfortunately, up to 50% of patients will experience recurrent instability (and therefore approximately 50% won't!) 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 muscles (specifically the VMO), patella strapping and proprioceptive (balance) exercises. If symptoms persist despite several months of physiotherapy stabilisation with surgery may be considered.

Surgical treatment

If the ligament doesn't heal after the initial dislocation, 'delayed' repair is not successful and it will need to be replaced by an alternative structure - either re-routing a piece of a nearby structure or obtaining a graft from somewhere else. 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 collected through a 3cm wound on the upper, inner aspect of the tibia (shin bone).

Following general anaesthesia (you are asleep), a tight inflatable band (tourniquet) is wrapped around your thigh to restrict 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 (approximately 1cm long) – 2 on the front and one above – which allows a thorough examination of the knee / patella joints and assessment of patella tracking.

Once the arthroscopy has been done the graft (hamstring tendon) is collected (harvested), usually from the same leg.

Two tunnels are then created in the patella using a small drill and both ends of the hamstring are passed into the tunnels. An incision is then made over the inner aspect of the femur the loose end of the graft is passed into this tunnel. The key to success of the operation is establishing the correct entry point for the femoral insertion of the ligament. The graft is introduced into the tunnel and fixed with a screw 'jamming' the tendon against the tunnel wall. The tracking of the patella and the limits of the side-to-side glide are confirmed by the camera on the arthroscope. The wounds are then closed and a wool / crepe dressing applied to the knee.



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

What (outcome) should I expect from the surgery?

The aim of the surgery is to stabilise the patella and prevent further episodes of dislocation, allowing you to return to normal function, including sports. Any surgical procedure to the front of the knee - in particular the patella - will cause some post-operative discomfort, which in turn will lead to some wasting of the quadriceps muscles. The early post-operative period will be focused on controlling any pain, regaining a full range of movement and later restoring the strength of the quadriceps.

The new ligament is no weaker than the original but further injury may still occur, although this is uncommon. As with all ligament reconstruction procedures, rehabilitation ('physiotherapy') is key to the outcome and post-operative function of that knee.

Following recovery from the 'insult of surgery' you should feel more secure and confident about your knee allowing normal day to day activities and (hopefully) a return to sports. 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.

Because this is a relatively 'new' operation and not commonly performed, there are few reports which have used outcome scores to demonstrate the benefits and timescale of recovery following operation. Anybody undergoing this procedure at the Royal Berkshire Hospital will have outcome scores recorded at various times but these numbers are not sufficient to be of any significant value as yet.

Potential risks and complications of surgery

Common (2-5%)

- Anterior knee pain / Quadriceps wasting: Surgery that involves 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.
- 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) making it difficult to breath (rare). Early movements are important to help prevent this from occurring.
- Numbness: You may experience some mild numbness on the anterior of your shin, close to your scars following surgery.
- 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.

Rare (<1%)

- Infection: The wound sites may become infected - this usually settles with antibiotics. Very occasionally a further operation may be needed. Deep infection within the knee joint is very rare.
- Unsightly scarring of the skin: Most wounds heal to a neat scar but thickened, red and painful scars occasionally occur, especially in Afro-Caribbeans.
- Damage to the skin under the tourniquet: This may require dressing or rarely surgery. There may also be numbness of the skin which is usually temporary.
- Graft rupture: The graft may rupture after further trauma. Further surgery may be necessary.
- Loss of balance reactions /proprioception (your ability to balance): Despite it being functionally stable, the knee may feel different for quite some time. 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

Day of operation / Day 1

- Return from surgery with a wool / crepe dressing. This dressing will be changed to a Tubigrip before you leave hospital the next day.
- You will be encouraged to practice full active extension of your operated leg.
- Your physiotherapist will show you static quadriceps exercises, proceeding on to straight leg raises (you may need to help lift your leg with a towel/belt so that your knee is kept straight when lifting your leg).
- You will be encouraged to mobilise so that you are full weight bearing - in full extension with crutches (you may have a brace only if you have poor quadriceps control).

Week 1

Goals

- Protect fixation and surrounding tissues.
- Diminish swelling / inflammation.
- Regain active quadriceps / VMO control.
- Maintain full knee extension / hyperextension.
- At least 45° knee flexion.
- Patient education regarding rehabilitation process

Week 2: Suture (stitch) removal by nurse at GP surgery

Weeks 2 - 4

Goals

- Control swelling / inflammation.
- Gradual increase in range of movement (within limits of pain).
- At least 90° knee flexion by end of week 2.
- At least 120° knee flexion by end of week 4.
- Quadriceps strengthening (especially VMO).
- Begin to drive short distances if able to perform an emergency stop safely.
- Return to sedentary job.

Weeks 5 - 6

Goals

- Full flexion.
- Good activation of quadriceps and straight leg raise with no lag (knee bend).
- Can start swimming (not breaststroke until 10-12 weeks post operatively).

- Can return to work in a physical job if able to carry out light duties with limited walking.

Week 6: Clinic review with x-ray on arrival. Ensure appropriate progress.

Weeks 7 - 12

Goals

- Eliminate any joint swelling.
- Increase quadriceps and VMO control for restoration of proper patella tracking.
- Improve muscular strength / control / endurance without exacerbation of symptoms.
- Avoid overstressing fixation site.
- No altered walking pattern.
- Functional exercise.
- Begin kneeling.
- Able to return to gym (with guidance from physiotherapist).
- Can start breaststroke when swimming.

Week 12 clinic review: check of progress.

Weeks 12 - 16

Goals

- Knee extension strength at least 70% other knee.
- Work towards achieving maximum strength and endurance of leg musculature.
- Functional activity drills.
- Good active patella control with no evidence of lateral tracking or instability.

Weeks 16+

Goals

- Full pain free range of movement.
- Continued improvement in quadriceps strength (80% or greater of contra lateral leg).
- Improve functional strength and balance reactions.
- Maximise 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: KOOS, Fulkerson and Kujala questionnaires & sport return discussion

Week 52 clinic final review: KOOS, Fulkerson and Kujala questionnaires & discussion re outcome and future

Further information

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Reviewed: July 2019
Review due: July 2021