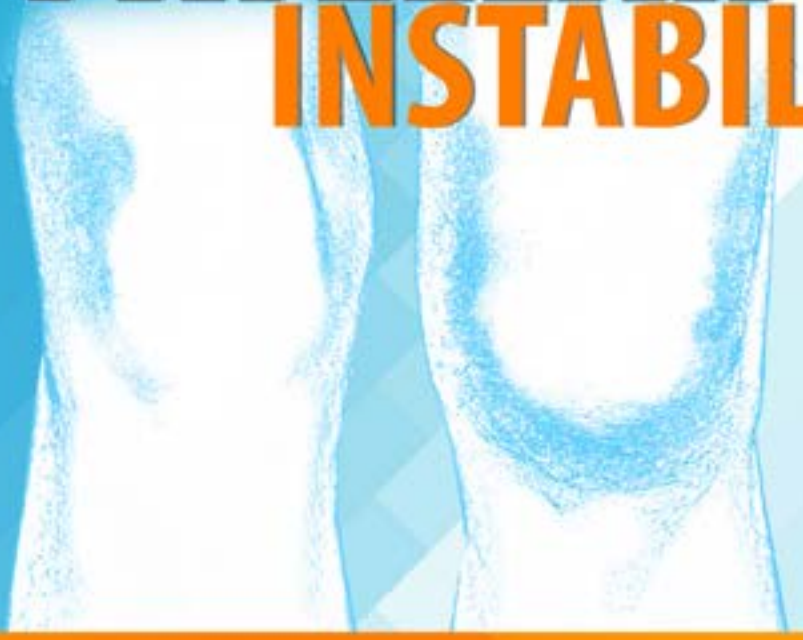
PATELLAR INSTABILITY



A Patient Information GUIDE

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Females are at higher risk of having patellar instability.

"YOUNG ATHLETES SUFFER PATELLAR DISLOCATIONS MORE COMMONLY THAN ANY OTHER AGE GROUP"

PATELLAR INSTABILITY

A PATIENT INFORMATION GUIDE

The knee joint is made up of 3 bones: the femur (thigh bone), the tibia (shin bone) and the patella (kneecap). Usually, the patella sits in the trochlear groove, which is a groove at the distal end of the femur. This forms the patellofemoral joint **(figure 1)**. Patellar instability is a condition that occurs when the kneecap comes out of the trochlear groove. Patellar subluxation occurs when the patella only ***partially*** moves out of the trochlear groove. Dislocation of the patella occurs when the patella moves ***completely*** out of the trochlear groove.

Patellar dislocations are typically laterally whereby the patella moves out of the groove towards the outer side of the knee joint. When they occur, they are often associated with significant pain and swelling. Patellar dislocations are most commonly caused by a twisting injury to the knee and less commonly by a direct blow to the knee. Individuals with hypermobility ("loose jointedness"), are at increased risk for patellar instability. Some patients also have a congenital condition in which the trochlear groove is more "shallow". In this situation, there is a loss of the bony restraint to help hold the patella in place which makes patellar dislocation more likely. There is also a tendency for patellar dislocation to run in families.

When the patella dislocates, the soft tissue on the inner side of the patella may be stretched or torn, including a ligament known as medial patellofemoral ligament **(MPFL)** which usually helps to hold the patella in place. Up to half of people who dislocate their patella will have further dislocations. They may also feel that the patella is unstable, even if it does not completely dislocate.

Young athletes suffer patellar dislocations more commonly than any other age group. Patients most at risk for patellar instability are 13 - 20 years of age. Females are also at higher risk for patellar instability.

WHAT IS A PATELLAR DISLOCATION?

A patellar dislocation occurs when the patella (kneecap) moves out of it's usual location in the knee joint.

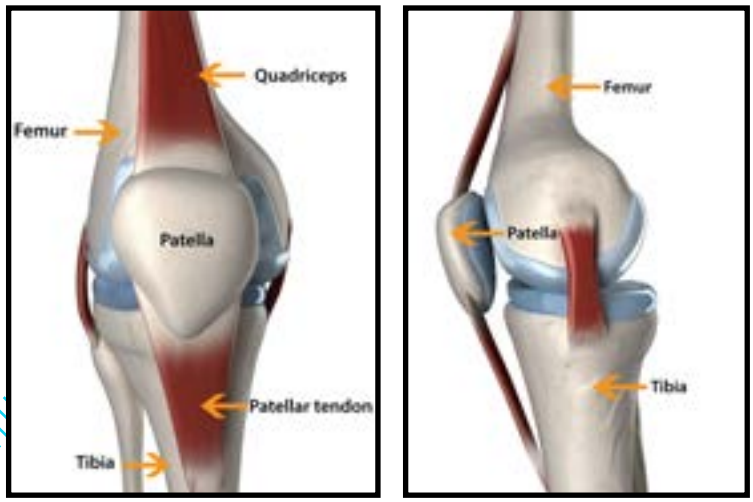
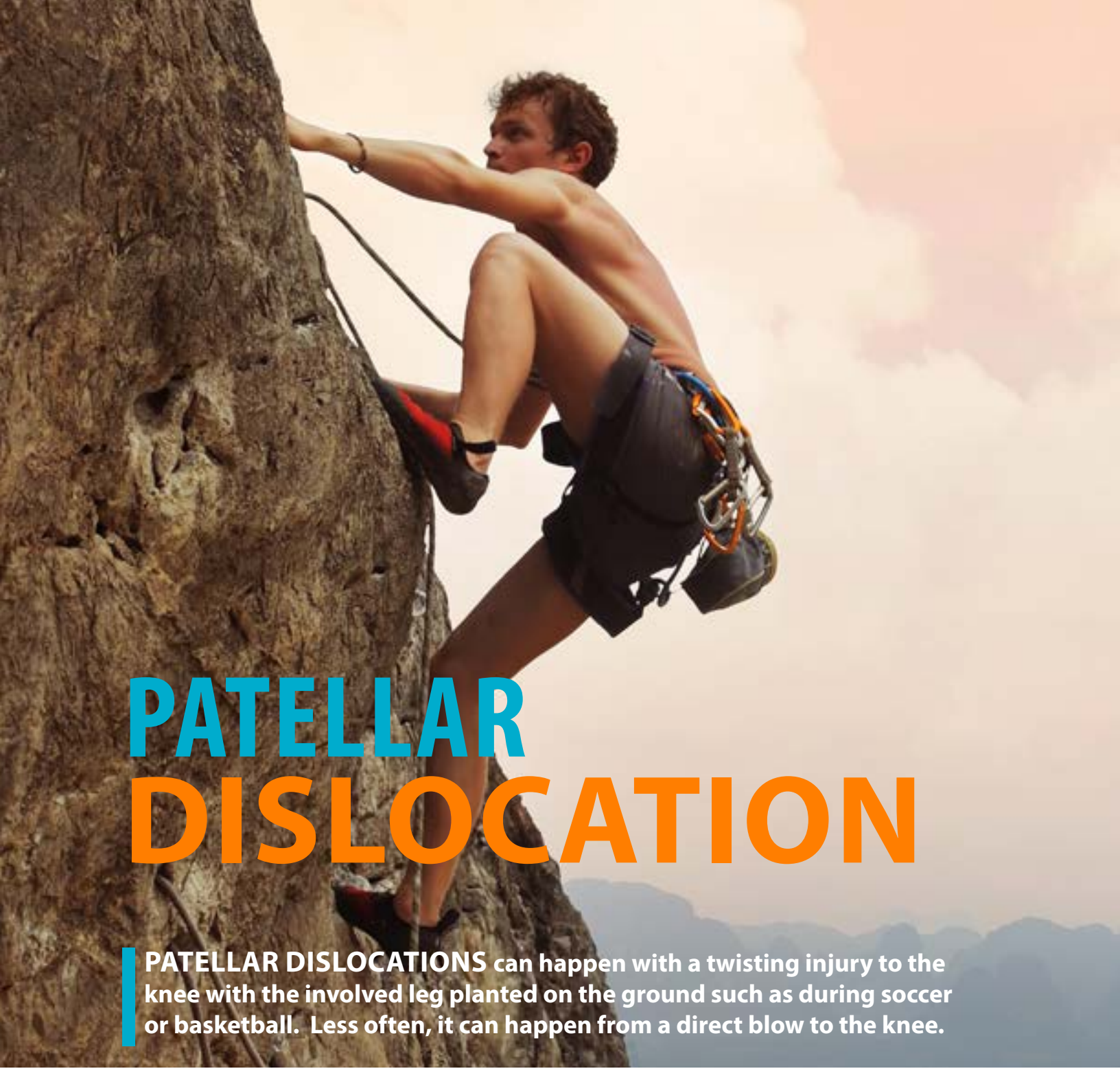


Figure 1. Front and side views of the knee



PATELLAR DISLOCATION

PATELLAR DISLOCATIONS can happen with a twisting injury to the knee with the involved leg planted on the ground such as during soccer or basketball. Less often, it can happen from a direct blow to the knee.

ANATOMY:

The patella is the largest sesamoid bone in the body. A sesamoid bone is a bone that is embedded within a tendon. It is attached to the quadriceps tendon proximally and the patellar tendon distally. The patella sits in a groove in the femur known as the trochlear groove **(Figure 2)**. The patella glides up and down the groove in the thigh bone (femur) as the knee bends and straightens. The patella has a smooth coating (articular cartilage) on its underside which allows it to slide easily in this groove. The trochlear groove on the femur is also covered with articular cartilage.

On either side of the patella, there is a broad band of tissue which is known as the retinaculum. The retinaculum does help provide a stabilizing effect on the patella. The powerful muscles on the front of the thigh, the quadriceps muscles, straighten the knee by pulling at the patellar tendon via the patella. One of the quadriceps muscles, the vastus medialis, pulls the patella inward (medially). Another quadriceps muscle, the vastus lateralis, pulls the patella outward (laterally). There is an important ligament on the medial side of the knee known

as the **MPFL** (Medial Patello Femoral Ligament) which acts as an important stabilizer to lateral patellar dislocation. The MPFL is almost always stretched or torn when the patella fully comes out of the groove as in a patellar dislocation.

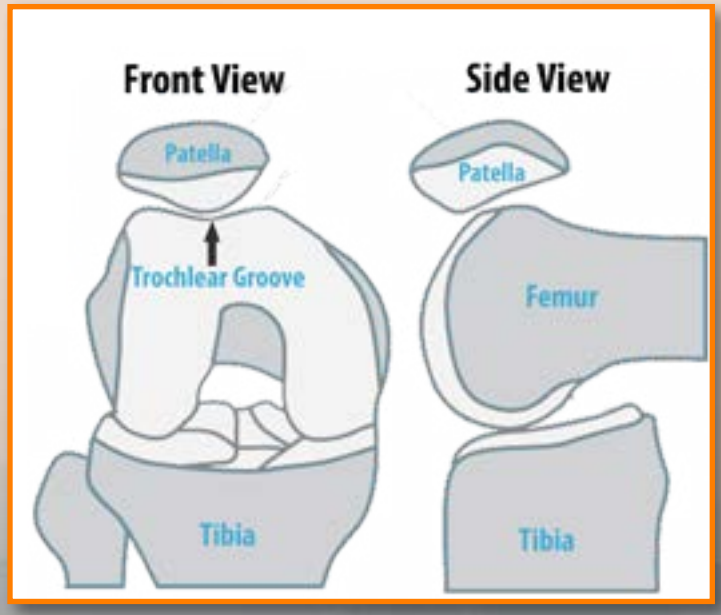
CAUSES:

Predisposing factors that increase the chance of the patella to sublux or dislocate include: generalized ligamentous laxity (loose jointedness), weakness of the medial quadriceps muscles that help to hold the kneecap in place, abnormal alignment of the bones of the lower leg (genu valgus or "knock kneedness"), a high riding kneecap (patella alta) which brings the patella above the groove, and trochlear dysplasia in which the trochlear groove is shallow. These predisposing factors allow the patella to slide more easily out of the groove causing patellar instability and may possibly cause recurrent instability of the patella. In these patients, the patella can sublux or dislocate with seemingly minor activities such as going up stairs or even kneeling.

Patellar dislocations can also occur during contact or non-contact situations in patients who may not have any of the above "predisposing factors". An athlete can dislocate his/her patella when the foot is planted and a rapid change of direction or twisting occurs. This may happen in sports such as soccer, gymnastics or basketball. Direct blows to a knee can also cause dislocations. This type of injury may occur in sports such as hockey or football. The force of these types of injuries is typically much greater and usually causes more severe damage to the knee especially to the restraining ligaments. Patients with traumatic dislocations also have a higher incidence of associated fractures in the patellofemoral joint.

Figure 2

THE FIGURE BELOW SHOWS HOW THE KNEECAP NORMALLY "SITS" IN THE TROCHLEAR GROOVE OF THE FEMUR.



"INITIALLY, PEOPLE WHO SUSTAIN A PATELLAR DISLOCATION WILL COMPLAIN OF SUDDEN PAIN IN THEIR KNEE AFTER A PLANT AND TWIST TYPE OF INJURY"

Diagnosis &Treatment

Diagnosis:

In most cases, the patients will describe a twisting episode where the patella dislocated and either reduced on its own or someone had to put it back in place for them. Following the injury, the patient may experience significant pain and swelling in their knee and they may have difficulty walking. In some situations, the patient may have experienced patellar dislocations in the past. This is known as ***recurrent*** patellar instability. These patients may or may not have the severity of the symptoms and may need to be addressed differently than a patient experiencing a first-time incident.

Physical examination of the knee may reveal that the patella is still dislocated. If this is the case, the patient will require a reduction of their patella which may require sedation. Once the patella is reduced there will be tenderness, usually on the medial (inner) side of the knee where the medial retinaculum and MPFL are located. There is often significant swelling in the knee (especially with a first time dislocation). A patellar apprehension test where the patella is gently moved outward may be performed. Quadriceps muscle atrophy usually develops due to the knee injury. Range of motion of the knee is often limited due to pain initially. The knee will be assessed for bone tenderness, joint line tenderness and ligament stability. Known predisposing factors for patellar instability (especially in patients with recurrent patellar instability) are often assessed such as generalized joint hypermobility, weakness in the muscles around the knee as well as the alignment of the lower extremity.

Imaging:

X-rays are generally recommended to see how the kneecap fits in its groove and to ensure that it is properly located. There are also several other bony landmarks that will be assessed such as the patellar height and possible tilting of the kneecap. X-rays are also important to rule out any other associated injury to the bones of the knee such as a fracture that may occur secondary to the patella dislocating.

Other tests such as Magnetic Resonance Imaging (MRI) or CT scan are occasionally used to rule out damage inside the knee. An MRI can be obtained to evaluate the MPFL and determine where it is torn. The MRI can also give a detailed look at the cartilage surfaces and see if there are any other injuries within the knee joint (meniscus, other ligaments). A CT scan may be ordered to determine the bony alignment of the lower extremity and can help with pre-operative planning in patients who have recurrent patellar dislocations.

Treatment:

The treatment goals are to prevent further episodes of patella dislocation, subluxations or feelings of instability. The other goals are to restore normal strength and function in the knee joint and to prevent further damage to the articular cartilage of the knee joint, which may lead to the development osteoarthritis in the future.

In order to reach these goals, there must be adequate healing of the ligaments and muscles in the acute phase. Rehabilitation will then focus on strength, flexibility and neuromuscular control of the knee. Many patients benefit from seeing a physiotherapist initially to assist in attaining these goals. The treatment of patellar dislocations and patellar instability depends on the severity of the injury and other associated injuries. Each treatment plan should be individualized.

Most first-time patellar dislocations are treated without surgery. This may include a short period of immobilization, which typically lasts 2 to 4 weeks in a long leg brace or cast. Following this, physiotherapy is initiated to regain the range of motion of your knee as well as to regain your strength, function and neuromuscular control of your knee. Stationary bicycling is an excellent way to regain mobility and strength in your knee in a safe manner. Balance training exercises are also extremely important to

"THE GOALS OF TREATMENT ARE TO HAVE A STABLE PATELLA AND TO RESTORE NORMAL STRENGTH AND FUNCTION IN THE KNEE."

help regain your neuromuscular control in your leg. A stabilizing kneecap brace may also be prescribed. The goal is for you to return to your normal activities within 2 - 4 months depending on your compliance and response to the physiotherapy and home therapy program.

On occasion, there are patients who fracture off a piece of bone and cartilage (osteochondral fracture) when their patella dislocates. If this occurs, surgery may be necessary. Also, in patients who sustain significant tears of their MPFL, surgery may be considered to repair the tear in the acute phase.

In chronic conditions, whereby the patella continues to be unstable despite non operative treatment, surgery may be indicated. There are a variety of potential surgical procedures available to help stabilize the patello-femoral joint. The type of procedure(s) recommended for you will depend on the pathology in your knee and whether or not you have any predisposing risk factors as outlined previously. For example, there are some patients who require a tightening of the tissue on the inner side of the knee (capsular imbrication and/or VMO advancement and imbrication). There are patients who may require a release of the tissues that pull the kneecap off track which is known as a lateral retinacular release. In patients with stretching or incompetence of their MPFL, an MPFL reconstruction procedure might be indicated. A variety of techniques are used to reconstruct the MPFL including autograft (your own) tissue or allograft (donor) tissue. In certain patients, a tibial tubercle transfer (oseotomy) may be necessary to correct their recurrent patellar instability. This is referred to as a distal realignment procedure whereby the kneecap is repositioned by re-alignining the attachment of the patellar tendon to the underlying tibial tubercle. There are some patients who require a combination of the above procedures to fix their recurrent patellar instability. The pros and cons of surgery will be discussed with you before your surgery is scheduled. It is **extremely important** to follow the appropriate rehabilitation program **before and after** surgery if you are going to proceed with patellar stabilization surgery.

Frequently Asked Questions

1 What are the indications for surgery?

As outlined above, there are a number of factors to consider when deciding to proceed with patellar stabilization surgery. Generally, surgery may be indicated if you have recurrent instability of your patella and you are having problems in your knee related to this recurrent instability. Surgery may also be recommended if you have associated injuries to your knee such as a loose body or damage to other structures in the knee joint. Patellar stabilization surgery will not reverse damage that may have already occurred to the articular cartilage in your knee and it will not "reverse" arthritis in your knee.

2 What is the MPFL?

MPFL stands for **M**edial **P**atello **F**emoral **L**igament. This ligament is on the inner side of the knee and helps stabilize your kneecap and prevents your patella from dislocating laterally. The MPFL may be injured when the patella dislocates laterally causing the MPFL to stretch or tear.

3 What kind of graft options are there for an MPFL reconstruction?

There are two main types of graft options: autograft (your own tissue) or allograft (donor tissue). Autograft options include using one of your medial hamstring tendons or a portion of your quadriceps tendon. Allograft (donor tissue) may be offered for MPFL reconstruction surgery. The advantages of using allografts for MPFL reconstruction include: no donor-site morbidity, decreased overall surgical morbidity, decreased operative time, improved cosmesis with smaller surgical incisions, less postoperative pain, and possibly an easier rehabilitation post-operatively. Allografts are particularly useful in patients for whom a previous autograft MPFL reconstruction has failed, patients with excessive joint laxity, patients who need a complex multiple ligament reconstruction and possibly in patients who are considered to be "older". A primary disadvantage of allografts is the risk of viral or bacterial disease transmission. This risk is very low and is estimated to be approximately a 1 in 1.5 million chance of disease transmission.

4 How are the grafts fixed to the bone in an MPFL reconstruction?

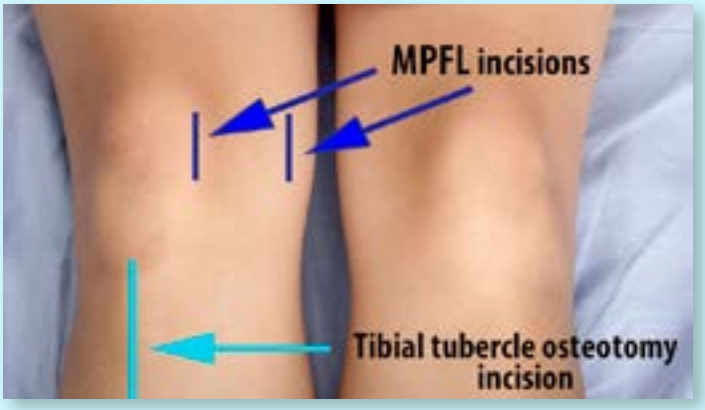
The graft needs to be secured on the patellar side and on the femur side. Bone anchor devices are used to secure the graft on the patella. A bio-absorbable screw is typically used to secure the graft in the femoral tunnel.

5 How long is the surgery?

This will depend on how much surgery is required to stabilize your patella. If you require an MPFL reconstruction with a graft and/or a tibial osteotomy, the length of the procedure will be longer. In general, it will typically take 1 1/2 to 2 hours to perform the surgical procedure(s).

6 Where are the incisions?

There are typically two 1 cm incisions around the kneecap tendon in order to perform the knee scope. Some patellar surgery may be completely done through the arthroscope. ***If you are having an MPFL reconstruction*** you will have additional incisions. There is a small 2.5 cm incision about 4 cm below the joint along the inside of your knee where the graft is harvested (if using autograft hamstrings) and there are two roughly 2.5 cm incisions on the medial side of your patella as well as on the medial side of your distal femur. There is also a small pinhole just above and on the outside of the knee where a pin used to pull the graft through the femoral tunnel. These incisions are small and cosmetically acceptable. ***If you are having a re-alignment osteotomy*** of your tibial tubercle, you will have a roughly 6cm incision over the front of your proximal tibia as well.



7 *Risks of patellar stabilization surgery?*

All types of surgery have inherent risks, even though these risks are low. The major risks after patellar stabilization surgery are infection, swelling, wound healing problems, skin numbness, blood clots, knee stiffness, neurovascular injury, growth plate injury (children), recurrent patellar instability, anterior knee pain and prolonged quadriceps weakness.

A. Infection: The risk of infection is reportedly about 0.8% and when recognized is treated with cleaning out of the joint and antibiotics. Preventative measures are taken such as: cleansing of the skin prior to surgery, careful surgical technique, small incisions, and peri-operative antibiotics. If an infection develops, you will require antibiotics (oral or intravenous) and you may require surgery to wash out your knee joint.

B. Swelling: Swelling around the knee joint is normal after patellar stabilization surgery. This can be alleviated by applying ice to the knee or using a cryotherapy device such as a CryoCuff or Polar Care. In very rare cases, patients may need to have the fluid drained from their knee if it limits their motion or if it is persistent. Rarely, some patients develop a painful swelling down the front of their leg, which is secondary to blood tracking underneath the skin from the surgical site. This can be very painful but thankfully, it is very rare. Once again, the best treatment for this is to apply ice to the leg, elevate the leg and make sure that the brace is not too tight on the lower leg. It would be very rare for a patient to develop an acute compartment syndrome (excessive swelling around the lower leg muscles) after patellar stabilization surgery.

C. Wound healing problems: The incisions are quite small and therefore complications are rare. Occasionally blisters occur but these are usually treated with local dressings or possibly antibiotics. Most wounds heal to a neat scar but thickened, red and painful scars can occur (especially if you have a tendency to form keloid scars) and may require treatment.

D. Numbness: There are many skin nerves that supply the sensation to the skin throughout the leg. Despite the small incisions, there is a risk that you may develop temporary or permanent numbness around your knee or down along the inner or outer aspect of your lower leg. This does not affect the ability to use your leg (your motor power), it affects your ability to feel the skin in that area (the affected area feels numb or hypersensitive to the touch). This may disappear slowly over time, or may not disappear entirely, depending on the patient.

E. Blood clots: Blood clots (deep vein thrombosis) are a concern and patients at risk include patients with family history of clotting, a history of a prior clot, patients over 40, obesity, cigarette smoking, women, birth control pills, history of cancer, and immobility. Preventative measures include a careful documentation of any of these factors, early mobilization, smoking cessation, and discontinue the use of birth control pills for a week before surgery and for at least 1 – 2 weeks after surgery. Other birth control techniques should be used while off birth control pills. You may be advised to take 1 or 2 Aspirin (81 mgs) per day for period of 2-3 weeks after surgery. If you have had a blood clot in the past or a direct relative has had a blood clot in their leg or a pulmonary embolism, please advise us before surgery. If you are at high risk, in some cases, use of a low molecular weight heparin (such as Fragmin) or Coumadin (Warfarin) is considered in the peri-operative period. Long trips including air travel should be avoided in the peri-operative period to minimize the risk of developing blood clots. ***If you suddenly get short of breath or have chest pain after surgery, you need to go to the nearest emergency room or call 911 immediately. A pulmonary embolism is a medical emergency and can cause death.***

F. Knee Stiffness: Significant stiffness in the knee after patellar stabilization is very rare. Loss of motion is less frequent now that earlier motion after surgery is the rule. Patients are initiated and instructed to start moving their knee joints soon after surgery. In extremely rare circumstances, if your motion does not progress occasionally a repeat arthroscopy and/or manipulation may be necessary.

G. Injury To Artery Or Nerve: An injury to a major artery or nerve around the knee would be a very rare occurrence.

H. Growth plate injury: In young children with wide open growth plates there is a low risk to injuring the growth plate with patellar stabilization surgery. Patellar stabilization surgery is modified in children with open growth plates to minimize the risk of inju-

ry to the growth plate. For example, proximal tibial osteotomy surgery is delayed in patients with open growth plates to diminish the risk of a growth arrest. If a growth plate injury occurs, there is the potential for a growth arrest.

I. 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 et.. Your physiotherapist will use techniques to reduce this pain and strengthen the muscles. It is very important that you work on regaining your muscles after a dislocation or surgery, otherwise you may be left with permanent muscle weakness and atrophy.

J. Graft tearing: If you have an MPFL reconstruction with a graft, there is a low possibility that the graft may tear or stretch if you have further trauma to your knee. If this occurs and you develop recurrent patellar instability, you may require revision patellar stabilization surgery.

K. Loss of proprioception: Despite the knee being functionally stable, it may feel different for quite sometime. It is extremely important to follow the rehabilitation program so that you regain your strength and your balance sense (proprioception) in your leg.

L. Severe Pain: Excessive pain, stiffness and loss of use of the knee (complex regional pain syndrome) is extremely rare after patellar instability surgery and the cause is unknown. If this happens you may need further treatment including painkillers, physiotherapy and sometimes nerve blocks. The knee can take a very long time to fully recover if this occurs.

M. Recurrent Patellar Instability: Despite a well performed patellar stabilization procedure(s), there are some patients who continue to experience patellar instability. People who have generalized ligamentous laxity (loose jointedness) and patients who have prolonged weakness and atrophy of their quadriceps muscles are more at risk of developing recurrent patellar instability. Patients who sustain a repeat injury to their knee joint may also develop recurrent patellar instability.

N. Painful hardware: Patients having MPFL surgery may feel some discomfort over the hardware (screw/anchor insertion sites) but this usually resolves over time. Patients who undergo tibial tubercle osteotomy surgery may develop discomfort over the anterior screws and these may need to be removed if this persists.

O. Non-union of osteotomy: If you have a realignment osteotomy of your tibial tubercle as part of your patellar stabilization surgery, there is a very low possibility that your bone may not heal properly (non-union) and you may require further surgery.

8 When can I drive?

This information only applies to patient's with a valid drivers license. You should not be taking any prescription pain medications as these can affect your ability to drive. If you drive an automatic car and the patellar injury or patellar surgery (if you are post-op) is on your left knee, then you can drive when you feel comfortable getting in and out of the car (2 – 6 weeks depending on the surgical procedure). If the surgery is on your right knee and/or if you have a standard car, it usually takes at least 4 - 6 weeks before you have adequate quadriceps or thigh muscle control to be able to operate your car safely. Please do not drive a car or operate machinery until you are safe to do so.

9 How long is physiotherapy?

The goal of therapy is to control pain and swelling, restore motion, develop strength, restore function, and to prepare you to return to your sport or sports of choice. This can vary from patient to patient but most patients are in formal physiotherapy for 2-3 months. Many of the exercises can be performed in a health club and therefore a membership is recommended unless you have gym equipment at home. Physiotherapy is usually started the first week after surgery and so it is advisable for you to set up appointments with your local physiotherapist before your planned procedure. Please follow the recommendations in the **Patellar Stabilization Rehabilitation Protocol** unless you are advised otherwise. Patient progression through a rehabilitation program may be quite different between patients. Most patients need to do a regular exercise program for their knee for 6 - 12 months after surgery.

10 What happens after surgery?

You will be seen 10 - 14 days after surgery to remove your sutures and check your wound. You

will be in a long leg hinged knee brace that extends from your ankle to your thigh . Crutches are used for the first 10 to 14 days to protect your knee. Initially the surgery makes your knee feel weak and unstable. This is due to the pain from the surgery and the swelling that ensues. Therefore the crutches are used for support and protection. You will be reassessed at regular intervals for one year after surgery (typically the appointments are at 2 weeks, 2 months, 6 months and one year after surgery).

11 When can I return to sports and do I need a patellar stabilization brace?

There are many activities that you are allowed to do while going through the rehabilitation process. It is important that you continue with straight ahead activities unless otherwise instructed. You are allowed to bike, swim and jog early on in the rehabilitation. Any activities that involve potential pivoting or twisting should be avoided until at least 4 - 6 months post-operatively depending on how your knee is progressing and whether or not you had any other associated injuries. It is my preference that you use your patellar stabilization brace for any potential pivoting or twisting activity for at least 4 to 6 months after a significant patellar dislocation or if you undergo patellar stabilization surgery. You may be advised to wear your brace for a longer period of time. However, please understand that wearing a patellar stabilization brace will not completely prevent you from ever dislocating your kneecap again in the future. Also, I feel that it is very important that you rehabilitate ***both*** knees in order to prevent future injuries to either knee.

12 Can I re-injure my knee?

Yes, you can. Unfortunately for some patients, even after patellar stabilization surgery there is a risk that you may injure your knee again in the future and re-dislocate your patella.

13 What if I choose not to have surgery?

The decision to proceed with patellar stabilization surgery is a personal one. It is very important that you are mentally and physically prepared to proceed with the surgery and the rehabilitation that is required after patellar stabilization surgery. Some patients opt to modify their activities, and/or wear a patellar stabilization brace, and/or try physiotherapy to strengthen the muscles around the knee in an effort to avoid patellar stabilization surgery.

14 What are the risks of not having patellar stabilization surgery?

This is also very important to consider. One important factor is quality of life. Many patients rely on certain activities to maintain their mental health. If an individual cannot find satisfaction without being able to participate in sports that require patellar stability, then patellar stabilization surgery is an option. In patients who have recurrent patellar instability, these patients theoretically may be doing further damage to their knees especially the patello-femoral joint. If the patellofemoral joint continues to dislocate, there is a possibility that they may be damaging the articular cartilage and as a result, they may develop earlier degenerative changes in their knees.

Patellar Instability Surgery Checklist

Before Surgery:

- ☐ You make sure that you have worked on regaining your strength and mobility in your knee before surgery
- ☐ You know the date and location of your surgery
- ☐ You have made arrangements with work / school that you will be missing time.
- ☐ You have seriously considered a smoking cessation program if you are a smoker.
- ☐ You have obtained your crutches, your post-op hinged knee brace and your patellar stabilization brace.. A cold therapy unit such as Cryo cuff ™ is also recommended.
- ☐ You have stopped drinking liquids and eating food at midnight prior to surgery.

Day of Surgery:

- ☐ Bring your health card
- ☐ Wear loose clothing.
- ☐ Bring your post-op hinged knee brace or knee immobilizer, crutches and cold therapy unit (if you purchased or rented one) with you to the hospital.
- ☐ Bring all medications (or a list of medications) that you take on a regular basis with you to the hospital
- ☐ If you have sleep apnea, please bring your CPAP machine with you to the hospital.
- ☐ If you are being discharged on the same day as surgery, you have someone who will take you home and stay with you for at least 24 hours after surgery.
- ☐ If you are being admitted after surgery, please bring any necessary personal items.

After Surgery:

- ☐ You have a follow-up appointment scheduled within 10 – 14 days after surgery.
- ☐ You can make arrangement for formal physiotherapy within 7 - 10 days after your surgery.
- ☐ You understand the importance of following the recommended rehabilitation program and you understand that you should not return to high risk activities until your strength and neuromuscular control are close to normal in your operative leg.