

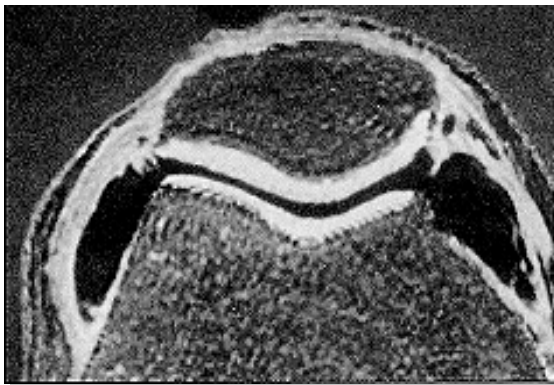


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# Anterior Knee Pain and Patellofemoral Problems

## What is patellofemoral joint?

The knee joint is made of two main joints: tibiofemoral and patellofemoral. The **patella** (knee cap), is a mobile, flat, triangular bone within the tendon of the quadriceps muscles, which articulates with the **femoral trochlea** (groove at the end and on the top of the thighbone).



## Anterior knee pain

Patients with patellofemoral pain represent a significant challenge to the orthopaedic and rehabilitation community, despite recent advances in the understanding of almost all other knee conditions. This clinical conundrum is often aptly named "The Black Hole of Orthopaedics", implying that no single explanation or therapeutic approach has fully clarified this problem yet. The primary factor differentiating this clinical problem from other knee conditions is its inherent subjectivity. Anterior knee pain, or patellofemoral pain, is pain in the front of the knee which is often made worse by sitting for prolonged periods, stair climbing or any activity which involves bending the knee. It is often aggravated by sport. The origin of patellofemoral pain can be directly traced to supraphysiological mechanical loading and mechanical or chemical irritation of nerve endings. Studies have shown that **patellofemoral pain syndrome (PFPS)** comprises up to 50% of overuse injuries. Even activities of daily living can become supraphysiologic. This syndrome seems to be caused by the damage to the under surface of the patella, or patellofemoral articulating surfaces, often inappropriately called chondromalacia patella.

## What causes patellofemoral pain?

Pure patellar pain remains poorly understood. Maltracking and damaged articular cartilage seem to be the main suspects and the origin of pain. Articular cartilage lesions themselves are asymptomatic, although the alteration of normal protective compressive stiffness and load-bearing properties of thinned-out or damaged articular surface remains a potential source of pain.

## Contributing factors

Several anatomical factors like genu valgum (knock knees), abnormal twisting of the femur (femoral torsion), and flat (pronated) feet contribute to the onset of anterior knee pain. When the patella is not centred in the groove of the femur, there is an imbalance that results in increased pressures between articulating surfaces and subsequent accelerated wear and tear (patella malalignment). Most clinicians subscribe to the concept of patellar malalignment as a source of pain. Abnormal pressure on the patella may result in patellofemoral knee pain. If you are very active and are involved in sporting activities the pressure may be normally placed through the patella but in excessive amounts, an example would be jogging, where as much as seven times ones body weight may be transmitted through the knee. Overuse, especially the pounding shocks absorbed during jogging and downhill running, previous knee injuries like a direct blow to the front of the knee, and obesity are all significant contributing factors.

## The aetiology\*

The aetiology of patellofemoral pain syndrome is multifactorial. Causes include overuse and overload, biomechanical problems and muscular dysfunction.

**Overuse and overload:** because bending the knee increases the pressure between the patella and its various points of contact with the femur, patellofemoral pain syndrome is often classified as an overuse injury. However, a more appropriate term may be "overload," because the syndrome can also affect inactive patients. Repeated weight-bearing impact may be a contributing factor, particularly in runners. Steps, hills and uneven surfaces tend to exacerbate patellofemoral pain. Once the syndrome has developed, even prolonged sitting can be painful because of the extra pressure between the patella and the femur during knee flexion.

**Biomechanical problems and muscular dysfunction:** no single biomechanical factor has been identified as a primary cause of patellofemoral pain, although many have been studied:

**Pes planus (pronation):** the terms "flat feet" and "foot pronation" are often used interchangeably. Technically speaking, foot pronation is a combination of eversion, dorsiflexion and abduction of the foot. This condition often occurs in patients who lack a supportive medial arch. Hyperpronation with a secondary increase in transverse plane motion of the tibia often leads to eccentric loading of the patella. This includes over use of the vastus lateralis and under use of the VMO. Foot pronation causes a compensatory internal rotation of the tibia or femur (femoral anteversion) that upsets the patellofemoral mechanism. This is the premise behind using arch supports or **custom orthotics** in patients with patellofemoral pain.

**Pes cavus (high-arched foot, supination):** compared with a normal foot, a high-arched foot provides less cushioning for the leg when it strikes the ground. This places more stress on the patellofemoral mechanism, particularly when a person is running. Proper footwear, such as running shoes with extra cushioning and an arch support, can be helpful.

**Q Angle:** although some investigators believe that a "large" Q angle (an angle between the longitudinal axis of femoral and tibial shafts) is a predisposing factor for patellofemoral pain, others question this concept. One study found similar Q angles in symptomatic and non-symptomatic patients. Furthermore, "normal" Q angles vary from 10 to 22 degrees depending on the study, and measurements of the Q angle in the same patient vary from clinician to clinician.

**Muscular causes:** the potential muscular causes of patellofemoral pain can be divided into "weakness" and "inflexibility" categories. Weakness of the quadriceps muscles is the most often cited area of concern.

## Treatment of patellofemoral pain\*

**Relative rest:** initially, knee activity should be reduced, at least relatively, because the theory that patellofemoral pain is an overuse and overload syndrome has merit. A relatively inactive patient can benefit from simply straightening the leg or walking periodically as needed. If the patient is a runner or engages in impact activity and insists on continuing some rigorous activity, swimming or another nonimpact aerobic activity is a reasonable recommendation. For example, the so-called "elliptical" nonimpact exercise machines at gyms have become quite popular for providing nonimpact aerobic activity.

**Ice and anti-inflammatory drugs:** ice is the safest anti-inflammatory "medication," but its successful use requires discipline. Applying ice for 10 to 20 minutes after activity is reasonable. A common complaint is the inconvenience of holding an ice bag on the knee, but a simple elastic wrap or a towel solves this problem. A frozen gel pack, crushed ice in a plastic bag or a bag of frozen peas also work well. Alternatively, special mechanical cooling devices may be useful to people with chronic patellofemoral pain (go to [www.aircast.com](http://www.aircast.com) for more information). Patients with patellofemoral pain syndrome have not been conclusively shown to benefit from anti-inflammatory drugs (NSAIDs). Although the same can be said about many other treatments for patellofemoral pain, the drawback of NSAIDs is that their potential side effects may be more significant than any adverse effects of ice application or exercises.



**Knee sleeves and braces:** the use of knee sleeves and braces in patients with patellofemoral pain remains controversial. A simple elastic knee sleeve with a patellar cut-out may provide some benefit, although this remains unproved. Typically, knee braces have a C-shaped lateral buttress that keeps the patella from moving too far laterally. However, the patellofemoral and extensor mechanisms are complex and the patella moves in several planes. Knee braces are probably best reserved for use in patients with clinically obvious lateral subluxation. The use of a knee brace or sleeve should not be considered a substitute for exercises. For more information on patella braces visit: [www.technologyinmotion.co.uk](http://www.technologyinmotion.co.uk).

**Footwear, arch supports and custom orthotics:** walking and athletic shoes have improved significantly in the past decade. Generally speaking, the quality and age of footwear are more important than the brand name - a new, quality shoe may help to alleviate anterior knee pain. Most runners change their shoes every 300 to 500 miles. Arch supports or custom orthotics can be helpful in patients with a wide variety of lower extremity complaints, including patellofemoral pain. Although the reasons are not entirely clear, an arch support may improve lower extremity biomechanics by preventing overpronation in pes planus and by providing a broader base of support for the normal or pes cavus foot. Over-the-counter arch supports are a reasonable and relatively inexpensive initial suggestion. Custom orthotics may be worth a try if an over-the-counter insert is not helpful, although they are more expensive ([www.formthotics.co.nz](http://www.formthotics.co.nz)).

**Exercises** continue to be the mainstay of treatment for patellofemoral pain syndrome. Historically this has involved strengthening the quadriceps muscle, in particular the vastus medialis obliquus muscle (VMO), but disagreement about the best technique for strengthening the VMO muscle continues. Currently a more global approach to optimizing function of the lower-extremity kinematic chain is advocated. This can include:

- optimizing the strength of the pelvifemoral musculature to help control limb alignment and rotation,
- optimizing the balance between quadriceps and hamstring muscle strength and firing sequence,
- optimizing the balance between the individual components of the quadriceps muscle bellies, in particular the medial and lateral dynamic stabilizers of the patella, and
- improving proprioception.

Although these approaches have been shown to be beneficial in alleviating patellofemoral pain syndrome, the relationship between neuromotor control of the knee musculature and the onset or recurrence of symptoms continues to be poorly understood. Dedicated patients can often manage patellofemoral rehabilitation on their own, with 20 minutes per day being a reasonable expectation.

Flexibility deficits in the hip external rotators, hamstrings, quadriceps, and gastrocnemius-soleus muscle group may contribute to abnormal patellofemoral biomechanics. Diagnosing asymmetry that results from such deficits is a critical part of managing patellofemoral disorders, because asymmetry should be addressed in a treatment plan that uses stretching exercises to focus on specific muscle groups. A number of studies showed that improved thigh muscle flexibility results in decreased anterior knee pain in adolescents. Athletes at this age frequently complain of anterior knee pain and become frustrated when no significant pathology has been found. They continue to have pain which

can at times be quite disabling. Adolescent growth and especially growth spurts cause a relative period of decreased flexibility. Initial flexibility evaluation in this group revealed significant quadriceps, hamstring and iliotibial band tightness. The patients are usually instructed to do flexibility exercises, in the morning and evening, before and after sport, with 3 to 5 repetitions per day. Adolescent athletes should stretch their thigh muscles to reduce the chance of anterior knee pain.

Image source: the physician and sportsmedicine [www.physsportsmed.com](http://www.physsportsmed.com)



**FIGURE 1.** In the Muncie method, a vastus medialis obliquus exercise (modified straight leg raise), patients sit hugging the unaffected knee with the affected leg extended. Then, they (1) lean forward, (2) rotate the affected leg out, (3) tighten the thigh muscle, (4) pause for 1 second, (5) lift the leg 1 in. off the ground (arrow), and (5) hold the leg off the ground for 5 seconds. Patients should attempt to do 20 'good' repetitions per day.

The Muncie method provides improved clinical outcome with simple set of exercises. This method can be used on its own initially or in addition to other therapies for anterior knee pain.

There has been a disagreement on the appropriate type of exercises for anterior knee pain. There is some concern about both traditional home-based patellofemoral exercises and the Muncie method as both are open kinetic chain exercises.

Closed chain exercises (i.e., the foot is in contact with a surface such as the ground or a metal plate on exercise equipment) are more functional (i.e., simulating "real" activities), and place less stress on the joint structures than open chain exercises. On the other hand, closed chain exercises may lead to increasing compressive forces on the patellofemoral joint (usually in greater degrees of flexion). Also, strengthening of the quadriceps, especially the VMO has been suggested to be safest and most effective through the last 15-20 degrees of knee extension as an open chain exercise. A recent study compared a group of 60 patients with patellofemoral pain randomized to a five-week program of only closed kinetic chain or only open kinetic chain exercises.

**The exercise program for the open chain group was:**

- quadriceps exercises (i.e., maximum isometric quadriceps contraction in full extension)
- straight-leg raises with patient supine short-arc movements (10 degrees of knee flexion to full extension)
- leg adduction exercises in a side-lying position, with each exercise held isometrically for six seconds, with a three second rest between repetitions.

**The exercise program for the closed chain group was:**

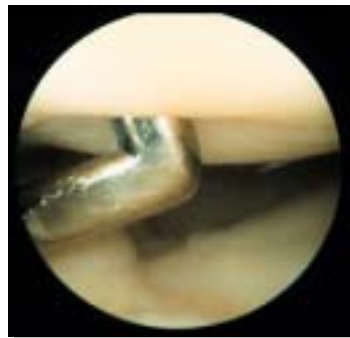
- seated leg presses-one-third knee bends on one leg, then both
- stationary bicycling
- rowing machine exercises
- step-up and step-down exercises
- progressive jumping exercises.

This study suggests that both open and closed chain exercise programs can be effective in the treatment of patients with anterior knee pain with some possible small advantages to closed chain exercises.

Training and PFJ exercises might also induce increased diffusion of nutrients to the articular cartilage through cyclic loading and unloading the PFJ, and improved nutrition.

### **Chondromalacia**

The term chondromalacia patellae was introduced into the literature by Aleman in 1928. This word is a misnomer and a source of confusion which should be abandoned. Indeed, the presence of “soft cartilage” – the literal translation of the term **chondromalacia** – is not strongly correlated with patellar pain.



The pain occurs as the articular cartilage on the back of the patella becomes soft and begins to break down. Damaged cartilage can't distribute pressure evenly along the back of the patella. Damaged articular cartilage can be repaired only partially as normal hyaline articular cartilage can not be reconstructed or replaced as yet. Arthroscopic debridement and shaving of damaged articular cartilage is of unclear benefit. Although very attractive as an option, so-called **electrothermal chondroplasty** seems to cause significant thermal damage to articulating surfaces and an unacceptable level of irreversible chondrocyte injury.

The **microfracture** cartilage repair technique generates fibrocartilage cover of the defect, and more advanced **autologous chondrocyte implantation** (ACI) has the potential to resurface defects in patella articulating surfaces with hyaline-like tissue (please visit [www.kneeclinic.info](http://www.kneeclinic.info) and download our **Articular Cartilage Repair** brochure).

### **Patella maltracking and instability**

Patella maltracking refers to several different conditions when the patella does not remain within the central groove of the femur (thigh bone). This includes **ELPS** (excessive lateral pressure syndrome) or **LPSCS** (lateral patellar compression syndrome), patella tilt, subluxation and dislocation. The kneecap most commonly tends to tilt and glide towards the outside of the knee (subluxation). Acute patellar subluxation often appears no different from an acute dislocation. With a dislocation, the patient reports that the kneecap moved out and had to be pushed back into place. With subluxation, the patient reports that the kneecap slipped out, then went back into place spontaneously.

### **Arthroscopic lateral release**

This day-case arthroscopic surgical procedure may be used to divide the lateral retinaculum (the soft tissue which pulls the patella towards the outside of your knee). It is performed in order to reduce this pull and therefore to centralise the patella, in people with severe patellofemoral pain combined with patella tilt and subluxation.



This simple procedure is not effective on its own for most patellofemoral problems and in some cases it may make things worse, in terms of discomfort, pain and swelling. Most knee surgeons would recommend that a lateral release be used only when there is residual patella tilt, which is a physical examination sign of a tight lateral retinaculum. As it is very important that you fully understand the goals and potential complications of this simple procedure, please discuss this operation in detail with your surgeon. Sometimes, if the pain or bleeding can not be controlled well enough before you are discharged home on the day of your surgery, we prefer to keep you in the hospital overnight.

### **Traumatic patella dislocation**

The patella may slip outwards and stay there, in which case the knee will lock and you will not be able to straighten it. Most of the time the patella will reduce itself spontaneously, if you manage to relax a bit, but sometimes this memorable experience will require manual reduction by yourself, another person or a casualty officer in the A&E department.



Most patients who have recurrent patellofemoral instability have an underlying anatomic predisposition. However, not all patients who exhibit instability have malalignment, nor do all patients who have malalignment have instability.

In most cases of recurrent patella dislocation, several anatomical conditions are frequently seen: general joint laxity, genu valgum, pes planus, excessive femoral anteversion, external tibial torsion, patella alta (high-riding patella), relatively flat patella, shallow femoral trochlea, loose medial structures, tight lateral structures, etc.

Patients who have acute patellar dislocation generally have an episode of instability and localised tenderness along the medial extensor retinaculum or possibly at the adductor tubercle, which is the origin of the medial patellofemoral ligament (MPFL). Also, the patient has localised tenderness along the peripheral edge of the lateral femoral condyle where impaction from the patella occurs with flexion of the knee. An effusion (haemarthrosis) is often present. Radiographs should be obtained, since up to 20% of patients develop an osteochondral loose body secondary to patella dislocation. Patients may develop mechanical locking symptoms which may require arthroscopic surgery.

In patients treated non-operatively for an initial episode of patellar dislocation, the chance of recurrent dislocation ranges from approximately 15% to 44%. Patients who have spontaneously reduced patella dislocations are more prone to recurrent dislocations, but they seem to have no evidence of long-term degeneration of the patello-femoral articulating surfaces.

If dislocated, the patella should be reduced and the knee should be immobilised initially in 30° of flexion with a long hinged knee brace. Plaster cylinders should not be used for immobilisation. There are controversies regarding indications and timing for surgical treatment of acute dislocation and chronic recurrent dislocation. The main concern in the long run is the repetitive damage to patellofemoral articular cartilage.

### **Nonsurgical treatment and rehabilitation**

Nonoperative management for patellofemoral instability involves maximizing lower-extremity strength and function. Patellofemoral instability symptoms may be reduced in some patients with the patella cut-out brace, which is thought to improve patellar tracking by stabilizing the patella within the groove. A secondary advantage of these braces is a warming effect on the muscle, which can improve muscle functioning and firing.

However, the use of a knee brace or sleeve should not be considered a substitute for therapeutic exercises.

**Patella taping**, or the McConnell tape technique, was originally reported to have a high success rate in reducing patellofemoral pain and pain as a result of malalignment and instability, but subsequent researchers have been unable to reproduce the results of McConnell's original study. However, it is the opinion of most physiotherapists treating patellofemoral pain and instability that patella bracing or taping can be helpful adjuvants to a mainstay of patellofemoral rehabilitation.

A more recent approach to patellofemoral instability is that of going further up the kinematic chain and involving the relationship of the femur to the pelvis. Patella bracing and McConnell's original taping technique advocate trying to control the relationship of the patella to the femoral trochlear groove as a strategy to treat patella instability. Several brace companies offer patellofemoral bracing products designed to address patella instability.

An alternative approach would be to recognize that femoral rotation needs to be controlled underneath the patella, and this is largely controlled by the pelvifemoral musculature, in particular the muscles that control hip rotation. Therefore, an attempt to maximize the strength of the pelvifemoral musculature, including hip extensors and hip abductors, is emphasized. In addition, an anteriorly rotated pelvis or hemirotated pelvis is a common postural habit of many people with patellofemoral pain syndrome. This can aggravate patellofemoral instability by posturing the femur in internal rotation (which is a coupled motion associated with an anteriorly tilted pelvis) and placing the pelvifemoral musculature in a nonoptimized biomechanical position.

### **Patella stabilisation**

Historically, surgical procedures to stabilize the patella involved an advancement of the vastus medialis obliquus (VMO) portion of the quadriceps muscle in an effort to dynamically prevent the kneecap from dislocating laterally. This could be done in isolation as a muscle transfer, or with imbrication of the medial retinaculum, which forms the distal extent of the deep fascia of the VMO muscle. The clinical significance of the medial patellofemoral ligament (MPFL) has been demonstrated in a variety of recent scientific publications. These studies yield strong evidence that the MPFL provides a critical soft-tissue restraint against lateral patella dislocation. It is believed that the MPFL is the essential ligament to be restored to a suitable tension or length after acute lateral patella dislocation, but there continues to be debate on how to accomplish this goal. A more modern approach to surgical stabilization of the patella is to re-establish a medial soft-tissue restraint by repairing or reconstructing the MPFL, which is the best option in acute dislocations, but quite difficult in chronic cases. Most modern stabilisation procedures, in recurrent patella dislocation, use a combination of arthroscopic lateral release and some form of medial parapatellar soft-tissue shortening and reinforcement.

Some people will need an additional distal bony procedure (so-called Elmslie-Trillat or Fulkerson's procedure). With both procedures, the Q angle is directly decreased by moving the tibial tubercle medially. The Fulkerson's procedure has the added benefit of decreasing patellofemoral forces by concomitant anteriorisation. However, the risk of postoperative fracture is higher with Fulkerson's procedure, necessitating crutch use for 6 or more weeks postoperatively. We recommend distal medialisation for patients who have isolated instability, and anteromedialisation for patients with significant patellofemoral pain or concomitant chondral lesions. Both techniques have proven to be highly successful in preventing further instability, although the results have been less predictable for reducing patellofemoral pain.

Following patella stabilisation surgery your knee will be in a long, hinged, brace for approximately four to six weeks. During this period the amount of knee flexion will be limited, starting at 30 degrees and adjusted by 10 to 15 degrees each week, whilst attending physiotherapy. In addition you may also require elbow crutches to mobilise. The physiotherapist will progress your exercises and you will gradually be allowed to fully bend the knee. After four or six weeks you will be reviewed in clinic and if everything is satisfactory you may be allowed to discontinue wearing the brace.

## Plica bands

Plica bands are folds of synovial membrane within the knee that are normal anatomical structures in most people. However, if the knee is injured then they can become painful, as they rub against the thigh bone. As the knee bends and straightens you can usually feel a thickened band, especially if it is enlarged or torn. Most plica bands do not cause any problems, but rarely an enlarged and hard band may require arthroscopic excision.



## Patella tendinosis

This is a common clinical condition seen in sports medicine. This condition was first described as "jumper's knee". Numerous investigators worldwide have shown that the pathology underlying these conditions is **tendinosis** or collagen degeneration. Painful overuse tendon conditions have a non-inflammatory pathology and therefore **tendinitis is not a correct term**. The usual complaint is pain well-localised at or near the inferior pole of the patella. It frequently affects people who use their knee extensor mechanism in a repetitive manner in "explosive" extension or eccentric flexion such as that in basketball, volleyball, or dancing. However, it may occur in athletes participating in other sports such as running, football, tennis or gym-training. The clinical implications of patellar tendon research can be summarized as follows:

- We should adopt the term **patellar tendinopathy** or **tendinosis** rather than the misnomer tendinitis when referring to patellar tendon overuse injury. The key pathology is tendinosis - collagen degeneration and its sequelae.
- A patient who presents with patellar tendinopathy for the first time may require 2 to 3 months to recover. A patient who has a long-standing injury may require 4 to 6 months to return to competition pain free and without recurrence.
- **Imaging** has not been shown as a useful guide to the choice of management or prognosis. A focal hypoechoic region on ultrasound or a region of high signal on MRI is certainly no indication, per se, for surgery.
- Relative **tendon unloading** is critical for treatment success. This can be achieved by activity modification and by biomechanical correction. Biomechanical abnormalities may be anatomic (static and dynamic) or functional (from regional dysfunction).
- **Progressive strengthening**, graduating to eccentric exercises are the treatments of choice. Prescribing exercise effectively requires thorough assessment of the patient's functional capacity and a skilful approach to gradually increasing the demand that the athlete imposes on the tendon.
- **Corticosteroids** should never be injected around or into the tendon because they cause collagen breakdown that weakens the tendon and predisposes it to spontaneous rupture.
- **Surgery** has been considered the treatment of last resort for tendinopathies, and this certainly applies, if not more so, for a confirmed case of tendinosis. Surgery can be used to excise tissue affected by tendinosis, but surgery has not been proven to stimulate collagen synthesis or maturation. Thus, the tendon that has had surgery requires time for repair and strengthening.
- Reviews suggest that surgery in tendinosis has a 75% to 85% success rate, and for some tendons this figure may well be a very-best-case estimate.
- Because surgical treatment of tendinosis is not without failure, and recovery takes a minimum of 4 to 6 months, this treatment should be reserved for failure of a high-quality program of conservative management.
- **Surgery can make things worse** (in terms of the severity and the duration of pain) because of its own morbidity.
- Therefore, an important implication of tendinopathy's underlying pathology being tendinosis is that conservative management must progress slowly. If the initial prognosis the patient receives is realistic, it is less likely that the patient will attempt to return to sport prematurely, suffer re-injury, and thus, "fail" conservative management.



- **Return to full competitive sport after successful patellar tendon surgery takes 6 to 12 months, and only 60% to 75% of patients are able to return to former levels of sporting activity.** Thus, the treating surgeon or physiotherapist must be sure that an appropriate conservative treatment program has failed before suggesting surgery, and that the patient is aware of the limits and potential risks of surgery.

### **Osgood-Schlatter Disease\*\***

Osgood-Schlatter disease, or tibial osteochondrosis, is the most common traction apophysitis and exertion injury in the adolescent knee. In boys, it appears at about age 13 or 14 years, although it can appear anytime between ages 10 and 15 years. In girls, it appears usually at age 10 or 11 years, and the onset ranges from age 8 to 13 years. The incidence is much higher in athletic adolescents and up to 33% of cases are bilateral.



Clinically, a hard bump at the lower end of patella tendon is often quite obvious. The condition develops from repetitive microtrauma to the tibial tubercle apophysis, usually in jumping sports. Symptoms include an insidious onset of a low-grade aching of the tibial tubercle, that is associated with activity. The pain is relieved with rest and aggravated by acceleration and deceleration forces, such as sudden stopping during running and jumping. Pain is reproduced with resisted extension from 90 degrees of flexion. Plain radiographs are usually normal, but occasionally fragmented bone and ossicles are present. Avulsions of the tibial tubercle are rare, but occur through its open physis, as a result of a violent quadriceps contraction, usually during jumping activities. Up to 40% of patients in this group have pre-existing Osgood-Schlatter's.

Initial treatment involves activity limitations and relative rest for 2 to 3 weeks. Patients should avoid sports and activities that require running, jumping or kneeling, until all symptoms are resolved. Cross training with cycling, stair-stepping and swimming should be encouraged, if these activities do not cause pain. Hamstring stretching and a patellar tendon strap may help. Cryotherapy is useful in controlling pain and swelling after activity. Anti-inflammatory pain medication usually does not help in this age group. A corticosteroid injection is contraindicated because the aetiology is not inflammatory, and a steroid injection can result in skin problems and weakening of the tendon. Surgical treatment is an option, but outcomes are very variable and the efficacy is questionable. Both the patient and parents should be aware that it may take a year or two for symptoms to resolve. Up to 60% of patients may continue to have some symptoms. However, symptoms are self-limiting and usually stop when growth stops.

### **Extensor mechanism injuries**

Traction injuries to the extensor mechanism can produce lesions in the quadriceps and patellar tendons. Inability to perform a straight leg raise indicates a complete disruption of the extensor mechanism.

**Patellar tendon rupture:** these injuries occur infrequently, and are generally seen in the younger athletic population. This injury is often overlooked! As with a quadriceps tendon rupture, patients are unable to do active SLR, but with less obvious soft-tissue disruption. However, a lateral radiograph is required for this injury, as it shows patella alta. Again, this injury requires repair and reconstruction of the tendon and retinacula. The lesion

in partial rupture of the patellar tendon is typically located in the posterior half of the tendon at its insertion site into the patella. Quite often, this injury is a consequence of overuse in an athlete who participates in repetitive jumping activities.

**Quadriceps tendon rupture:** complete ruptures of the quadriceps tendon typically occur in people in their 40s and 50s, usually with pre-existing degenerative changes in the tendon. On examination, the patient is unable to actively extend the knee, and a palpable gap can be detected above the patella. Complete quadriceps tendon rupture requires surgical repair.

### **Prepatellar bursitis**

Plumbers, carpet layers, roofers, gardeners and other people who spend a lot of time on their knees often experience swelling in the front of the knee. The constant friction irritates a small lubricating sac (bursa) located just in front of the kneecap (patella). The bursa enables the kneecap to move smoothly under the skin. If the bursa becomes inflamed, it fills with fluid and causes swelling at the top of the knee. This condition is called prepatellar bursitis. Usual symptoms are: pain with activity, (but not usually at night), rapid swelling on the front of kneecap, which also becomes tender and warm to the touch. Conservative treatment is usually effective, as long as the bursa is simply inflamed and not infected. Try the following: rest and discontinue the "offending" activity until the bursitis clears up, apply ice at regular intervals three or four times a day for 20 minutes at a time, elevate the affected leg except when necessary to walk, take an anti-inflammatory medication. If the swelling is significant, your GP may decide to drain (aspirate) the bursa with a needle. Chronic swelling that causes disability may also be treated by draining the bursa, but if the swelling continues, your orthopaedic surgeon may recommend surgical removal of the bursa. The operation is an outpatient procedure. It takes a few days for the knee to regain its flexibility and some weeks before normal activities can be resumed.

**\*Source:** Juhn MS. Patellofemoral Pain Syndrome: A Review and Guidelines for Treatment. AAFP 1999

**\*\* Source:** Schenck RC Jr, Ed. Athletic Training and Sports Medicine. Chapter 16: Shelbourne KD et al., Knee Injuries. AAOS 1999

**Further information:** Cosgarea AJ, et al. Evaluation and Management of the Unstable Patella. The physician and sportsmedicine, October 2002, 30(10)33-40. [www.physsportsmed.com](http://www.physsportsmed.com)

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