

Patella Luxation: Should I Cut or Just Say No?

Kristi M. Sandman, DVM, DACVS
Animal Emergency and Treatment Center,
Grayslake and Chicago, IL

Objectives of the Presentation:

Goals for the general practitioner upon completion of this session:

- Distinguish between the 4 grades of patella luxations and their common clinical presentation
- Understand the pathogenesis of patella luxations with both the soft tissue and the skeletal changes
- Understand the different surgical options and when to use them.
- Review some case examples

Overview:

The problem of patella luxation is a common cause of lameness in dogs. A better understanding of the etiology and the pathophysiology of patella luxations can allow a better understanding of the treatment options and treatment decision making.

The definition of a patella luxation, or knee cap that is dislocating from the sulcus, is well known. The classic grading scheme with increasing severity from Grade 1 – Grade 4 is:

- Grade 1: This is a subluxation of the patella or excessive directional laxity of the patella. The patella can luxate with digital manipulation, reduces when pressure released, flexion/extension are normal
- Grade 2: The patella does luxate easily, but is also reduced easily. Patella can luxate manually or spontaneously, returns to normal position when pressure released or extension of limb, mild angular/torsional deformities are present.
- Grade 3: The patella is luxated most of the time, but can be manually reduced. There are abnormal soft and hard tissues surrounding the stifle.
- Grade 4: The patella is luxated and cannot be reduced.

The clinical signs in dogs with patella luxations vary. Most dogs with a Grade 1 patella luxation are asymptomatic. Dogs with Grade 2 may have a history of “skipping” or picking the leg up for several strides, stretch the leg out and then walk out normally again. These episodes represent the patella luxating and then reducing on its own when the pet stretches its legs out. The frequency of these episodes may be sparse and then increase as time goes on. Repeated episodes of the patella luxating/reducing erode the medial trochlear ridge and cause progression to a grade 3. Dogs with a grade 3 or 4 can have a more persistent lameness, but it may not seem as dramatic to the owner as the “skipping” type lameness. These dogs may be reluctant to jump onto furniture or do stairs. If they have bilateral patella luxation with grade 3 or 4 they may be bowlegged or walk in a crouched gait due to the inability to fully extend the stifles. If dogs that have been relatively asymptomatic for their patella luxations suddenly

become more lame, they should be examined for possible concurrent cranial cruciate ligament rupture. “Sloppy” patella is when the patella can be luxated both medially and laterally.

Examination of dogs for patella luxations is best done with the pet standing rather than lateral recumbancy. The position of the patellas should be noted while the pet is in a relaxed standing position. To test for medial patellar luxation, the stifle is then extended and internally rotated while medial pressure is applied with the thumb. To test for lateral patella luxation, extension and external rotation is combined with lateral digital pressure upon the patella. Bony crepitation during patella luxation and reduction indicates an erosion of the hyaline cartilage from the ventral aspect of the patella and the trochlear ridge it is riding over. Indistinct transition between patella luxation and reduction indicates severe trochlear ridge erosion.

The pelvic limb conformation should be assessed. Dogs with medial patella luxation can appear bowlegged with the point of the hocks pointed laterally. Internal torsion (pigeon-toed) conformation is often seen with medial patella luxation. Genu valgum (knock-kneed) and external torsion (cow hocked) conformation can be seen with lateral patella luxation.

Pathophysiology:

The patella is a Type A (primary function is articulation) sesamoid bone located in the tendon of insertion of the quadriceps muscle. The quadriceps mechanism is a pulley mechanism that allows for stifle joint extension. The quadriceps mechanism includes the quadriceps muscle group, the patella, femoral trochlear sulcus and the patellar ligament (tendon of insertion of the quadriceps muscle). This pulley mechanism must work in a straight line to function. Factors such as patella alta (abnormally high patella in relation to the femur) and poor muscle integrity can contribute to patella luxation, however, malalignment of the quadriceps mechanism seems to be the primary underlying cause of the patella luxation. If the quadriceps muscles are displaced medially, the patella must also be displaced medially. The most common cause for the malalignment of the quadriceps mechanism is femoral varus. When a patella luxates from the trochlear groove (sulcus), a tension band effect is created on the side of the luxation compressing the physis on that side and distracting the physis on the contralateral side. Additionally, strain on the tibial tuberosity results in abnormal growth (deviation) and the sulcus develops poorly due to the lack of an adequate retropatellar force. In the 6 week old dog, altered quadriceps pull causes permanent bone changes in 2 – 4 weeks. The severity of MPL is progressive until about 6 months of age. Therefore, in the case of a medial patellar luxation the structures that need to be addressed are the femoral varus, medially deviated tibial tuberosity, shallow sulcus, contracted medial retinaculum, vastus medialis and rectus femoris muscles, stretched lateral retinaculum and vastus lateralis muscle.

Radiograph:

A standard VD pelvis radiograph with legs positioned like an OFA shot through the distal tibia and a lateral view of the leg from the hip down through the distal tibia are essential for evaluation. Sedation or general anesthesia is generally required to obtain the correct positioning. Radiographs are evaluated for osteoarthritis and other orthopedic conditions. The patella position may be normal in dogs with grade 1 and 2 patella luxation. In large breed dogs, measuring the femoral varus angle can help in surgical planning if a distal femoral osteotomy is indicated.

Surgical Treatments:

The goals of surgery are to straighten the quadriceps mechanism (quadriceps-patella-trochlear groove-tibial crest), attain adequate depth of the trochlear groove and to allow minimal post-operative pain so the patella will stay in the trochlear groove and the dog will use the leg. The treatment approach for patella luxations cannot be based solely on the Grade of the luxation. Every patella that is surgically addressed must have all the soft tissue and skeletal aspects evaluated if the repair is to be successful. I describe this as my “artistic” surgery as I look at each piece of the structures that contribute to the patella luxation and determine which needs to be addressed and how much to provide the correct alignment that will allow the patella to remain in the correct position post-op. Traditional repairs include desmotomy, imbrications, stabilization sutures, sulcoplasty, and tibial tuberosity transposition. These repairs are used for both medial and lateral patella luxations.

Surgical positioning is in dorsal recumbency at the end of the table to allow accurate assessment of the quadriceps/patella alignment during surgery. In dogs with bilateral patella luxations, I stage the surgeries 6 – 8 weeks apart to minimize the risks of complications with repair of the most severely affected stifle first.

Skeletal Reconstructions

Sulcoplasty/Trochleoplasty

A trochleoplasty allows restoration of the proper depth and length of the sulcus. Wedge recession or block recession trochleoplasty are preferred over abrasion trochleoplasty due to the minimal disruption of the hyaline cartilage of the trochlea. The recession wedge sulcoplasty has been shown to preserve articular cartilage in the retropatellar area. Recession block sulcoplasty mathematically preserves more articular cartilage than wedge recession, but the clinical relevance is undetermined. Trochleoplasty procedures can be done with a power reciprocating saw, a hobby saw or an osteotome and mallet. I have found in some cases turning the wedge segment around and putting it back in at opposite sides can allow a deeper groove proximally where the patella tends to ride out easier. It is important to extend the groove/block proximally enough so that when the patella rides in its most proximal position, 50% or more of its depth will sit in the groove.

Tibial Tuberosity Transposition

The purpose of the tibial tuberosity transposition (TTT) is to lateralize (on medial patella luxations) the insertion of the patellar ligament and re-establish a straight quadriceps mechanism. It ignores the femoral varus and overall functional hind limb axis, but is very effective in most cases of mild femoral varus and mild quadriceps malalignment. Tibial tuberosity transposition is performed with a sagittal saw placed from the medial side, an osteotome/mallet placed from the proximal/medial aspect or a bone cutter that allows preservation of the distal periosteal/soft tissue attachments. It is important to ensure that a large osteotomized fragment is obtained so that there is enough bone for the pins to purchase and hold during the healing process. The tuberosity is then moved lateral and cranial and secured with multiple K wires +/- a figure 8 tension band depending on the size/activity of the animal (over 40# generally get a tension band). In animals with patella alta, I will also move the

tibial tuberosity distally. Implants are not removed after healing unless there are problems with pain, irritation or infection.

Tibial tuberosity transposition alone may not be adequate to improve quadriceps alignment. Transposition of the rectus femoris muscle laterally or correction of excessive femoral varus by distal femoral ostectomy may be required.

Soft Tissue Reconstructions:

Capsular, retinacular and muscle releases along with imbrications and anti-rotational sutures are soft tissue reconstruction repairs for patella luxations. These alone will not successfully correct bony conformational abnormalities, but they are necessary as adjuncts to the above skeletal reconstructions. Release of the thickened and contracted joint capsule is done on the side of the patella luxation by incising the capsule from the tibial plateau to the suprapatellar recess. Retinacular tissue may also need to be released in a similar manner to release excessive tension on the patella. The quadriceps muscle group may also need to be elevated from the suprapatellar region to the proximal femur. The pes anserinus muscle groups (Sartorius, gracilis and semi-tendinosus muscles) can be released by elevation of their insertions on the medial aspect of the proximal tibia if their tension is causing internal rotation of the stifle. Stretched or torn tissues opposite the side of the luxation often need to be tightened to achieve a balance of soft tissue tension on the patella. Tightening can either be done by imbricating the tissues with a horizontal mattress (vest over pants) or by resecting excessive tissue before closing/imbricating. Extra-capsular anti-rotational sutures can be placed from the fabella to the tibial crest to limit excessive internal stifle rotation and also to repair concurrent cranial cruciate ligament ruptures.

Step by Step Approach to Small Breed Medial Patella Luxation (MPL)

1. Before and after incision in skin, evaluate alignment of quadriceps mechanism with hock in 90 degree flexion and extension and leg in single plane and evaluate position of tibial tuberosity.
2. Lateral or medial approach to the joint, evaluate the cruciate ligaments, menisci and patella. Medial release of tissue, evaluate need to release retinaculum and quadriceps. Test patellar stability (full flexion/extension and internal/external rotation).
3. Evaluate the trochlear groove depth and evaluate for patella alta. Trochleoplasty performed if trochlear depth and or length are inadequate. Test patella stability.
4. Extend stifle and assess alignment of the patella, patellar ligament, tibial tuberosity and long axis of pes and crus. If tibial tuberosity is displaced relative to the foot then tibial tuberosity transposition is performed. Test patellar stability.
5. Perform retinacular, capsular and fabello-tibial crest anti-rotational sutures as needed. Test patellar stability.

When Should Surgery be Recommended:

All patients who have clinical signs of patella luxation should have surgery to correct the luxation. Dogs can have surgery to repair patella luxations younger than 6 months of age, but most patients present between 7 months – 3 years of age. Dogs that have patella luxation(s) and are not showing clinical signs are the more difficult dogs to decide when to recommend surgery. These are my personal guidelines that I have developed over the years of treating

patella luxations. Each case of patella luxation that presents must be looked at individually and assessed for risk of continuing progression of their Grade, progression of erosion of the articular cartilage, risk for cranial cruciate ligament rupture and risks of a more difficult surgery in the future should repair be delayed. These are general guidelines and likely do not encompass every dog you may be presented with a patella luxation. If there is any question if the pet would benefit from having surgery, it is best to get the advice of a surgeon to help you with the decision.

Dogs that have Grade 1 patella luxations and do not show clinical signs are generally watched for progression of the grade or lameness. If either of these occurs, then surgery is recommended. Dogs that have a grade 2 and do not show clinical signs are closely evaluated for any signs of cartilage wear, age of presentation and previous history. Dogs who have signs of cartilage wear unanimously get a recommendation for surgery from me. If they did not have any patella luxation in earlier exams and then progress to having patella luxations, I recommend surgery. If they have a Grade 2 that does not cause clinical signs and they palpate with no grating and the grade has not worsened since the last exam, I may watch them and recommend a recheck in 3- 6 months to see if they are progressing. Some of these dogs are fine to monitor, others would benefit from having surgery earlier rather than waiting. Dogs with Grade 3 or above with no clinical signs I believe should be evaluated for surgery. Many of these dogs are at higher risk for progression of osteoarthritis and possible cranial cruciate ligament rupture. Many times dogs who have a chronic Grade 2 or 3 and then require repair when they are older have a large amount of cartilage damage, have worn off their medial trochlear ridge and have a large amount of new formation of cartilage just medial to the trochlear ridge where they have tried to make a new “bed” for their patella to ride in. These pets do not have as good as recovery from surgery as those pets who are treated before these irreversible changes have occurred.

Dogs with traumatic luxations add an additional twist. I have had many dogs with traumatic luxations require surgery to correct it. I have also had others who present with a Grade 1 or 2 that have an overall good quadriceps patella alignment that have had damage to their soft tissue surrounding the joint. If palpation shows they have overall good alignment, I have had some success in restricting the activity of these pets which has allowed the soft tissues to heal/tighten and the patella stabilizes within 3 – 6 weeks.

Post-Op Care

Bone and soft tissue repairs require 6 – 8 weeks to heal. Restrictions including no running, jumping, free access to stairs, furniture or yard is not allowed. Dogs should be restricted to a small room/crate and not allowed to play with other members of the household. Short walks can be added after sutures are removed and gradually increased in length as the pet improves in the use of their operated limb. Radiographs can be performed 6 weeks after surgery to evaluate any osteotomies and their healing. I don't recommend bandages post-op as I want the patients to be able to flex their stifles early in the post-operate period.