

THE LUXATING PATELLA: One size does NOT fit all



Synopsis-- Anatomy and the Disease

The quadriceps mechanism is the unit of interest when talking about a luxating patella. The condition is a dynamic one, created by predisposing genetics and the resultant development, or by a predisposing anatomy exacerbated by low impact trauma. The patella is supported or encouraged to ride in its groove by several structures. 1) The alignment of the quadriceps muscle/patellar tendon/patella/patellar ligament/tibial tubercle (quadriceps “mechanism”) with the groove; 2) medial and lateral retinacular/joint capsular tension; and 3) depth of groove—probably in that order of importance.

IN BREEDS WITH PREDISPOSING GENETICS, we see either a) the mismatch of quadriceps mechanism growth/elongation with bone growth/elongation or b) a wayward tibial tubercle physis that “moves” medially or laterally as it develops as the developmental cause of this condition. When this abnormality is pronounced early in puppyhood, a patella that jumps its track even just a little promotes a vicious cycle of malalignment by the quadriceps mechanism pulling the tibial tubercle physis medially or laterally. **In other breeds/mixed breeds**, a subtle abnormal anatomy of the quadriceps mechanism can be suddenly turned into a painful luxation with vigorous play, turning, landing, and is best categorized as a catastrophic sprain. The resultant looseness is poorly contained conservatively, and repeated luxations perpetuate the tissue damage preventing healing.

PAIN OR DISABILITY associated with a loose patella manifests from several situations. **Ongoing pain and consistent lameness** is seen when cartilage wear results in subchondral bone exposure, grinding and joint inflammation. **Episodic, screaming-type pain** is seen with fairly tight patellas that become luxated. These appear much like a luxation of a primary joint, like hip or shoulder—major stretch of soft tissues hurts a bunch until it is manually put back in place (by dog him/herself, by owner, by DVM). **Intermittent skip-step lameness** is probably the most commonly seen disability and seems more like a weird/odd feeling to the pet (vs. significant pain) and can develop into a learned gait over time. **An inability to jump up** is related to a poorly functioning quadriceps muscle made inefficient with the lack of biomechanical advantage gained from the patella-lever action over the front of the knee.

The finding of a luxating patella in a patient does not necessarily suggest immediate surgical stabilization.

CRITERIA THAT ARGUE IN FAVOR OF SURGERY are:

- 1) A patient less than 1yr of age, with several week/month history of exam findings demonstrating more and more laxity (i.e. more propensity to luxate or stay luxated; progressing from low grade to higher grade).
- 2) A young patient (4-6mo age) with grade III or IV luxation (may require 2-3 staged procedures.)
- 3) A patient with an acute, adult onset of lameness and the finding of a painful patella with manipulation/luxation (with NO history of patella luxation in past.)
- 4) A young adult, bully-breed patient with any grade luxation.
- 5) A young adult patient with persistent lameness, excessively frequent “skip-step” gait, or impaired mobility (jumping, etc.) and grade II or higher luxation.

An acute onset of lameness localized to the stifle in an **adult/middle aged dog** is usually caused by cruciate disease/ACL rupture. A prior, non-clinical patella luxation may increase in grade acutely due to the joint capsule distension associated with cruciate disease. Stabilization of the cruciate laxity and capsule imbrication may be all that is needed in these cases.

Unlikely candidates are typically middle-aged toy breed (chihuahua, yorkie, etc.) with intermittent skip step, normal muscling, appropriately agile; even with a grade II luxation, these patients are unlikely to have negative effects and do not typically need a surgical patella stabilization. The finding of crepitation (i.e. nails on a chalkboard) with manual manipulation of the patella out of the groove puts these pets back into the surgical group.

GRADING a luxating patella is primarily useful for record keeping and monitoring. It does not necessarily predict the need for surgical stabilization or how “severe” things are. This is rarely appreciated by owners. It does strongly flavor a surgical consult, so having everyone on the same page communication-wise is helpful. That said, often the dog is the trickster with a changing grade; anesthesia adds some variation as well! In general, surgery folks follow this rubric:

- Grade I/IV—a patella that rises up the trochlear ridge but just doesn’t quite jump the track
- Grade II/IV—a patella that is happy to live in the groove for most of its daily life, but can easily be pushed out; snaps back in.
- Grade III/IV—a patella that prefers to live out of the groove but can be easily pushed back in during exam.
- Grade IV/IV—a patella that has set up shop outside the groove and often has made its own nouveau groove medially/laterally; no amount of pushing gets this kid back home.

OTHER EXAM FINDINGS that help describe the clinical picture and explain the course of lameness are: 1) crepitation (think “nails on the chalkboard”) when moving patella in/out of groove; 2) stifle angle (higher grades may develop a “squatting” appearance); and 3) medial plus lateral patellar laxity (these are tricky to repair, FY!!)

Surgical Overview:

The toolbox for patella stabilization has four techniques in it (well, there is a 5th I’ll mention too, but rarely employed). We mix and match these techniques based on the exam, radiographic, and intraoperative findings.

- 1) **Imbrication:** Pretty much every patellar stabilization involves resecting and then tightening the lateral capsule/fascia of the stifle. This “tethers” the patella into position, but is rarely enough to counter the biomechanical disadvantage a malalignment creates. This is the primary technique in immature (<10mo) patients, employed as a somewhat temporary “fix” until maturity is reached. It prevents more dramatic malalignment and poor groove development created by the patella remaining “out”.
- 2) **Release/desmotomy:** For patellas that are too fond of living out of the groove, the fascia/capsule on the side of luxation is too tight. A release allows the soft tissue re-alignment and augments the other tools in the box.
- 3) **Tibial tuberosity transposition:** This is the primary player in patellar repair; an osteotomy of the tibial tubercle and transposition to a more lateral (or medial) location re-aligns the quad-mechanism discussed above. Implants (kwires/cerclage) are used to stabilize the transposition.
- 4) **Trochleoplasty:** Making a deeper, more inviting groove is a noble goal, but rarely employed in my hands anymore. One study looked at those cases with and without trochleoplasty employed in repair and found no difference in recurrence. Also, when I am able to look at stifle joints that have had a trochleoplasty in the past, the health of the cartilage in the groove looks amazingly like DJD. Hmm. Cartilage really does not like surgical manipulation!
- 5) **Femoral corrective osteotomy:** As promised, the 5th tool rarely employed is somewhat invasive and helpful in those uncommon cases with marked femoral angulation. The biomechanics just can’t be corrected without adjusting the track too.

The **indications & rationale** for surgical treatment are:

- The goal of early patella stabilization surgery is to delay and minimize cartilage wear/eburnation (DJD).

- In young/growing patients, early surgery is instrumental toward preventing permanent femur/tibia developmental abnormalities. Often these puppies need more than one procedure, before and after bone maturity.
- In juvenile patients (<10mo), early imbrication serves to maintain a relatively consistent patella-groove position. The pressure of the patella in the groove actually develops the depth of the groove. This also redirects the abnormal force (medial or lateral) that the quad-mechanism is putting on tibial tubercle physis allowing it to continue to develop cranially (not medially or laterally displaced).
- Unilateral/staged surgery has been shown to have fewer postoperative/implant related complications. Bilateral surgery is an option, but one requiring more specific and cautious discussion of outcomes and expectations with the owner.
- For higher grade, young dogs with a squatting posture, the risks:benefits of staged vs. bilateral surgery may be in favor of bilateral surgery.

Other options for treatment (besides surgery) are:

- A lean body condition (or conversely an excessive body condition) is very clearly directly related to the clinical manifestation of patella luxation.
- There are no knee braces that demonstrate successful external support sufficient to prevent or protect the stifle.

Supportive/ancillary options with surgical treatment are:

- High dose fish oil (1g/10-15#) and chondroprotectants may improve stifle comfort in those patients with eburnated cartilage noted at surgery.

The **perioperative experience** for pet and owner includes:

- 3-legged lame for **1-2wks**; longer lameness not typical, so if present, this warrants re-exam and/or radiographs
- **Bandage** postop (1-3d) to minimize swelling and pain
- Activity restriction to leash, **no exercise x 8wks**; gradual return to activity subsequent 4wks (total 3mo)
- Recurrent or persistent lameness (>6wks) may suggest the need for implant removal (with brief general anesthesia); seen in **approximately 10% of cases**.
- Professional PT not required but may improve healing and maintain conditioning during restricted period.

Expectations for outcome are:

- Patient outcomes postoperative to patella stabilization suggest a reliable return to weight bearing, and high level of function long term for the majority of patients.
- Non-clinical, low-grade luxation found only on postoperative exam, may not be clinically significant.
- A laterally luxating patella and grade III and IV luxations have more challenging prognoses.
- Patients with a stabilized patella luxation may develop DJD/arthritis in their lifetime, but this concern is less than for other stifle joint abnormalities.
- Larger patients and bully-breeds seem more at risk for progressive DJD, manifesting as stiffness when rising, limping after vigorous activity.

Complications that may arise with this procedure are:

- **Implant-related irritation** (10% of cases and significant, requires implant removal (minor surgery))
- Superficial or deep **surgical infection** (rare, requiring long course Abx),
- **Implant infection** (rare and significant, requiring Abx course and surgical implant removal (minor surgery)),
- **Implant breakage** (rare and significant, may require additional surgery if early postoperative)

- **Insufficient patella stability** (rare and significant, requiring additional surgery *if clinically significant luxation*, not just an “exam” luxation)

Postoperative **outcomes may be poor** due to the above complications, and/or:

- **ACL rupture** subsequent to patella surgery (rare and usually unrelated; years from patella surgery)
- **Progressive DJD/arthritis** (dependent upon patient lifestyle and breed, joint status at surgery.)

What a surgeon needs prior to surgery:

- Confirmation of ongoing lameness or other criteria as discussed above.
Affected leg/body part “marked” by owner for confirmation (wax “costume makeup” works well)
- Skin near the surgery site CLEAR of infection (papules, pustules, crusts, collarettes, etc.) If urgent surgery, owner must be alerted to *increased risk* of incisional, deep and/or implant infections.

General considerations and complications for all surgery/anesthesia procedures are:

- *Difficult and/or painful anesthetic recovery (variable; may require additional medications or re-hospitalization)*
- Incisional infections (rare, minor; usually require oral antibiotics)
- Incisional dehiscence (rare, minor or major; may require surgical revision)
- *Adverse anesthetic event (rare, major; may result in serious impairment or death)*

Proper owner expectations are important to a successful experience and patient outcomes. Please discuss this information with your clients while assisting them with decision-making for **Patella luxation stabilization**.

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