

Four Leg News

September - October 2015

Volume 4 Issue 5

Introduction

The information in this newsletter is intended to provide a background regarding the management of human patellofemoral luxation. Now, since we all realize that there are differences in knee & stifle orientation, and humans tend towards lateral luxation whereas dogs luxate medially, and of course the whole biped versus quadruped thing. However, there can be some very useful information that we can garner from learning about the 'human' side of the equation and then figuring out what we can utilize (or not) for dogs. So bear with me in learning about human 'stuff'. It is the stepping-stone to determining a solid plan for working with dogs with patellar luxation.

I hope you enjoy the information! Happy reading!

Cheers,
Laurie

Factors Associated with Patellofemoral Pain in People

• • •

It is important to identify the factors that influence patellofemoral stability, as they could influence whether surgical or conservative management would be most effective.

Trochlear dysplasia is a combination of decreased trochlear depth with a low femoral condyle (laterally in humans).

Patellar tilt is the angle that the patella is tilted, which is thought to be secondary to shape of the patella & trochlea and the relationship between the tightness of the medial & lateral soft tissue structures.

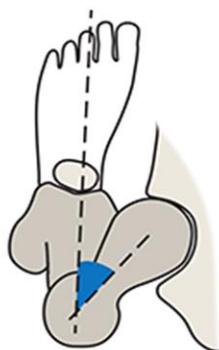
Patellar position refers to the relationship between patella height and patella tendon length, for a 'high sitting patella' (patella alta) will not properly engage with the trochlea.

Femoral anteversion alters the position of the femur relative to the patella such that the patella starts in a relatively more laterally displaced position. This could be also known as a 'Q-angle' (wide hips – narrow knees).

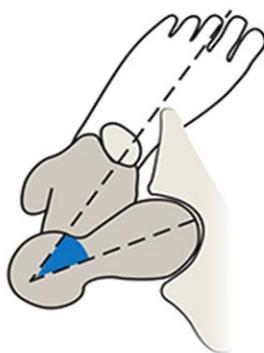
Non-Contractile soft tissue support pertains to the medial & lateral retinaculum and the joint capsule. As well, the anterior soft tissues around the hip can contribute to increasing the internal rotation of the hip, which can adversely affect the stability of the patellofemoral joint.

Continued overleaf ...

Excessive Femoral Anteversion



Position of the femoral head with the foot straight.

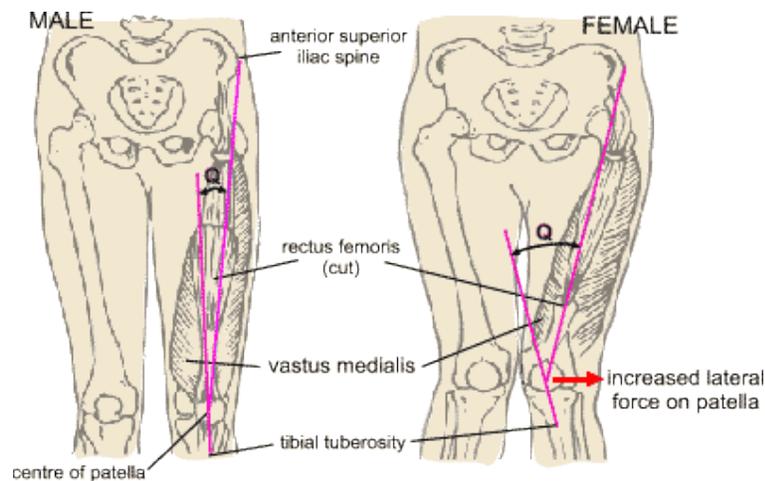


Most patients with excessive femoral anteversion "in-toe" to better position the femoral head.

... Patellofemoral Pain in People continued

Lateralization of the tibial tuberosity relative to the trochlear groove could cause a lateral pull and orientation of the patella.

Proximal muscles, as in the pelvic musculature, are key to controlling the thigh and minimizing increases in the dynamic 'Q-Angle' and the valgus vector force on the patellofemoral joint. Additionally, weak gluteal muscles and delayed muscle timing of gluteus medius activation is seen in individuals with patellofemoral pain syndrome.



Distal muscles, vastus medialis in particular, provides the medial stability needed to counteract the large vector pull of vastus lateralis.

And why do you care?

What this tells us is that patellofemoral stability is multifactorial. Therefore when we assess a person (or dog) in regards to those with the potential to rehab conservatively and those that need surgery, we must take into consideration a multitude of factors. It also means that a straight comparison of surgical versus non-operative interventions for patellofemoral instability could be elusive or misleading should the above factors not also be taken into account.

References:

Andrish J. The Management of Recurrent patellar Dislocation. *Orthop Clin N Am* 39 (2008), 313-327.

Barton CJ, Lack S, Malliaras P et al. Gluteal muscle activity and patellofemoral pain syndrome: a systematic review. *Br J Sports Med* 47 (2013), 207 – 214.

Lankorst NE, Bierma-Zeinstra SMA, van Middelkoop M. Factors associated with patellofemoral pain syndrome: A systematic review. *Br J Sport Med* 47 (2013), 193-206.

McConnell J. Rehabilitation and nonoperative treatment of patellar instability. *Sports Med Arthosc Rev* 15 (2007), 95-104.

Smith, TO, McNamara I, Donell ST. The contemporary management of anterior knee pain and patellofemoral instability. *The Knee* 20 S1 (2013), S3 – S15.

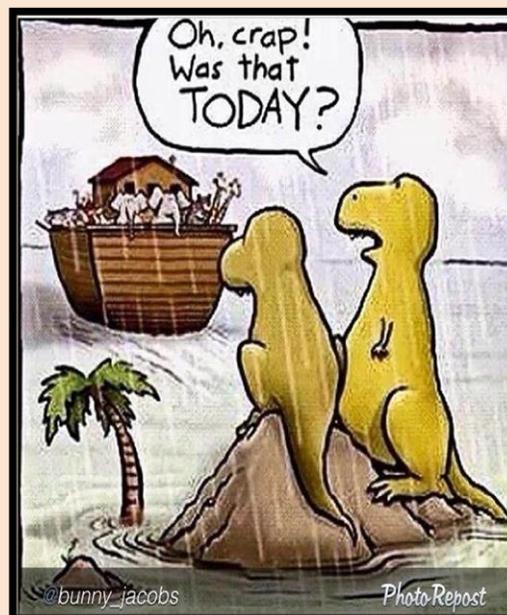
Operative Versus Non-Operative Management of Patellar Dislocation in People

Several randomized controlled trials, systematic reviews and meta-analyses have been conducted on this topic. Patellar dislocation is a common knee injury, accounting for 2 – 3% of all knee injuries.

Traditionally, first time dislocations are managed medically, with a period of immobilization followed by physiotherapy, principally targeting the quadriceps mechanism. Almost 70% of hospital departments surveyed in Germany chose non-operative therapies after a primary patellar dislocation as their first treatment option. It is reported that between 40 – 60% of patients managed with way will experience recurrent patellar dislocations and subluxation.

Some of the highlights within the literature that compare 'OP vs Non-OP' are as follows:

- Operative management of patellar dislocation resulted in a lower risk of recurrent patellar dislocations compared to non-op management. However both groups reported high recurrent dislocation rates. (Smith et al 2011)
- Surgery however was associated with a significantly higher risk of patellofemoral joint osteoarthritis. (Smith et al 2011)
- Pain was less of a factor in surgical patients. (Smith et al 2011)
- No significant differences could be found between surgical and non-surgical management for initial management of primary patellar dislocation, the risk of recurrent dislocation, or in 'functional knee scoring' measures. (Petri et al 2013; Hing et al 2011)
- Surgical intervention may provide better clinical results in the short term (Yao et al 2015)
- Surgical intervention may reduce the risk of recurrence of dislocation at the two to five year mark and six to nine year marks (but the quality of evidence is very low). (Smith et al 2015)
- No statistically significant difference in 'functional results' between the two groups, however imaging was important in selecting operative or arthroscopic treatment. (Apostolovic et al 2011)



Continued overleaf ...

... Management of Patellar Dislocation in People Continued

Why do you care?

If conservative management is the first choice for patellar dislocations in people, perhaps there is a subset of dogs that could benefit from conservative management as well. Certainly not all dogs would be conservative candidates. However, it would be pertinent to have a therapeutic plan to treat cases of dogs with grade 2 patellar luxations and looking at the human literature could provide a starting point.

References:

Apostolovic M, Vukomanovic B, Slavkovic N, et al. Acute patellar dislocation in adolescents: operative versus nonoperative treatment. *In Orthop* 35(10), 2011, 1483-1487.

Hing CB, Smith TO, Donell S, et al. Surgical versus non-surgical interventions for treating patellar dislocation. *Cochrane Database of Systematic Reviews*, Issue 11, (2011), Art. No.: CD008106.

Hohlweck J, Quack V, Arbab D, et al. Diagnostic and therapeutic management of primary and recurrent patellar dislocation – analysis of a nationwide survey and the current literature. *Z Orthop Unfall* 152(4), 2013, 380-388.

Petri M, Liodakis E, Hofmeister M, et al. Operative vs conservative treatment of traumatic patellar dislocation: results of a prospective randomized controlled clinical trial *Arch Orthop Trauma Surg* 133 (2013), 209 – 213.

Smith TO, Song F, Donell ST, et al. Operative versus non-operative management of patellar dislocation. A meta-analysis. *Knee Surge Sprots Traumatol Arthosc* 19 (2011), 988-998.

Smith TO, Donell S, Song F et al. Surgical versus non-surgical interventions for treating patellar dislocation. *Cochrane Database of Systematic Reviews* Feb 25 (2015), CD008106.

Yao LW, Zhang C, Liu Y et al. Comparison operative and conservative management for primary patellar dislocation: an up-to-date meta-analysis. *Eur J Orthop Surg Traumatol* 25(4) 2015, 783-788

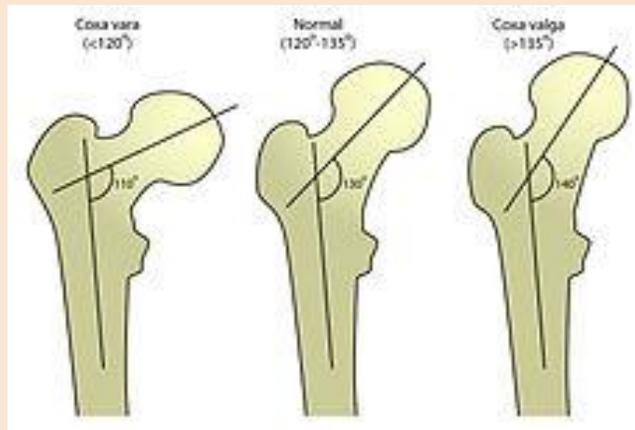


Incidence of Patellar Luxation in Dogs

Heritability of patellar luxation (PL) is equal between purebred and mixed-breed dogs (Bellumori et al 2013). And in one study (Heuven et al 2013) that looked at Dutch Flat-Coated Retrievers it was found that breeding of one PL-affected parent increased the prevalence of patellar luxation in offspring by 45% compared to that with two unaffected parents. A screening program for PL was able to reduce the incidence of PL in this breed from 28% to 18%, but stagnation occurred thereafter. The study concluded that environmental factors also play a large role in the manifestation of the disorder.



Most studies found females to be more affected than males (Lavrijsen et al 2013; Bellumori et al 2013; Soontornvipart et al 2013; Bound et al 2009). Most luxations are medial (with incidences reported as high as 92%), however the flat-coated retriever study mentioned above noted a 61% incidence of lateral luxation. Bound et al (2013) reported that Labradors were most commonly affected (21%) in their review of medical records. However this condition is well known to affect small breed dogs (75% of the Pomeranians in the Soontornvipart et al 2013 study presented with PL), but it could be that many small dogs are able to function with a patellar luxation and therefore do not present as readily to surgical centres for consultation. Increased measurements related to angle of inclination of the femoral neck (coxa valga) and medio-lateral bowing of the femur & tibia at the stifle were found to correlated with medial patellar luxation in dogs.



The incidence of medial patellar luxation was greater than the incidence of lateral luxations in both small and large dogs (Alam et al 2007). Small breed dogs were almost exclusively medial patellar luxations and lateral luxations were uncommon, but observed more often in larger-breed dogs.

Continued overleaf ...

... Incidence of Patellar Luxations in Dogs continued

In a study of lateral patellar luxation (retrospective study of 65 dogs) the majority were males, presenting at a median age of 10 months, with most being medium to large in size (Kalff et al 2014). Thirty six percent had genu valgum as an issue.

There is also a concern regarding the incidence of a concomitant cranial cruciate ligament rupture in dogs with medial patellar luxation. Campbell et al (2010) reviewed files of 162 small-breed dogs (266 stifles) and found that 41% of all dogs with MPL had concomitant CCL rupture. Dogs with MPL alone were a mean age of 3.0 years, whereas dogs with MPL and concomitant CCL rupture were 7.8 years. They also found that dogs with grade 4 MPL were more likely to have an associated CCL rupture. Yeadon et al (2011) found in their study of dogs with MPL, there was a complete CCL rupture in 44% and an incomplete tear in 56% (thus 100% had some degree of tear in this study group).

Why care about this?

This information is just good for knowing. I'm sure we've all seen enough of these dogs to spot one a mile away! I'll throw in one of my personal observations... of the small dogs I've seen, it's been primarily cocker spaniels that have presented with lateral luxation. Additionally, I've seen many a small dog that can 'deal with' a luxating patella, but the large dogs tend to be 'non-copers', needing surgical correction. Now, in regards to the CCL-MPL combo dogs, it makes sense that the Grade 4 luxations were more prone to the concomitant CCL rupture. Without the proper alignment of the quadriceps & the protectiveness that they have on stifle stability, certain forces could be transferred through the cruciate instead of the normal mechanisms. What is most interesting to me is that the concomitant injuries occurred more so in the older dogs. Is that because their muscle tone deteriorated over the years? Is it because it took that long for cumulative microtrauma to the CCL to finally get to the point of a full rupture? In the Yeadon et al study, it would seem that the dogs didn't present for their patellar luxation, until the cruciate tear became involved. And as such, if there was a way to be proactive about preventing a cruciate tear in the dogs with MPL, would that not be a wise option?



"They rubbed my tummy, chief—I told them everything."

Continued overleaf ...

... Incidence of Patellar Luxations in Dogs continued

References:

Alam MR, Lee JI, Kang HS et al. Frequency and distribution of patellar luxation in dogs. 134 cases (2000 to 2005). *Vet Cop Orthop Traumatol* 20(1), 2007: 59 – 64.

Bellumori TP, Famula TR, Bannasch DL et al. Prevalence of inherited disorders among mixed-breed and purebred dogs: 27, 254 cases (1995 – 2010) *J Am Vet Med Assoc* 242(11), 2013: 1549-1555.

Bound N, Zakai D, Butterworth SJ, et al. The prevalence of canine patellar luxation in three centres. Clinical features and radiographic evidence of limb deviation. *Vet Comp Orthop Traumatol* 22(1), 2009: 32 – 37.

Campbell CA, Horstmal CL, Mason DR, et al. Severity of patellar luxation and frequency of concomitant cranial cruciate ligament rupture in dogs: 162 cases (2004 – 2007). *J Am Vet Med Associ* 236(8), 2010: 887 – 891.

Kalff S, Butterworth SJ, Miller A, et al. Lateral patellar luxation in dogs: a retrospective study of 65 dogs. *Vet Comp Orthop Traumatol* 27(2), 2014: 130 – 134.

Lavrijsen IC, Heuven HC, Breur GJ, et al. Phenotypic and genetic trends of patellar luxation in Dutch Flat-Coated Retrievers. *Anim Genet* 44(6), 2013: 736-741.

Soontornvipart K, Wangdee C, Kalpravidh M, et al. Incidence and genetic aspects of patellar luxation in Pomeranian dogs in Thailand. *Vet J* 196(1), 2013: 122 – 125.

Yeadon R, Fitzpatrick N, Kowaleski MP. Tibial tuberosity transposition-advancement of medial patellar luxation and concomitant cranial cruciate ligament disease in the dog. Surgical technique, radiographic and clinical outcomes. *Vet Comp Orthop Traumatol* 24(1), 2011: 18 – 26.

Complications with Surgical Correction of Patellar Luxation

Cashmore et al (2014) observed major complications in 18.5% of patellar luxation stabilization procedures. Implant associated complications were most frequent, followed by patellar relaxations and thirdly tibial tuberosity avulsion. Interestingly (to me...) is that release of the cranial belly of sartorius reduced the incidence of patellar relaxation. A much earlier study of MPL complications in sixteen large-breed dogs reported one wound dehiscence and trochlear wedge migration, one pin loosening, and one persistent lameness caused by lymphoplasmacytic synovitis (Remedios et al 1992). Gibbons et al (2006) reported a complication rate of 29%, and increasing body weight was found to be a risk factor. A retrospective study of 137 stifles treated via tibial tuberosity transposition for MPL found that 43% had complications. Of these 18% were identified as major. Factors significantly associated with increased risk of complication included large breed, increased weight, and use of a screw for tibial tuberosity fixation. Factors that were not associated with complications were increased age and concurrent CCL tear (Stanke et al 2014). One study conducted entirely on Pomeranians revealed a relaxation rate of 11% in dogs with grade 3 luxation and 36% in dogs with grade 4 luxation (Wangdee et al 2013). No dogs with grade 2 luxations had re-luxation episodes

... *Complications with Surgical Correction of Patellar Luxation continued*

Why do you care?

It's my opinion that the grade 2 luxations can be rehabilitated conservatively in small dogs. Large dogs become tricky! And I was a bit shocked at the recurrence rate. It was higher than I thought. The other complications I've seen have been related to dogs with autoimmune issues or allergies where the suture material has been 'eaten away' and/or the bone around the pin has been 'eaten away', and in one case nerve damage was associated as well. So, with high functioning grade 3 or 4 luxations, and with all grade 2 luxations, why not try conservative rehabilitation before contemplating surgery?



References:

Cashmore RG, Haylicek M, Perkins NR et al. Major complications and risk factors associated with surgical correction of congenital medial patellar luxation in 124 dogs. *Vet Comp Orthop Traumatol.* 27(4), 2014: 263-270.

Gibbons SE, Macias C, Tonzing MA et al. Patellar luxation in 70 large breed dogs. *J Small Anim Pract* 47(1), 2006: 3 – 9.

Remedios AM, Basher AW, Runyon CL et al. Medial patellar luxation in 16 large dogs. A retrospective study. *Vet Surg* 21(1), 1992: 5 – 9.

Stanke NJ, Stephenson N, Hayashi K. Retrospective risk factor assessment for complication following tibial tuberosity transposition in 137 canine stifles with medial patellar luxation. *Can Vet J* 55(4), 2014: 249-356.

Wangdee C, Theyse LF, Techakumphu M et al. Evaluation of surgical treatment of medial patellar luxation in Pomeranian dogs. *Vet comp Orthop Traumatol* 26(6), 2013:435 – 439.

Take Home Message

Now you have some background information surrounding patellar luxation. However, nowhere in current veterinary medical circles is there a plan for how to conservatively manage these dogs. As such, there may be some points we could take from human physiotherapy management of patellar luxation in order to direct care of these dogs. So check out the upcoming video on conservative management of patellar luxation in dogs!

• • •

Heartwarming Story for No Particular Reason.

Bob the Railway Dog

Source: <http://offtheleashdogcartoons.com/scoops/10-heartwarming-dog-stories-from-history/>

Bob the Railway Dog (1882 – 1895) a scruffy brown stray, bought on impulse by a local railway man as a gift for his wife – and setting in motion the beginnings of a legend. Bob the Railway Dog had an insatiable thirst for train travel – he was a dog for all Australians.



Bob the railway dog: icon of Australian history
Credit – Australian Geographic

Bob was born in South Australia in 1882, and for some reason he loved trains. He spent the early years of his life as a stray, following railway workers to work, until he was rounded up by a dogcatcher. It looked as if he was destined for the pound, but luckily for Bob he was bought by a kindly station guard who'd taken a liking to him. It worked out well, as his new master allowed him to ride the train with him in the guard's van every day. But, eventually, his master got a promotion and he and Bob parted ways. Then Bob started to jump trains alone.

Bob travelled up and down Southern Australia, becoming a familiar and welcome sight on trains across the land. Sometimes, when Bob felt that he needed some privacy, he chose an empty carriage and scared away any passengers who tried to sit in it by barking like crazy. The station masters and guards all knew him by name. so they left him to his own devices. At night he followed the engine driver home

For most of his life, Bob went where he pleased, and as his fame grew so did his reception when he rode into town. He was allowed to attend banquets as a guest of honour, was given a special bracelet with his name on it—with an engraving telling anyone who read it to let him go where he wanted—and when he was seen riding on trains by local children they ran after him as if he were the Pope. Bob had many adventures in his short life and died the most famous dog in Australian history.



'Bob, the railway dog' at Port Augusta.

Credit – wikipedia



FourLegRehabInc

CANINE REHAB EDUCATIONAL RESOURCES

See what else is available to learn:

Visit www.fourleg.com

Drop me a line! Send me your questions!

Four Leg Rehab Inc

PO Box 1581,
Cochrane, AB T4C 1B5
Canada

Laurie@Fourleg.com