

Tendonopathies: Diagnostic and Treatment Considerations

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Canine tendonopathies may be acute or chronic in nature and are seen in both athletic and companion type dogs. Pathology may result from either partial or complete rupture in an acute setting or repetitive micro-trauma that outweighs the reparative process in chronic cases. This chronic inflammatory process along with hypoxia and other factors leads to collagen disorganization and chondroid metaplasia resulting in thickening, loss of tensile strength, and pain.

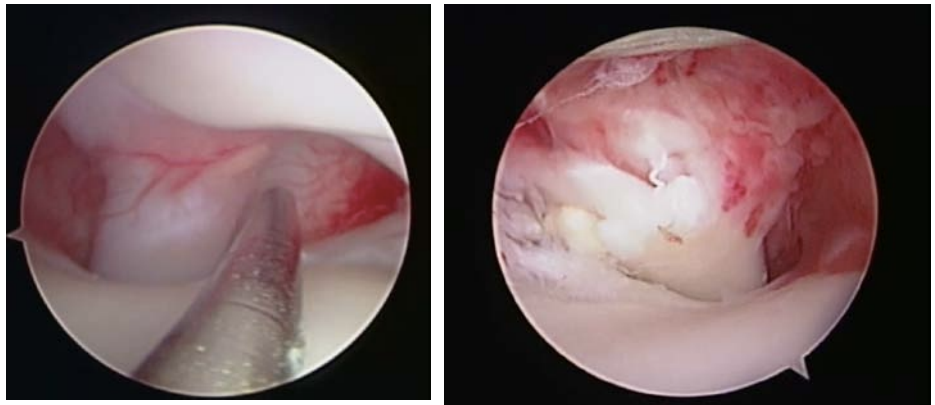
Tendon pathology can be difficult to isolate on physical exam particularly in the shoulder where exam findings do not correlate well with specific musculotendinous groups (Devitt). Diagnostic imaging options include radiographs, ultrasound and MRI. Radiographs help to rule out other causes of lameness but are often low yield. Specialized views may be selected to differentiate the involved tendon such as a skyline view in the shoulder to delineate biceps vs supraspinatus calcification. Ultrasound is an inexpensive modality in musculoskeletal imaging but requires a steep learning curve. US findings include increased joint fluid, changes in fibril pattern, tendon thickening and tendon loss in cases of complete or partial ruptures. MRI can show loss of normal tendon architecture, tendon edema and periarticular swelling and has the advantage of imaging the entire musculotendinous unit. Positive contrast arthrograms may be performed with MRI to further delineate intra-articular structures.

Biceps tenosynovitis

Underlying causes for acute bicipital tenosynovitis include strain, partial rupture, entrapment of osteochondral fragments, direct trauma, and impingement by supraspinatus tendon enlargement. Dogs are often painful on a biceps test and this maneuver will accentuate the lameness. Diagnostic options include radiographs, ultrasound and MRI.

Treatment options for bicipital tendonitis include both medical and surgical approaches (Wall). Medical therapy is reserved for inflammation only with no major tear and consists of intrarticular injections of methylprednisolone acetate or triamcinolone using sterile technique with at least 6

weeks of activity restriction (Stobie). Surgical therapy involves either tenodesis or tenotomy. Reports on both surgical techniques subjectively demonstrated a good to excellent results (Wall). Tenotomy is considered preferable by some as no implants are required and it is readily performed via a minimally invasive arthroscopic procedure (Wall). When



considering a tendon release, care should be taken not to over interpret secondary biceps changes for primary pathology. The biceps origin may become severely inflamed secondary to global joint inflammation and tenotomy in these cases would be contraindicated as the biceps does contribute to shoulder stability.

Torn biceps tendon origin on the L with normal biceps tendon for comparison on the R image.

Supraspinatus tendinopathy

The supraspinatus tendon originates on the scapula and crosses the shoulder joint to broadly insert on the greater tubercle. Labradors and Rottweilers have shown some predisposition to this disease. Microtrauma and hypoxia due to the low vascularity of this tendon are two proposed etiologies. Our clinic has an increase in case numbers at the start of upland bird season when the unconditioned dog is taken out for their first few times. A recent retrospective review of 327 dogs with ST, found failed NSAID therapy and rehabilitation in 75% and 41% of cases respectively. On physical exam these authors found pain on the following maneuvers: shoulder flexion in 64%, biceps stretch 48%, pain on direct pressure in 59%. Mineralization was present in 37 of 283 cases with radiographs. US examination showed enlargement, irregular fiber pattern and mixed echogenicity. On shoulder arthroscopy biceps impingement was seen in 38.7% of cases. Other intra-articular lesions in the biceps, subscapularis and glenohumeral ligaments were common. Additionally, 257 elbows in 191 dogs were evaluated concurrently with elbow arthroscopy and 54.5% had concomitant pathology.

Initial treatment of SST may consist of simple rest and NSAID therapy, which should be combined with a rehabilitation plan. Other nonsurgical therapies consist of extracorporeal shockwave therapy, and regenerative medicine (PRP and stem cell injection). Extracorporeal shockwave therapy has been used to reduce mineral opacity radiographically in a case series (Danova). Most recently the Canap's group reported on injections of adipose derived stem cells and PRP delivered via US guided injection in 116 cases with resolution of lameness in 88%. They are currently performing a prospective trial. In cases of concurrent biceps tenosynovitis additional injection of intra-articular steroids may be considered.

Surgical removal of mineral bodies within the tendon has been performed in addition to tendon splitting in non-calcified cases. This resulted in 11/19 dogs gaining excellent postop function, 5 good and 3 poor. Mineralized vs nonmineralized tendinopathy groups had no difference in prognosis (LaFuente). Another study reported on surgical removal of calcified tendon but all dogs in this series reformed mineral deposition with a mean follow-up time of 5 years (Latinen).

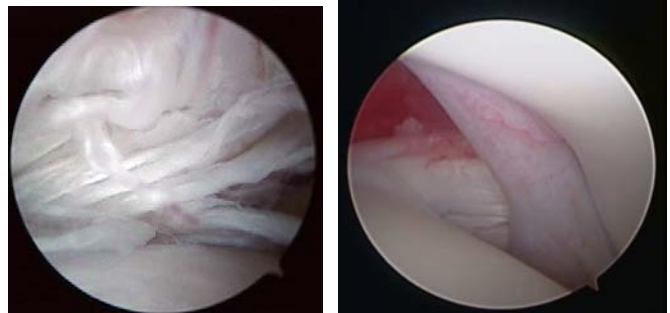
Infraspinatus

Infraspinatus tendopathy is typically reported in high activity dogs as an acute injury. The tendinopathy that follows is similar to the supraspinatus but likely more inflammatory given the typical acute pathologic event. Pain may be present on direct palpation over the tendon and internal rotation. A circumducting gait may be noted 3-5 weeks following injury as the tendon undergoes fibrosis and contracture producing external rotation of the paw and adduction of the elbow. Tendon release is performed in these cases. Other pathologies in this tendon such as calcification and osteochondromas of the bursa are treated with surgical and non surgical means (McKee).

Subscapularis

The subscapularis arises from the medial aspect of the scapula to then insert medially at the proximal humerus. Due to the location deep in the axilla, ultrasound examination is somewhat limited while MRI allows imaging of the entire structure. A portion of the distal tendon is seen on arthroscopic exam as it is intra-articular and fans out just medial to the cranial aspect of the medial glenohumeral ligament (MGHL). Large case numbers of subscapularis pathology are not reported however, we found nearly 50% of dogs had a lesion in the subscapularis during MRI and arthroscopic exam of the shoulder (Murphy). Subscapularis pathology may often occur in conjunction with medial glenohumeral ligament pathology resulting in medial shoulder instability. However isolated tears are also seen with normal abduction angles. Treatment is similar to medial shoulder instability with conservative management consisting of prevention of abduction, exercise restriction and rehabilitation. Regenerative therapies such platelet rich plasma and stem cells may also be injected within the tear at arthroscopy. Surgical reconstruction of the medial joint or thermocapsuloraphy is also described (Franklin).

Torn intrarticular portion of the subscapularis tendon (left image). A normal subscapularis tendon with a normal medial glenohumeral ligament (right image). foreground.



Abstract

Objective

To report the long-term clinical outcomes and radiographic results in dogs diagnosed with partial bicapital rupture and treated by arthroscopic tenotomy.

Materials and methods

The medical records of dogs that had undergone arthroscopic tenotomy were retrospectively reviewed. Inclusion criteria for this study were: performance of an arthroscopic tenotomy between August 1999 and July 2007, availability of arthroscopic records data for review, and ability to obtain follow-up data for more than one year after arthroscopic tenotomy. In all cases, owners were interviewed during follow-up appointments or via telephone to determine perceived outcome after surgery.

Results

Forty-seven arthroscopic tenotomies were performed on 40 dogs without any major surgical complications. Long-term follow-up examinations, ranging from 12 months to 48 months (mean 26 months) after the tenotomy, were obtained for 24 dogs (25 shoulders). Clinical outcome was assessed as excellent in 22 shoulders, with each dog showing a full return of limb function. A total of 10 dogs (11 joints) were evaluated radiographically; six joints revealed no progression of pathology, and five joints showed a limited progression of pathology.

Conclusion

Arthroscopic tenotomy in the treatment of bicapital partial rupture yields favourable long-term clinical results and a high degree of owner satisfaction. The feasibility of this technique and the long-term clinical and radiographic outcome from our study indicate that this technique can be considered a reliable and safe treatment for partial bicapital rupture.

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