



### Muscle injuries of the forelimb (Supraspinatus, Biceps infraspinatus, triceps...)

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#### Supraspinatus disease

Supraspinatus disease (SD) is a relative uncommon condition affecting dogs with fore limb lameness. Currently it is thought to be caused by a repetitive strain injury. Its diagnosis and management can be challenging. The diagnosis is based on clinical findings and advanced imaging. Dogs affected by SD often don't respond to traditional conservative management (rest and NSAIDs) and normally the lameness is worsened by exercise. Treatment strategies previously reported varies from surgery (excision of mineralisation within the tendon), physiotherapy or no treatment at all since SD could well be asymptomatic and therefore an incidental finding. Dr Sherman Canapp, evaluated 120 dogs with SD, and found that SD can affect dogs of pretty much all ages (8months-13 years) with a mean age at presentation of 6 years. 1/3 of these dogs were involved in sport activities such as agility or flyball. 75% of these dogs did not respond to rest and NSAIDs. The majority of these dogs presented with a unilateral lameness and a lameness score of 3/6. The duration of lameness was also variable (weeks-1 year). Breeds more commonly affected were Labrador, Rottweiler and Border collie.

In the same study, the clinical findings were also quite interesting:

- Direct pain on Supraspinatus palpation: 59% of dogs
- Pain on shoulder extension: 63% of dogs
- Pain on shoulder abduction: 70% of dogs
- Pain on shoulder flexion: 27% of dogs
- Pain on biceps tendon test ( shoulder flexion, elbow extension and direct palpation of biceps): 47% of dogs
  - Of these dogs with biceps tendon pain, in 95% of the cases further imaging such as ultrasound or MRI was performed and showed concurrent biceps tendon disease in 95% of the cases.

From the imaging point of view, the majority of these dogs had radiographs, and only 25% of the cases had a visible mineralisation in the supraspinatus. In the majority of cases with bilateral SD, mineralisation was only present in one shoulder.

MRI was performed in 30 dogs (25%), the most commonly found changes in SD were hyperintensity of signal on T1 and STIR sequences of the Supraspinatus Tendon (ST) at its insertion on the greater tubercle. A flattened or oval appearance of the biceps tendon, loss of fluid around the biceps tendon within the bicipital groove at the level of insertion of the supraspinatus, subsequent compartmentalization of fluid distal to supraspinatus insertion, and/or displacement of the biceps tendon from the bicipital groove characterize biceps impingement secondary to ST. On a recent paper published by Spall and others (Vet Surg, 2016), supraspinatus tendon volume was determined using proton density transverse sequences and showed that dogs diagnosed with non-calcified supraspinatus tendinopathy had higher supraspinatus tendon volumes compared to dogs with other orthopedic disorders and healthy dogs.

Ultrasound was performed in 82 dogs (68%) and the most common changes were changes in size, shape and echogenicity. In most cases the supraspinatus appeared enlarged with irregular fiber pattern and mixed echogenicity (hyperechoic foci and hypoechoic areas).

Radiographs of the ipsilateral elbows were obtained in 95% of the cases evaluated by Dr Canapp and showed some degree of elbow disease in 60% of the cases.

Elbow and shoulder arthroscopy was performed in 75% of the cases and showed:

- Increased size of the ST causing capsular bulging (91%)
- 56% had associated biceps disease ( majority impingement-tenosynovitis rather than actual core lesion)
- Subscapularis affected in 90% of cases
- Medial gleno-humeral ligament pathology in 60%
- Elbow medial compartment disease ( of various degrees) 70% of cases

This results supports what is my clinical experience when dealing with SD

1. SD can be present on its own and should be part of the differential diagnosis of dogs with shoulder pain/lameness, particularly athlete dogs
2. Often it can be an incidental finding, the rest of the shoulder and elbow should be evaluated. Questionable clinical importance of ST mineralisation.
3. It can be associated with medial shoulder instability.
4. It can be difficult to differentiate SD and Biceps disease unless you have access to advanced imaging
5. Very often biceps and supraspinatus disease go together.
6. We need something more than radiographs (ultrasound, MRI or CT).



The treatment strategy should be heavily influenced by your clinical findings. My treatment of choice for isolated SD is shockwave therapy. I recommend 3 treatments 3 weeks apart. The animals have to be heavily sedated for this. The settings I use are based on recommendations from the manufacturer. I advise the owners to limit the dog's activity to short walks on a leash after the first treatment until evaluation 3–4 weeks after the final treatment. I am aware there are people combining shock wave therapy and intra-lesional stem cells or platelet-rich plasma and reporting good results as well.

If there is secondary impingement of the biceps tendon, I combine this treatment with one intra-articular injection of depomedrone (40mg in a Labrador-size dog) given after the first shock wave treatment.



Supraspinatus mineralization

### Biceps disease:

Biceps disease has been historically the most common shoulder condition seen in performance dogs. However with the development of new advanced imaging modalities we are starting to realise that more often than not, biceps disease is a secondary finding (secondary to Supraspinatus disease). Although primary biceps disease also exist. In my opinion, the more important aspect of biceps disease management is to ascertain whether we are dealing with a primary or secondary finding.

Although MRI is currently considered the gold standard for shoulder musculotendinous disease evaluation, my experience with shoulder CT has been very positive, and it is currently my first choice when assessing shoulder disease. I often use ultrasound as well. It is possible to differentiate between core lesions (more likely primary disease) and flattened or oval appearance of the biceps tendon, loss of fluid around the biceps tendon within the bicipital groove at the level of insertion of the supraspinatus, subsequent compartmentalization of fluid distal to supraspinatus insertion, and/or displacement of the biceps tendon from the bicipital groove characterize biceps impingement secondary to supraspinatus disease.

Animals are visually lame during ambulation, and this lameness is exacerbated with exercise. Affected animals may guard against flexion and extension of the shoulder joint, which can limit the swing phase of the gait. Pain is often elicited by applying focal digital pressure on the biceps tendon within the intertubercular groove while flexing the dog's shoulder with its elbow held in extension.

Biceps tendinopathy treatment is well established. Conservative treatment (rest, NSAIDs and intra-articular depomedrone) can be used in less severe cases, whereas tenotomy or tenodesis is reserved for cases non responsive to conservative management or more severe cases.

### Infraspinatus disease:

Contracture of the infraspinatus is very uncommon, yet it is one of the most commonly reported contracture in the dog. It is normally a unilateral condition, although it has been reported bilaterally in some cases. The majority of cases that I have seen with infraspinatus contracture were hunting dogs. On acute presentation can be painful, although they normally present as a chronic lameness case, where pain is not clearly present. It is believed to be caused by repetitive trauma, or acute trauma, and it has been suggested for an osteofascial compartment syndrome to develop prior to end stage fibrotic contracture.

Affected dog present with a weight bearing lameness with circumduction of the affected limb and a flip-like action of the paw. When stationary the affected limb is held with the shoulder externally rotated and the elbow in adduction against the thoracic wall. The carpus and distal paw is externally rotated and held in abduction. Tenotomy of the tendon of insertion is the treatment of choice (partial tenectomy is recommended to ensure there is no relapse).



# COMPANION ANIMAL

## ORTHOPAEDICS

### Triceps disease:

Avulsion of the triceps is a rare injury in small animals. It can occur after direct or indirect trauma and usually occurs at the osseotendinous junction. Factors such as the use of corticosteroids infiltrations can increase the risk of this injury following minor trauma. It is not unusual for dystrophic mineralisation to be present in the triceps tendon in cases that are avulsed suggesting perhaps a chronic tendinopathy. Reinforcement by imbrication of the tendon has been suggested for cats that have dystrophic mineralisation, triceps tendinopathy but no avulsion.

A high index of suspicion should be present when physical and radiographic examination shows a palpable gap proximal to the olecranon, presence of an avulsed bone fragment, or dystrophic mineralisation of the tendon. Ultrasound remains a very useful imaging modality, particularly in the absence of radiographic changes. Primary repair of the tendon, preferably using a modified three loop pulley suture pattern or a triple locking loop suture followed by postoperative immobilization normally results in an excellent outcome.