

MSK US of the canine shoulder in athlete dogs

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Objectives

- Ultrasound has become an essential tool in the diagnosis of shoulder diseases
- A systematic approach is fundamental to increase the accuracy of the examination



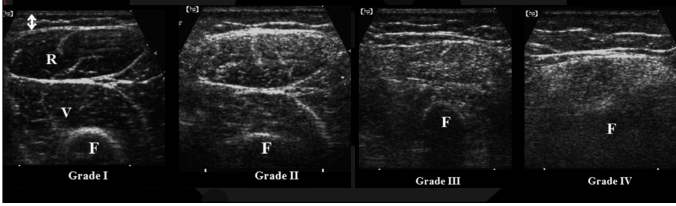


Adapted from
"Canine Lameness", 2020

Article

Ultrasound Echogenicity as an Indicator of Muscle Fatigue during Functional Electrical Stimulation

Qiang Zhang ^{1,2}, Ashwin Iyer ^{1,2}, Krysten Lambeth ^{1,2}, Kang Kim ^{3,4,5,6} and Nitin Sharma ^{1,2,*}

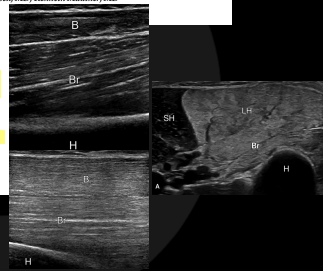


Ultrasound Findings of Delayed-Onset Muscle Soreness

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Victor Longo, DO, Jon A. Jacobson, MD, David P. Fessell, MD, Kenneth Mautner, MD

There are many causes of muscle pain, which include muscle strain, contusions, and tears; another cause of muscle pain is delayed-onset muscle soreness (DOMS), which is considered a type 1 muscle strain.^{1,2} Delayed-onset muscle soreness is the development of pain, soreness, or stiffness of the activated musculature after intense physical activity due to muscle microtrauma, resulting in inflammation and edema.³ The onset of symptoms is approximately 24 hours after the activity, peaking at 48 to 72 hours, and resolving within 5 to 7 days after the inciting activity.^{4,5} Delayed-onset muscle soreness can predispose to increased risk of further injury,⁶ hence the importance of accurate diagnosis.



Exploring the associations between skeletal muscle echogenicity and physical function in aging adults: A systematic review with meta-analyses

Dustin J. Oranchuk ^{1,2}, Stephan G. Bodkin ^{1,2}, Katie L. Boncells ¹, Michael O. Harris-Love ³

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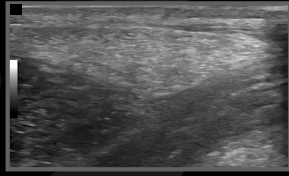
Assessment and quantification of skeletal muscle morphology and function within the aging population is vital for diagnosis, treatment, and injury/disease prevention. Sarcopenia, defined as the reduction in muscle mass and strength,¹ is a growing concern, with up to 25% of individuals over 70 years old receiving the diagnosis.² Early identification of the decline in skeletal muscle morphology and function can lead to appropriate therapies, such as exercise or nutritional interventions, which may improve patient outcomes.³ To date, screening measures to identify patients at risk for sarcopenia-related disability include patient-reported outcomes (such as the Strength, assistance with walking, rising from a chair, climbing stairs, and falls (SARC-F) questionnaire), objective

muscle quality, and physical performance. We hypothesized that muscle echogenicity would be a moderate predictor of physical performance. Furthermore, we anticipated that the echogenicity of agonist muscle groups would correlate better with physical performance when compared to less obviously relevant muscle groups.

The results of this systematic review with meta-analyses demonstrate a consistent yet modest association between skeletal muscle echogenicity and physical function in aging adults. Additionally, sub-analyses show minimal between-muscle differences in correlations between echogenicity and physical function, suggesting that ultrasound-estimated muscle quality and composition are systemic. However, including multiple muscles tends

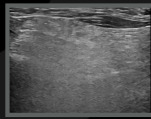
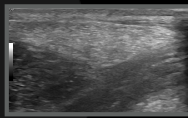
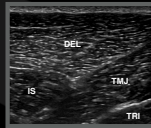
Muscle echogenicity

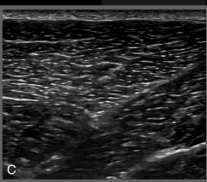
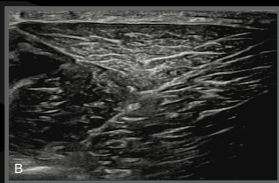
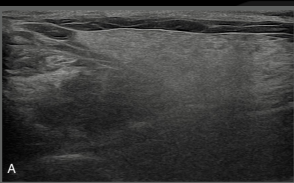
- One of the most common findings in MSK ultrasound
- Same change, different meaning
- Fundamental to differentiate between conditions



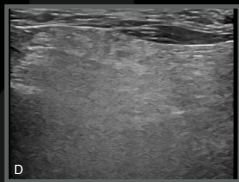
Increased echogenicity of Deltoid muscle:

- If there is no scattering artefact, consider atrophy
- If a scattering artefact is present: inflammation is there - check for pain





1. Normal muscle
2. Atrophy
3. Muscle soreness
4. Inflammation (scattering artifact)
5. ~~Fibrosis~~

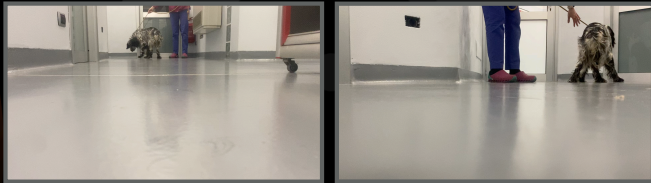


Abbie, English Setter, FI, 7 years

- Suspected trauma three months ago
- Progressive left front lameness over the last three months
- Gait is unremarkable at rest but becomes abnormal after exercise
- Not responding to NSAID

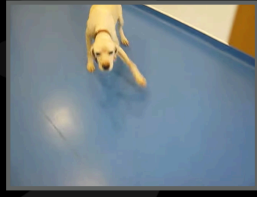


Abbie, English Setter, FI, 7 years

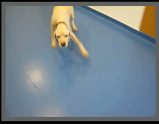




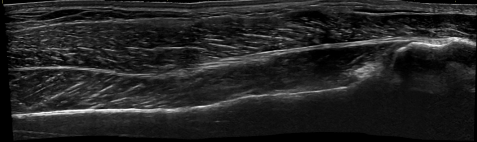
Abbie and Rena



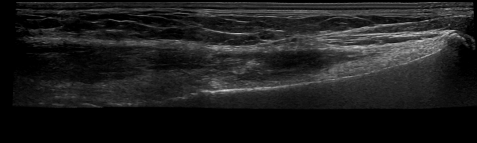
Rena, FS, 5 years



Right shoulder



Left shoulder



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RESULTS BY YEAR



PUBLICATION DATE

- 1 year
- 5 years
- 10 years
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TEXT AVAILABILITY

- Abstract
- Free full text
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- 11 results
- Infrapinatus muscle contracture.**
1
Harven D.
Case Rep. 2020 Aug;4(8):751-2.
PMID: 32722373 **Free PMC article.** No abstract available.
 - Fibrotic Contracture of the Infrapinatus Muscle with or without Contracture of the Teres Minor Muscle: A Retrospective Study in Eight Dogs.**
2
Kiywai A, Papadimitou S, Pantele K, Sideri A, Pappa E, Pissinou NI.
Animals (Basel). 2024 Sep 6;14(9):2648. doi: 10.3390/ani14092648.
PMID: 39272374 **Free PMC article.** Review.
 - The Shoulder Joint and Common Abnormalities.**
3
Stokes R, Dycus D.
Vet Clin North Am Small Anim Pract. 2021 Mar;51(3):323-341. doi: 10.1016/j.cvsm.2020.11.002. Epub 2021 Apr 11.
PMID: 33448362 Review.
- This article provides an updated review of common canine shoulder pathologies, including osteoarthritis, bicipital and supraspinatus tendinopathies, **infrapinatus contracture**, medial shoulder syndrome, and luxation...

Review

Fibrotic Contracture of the Infraspinatus Muscle with or without Contracture of the Teres Minor Muscle: A Retrospective Study in Eight Dogs

Androniki Krystalli ^{1,*}, Sofianos Papaefthymiou ^{1,†}, Kornilia Panteli ¹, Alkaterini Sideri ^{2,†}, Elena I. Pappa ^{2,†} and Nikitas N. Prassinos ¹

Acute clinical signs include local pain, lameness, and swelling, which subside over one to four weeks after which the dogs progressively develop a persistent deformity, due to contracture [10,15]. In the standing position, they present elbow adduction and external rotation of the distal thoracic limb, and when walking, they show a characteristic circumducted gait abnormality of the distal limb with a carpal flip [6,11,17–19]. Atrophy of the spinatus muscle group and reduction in the range of shoulder flexion are frequently evident during orthopedic examination [8,13,20–22]. The causes of muscle contracture include repetitive strains and ischemia, infection, eosinophilic myositis, neoplasia, and myositis ossificans [14,15,23]. The most likely cause of FCIM appears to be trauma during exercise, leading to compartment syndrome, as hemorrhage, degeneration, atrophy, and fibrosis are the histological changes shown in infraspinatus muscle biopsies [8,20].

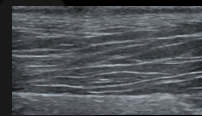
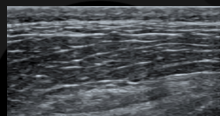
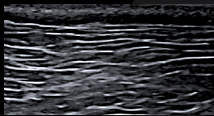
Radiographs of the shoulder joint appear normal, although, in some cases, they could show a narrowing of the scapulohumeral joint space [24], while ultrasonographic findings are a crucial diagnostic tool [8]. Biochemical blood analysis may show an elevation in CK [25]. The treatment consists of the tendon's tenotomy at its insertion and the breakdown of adhesions [8,19]. The prognosis is good, as the animals return to their vigorous life in one or two months [10,26].

Ultrasonographic correlation with histology

Fibrillar muscle pattern

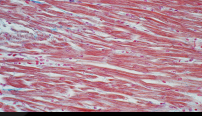
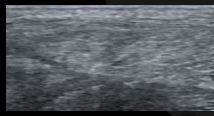
Moderate muscle atrophy

Severe muscle atrophy



Early phase muscle fibrosis

Late phase muscle fibrosis



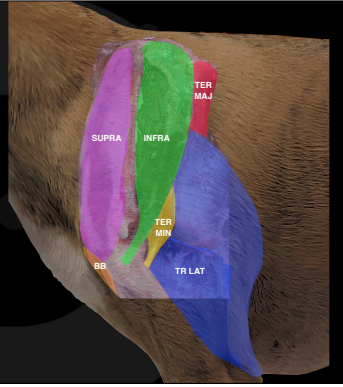
Abbie, English Setter, FI, 7 years

- Left infraspinatus muscle contracture
- Partially ruptured tendon
- Surgery?



Gross anatomy of the shoulder

- Deltoidaeus
- Infraspinatus
- Teres Major
- Triceps
- Supraspinatus
- BB
- Teres Minor



Gross anatomy of the shoulder

- Deltoidaeus
- Infraspinatus
- Teres Major
- Triceps
- Supraspinatus
- Biceps Brachii
- Subscapularis



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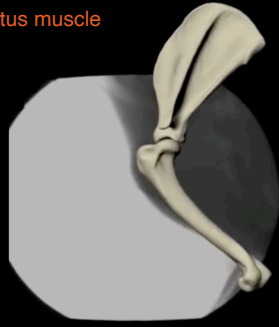
The supraspinatus muscle

- Carries the weight of the head
- Fibro-cartilaginous aponeurosis
- Low pain receptors density



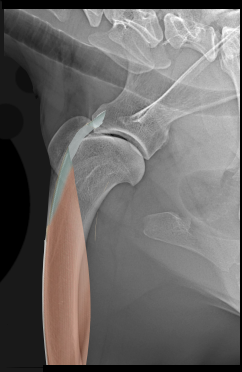
The supraspinatus muscle

- Stop the humerus from displacing cranially
- Carry the weight of the head



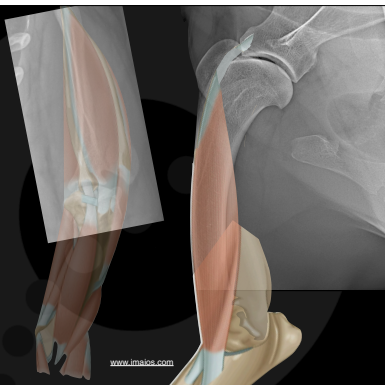
The biceps muscle

- A weak medial stabiliser of the shoulder
- Connect shoulder and elbow



The biceps muscle

- Connect shoulder and elbow
- Flex the elbow and extend the shoulder



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Scar, Border Collie, MI, 3 years

Two months later

- Doing great but not back to sport
- On physical examination good extension of the right shoulder
- Increased triceps tone



Star, MI, 3 years
Right shoulder
Two months later

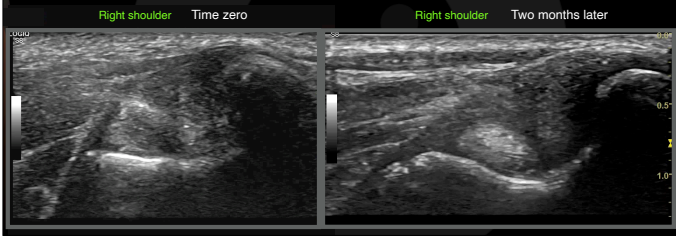
Supraspinatus tendon - BB longitudinal scan

Star, MI, 3 years
Right shoulder
Two months later

Supraspinatus tendon - BB transverse scan

Scar, MI, 3 years

Supraspinatus-biceps tendon interface, transverse



Key points to diagnose chronic supraspinatus tendinopathy

- Check the supraspinatus and BB sliding on both views (long and transverse)
- Check the joint capsule
- Check the triceps tone
- Follow up in two months



Scar, Border Collie, MI, 3 years

Two months later

Ultrasonographic diagnoses:

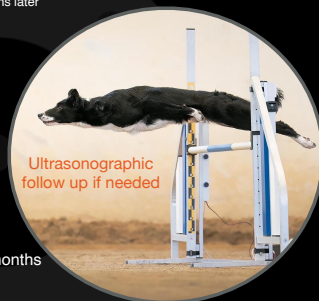
Improved second degree supraspinatus tendinopathy

No signs of impingement syndrome now

Conclusions

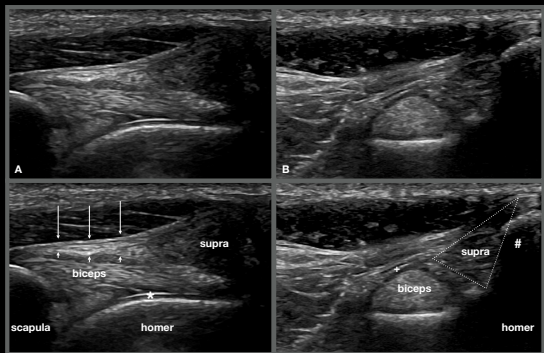
He went back to sport - He is winning

Recheck with the physiotherapist every three months

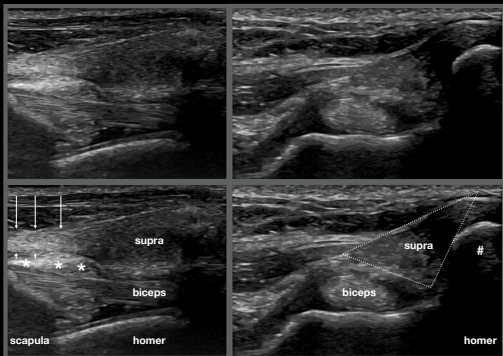


Ultrasonographic follow up if needed

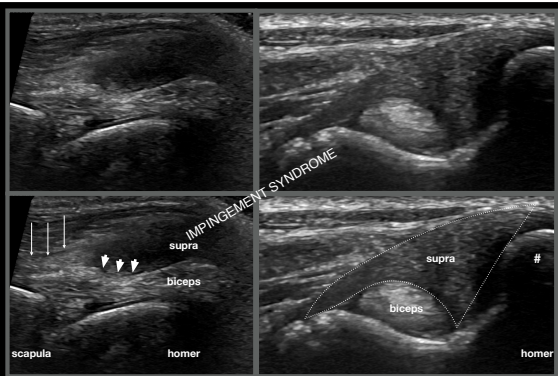
Unremarkable Supraspinatus



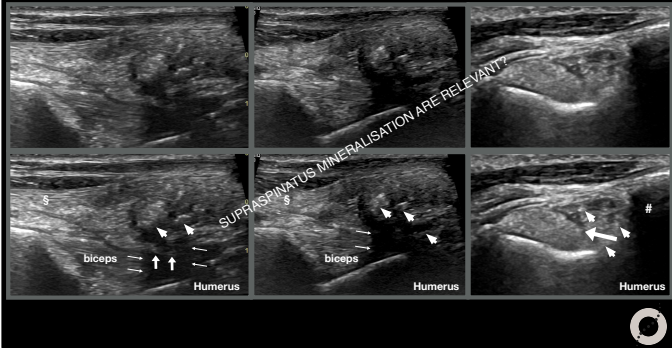
First degree of tendinopathy



Second degree of tendinopathy



What the meaning of supraspinatus mineralization?



Conclusions

- A systematic approach helps to become confident in MSK ultrasound
- A multidisciplinary team is needed



Thank you



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