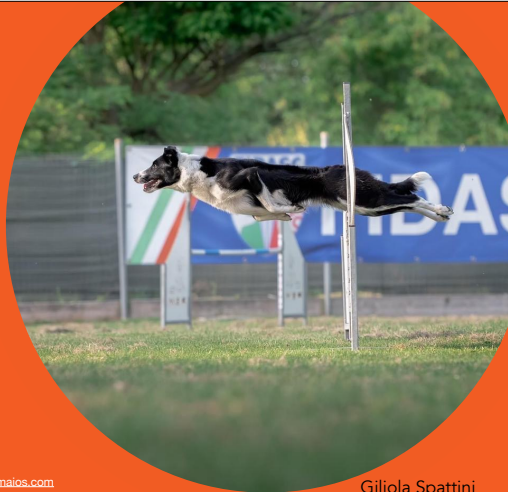


Ultrasound of the Infraspinatus and Triceps muscles



Thank to www.imaos.com



Giliola Spattini
DVM, PhD, DECVDI

Objectives

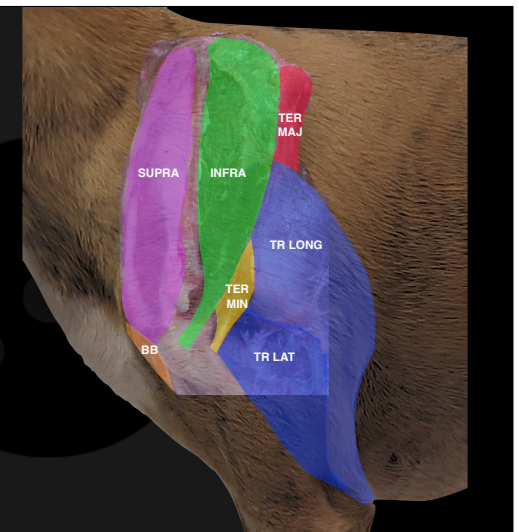
- Ultrasound has become an essential tool in the diagnosis of shoulder diseases
- A systematic approach is fundamental to increase the accuracy of the examination



Pain in
shoulder
region

Adapted from
"Canine Lameness", 2020

Ultrasonographic technique for the shoulder



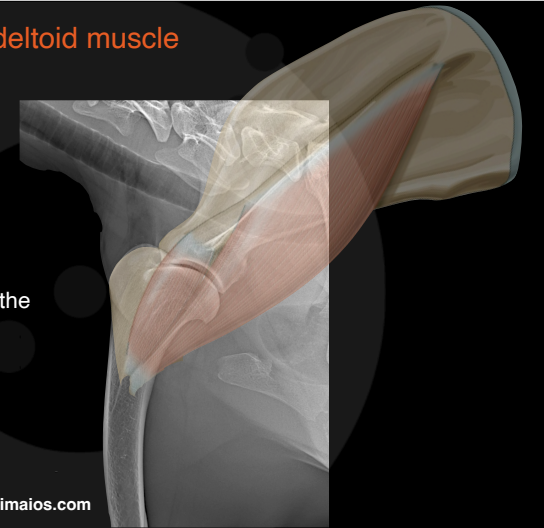
Gross anatomy of the shoulder

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

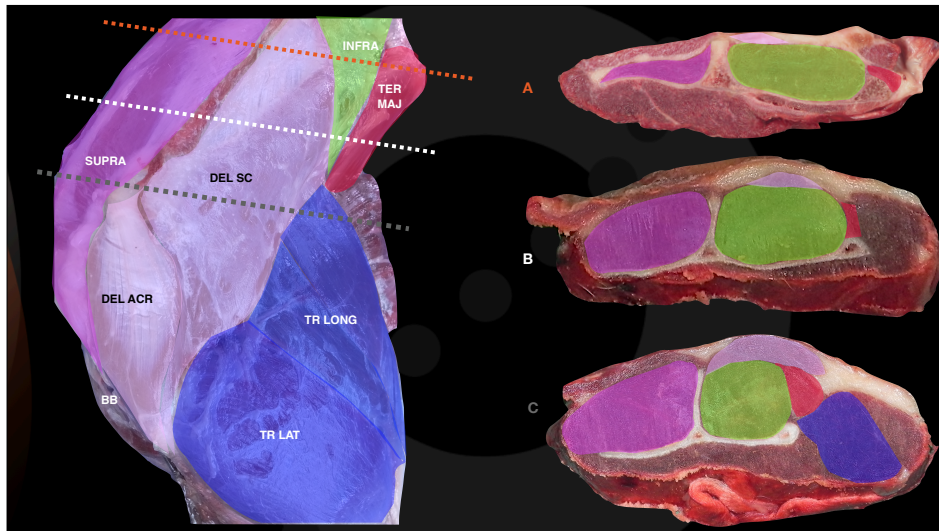


The deltoid muscle

- Anti-gravity muscle
- Stabilises the shoulder when the foot is down (stance phase)



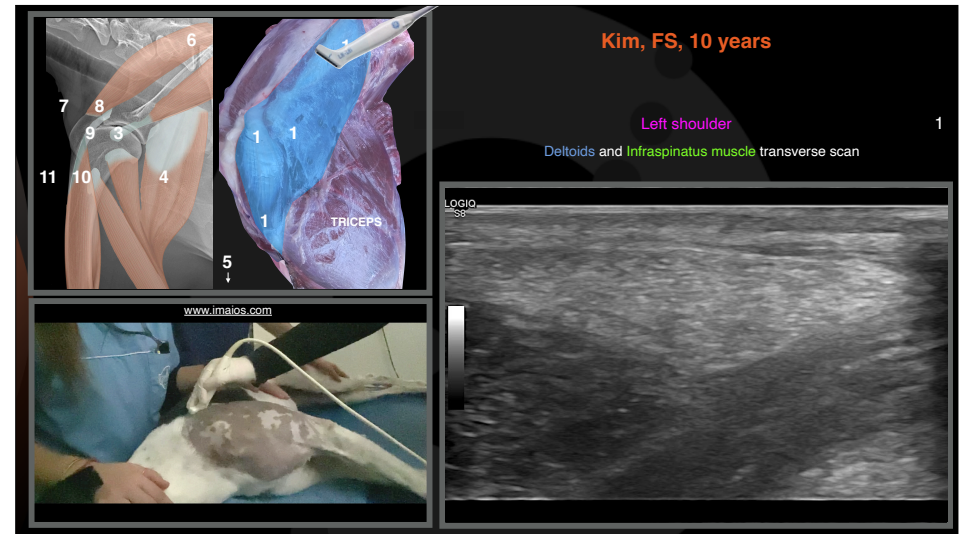
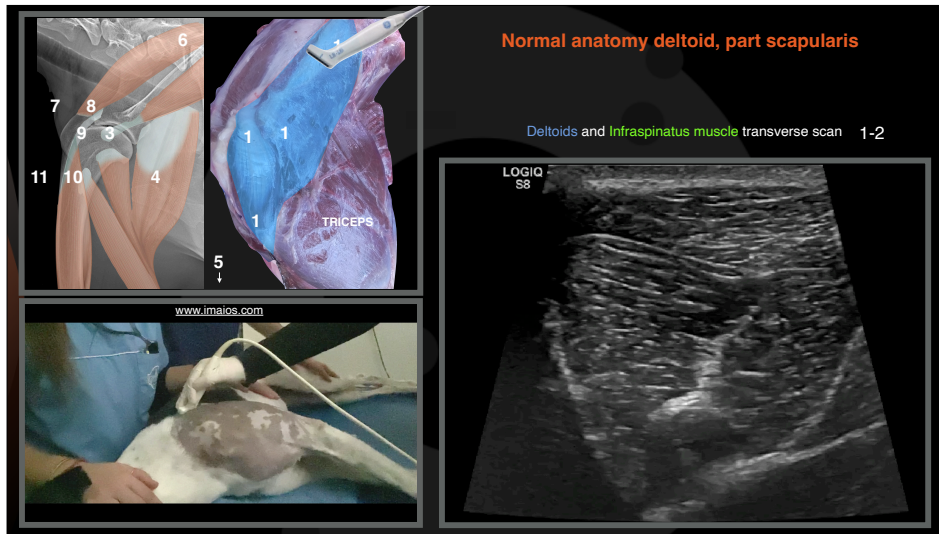
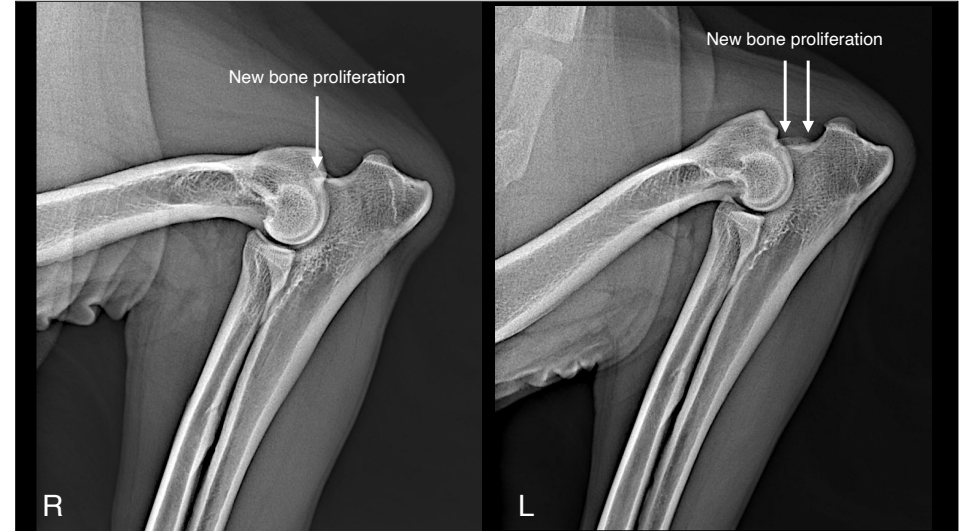
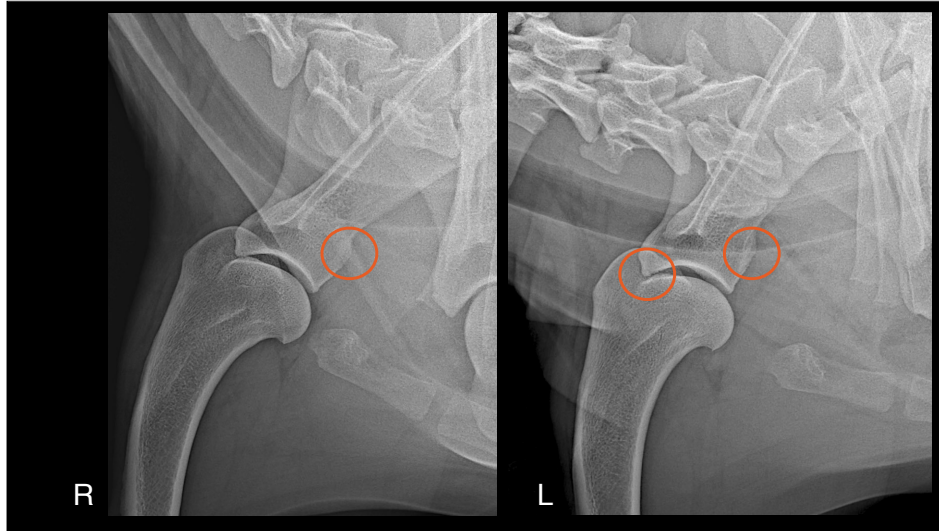
www.imaio.com

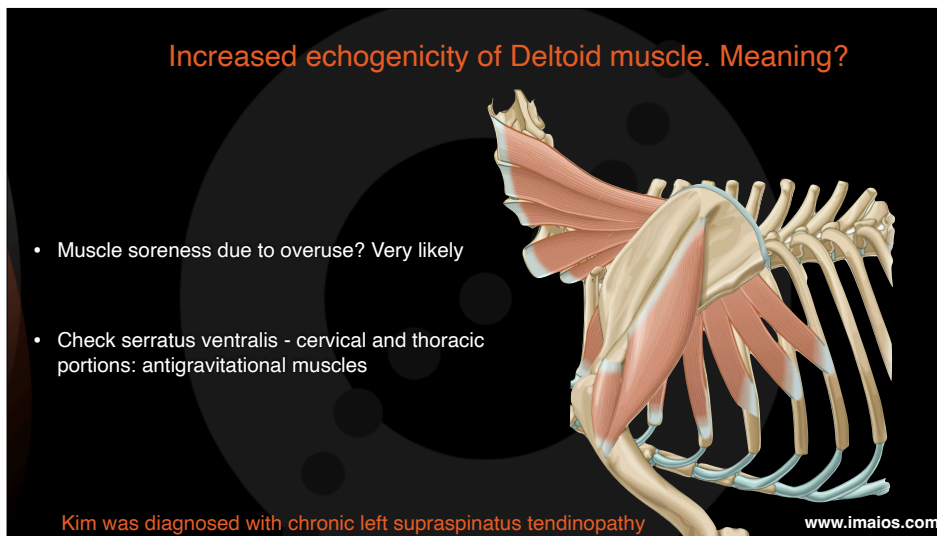
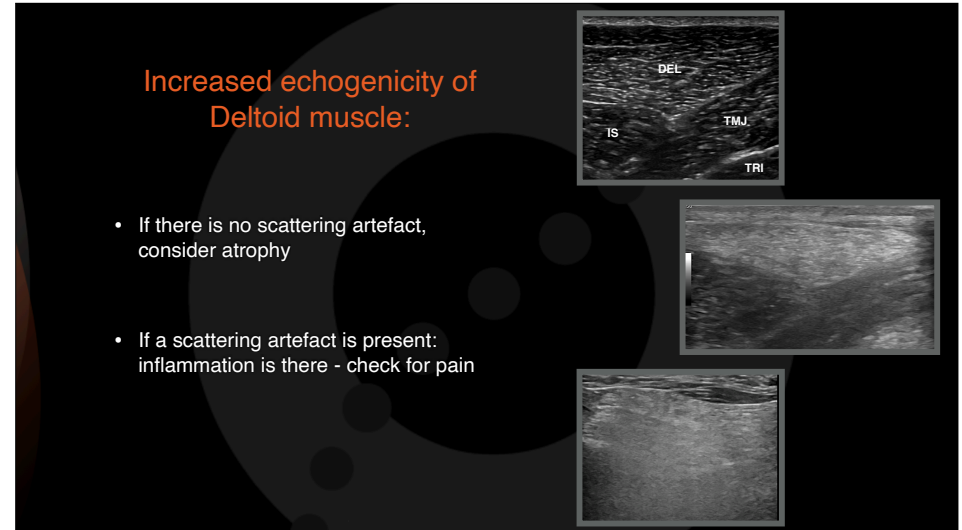
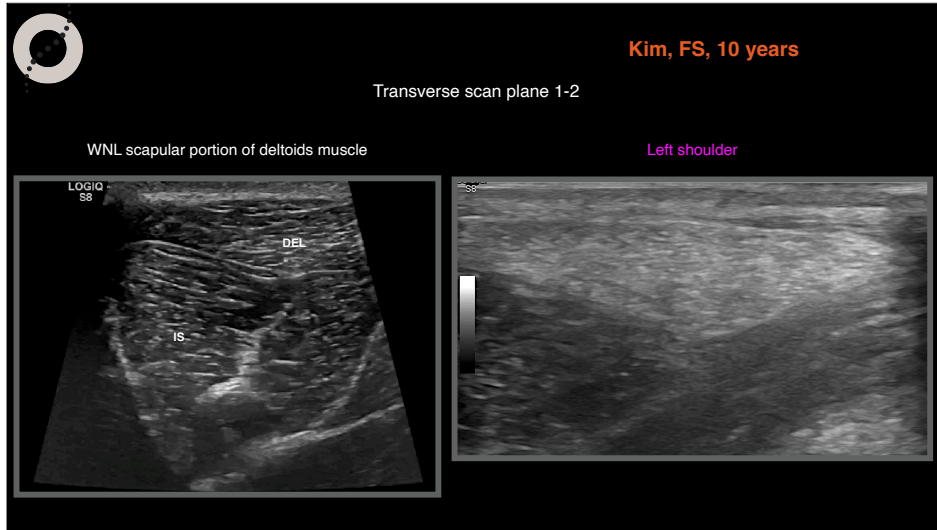


Kim, Golden, FS, 10 years

- For the last 3 months, lame on left front limb in the morning
- Pain in left shoulder and right elbow

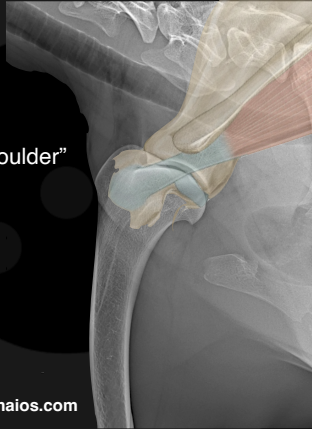






The infraspinatus muscle

- "Lateral collateral ligament of the shoulder"
- Best tendon to start to scan



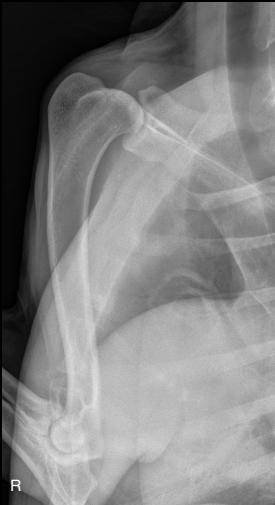
www.imaio.com

Rena, Mongrel, FS, 5 years

- Progressive left front lameness from the last three months
- Abnormal gait, worsening
- Not responding to NSAID

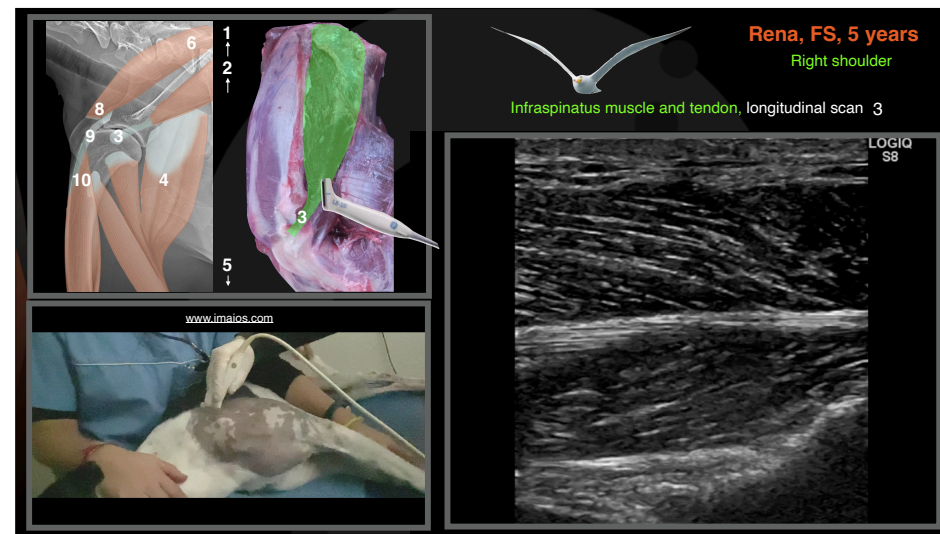
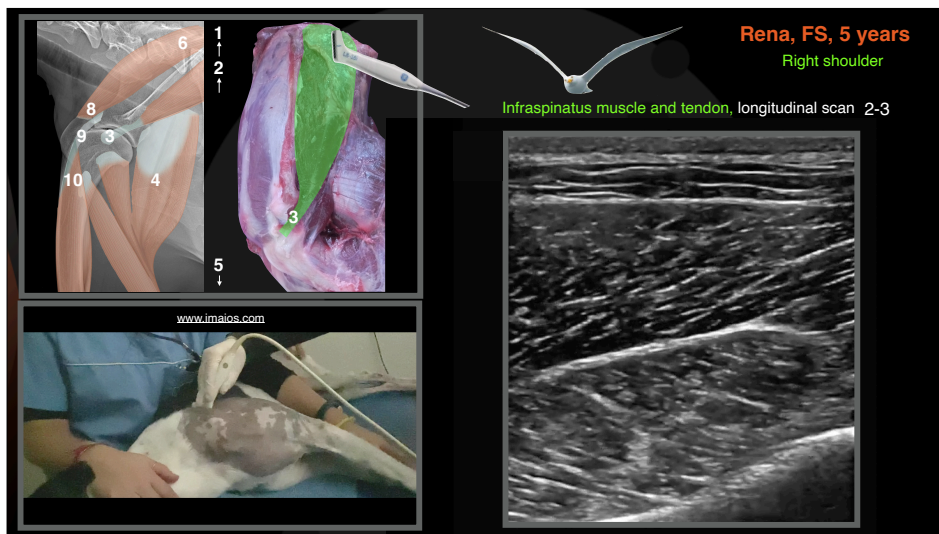
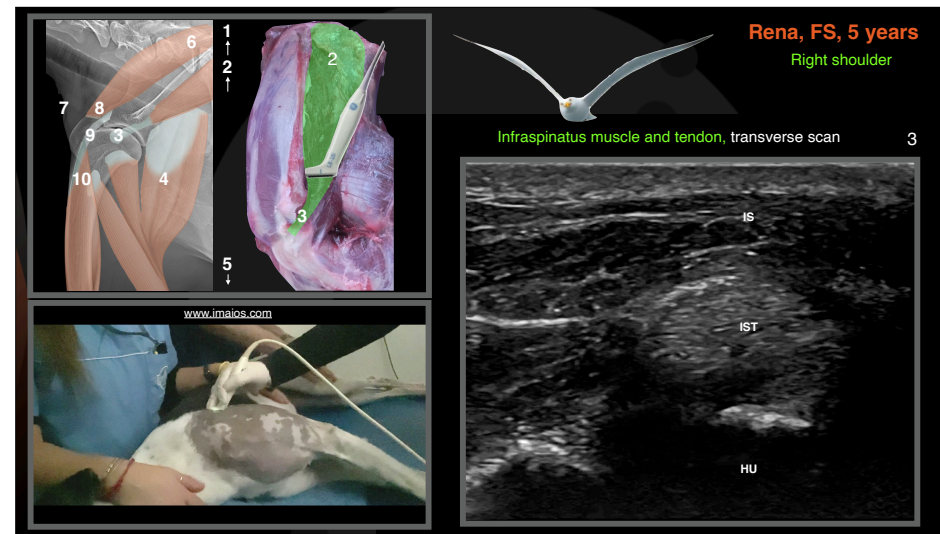
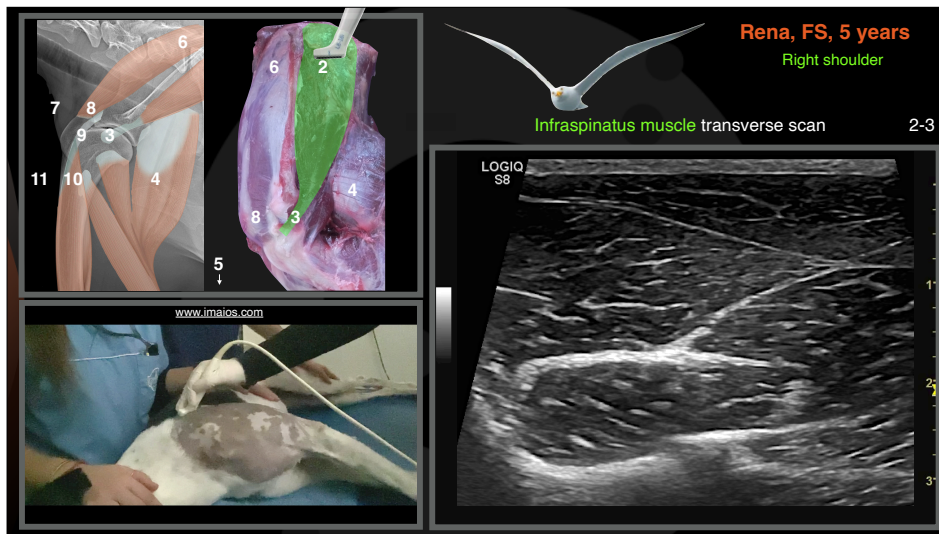


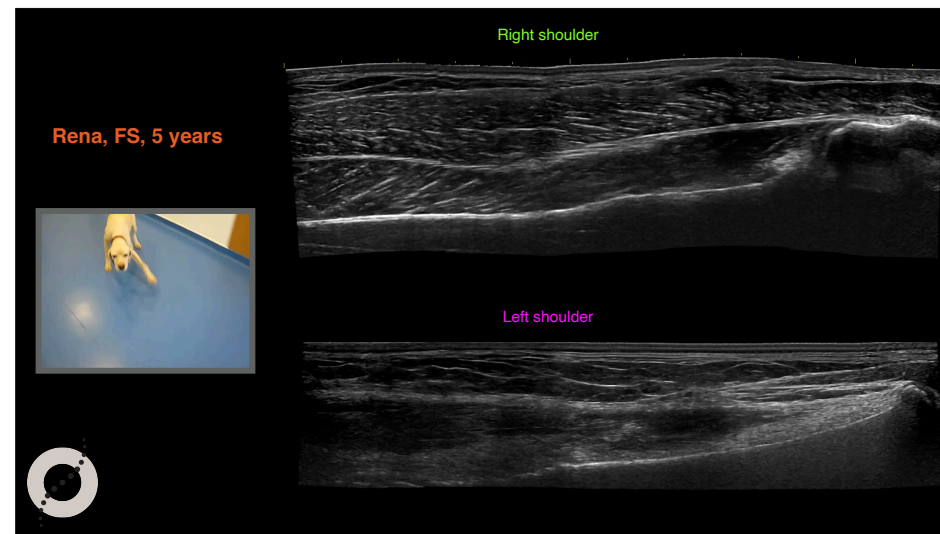
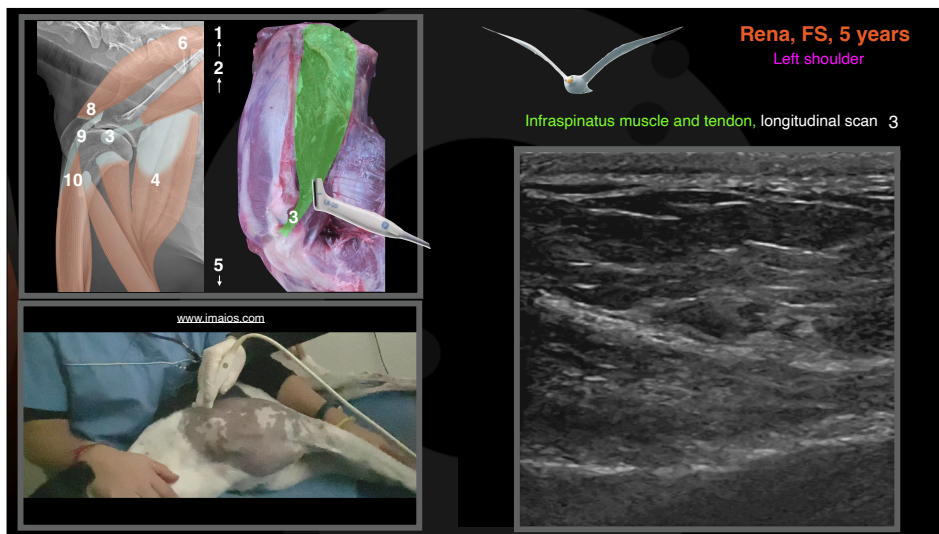
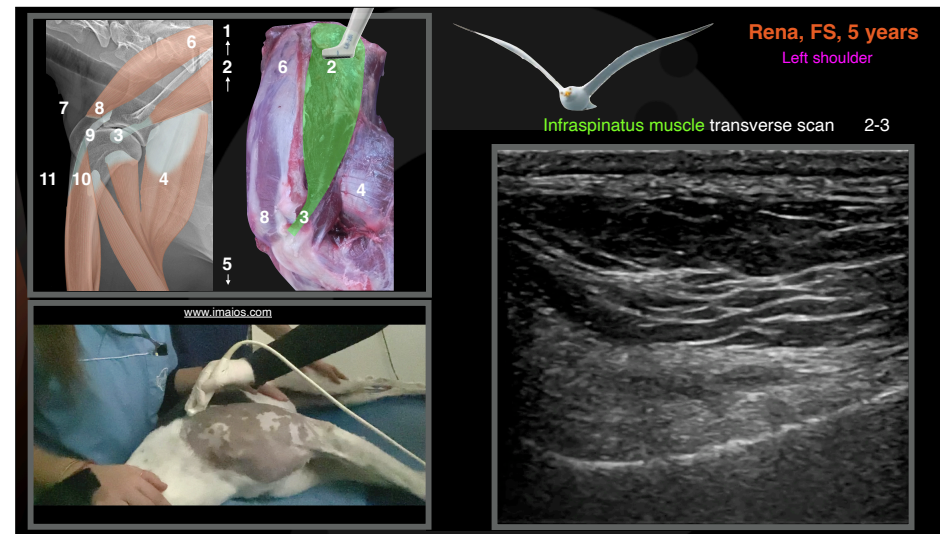
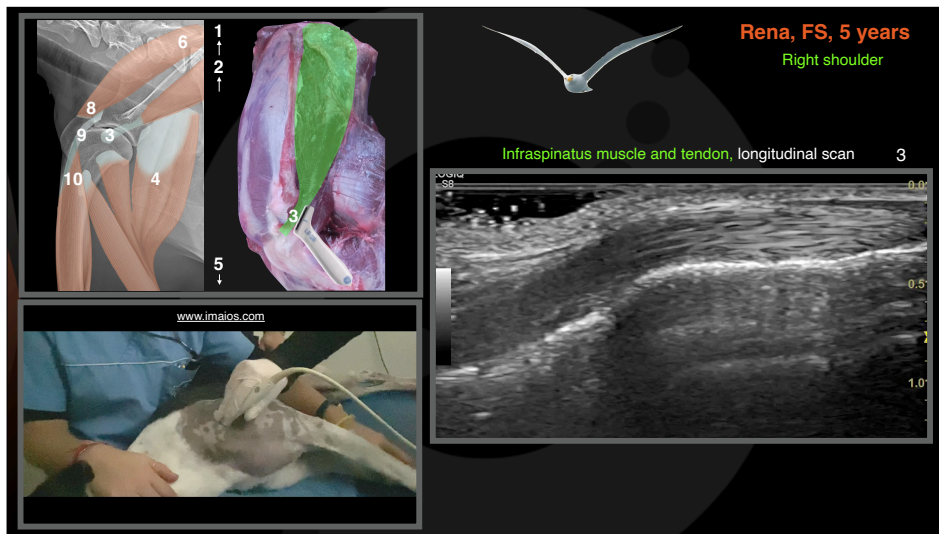
Rena, FS, 5 years

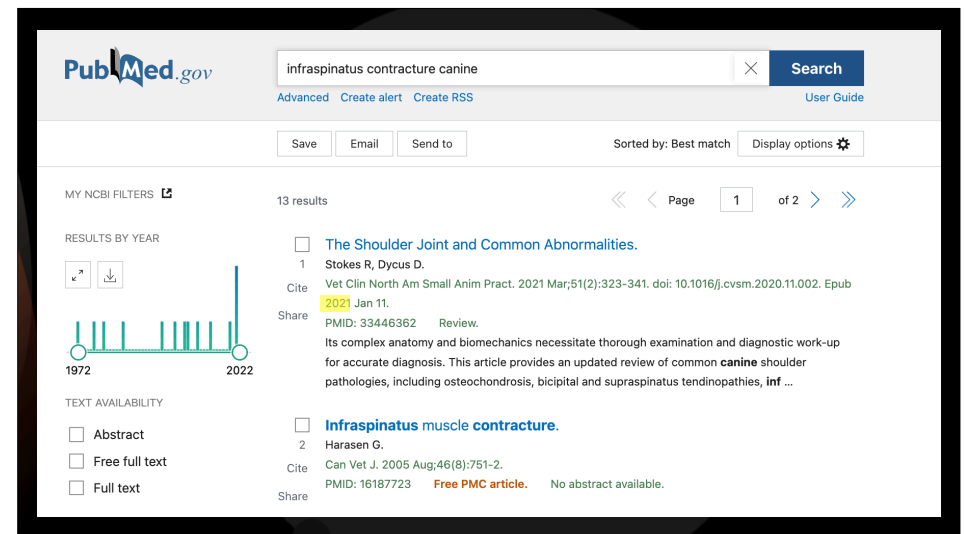
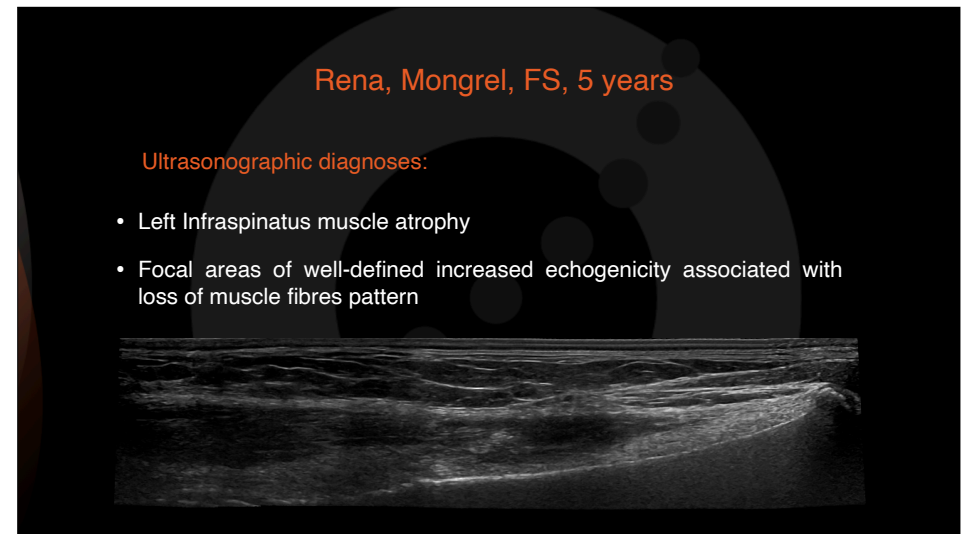
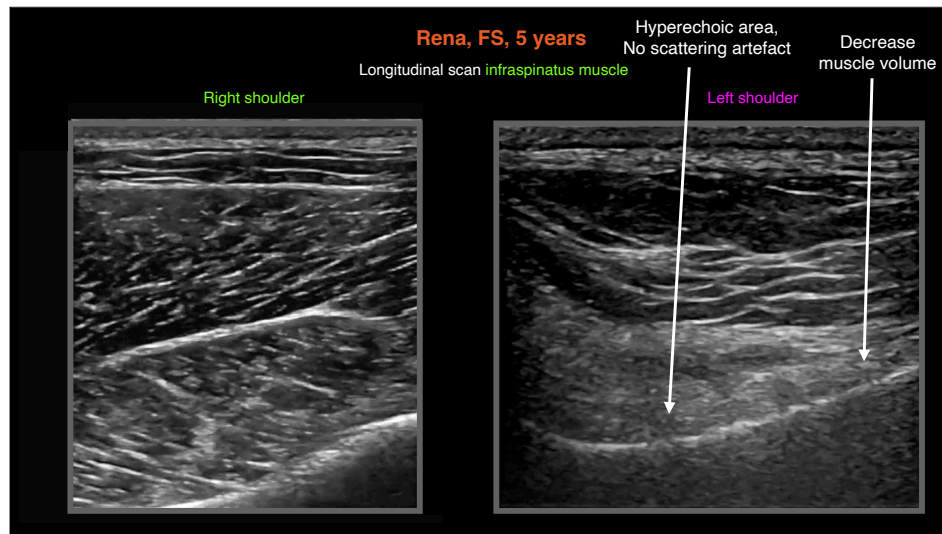


Rena, FS, 5 years









The Shoulder Joint and Common Abnormalities



Rebecca Stokes, DVM^a, David Dycus, DVM, MS, CCRP^{b,*}

Vet Clin Small Anim 51 (2021) 323–341

KEYWORDS

- Medial shoulder syndrome • Supraspinatus tendinopathy • Bicipital tendinopathy
- Arthroscopy • Osteochondrosis • Osteochondritis dissecans
- **Infraspinatus contracture** • Shoulder luxation

KEY POINTS

- The shoulder is a complex joint composed mostly of static and dynamic capsuloligamentous support structures.
- Thorough orthopedic and neurologic examination, radiographs, advanced imaging techniques (musculoskeletal ultrasound, computed tomography, and magnetic resonance imaging), and/or arthroscopy are used to obtain accurate diagnosis.
- Osteochondrosis/osteochondritis dissecans is an important developmental disease commonly affecting the caudal humeral head.
- Canine bicipital and supraspinatus tendinopathies show similarities to humans; however, accurate diagnosis and clinical significance are difficult to determine.
- Medial shoulder syndrome is one of the most common shoulder pathologies occurring in greater frequency than luxation.

CT findings in a dog with subacute myopathy and later fibrotic contracture of the infraspinatus muscle

Marthe Aamodt Mikkelsen | Nina Ottesen *Vet Radiol Ultrasound*. 2019;1–5.

Department of Companion Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Science, Oslo, Norway

Correspondence

Nina Ottesen, Department of Companion Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, Campus Adamstuen, Post box 8146 Dep, 0033 Oslo, Norway.
Email: nina.ottesen@nmbu.no

Abstract

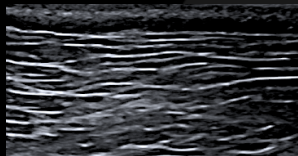
A 5-year-old Norwegian elkhound was referred due to an acute onset of lameness and persistent shoulder pain over a period of 3 weeks. Computed tomography demonstrated an enlarged, hypoattenuating right infraspinatus muscle with peripheral contrast enhancement and a nonenhancing center, without concurrent lesions in superficial structures or bones. The right infraspinatus muscle showed progressive atrophy on consecutive CT studies. The dog developed clinical symptoms compatible with fibrotic infraspinatus contracture 2 months after the initial presentation, and was treated with infraspinatus tenotomy. Histopathological diagnoses based on intraoperative biopsy samples were fibrotic muscle atrophy and muscle hypertrophy with regeneration.

KEYWORDS

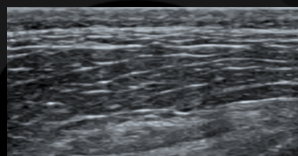
canine, compartment syndrome, infraspinatus necrosis, myopathy

Ultrasonographic correlation with histology

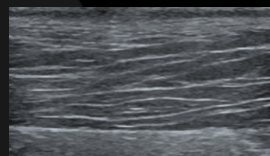
Fibrillar muscle pattern



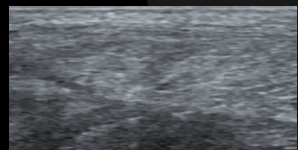
Moderate muscle atrophy



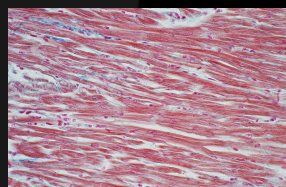
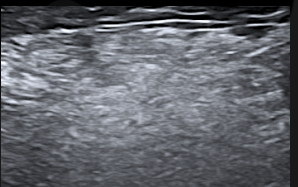
Severe muscle atrophy



Early phase muscle fibrosis

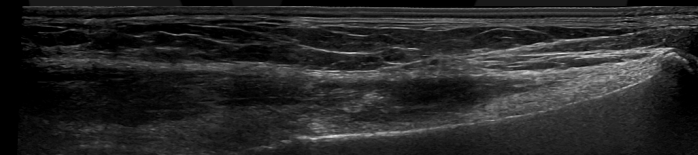


Late phase muscle fibrosis



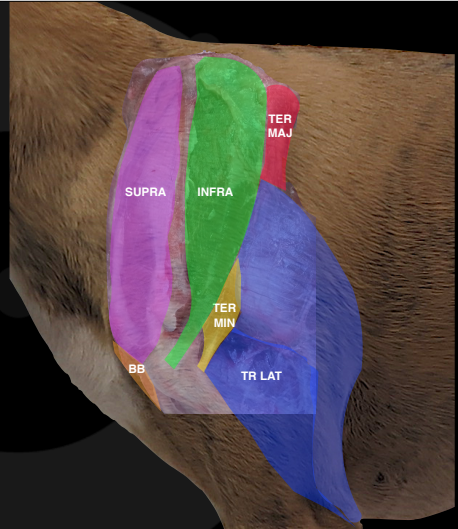
Key points to diagnose infraspinatus contracture

- Typical gait
- Hyperechoic band
- No scattering artefact
- Severe muscle atrophy



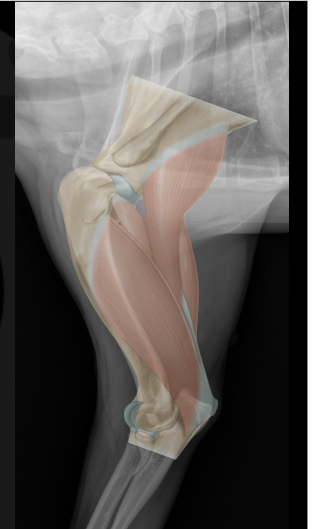
Gross anatomy of the shoulder

- Deltoideus
- **Infraspinatus**
- Teres Major
- Triceps
- Supraspinatus
- BB
- Teres Minor



The triceps muscle

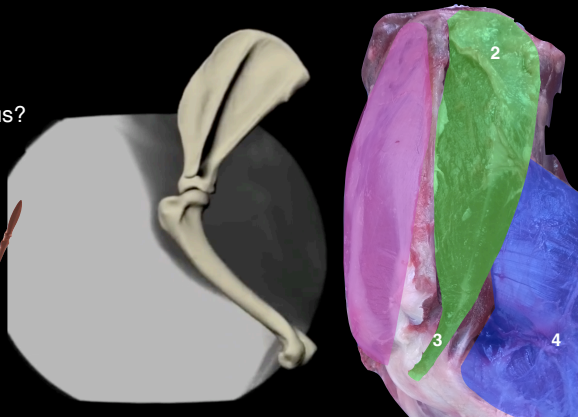
- The great stabiliser of the shoulder
- Anti-rotational
- Antagonist of the supraspinatus



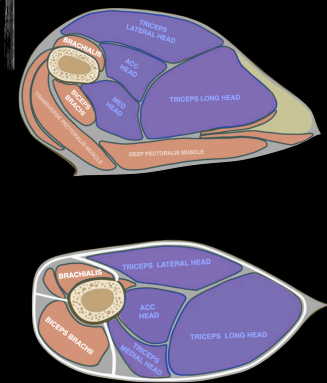
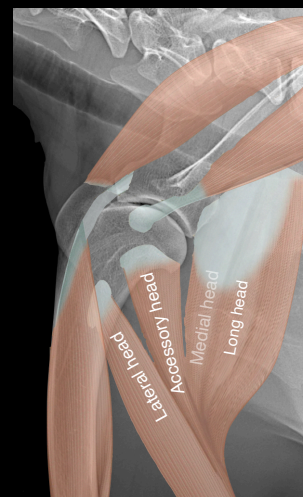
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Why we include the triceps in a shoulder ultrasound?

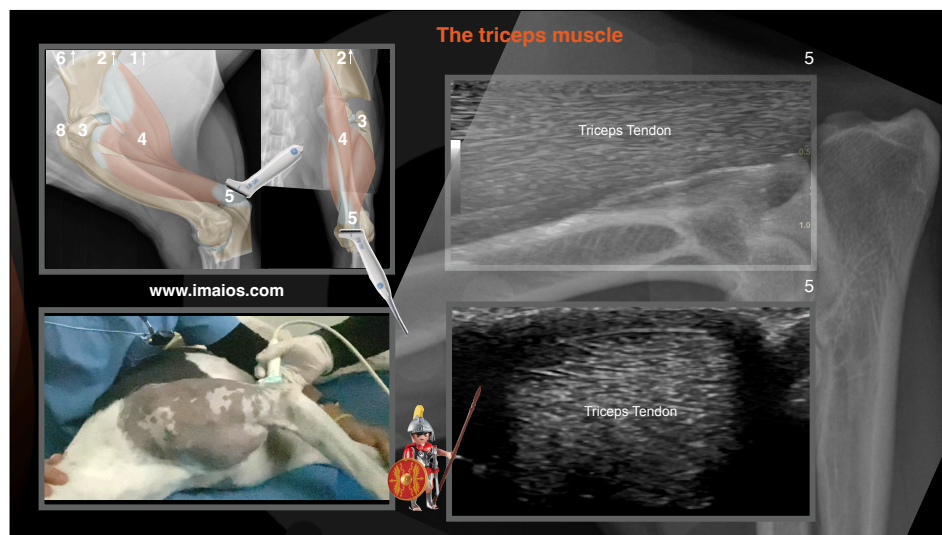
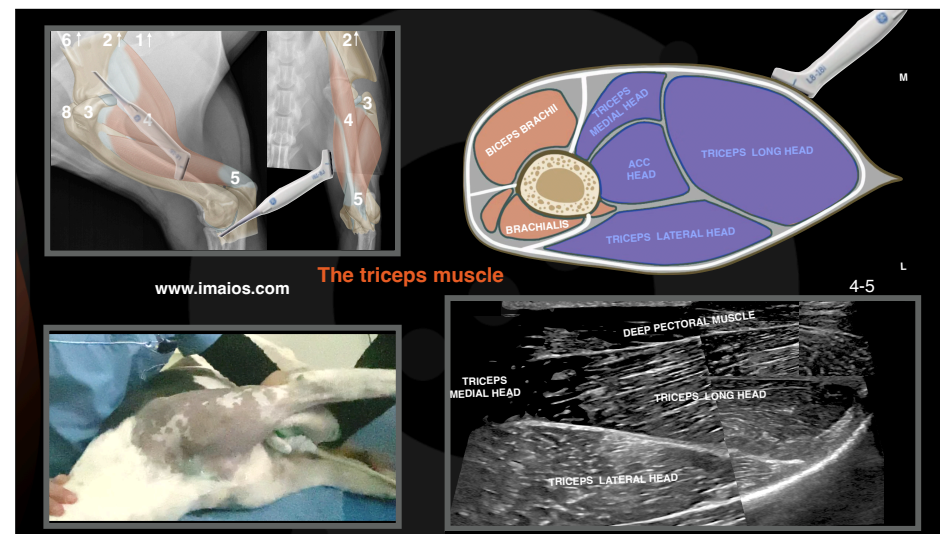
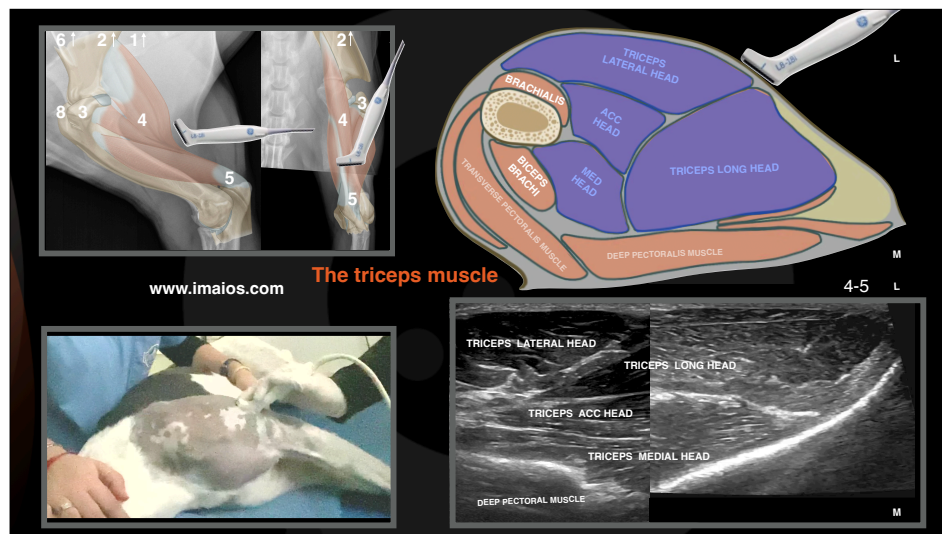
- How can we decrease the pressure on the supraspinatus?
- Improving the triceps muscle volume and function



The triceps muscle



www.imaio.com



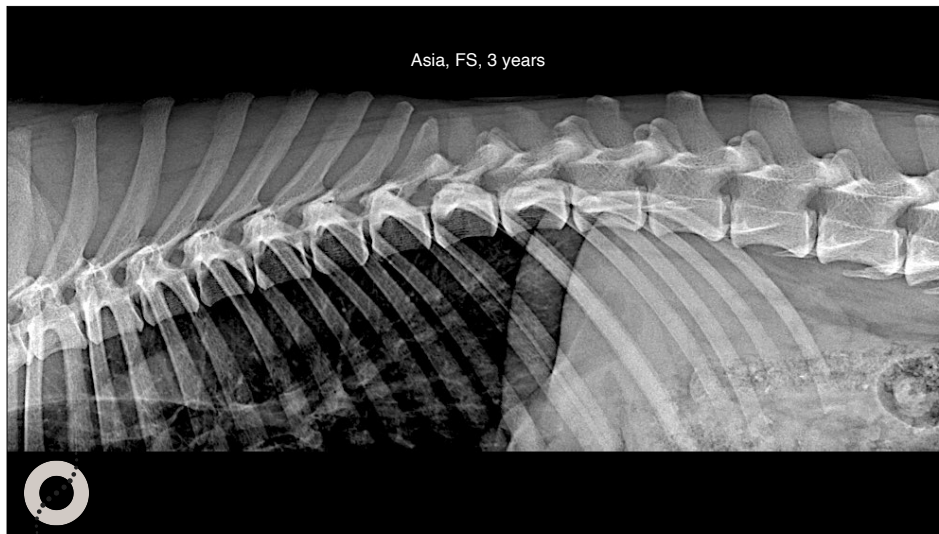
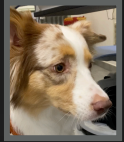
Asia, Australian Shepherd, FS, 3 years

Two weeks later

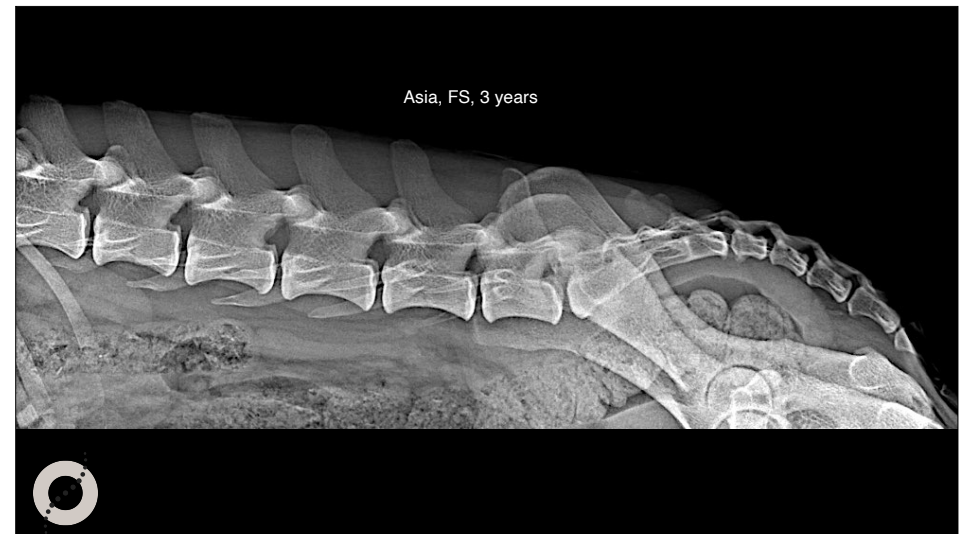
- Minimal reduction of the right hindlimb proprioception
- Second-degree lameness of right front limb persistent ten days after the trauma
- Pain in the area of the right triceps muscle



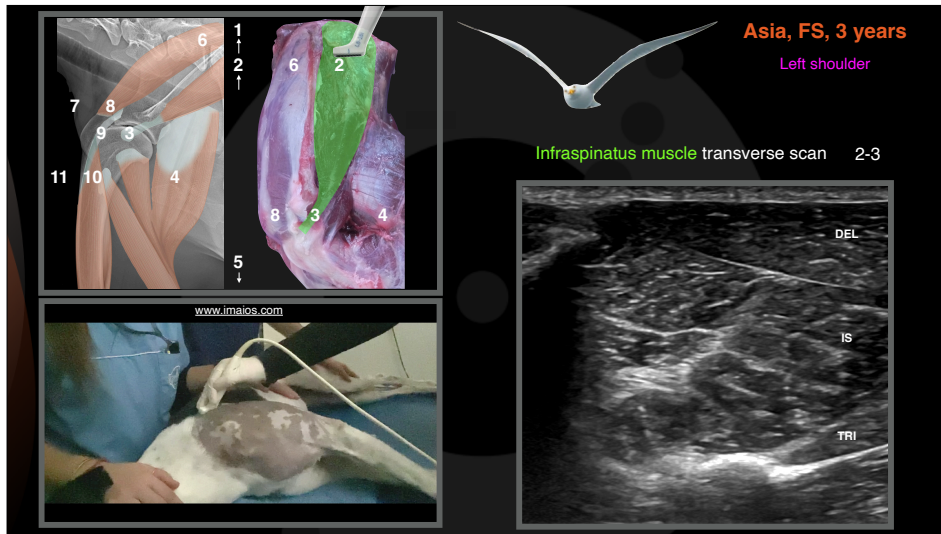
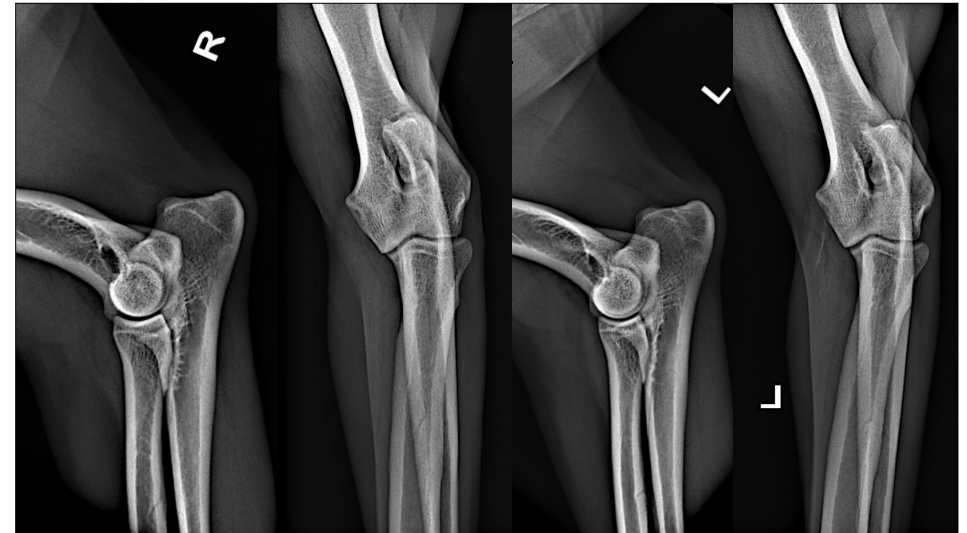
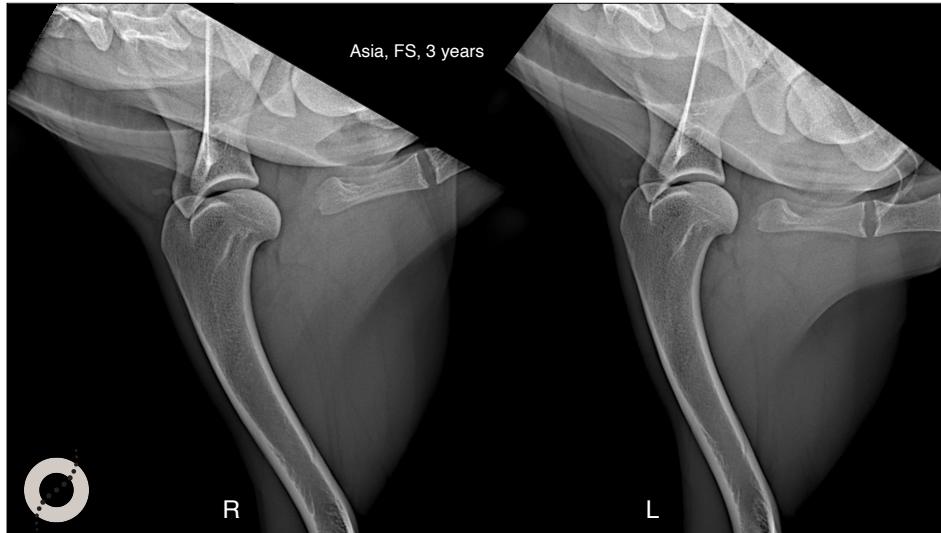
Asia, FS, 3 years

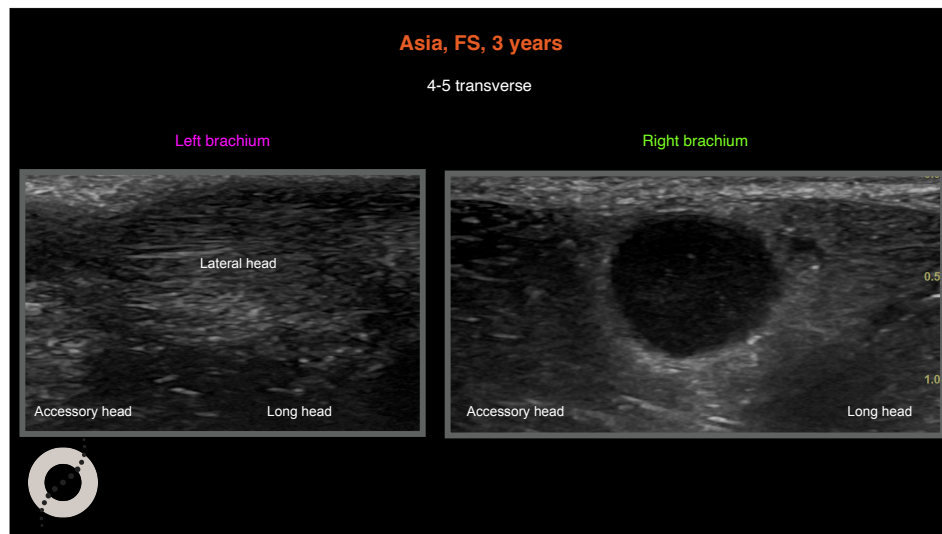
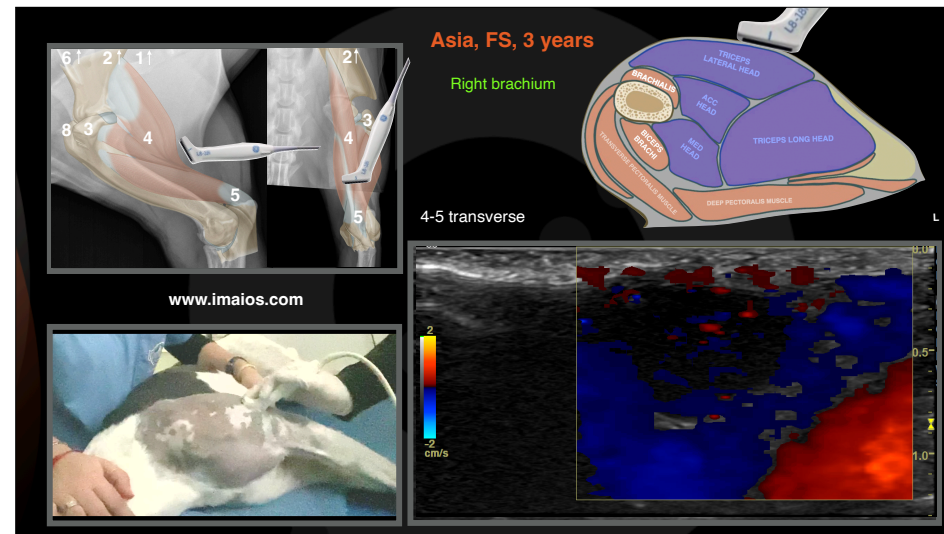
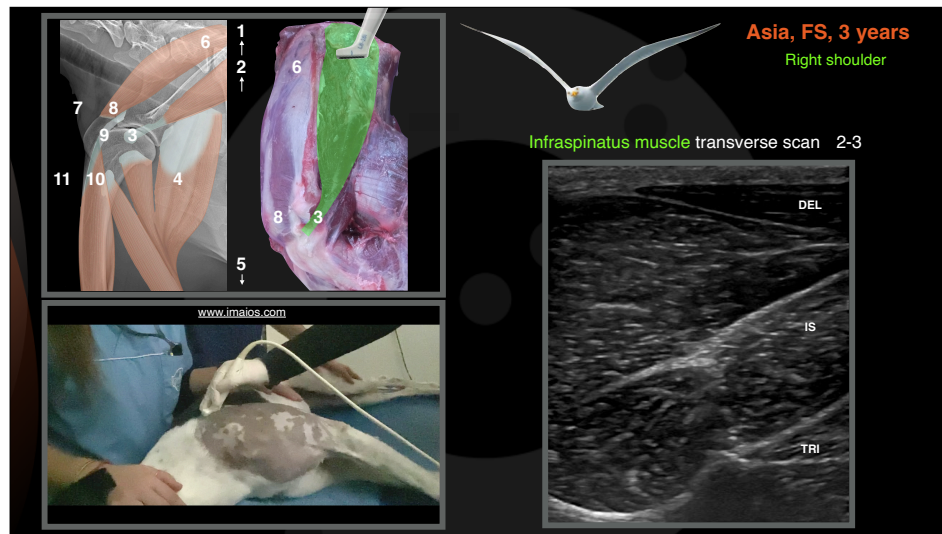


Asia, FS, 3 years



Asia, FS, 3 years



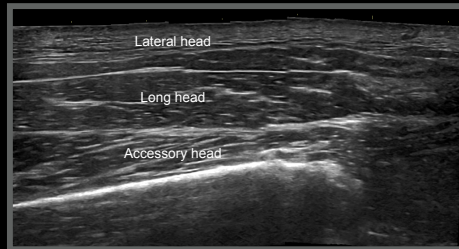


Asia, FS, 3 years

4-5 longitudinal

Left brachium

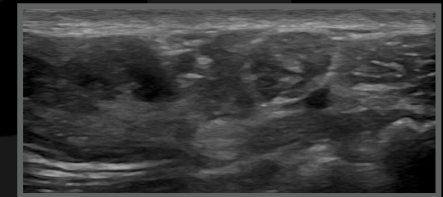
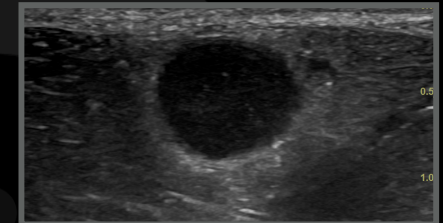
Right brachium



Asia, Australian Shepherd, FS, 3 years

Ultrasonographic diagnoses

- Focal rupture-hematoma of the lateral head of the right triceps



Consensus statement



OPEN ACCESS

Terminology and classification of muscle injuries in sport: The Munich consensus statement

Hans-Wilhelm Mueller-Wohlfahrt,¹ Lutz Haensel,¹ Kai Mithoefer,² Jan Ekstrand,³ Bryan English,⁴ Steven McNally,⁵ John Orchard,^{6,7} C Niek van Dijk,⁸ Gino M Kerkhoffs,⁹ Patrick Schamasch,¹⁰ Dieter Blottner,¹¹ Leif Swaerd,¹² Edwin Goedhart,¹³ Peter Ueblicher¹

Mueller-Wohlfahrt H-W, et al. *Br J Sports Med* 2013;**47**:342–350. doi:10.1136/bjsports-2012-091448

Direct muscle injuries: (extrinsic trauma)

- **Contusion**- bruise, hematoma, usually belly muscle affected
- **Laceration**- bite lesion



Indirect muscle injuries: (intrinsic trauma)

Functional disorders

Over-exertion related (fatigue induced, muscle soreness)

Neuromuscular muscle disorders (eg. nerve compression, myositis...)

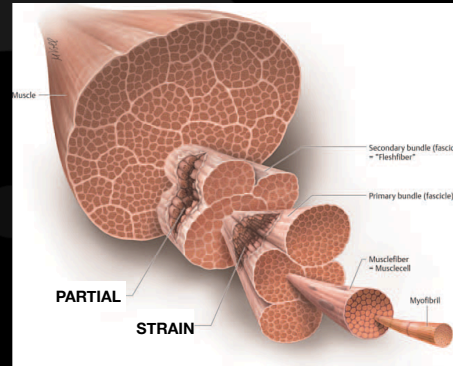


Indirect muscle injuries: (intrinsic trauma)

Structural injuries

Partial muscle/tendon/ligament tear
(strain/sprain. Not palpable lesion)

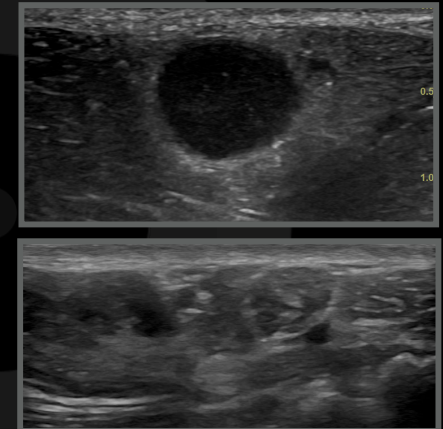
Moderate to total muscle tear (palpable muscle defect)



Asia, Australian Shepherd, FS, 3 years

Ultrasonographic diagnoses

- Lateral head of the right triceps focal hematoma-rupture



Article

Efficacy of Serial Ultrasonographic Examinations in Predicting Return to Play in Agility Dogs with Shoulder Lameness

Maria Grazia Entani ¹, Alessio Franini ¹ , Ludovica Dragone ², Gabriele Barella ³, Fabio De Rensis ⁴ and Giliola Spattini ^{5,*}

Healing phase	Tendon	Muscle
Inflammatory phase	24 h	5 days
Proliferative phase	2 days- 6 weeks	4 weeks
Remodeling phase	Consolidation 6-10 weeks Maturation 10-52 weeks	Consolidation 5-12 weeks Maturation 12-52 weeks

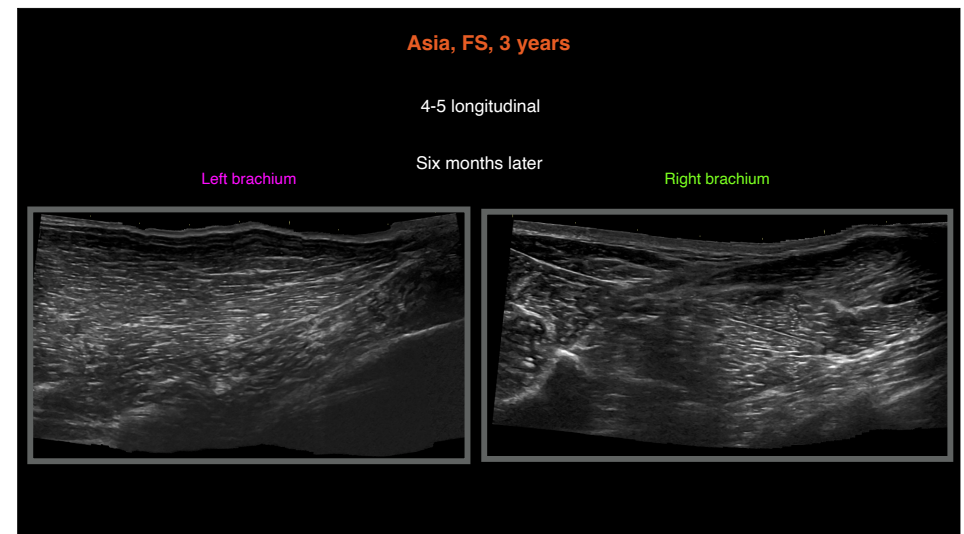
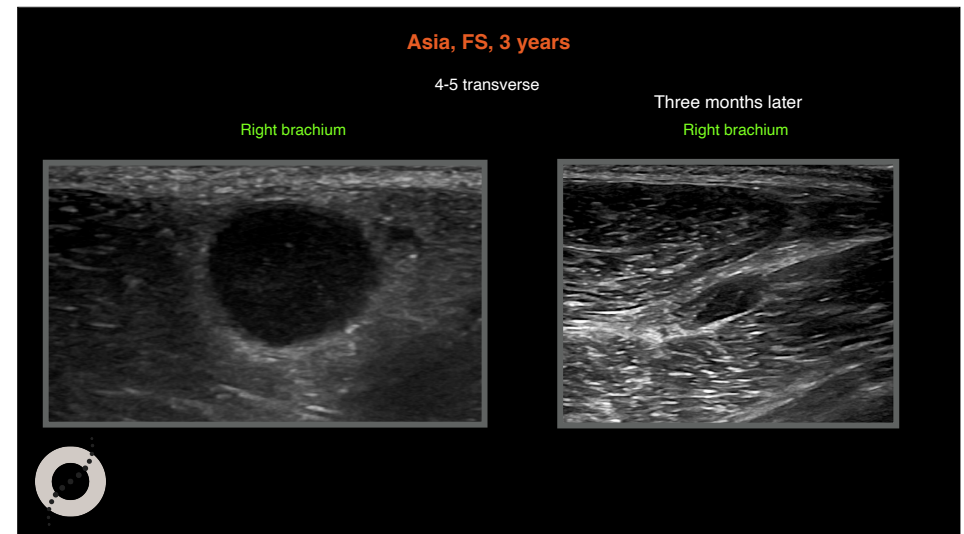
Animals **2022**, *12*, 78. <https://doi.org/10.3390/ani12010078>

Asia, Australian Shepherd, FS, 3 years

Three months later



- She is doing fine, but when She runs, the right front limb is less cranially extended



Thank you



Diagnostic Mindset

www.diagnosticmindset.com