

The ultrasonographic examination of the carpus

Giliola Spattini
DVM, GP Cardio, CCRT, PhD, DECVDI



Diagnostic Mindset



Thank to www.imagos.com

Objectives

High resolution US is available and has improved the possibility to scan distal MSK structures

Knowledge of anatomy and biomechanics forces increases the planning for treatment

A systematic approach is needed



Introduction

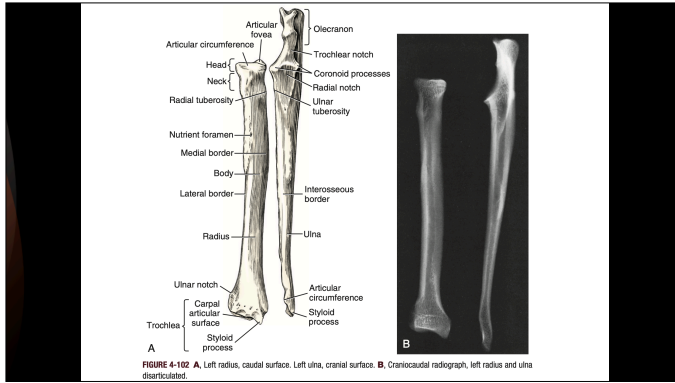
Article *Animals* 2023, 12, 2050. <https://doi.org/10.3390/ani12162050>

High-Resolution Ultrasonographic Anatomy of the Carpal Tendons of Sporting Border Collies

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

Canine sports are on the rise, and sport-related injuries have been increasingly noted. In a survey on **Racing Greyhounds**, the rate of **carpal injuries reached 17%**; in marathon sled dogs, shoulder and carpal injuries are commonly encountered [5,6]. In 2013, Cullen et al. provided data regarding the nature of the injuries in dogs involved in high-level agility competitions. They found that **7% of 1602 agility-related injuries** were located in the **carpus** [7]. The workload on forelimbs during sports activities and the number of carpal injuries described in canine athletes suggest that the carpal joint can undergo significant load stress during the athletic gesture.

Canine bodyweight is unequally distributed between the forelimbs and the hindlimbs during unimpeded walking, with approximately 60% of the vertical force exerted on the forelimbs. When trotting, more than the dog's entire body weight is carried by a single forelimb. It increases to over twice the body weight during a gallop. In fact, as reported in a previously published paper regarding ground reaction forces, a galloping Labrador Retriever sustains 2.6 times its body weight on the forelimbs while trotting at 27 km/h. Regarding agility activity, the literature suggests that **more than 4.5 times body weight is borne by the forelimbs in hurdle jumps landing during agility tracks** [8,9]. Diagnosing



Received 21 January 2021 | Revised 14 April 2021 | Accepted 20 April 2021
 DOI: 10.1111/anim.15082

ORIGINAL INVESTIGATION WILEY

Ultrasonographic anatomy of the dorsal region of the carpus of the dog

Sonia González-Rellán¹ | Patricia Fdz-de-Trocóniz² | Andrés Barreiro^{1,2}

Received 3 December 2020 | Revised 14 January 2021 | Accepted 21 January 2021
 DOI: 10.1111/anim.15082

ORIGINAL INVESTIGATION WILEY

Ultrasonographic anatomy of the palmar region of the carpus of the dog

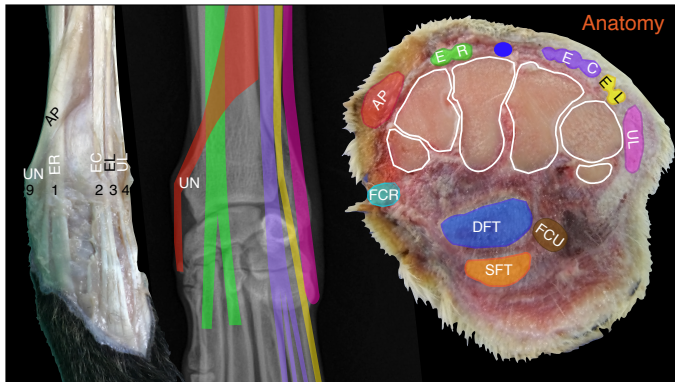
Sonia González-Rellán¹ | Patricia Fdz-de-Trocóniz² | Andrés Barreiro^{1,2}

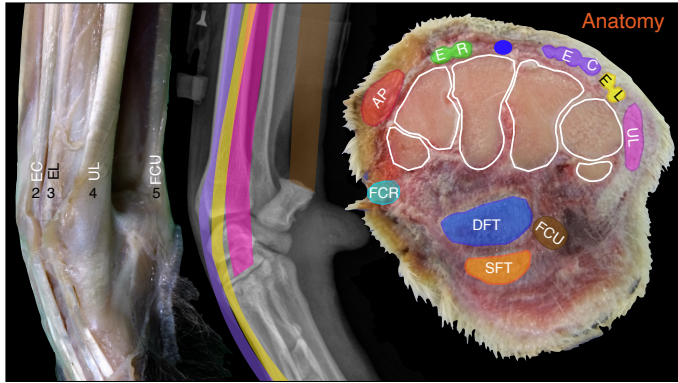
animals *Animals* 2022, 12, 1573. <https://doi.org/10.3390/ani12121573> MDPJ

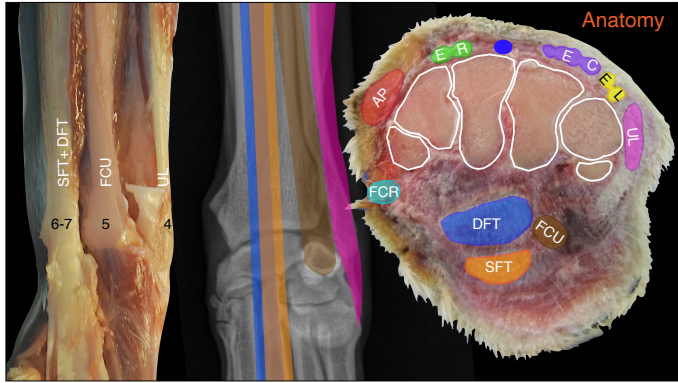
Article
Anatomy of the Palmar Region of the Carpus of the Dog
 Sonia González-Rellán¹, Andrés Barreiro^{1,2}, José Manuel Cifuentes³ and Patricia Fdz-de-Trocóniz¹

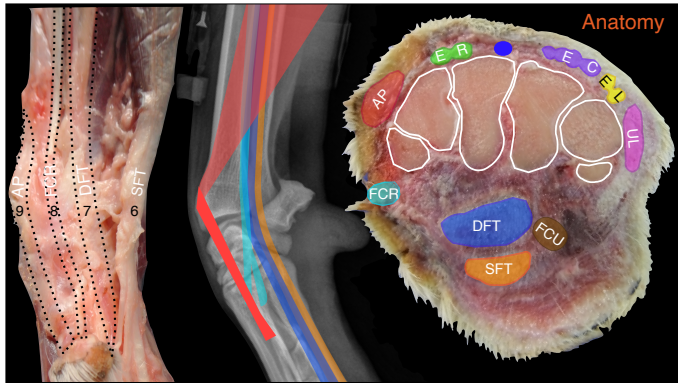
¹ Department of Anatomy, Animal Production and Clinical Veterinary Sciences, University of Santiago de Compostela, 27002 Lugo, Spain; andres.barreiro@usc.es (A.B.); m.cifuentes@usc.es (J.M.C.); patricia.troconiz@usc.es (P.F.-T.)
² Real Galicia Veterinaria University Hospital, 27002 Lugo, Spain
³ Correspondence: sonia.gonzalez.rellan@gmail.com

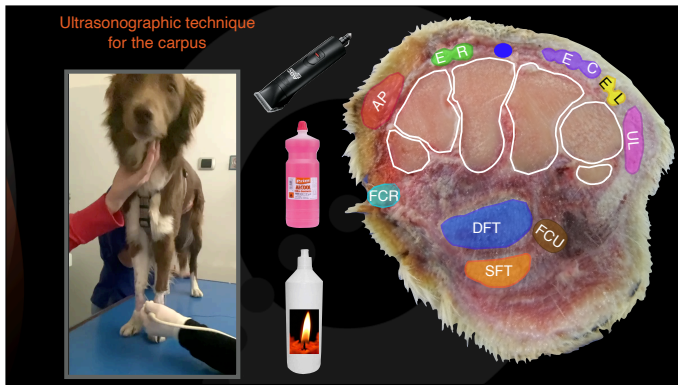






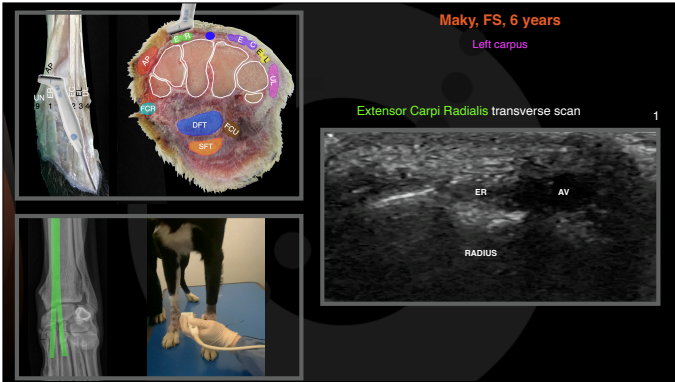


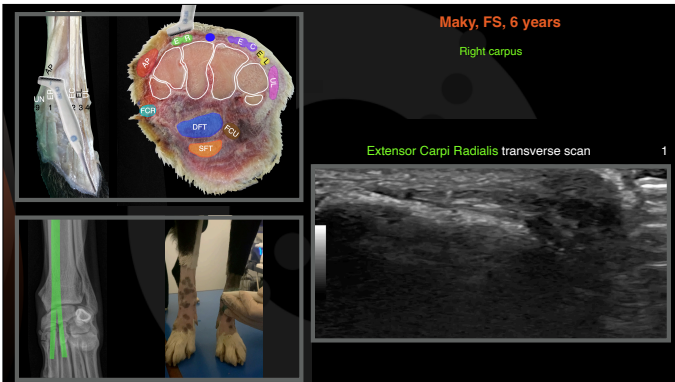


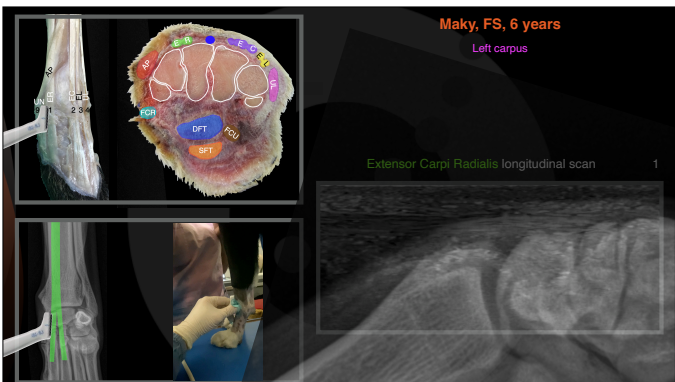


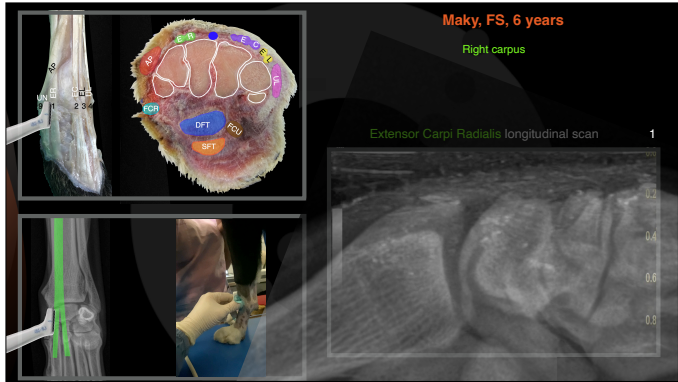


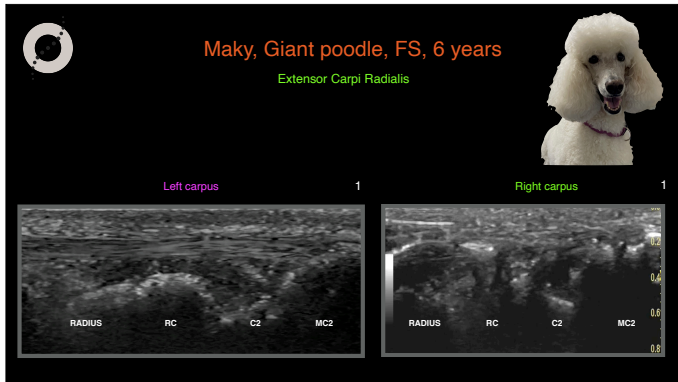


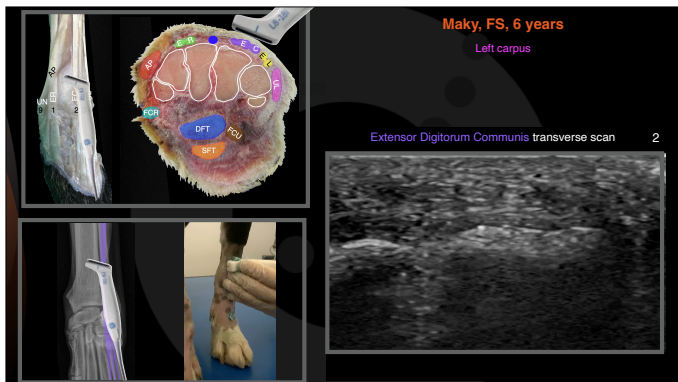












Maky, Giant poodle, FS, 6 years

Extensor Digitorum Communis

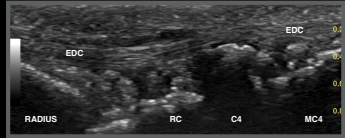
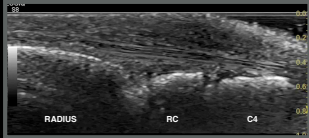


Left carpus

2

Right carpus

2

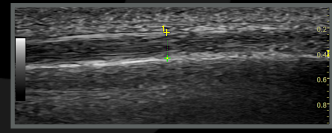
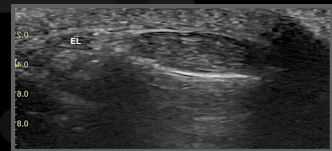
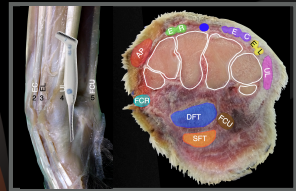


Maky, FS, 6 years

Left carpus

Ulnaris lateralis transverse and longitudinal scan

4

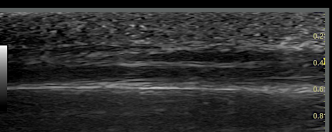
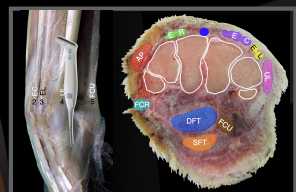


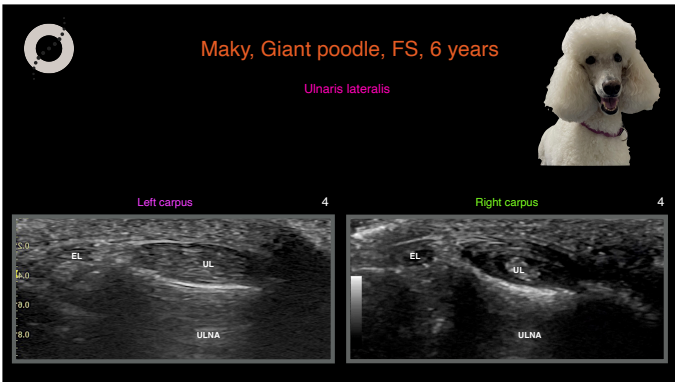
Maky, FS, 6 years

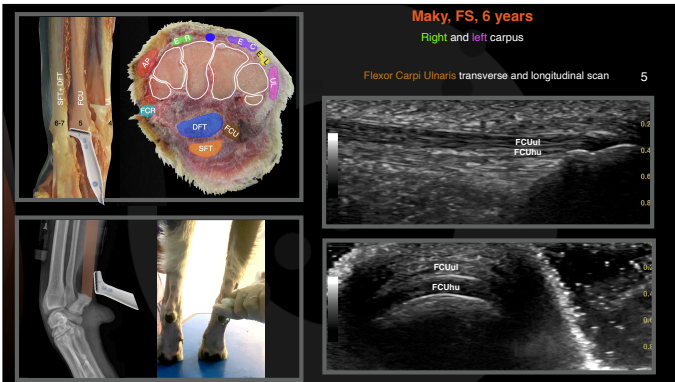
Right carpus

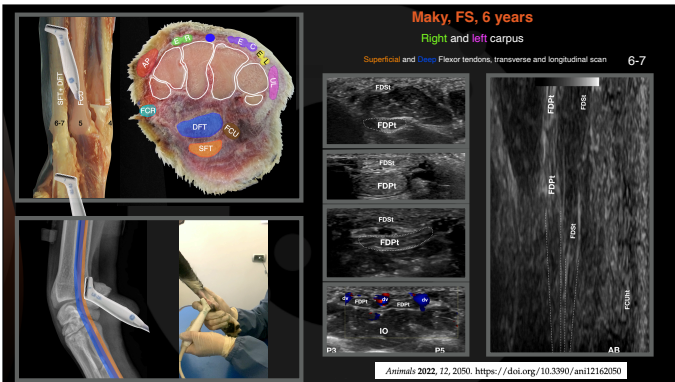
Ulnaris lateralis transverse and longitudinal scan

4





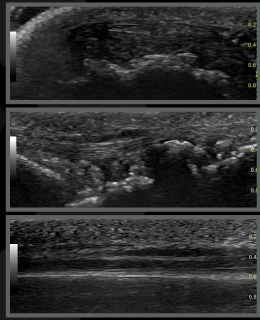




Maky, Giant poodle, FS, 6 years

Ultrasonographic diagnoses:

- Thickening right extensor retinaculum
- Severely remodelled right dorsolateral bone surfaces
- Right Ulnaris Lateralis and EC tendinopathy



Maky, Giant poodle, FS, 6 years

Conclusions:

- Severe progression of arthrosis with suspected increased inter-osseous movement
- Possible lateral instability of the right carpus
- Right Ulnaris Laterals partial tear



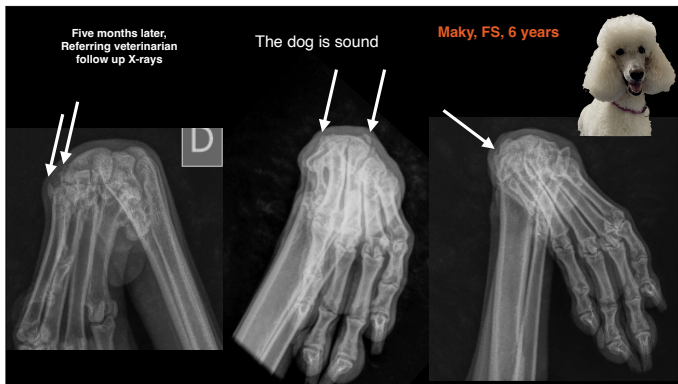
Next step:

- Review the X-rays

Maky, FS, 6 years





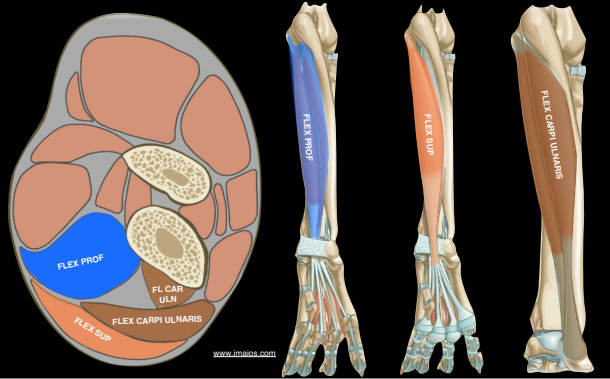




Olivia, Weimaraner, FS, 6 years



Anatomy of the caudal face of the ante brachium

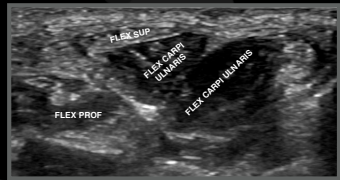
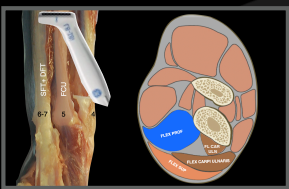


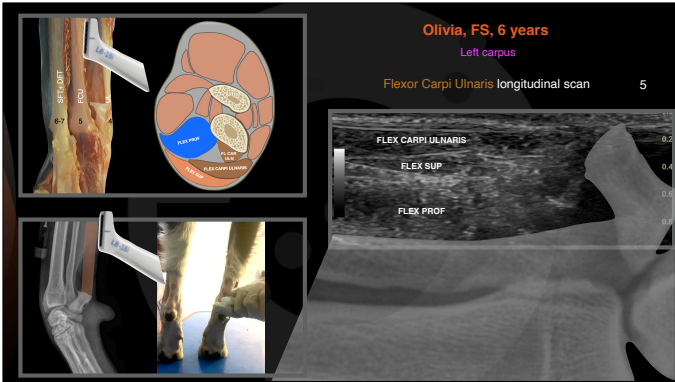
Olivia, FS, 6 years

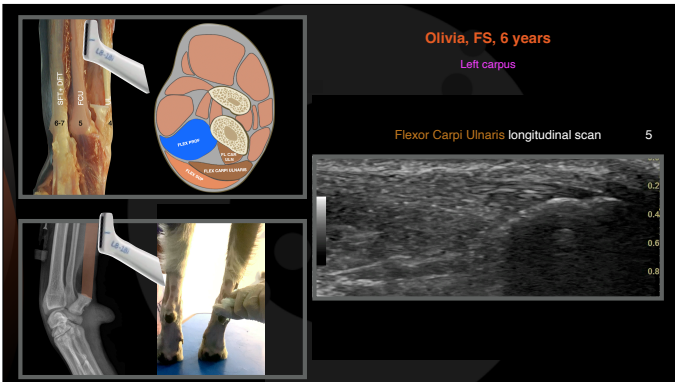
Left carpus

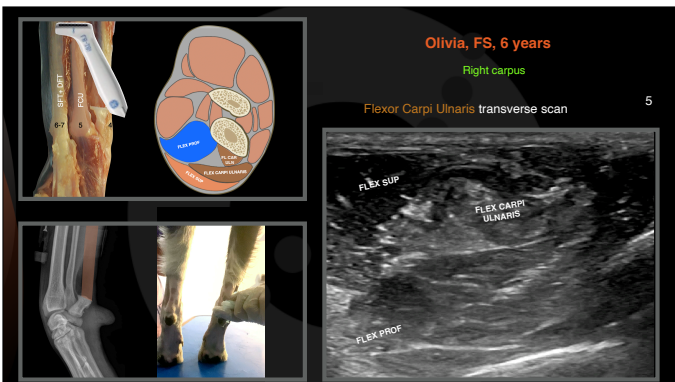
Flexor Carpi Ulnaris transverse scan

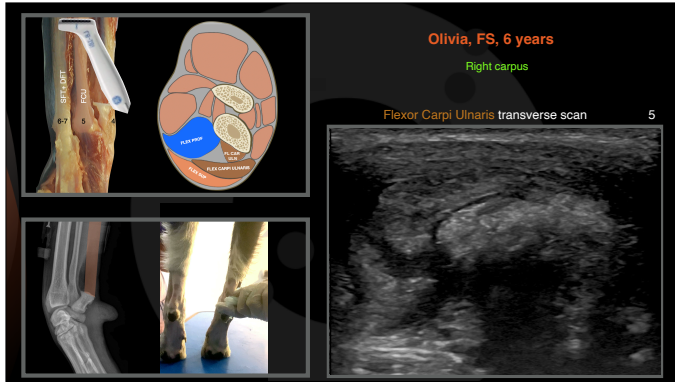
5

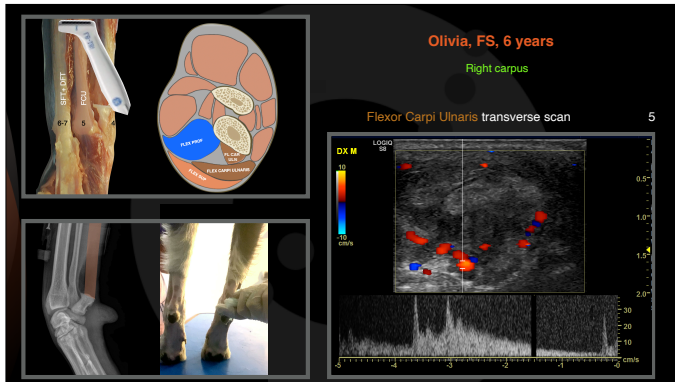


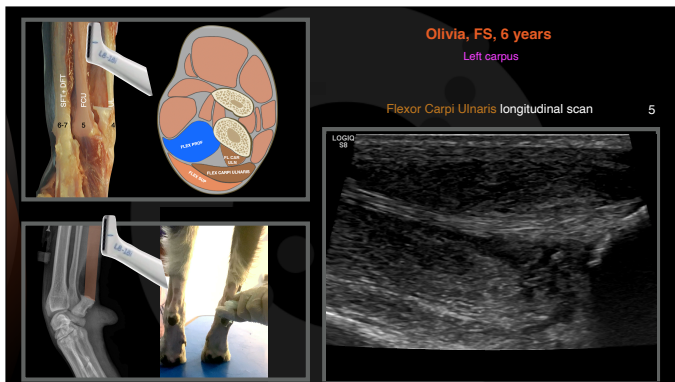


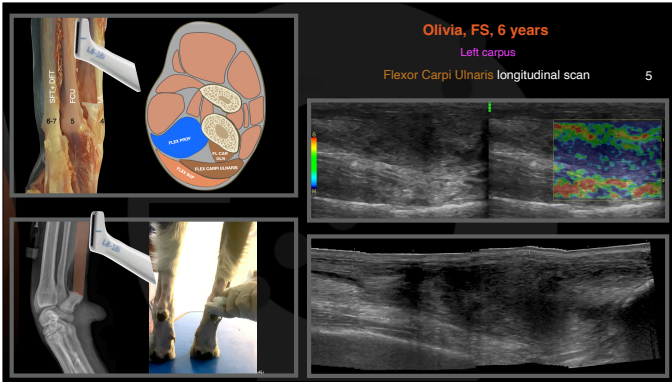
















How to arrive to Conclusions:

- PE examination
- Blood works
- Ultrasonographic findings
- Literature



PubMed.gov flexor carpi ulnaris dog Search

Advanced Create alert Create RSS User Guide

Save Email Send to Sorted by: Best match Display options

MY NCBI FILTERS 15 results Page 1 of 2

RESULTS BY YEAR

TEXT AVAILABILITY

ARTICLE ATTRIBUTE

ARTICLE TYPE

- Reconstruction of the **flexor carpi ulnaris** tendon with a fascia lata autograft in two **dogs** with carpal hyperextension.
1
Cite Tan Y.
Vet Surg. 2022 Nov;51(8):1311-1318. doi: 10.1111/vsu.13890. Epub 2022 Sep 18.
Share PMID: 36117264
OBJECTIVE: To describe the outcome of two **dogs** treated with fascia lata autografts to repair carpal hyperextension caused by **flexor carpi ulnaris** (FCU) tendon injury. **ANIMALS:** Two **dogs** with traumatic carpal hyperextension. **STUDY DESIGN:** Case rep ...
- Flexor carpi ulnaris** tendonopathy in a **Weimaraner**.
2
Cite Kuan SY, Smith BA, Fearnside SM, Black AP, Allan GS.
Aust Vet J. 2007 Oct;85(10):401-4. doi: 10.1111/j.1751-0813.2007.00187.x.
Share PMID: 17903127 No abstract available.
- Anatomy of the Palmar Region of the Carpus of the **Dog**.
3
Cite González-Rellán S, Barreiro A, Cifuentes JM, Fdz-de-Trocóniz P.
Animals (Basel). 2022 Jun 18;12(12):1573. doi: 10.3390/ani12121573.
Share PMID: 35739009 Free PMC article.

- Flexor carpi ulnaris** (humeral head) muscle flap for reconstruction of distal forelimb injuries in two **dogs**.
4
Cite Chambers JN, Purinton PT, Allen SW, Schneider TA, Smith JD.
Vet Surg. 1998 Jul-Aug;27(4):342-7. doi: 10.1111/j.1532-950x.1998.tb00137.x.
Share PMID: 9662777
OBJECTIVE: To describe the use of the humeral head of the **flexor carpi ulnaris** muscle as a rotational flap for reconstruction of distal antebrachial, carpal, and metacarpal injuries in two **dogs**.
STUDY DESIGN: Description of clinical cases. RESULTS: Loc ...
- High-Resolution Ultrasonographic Anatomy of the Carpal Tendons of Sporting Border Collies.
5
Cite Entani MG, Franini A, Barella G, Saleri R, De Rensis F, Spattini G.
Animals (Basel). 2022 Aug 11;12(16):2050. doi: 10.3390/ani12162050.
Share PMID: 36009639 Free PMC article.
On the lateral face, the tendon of the Extensor **Carpi Ulnaris** was recognised and followed. On the palmar face, the two heads of the **Flexor Carpi Ulnaris** tendon ending on the accessory carpal bone, the adjacent **Flexor Digitorum** & nbs ...

Flexor carpi ulnaris tendonopathy in a Weimaraner

SY KUANG,¹ BA SMITH,¹ SM FEARNSSIDE,² AP BLACK³ and GS ALLAN⁴



This case describes a flexor carpi ulnaris tendonopathy in a Weimaraner, with thickening of the tendon and disorganised fibres, most likely a result from chronic repeated stresses, with repeated stresses. These repeated stresses lead to chronic strains with a thickened, fibrotic, and weakened tendon.¹ In racing Greyhound injuries, it is the humeral head that is strained.² Chronically repeated strain injuries may lead to a larger rupture of the tendon, resulting in hyperflexion of the hock and weight-bearing on the plantar surface of the metatarsus.^{3,4} Successful non-surgical treatments of Achilles tendon strains have been reported in various species,^{5,6,7,8} and includes splinting or casting the hock in extension, and restricted activity.⁹

Strains can occur when the load is excessive, or when the yield point of the tendon is lowered.¹⁰ High load trauma resulting in tendon injury is uncommon, because tendons can absorb energy more efficiently than muscle or bone, hence muscle tears or avulsion fractures are more likely to occur before complete failure of a tendon.¹¹ Lowering of the tendon yield point can occur as a result of disease or other degenerative conditions causing disruption and disorganisation of the collagen arrangement, or as a result of repeated high frequency loading events causing microfibre injury accumulation resulting in progressive weakening of the tendon.^{12,13} An alternative hypothesis involves development of ischaemia when the tendon is under maximal tendon load, with reperfusion on relaxation generating oxygen free radicals, causing tendon damage.¹⁴

Olivia, Weimaraner, FS, 6 years

Follow up

- Impossible to rest
- Improving with physiotherapy



Conclusions

- High resolution US can help in the management planning of carpal injuries
- Team working with orthopaedic and rehabilitation centres usually gain the best long term results



Steve Job tribute to Alan Turing

Thank you



Diagnostic Mindset

www.diagnosticmindset.com

