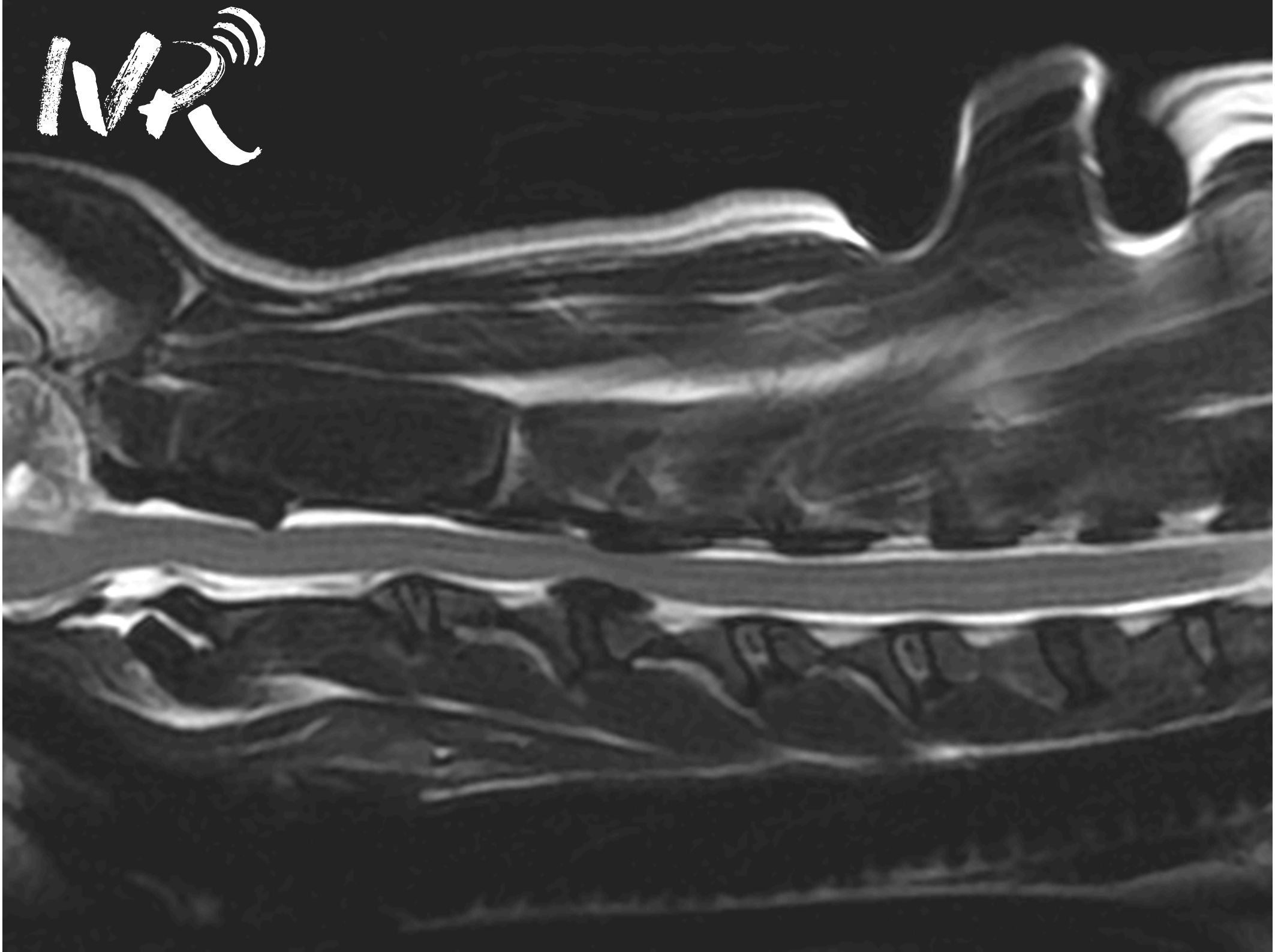
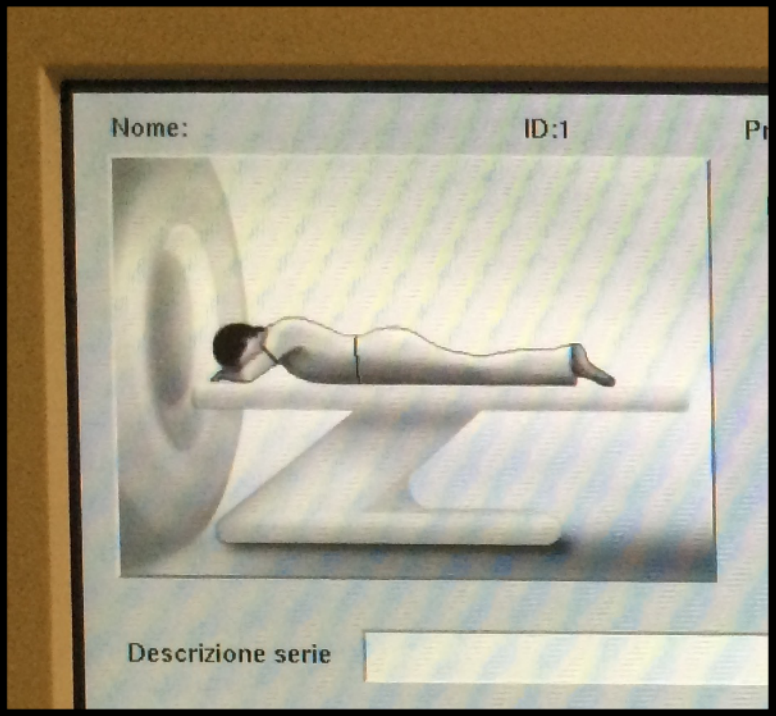
Intervertebral disc herniation: CT and MRI are complementar?

Edoardo Auriemma

edoardo.auriemma@gmail.com



CT ? MRI
mielo-TC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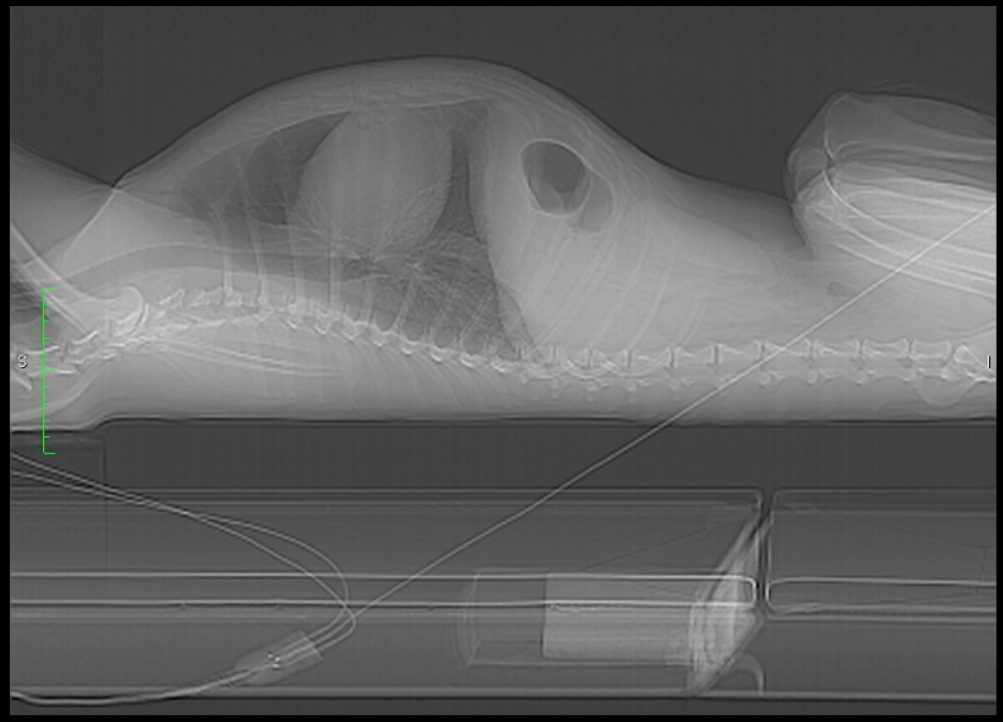

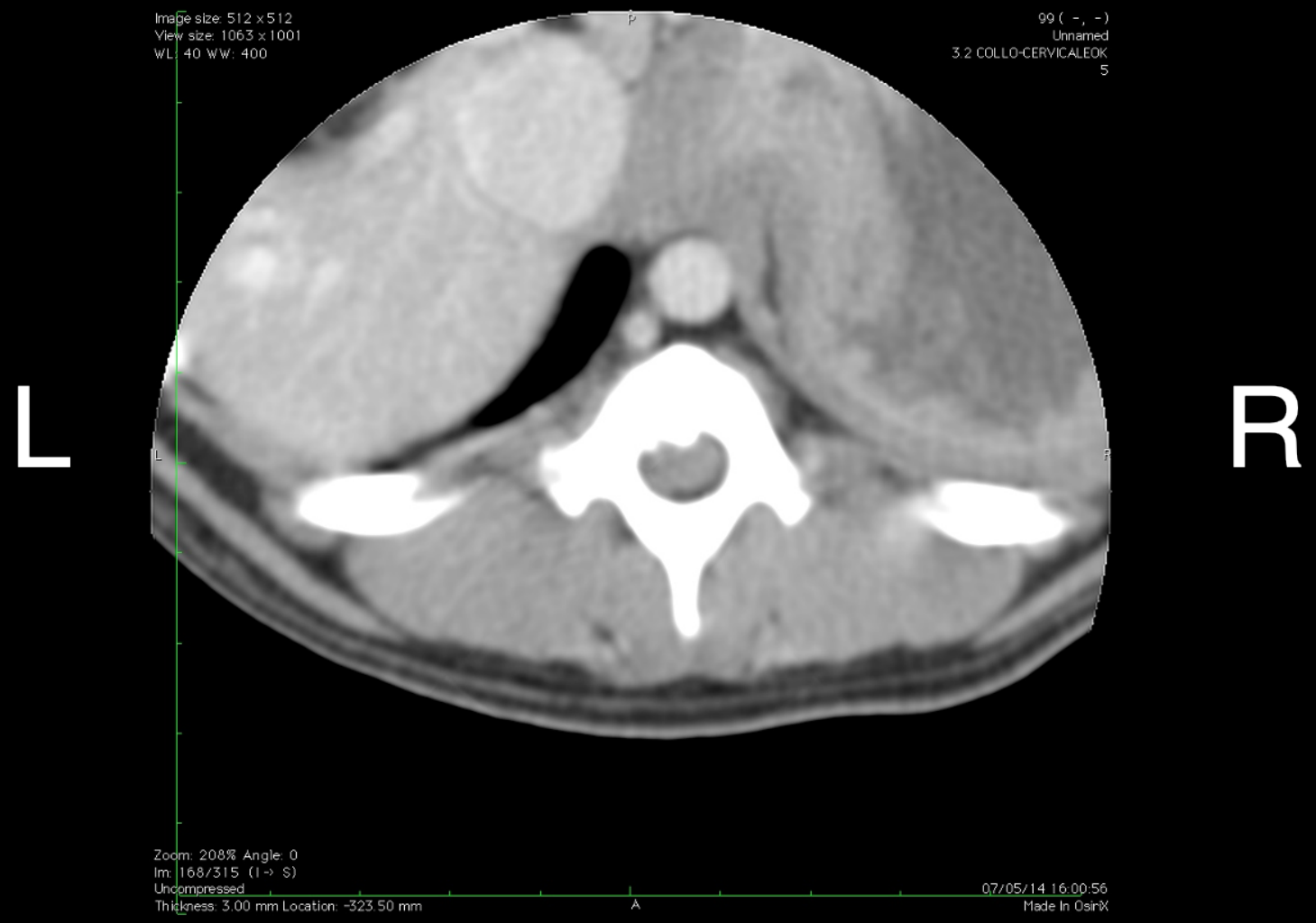
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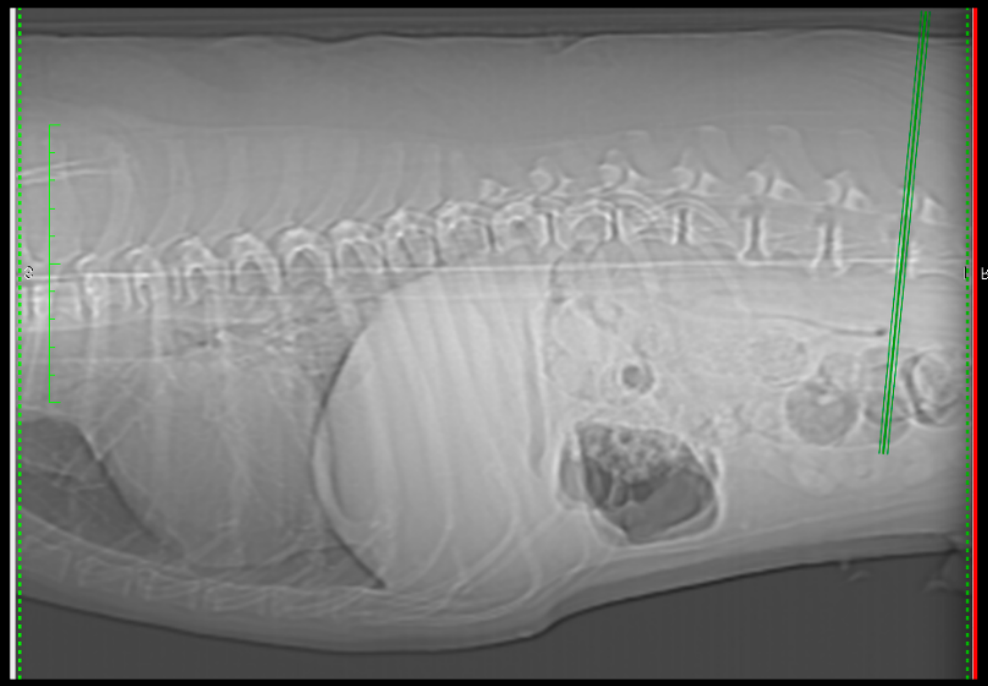

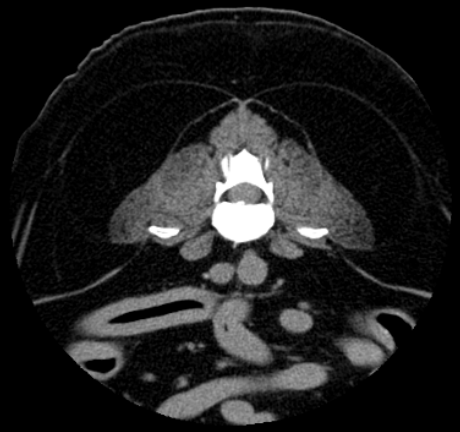

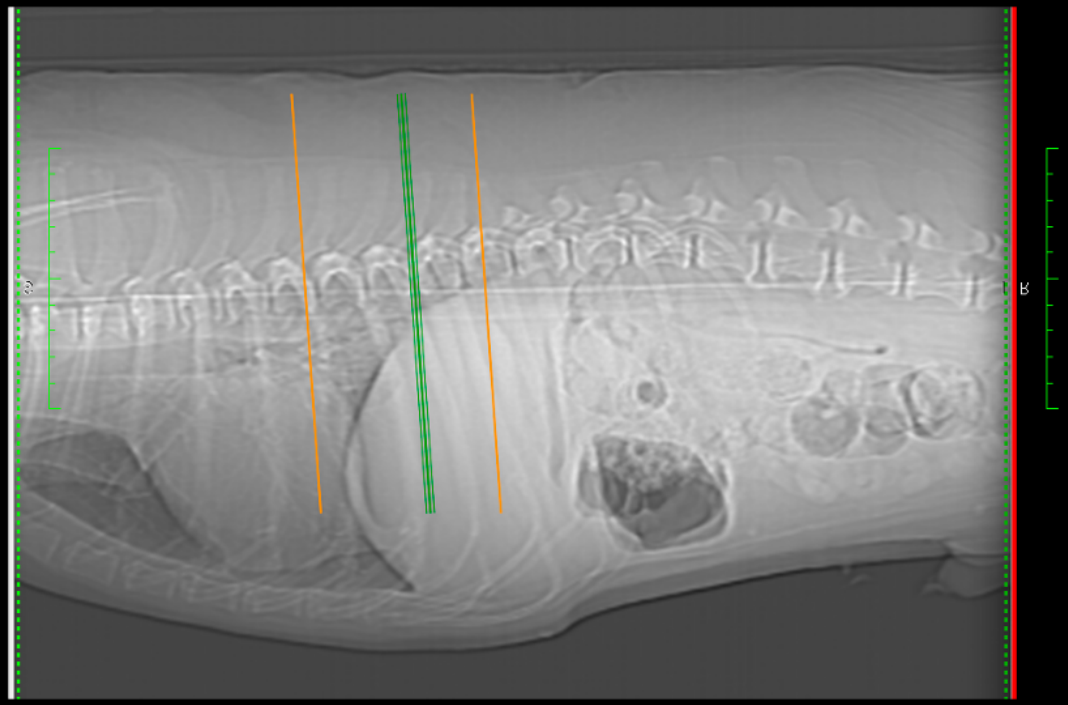

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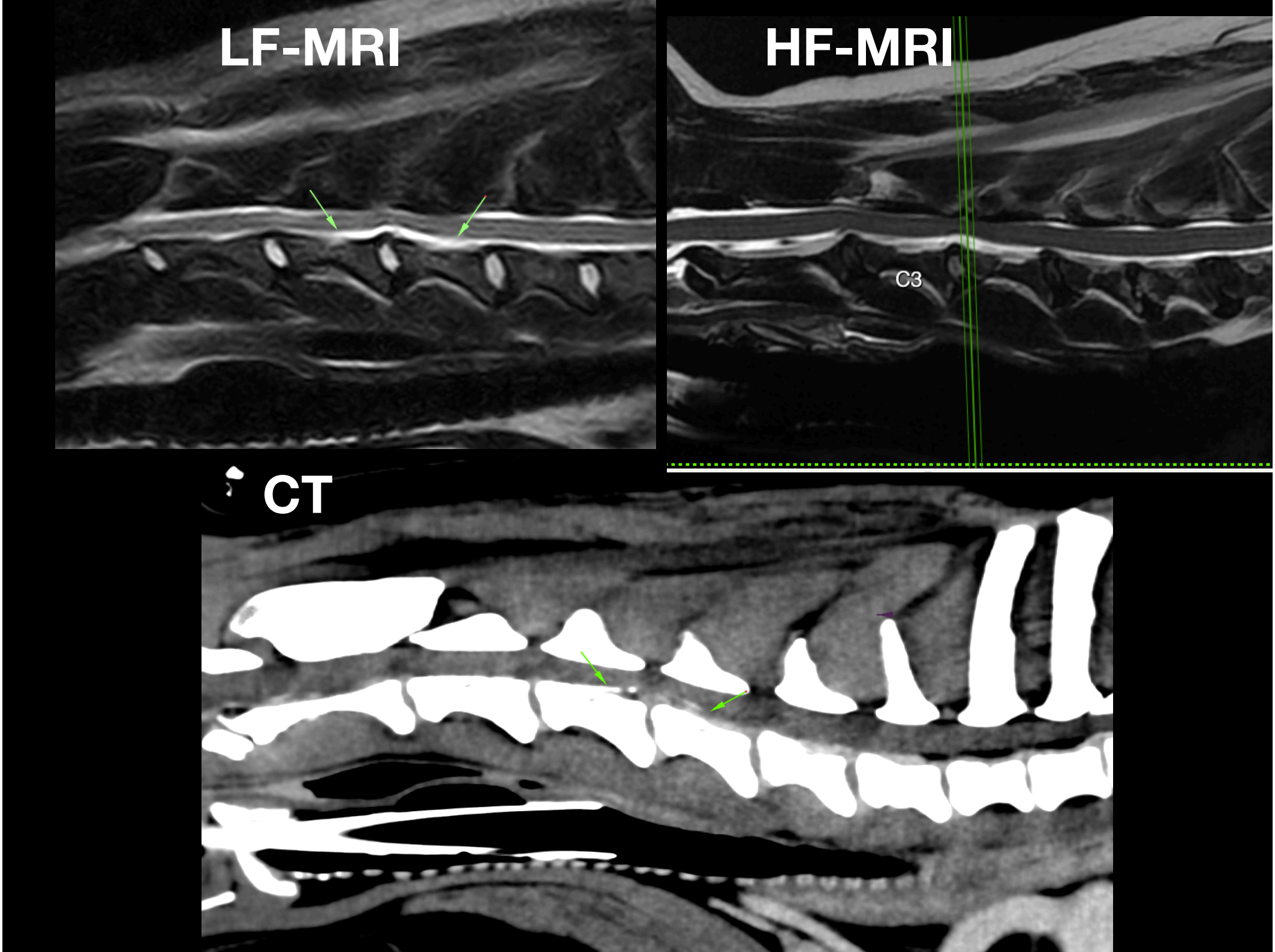

LF-MRI
HF-MRI
C3
CT

frontiers in Veterinary Science

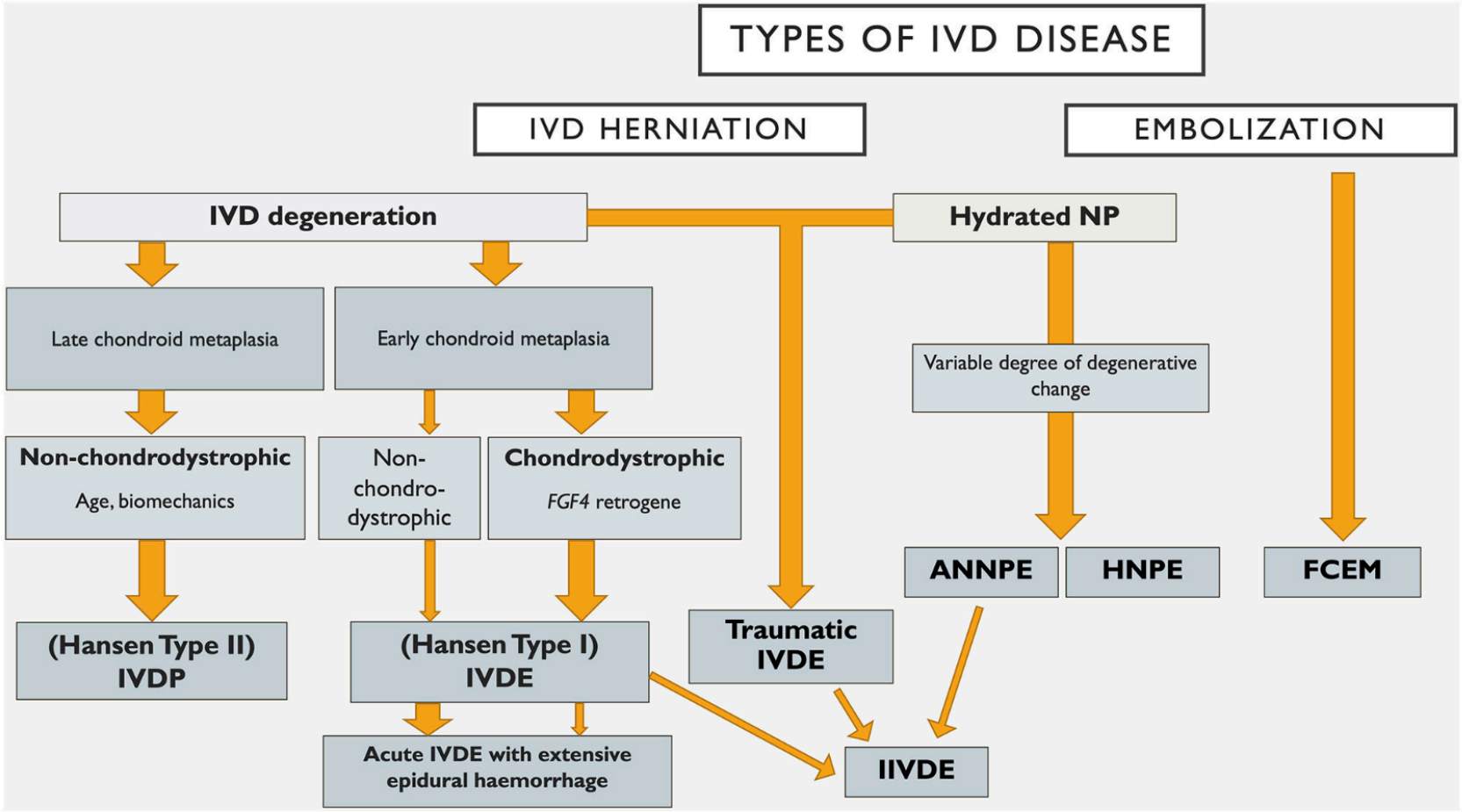
REVIEW
published: 06 October 2020
doi: 10.3389/fvets.2020.579025

Check for updates

Classification of Intervertebral Disc Disease

Joe Fenn[1], Natasha J. Olby[2], and the Canine Spinal Cord Injury Consortium (CANSORT-SCI)*

[1] *Department of Clinical Science and Services, Royal Veterinary College, London, United Kingdom,* [2] *Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC, United States*



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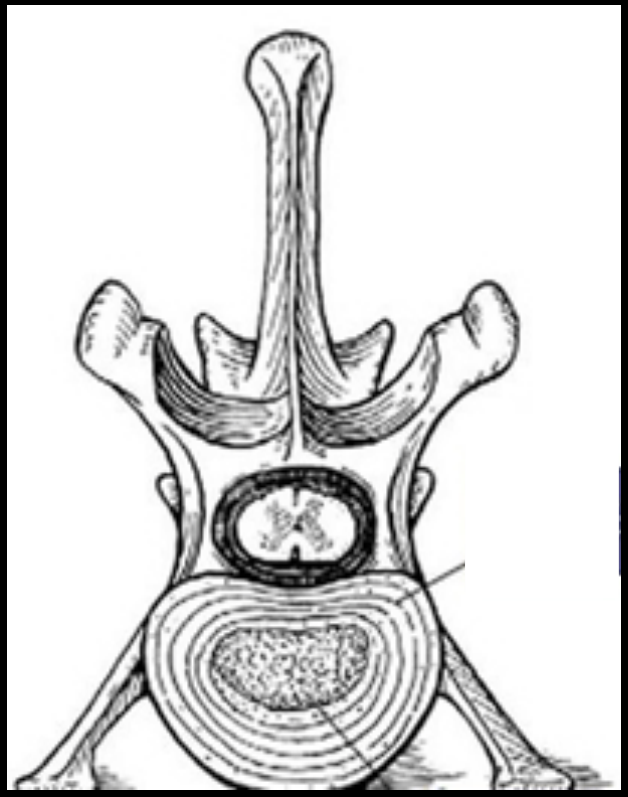
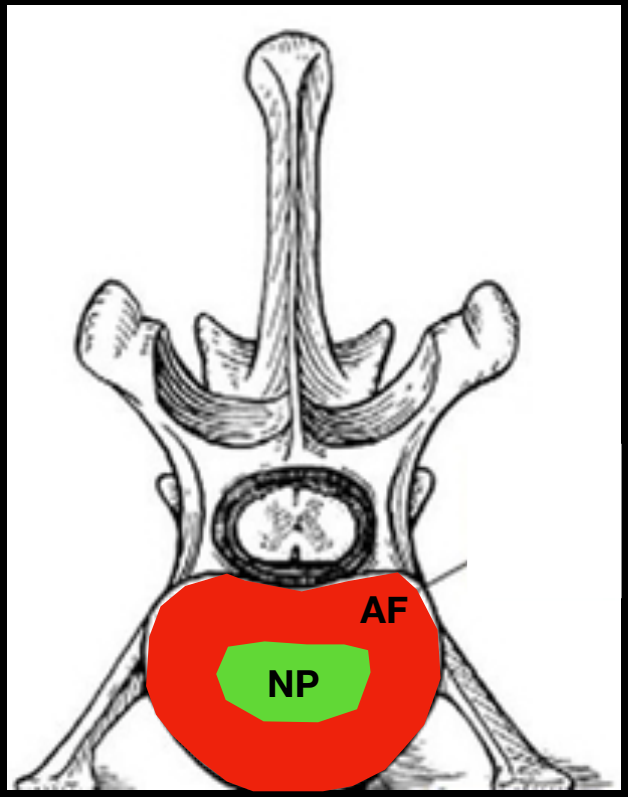
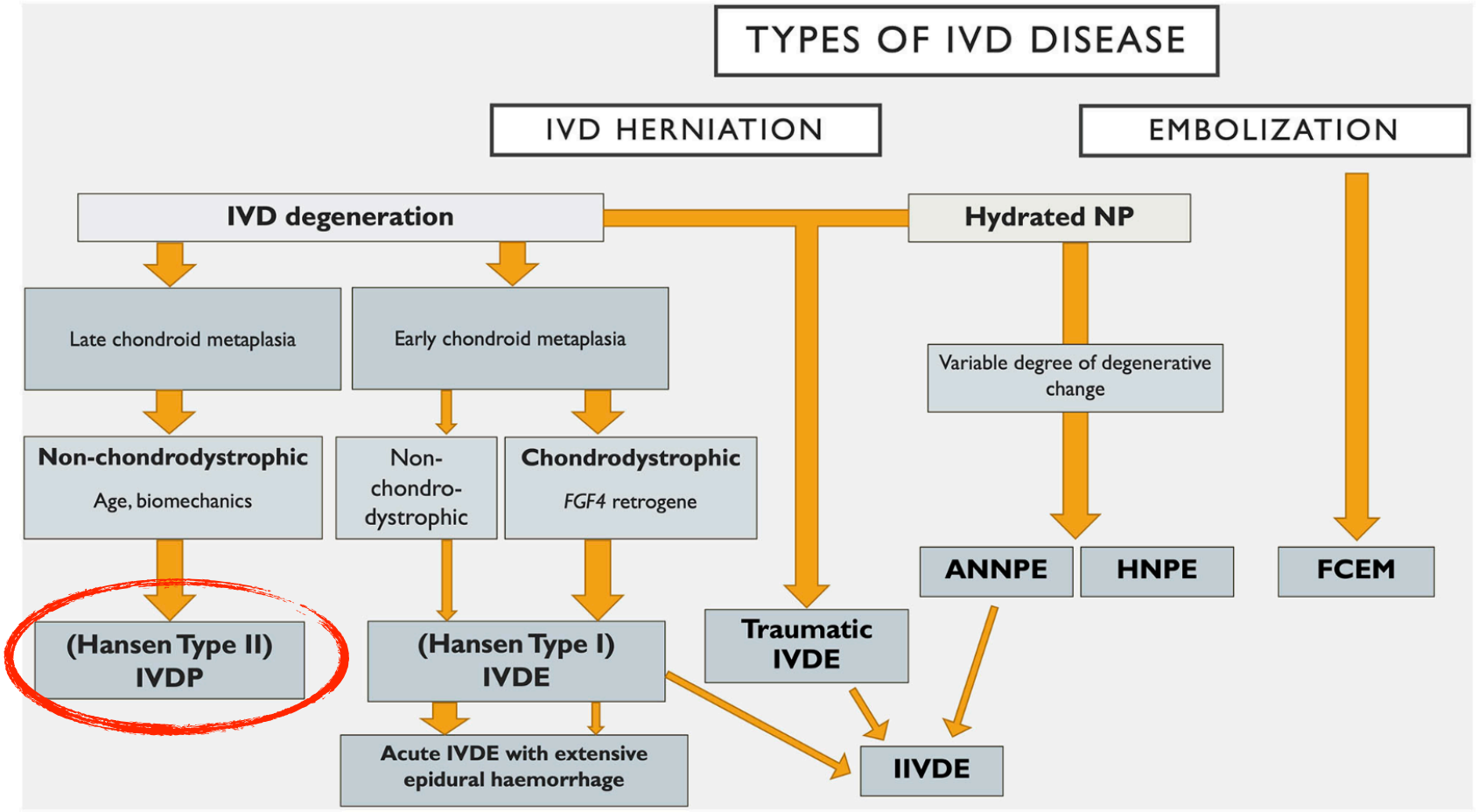



AF
NP



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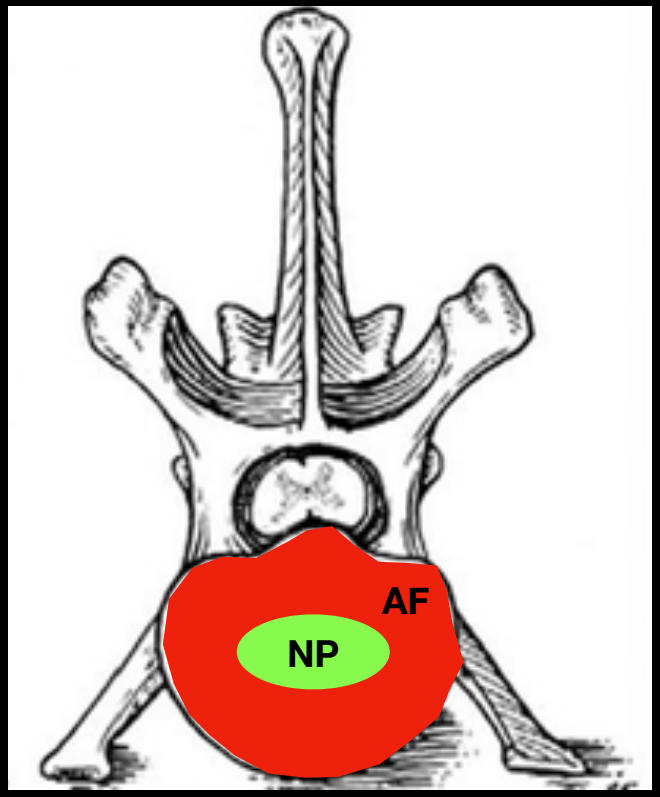
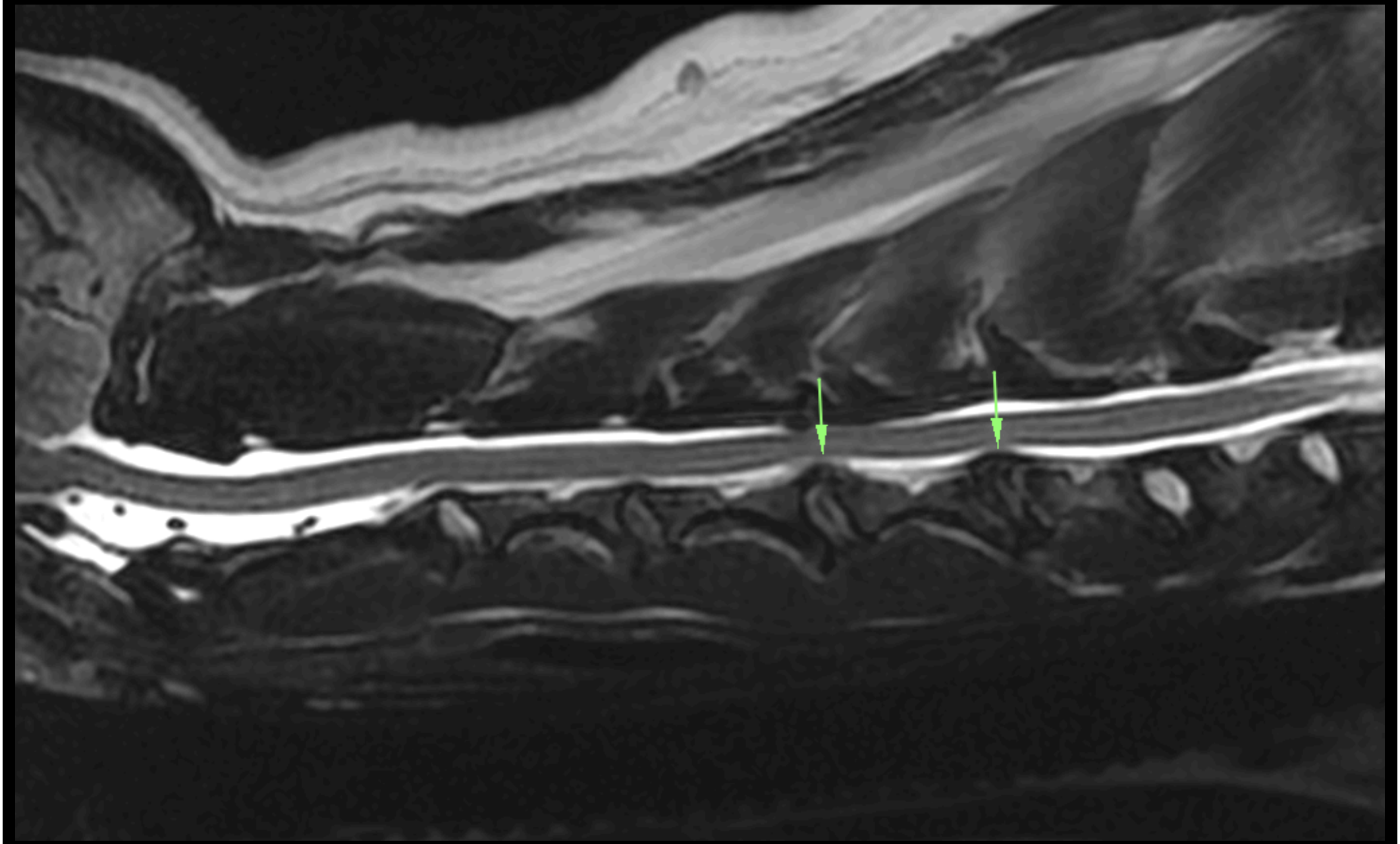
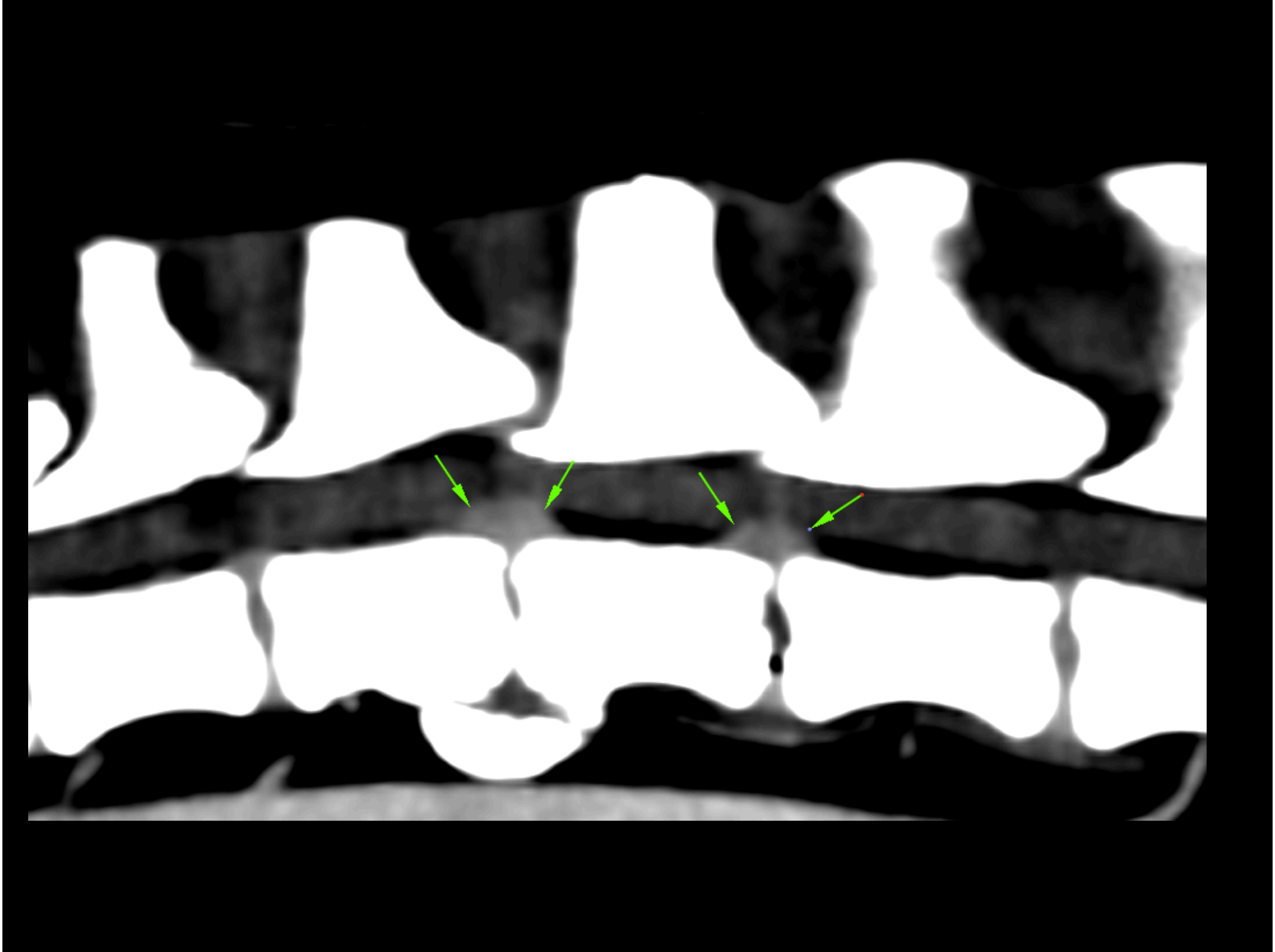
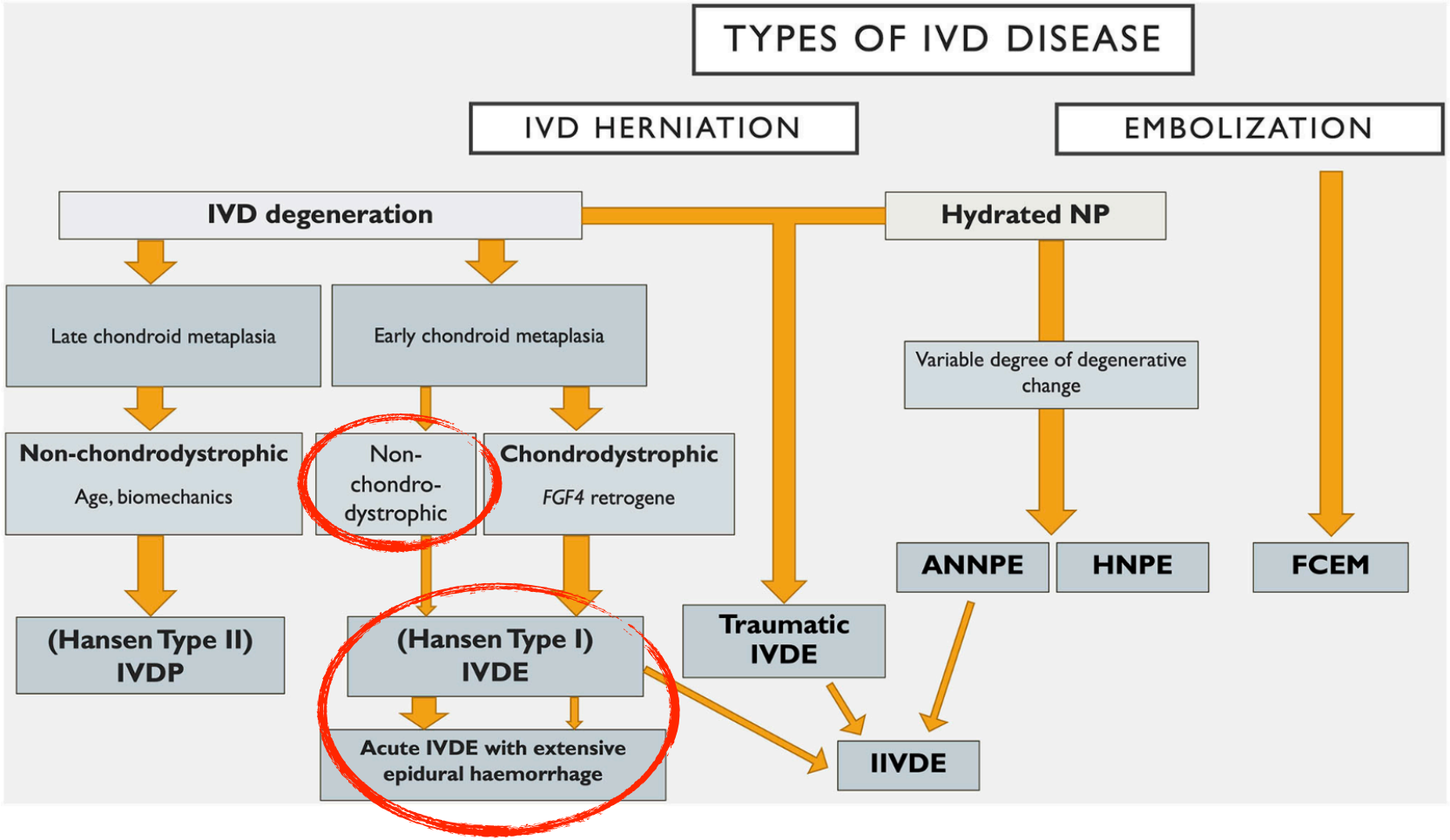


HANSEN TYPE II







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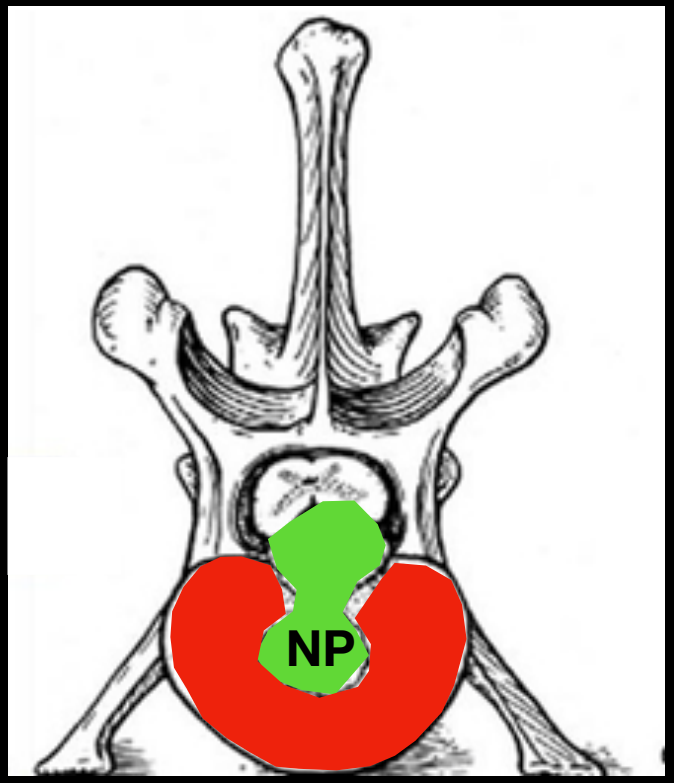


HANSEN TYPE I

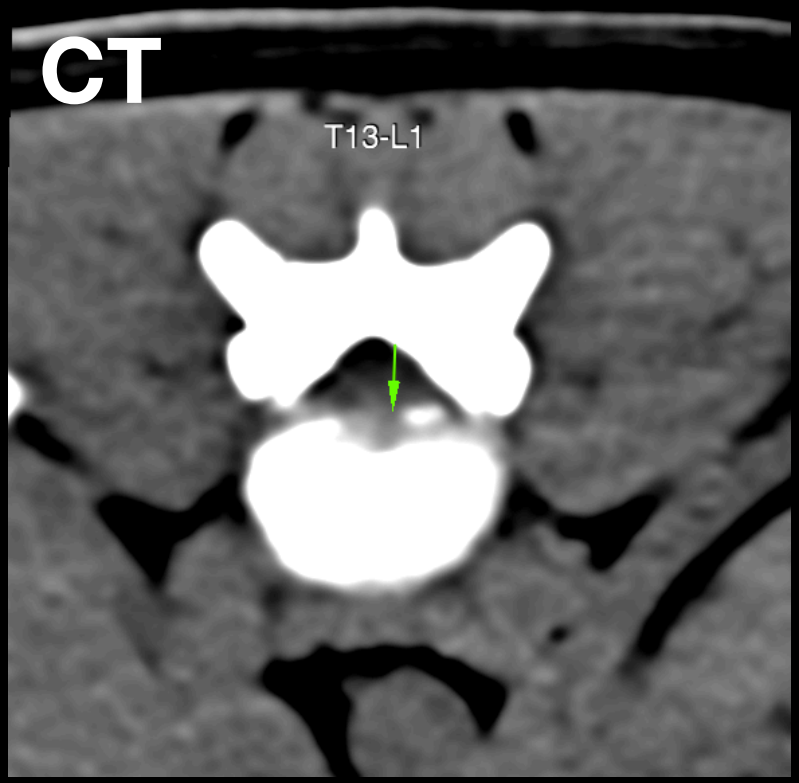
HANSEN TYPE I

“EXTRUSION”

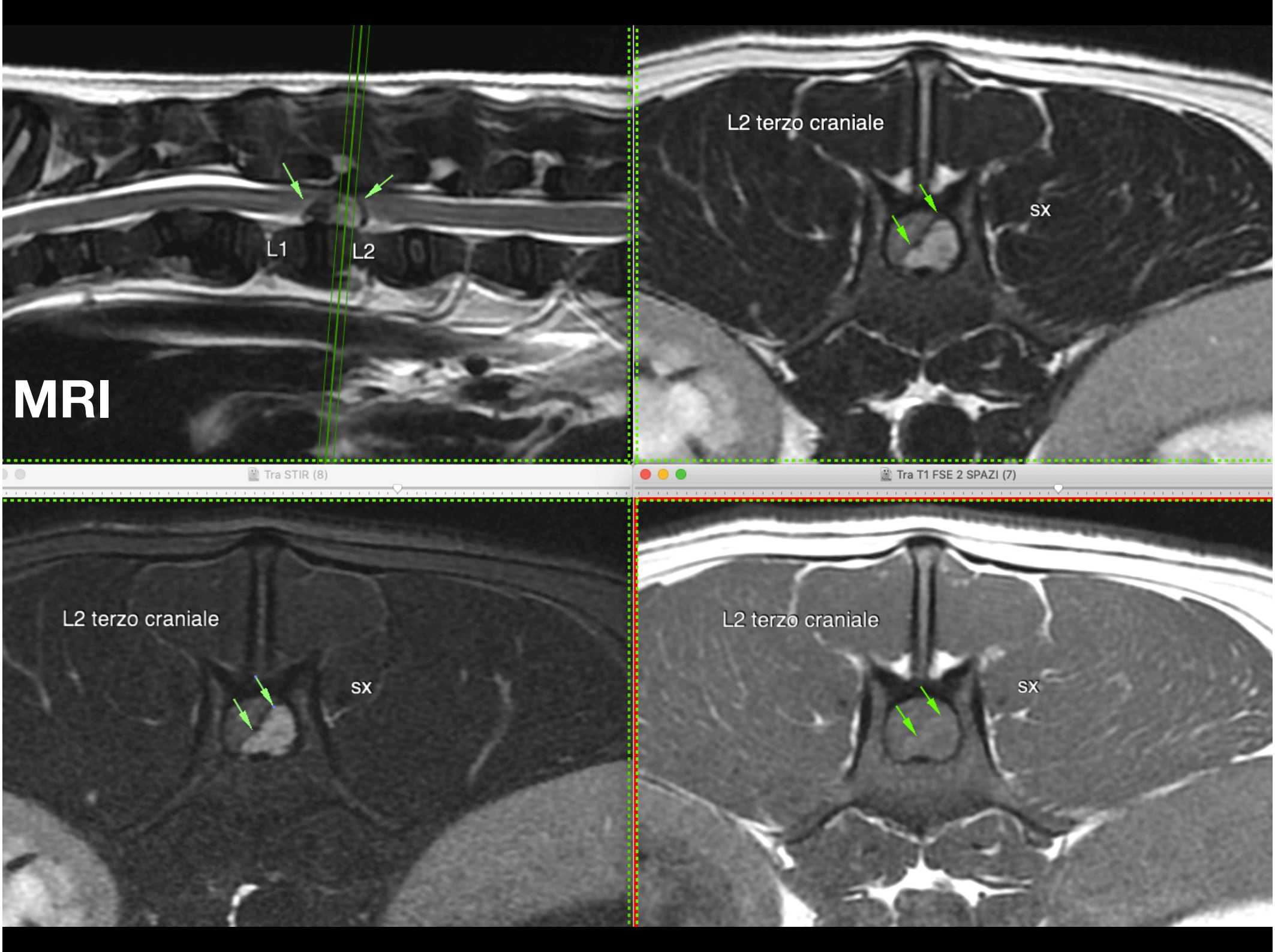
ACUTE

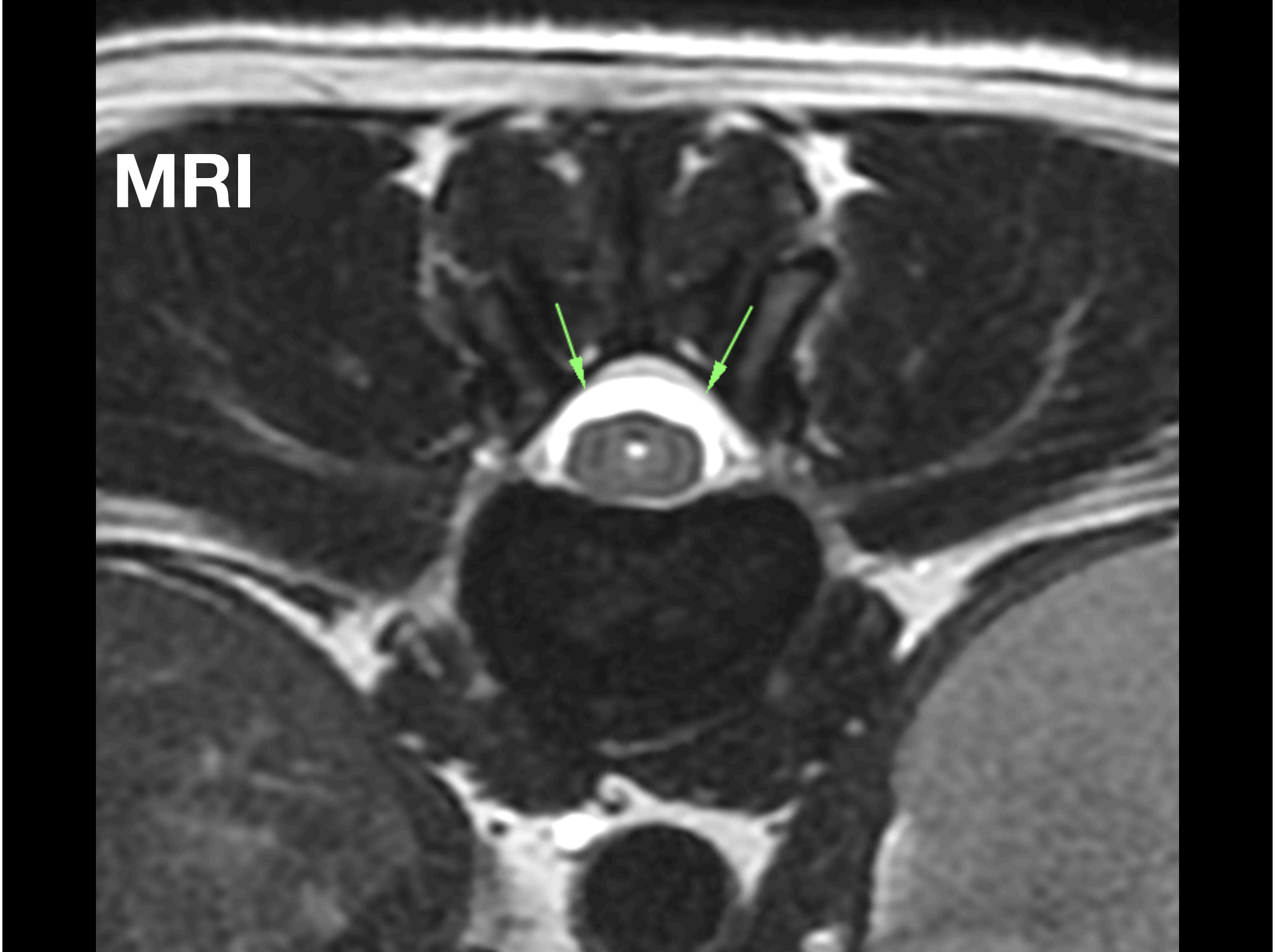
CHONDROID METAPLASIA

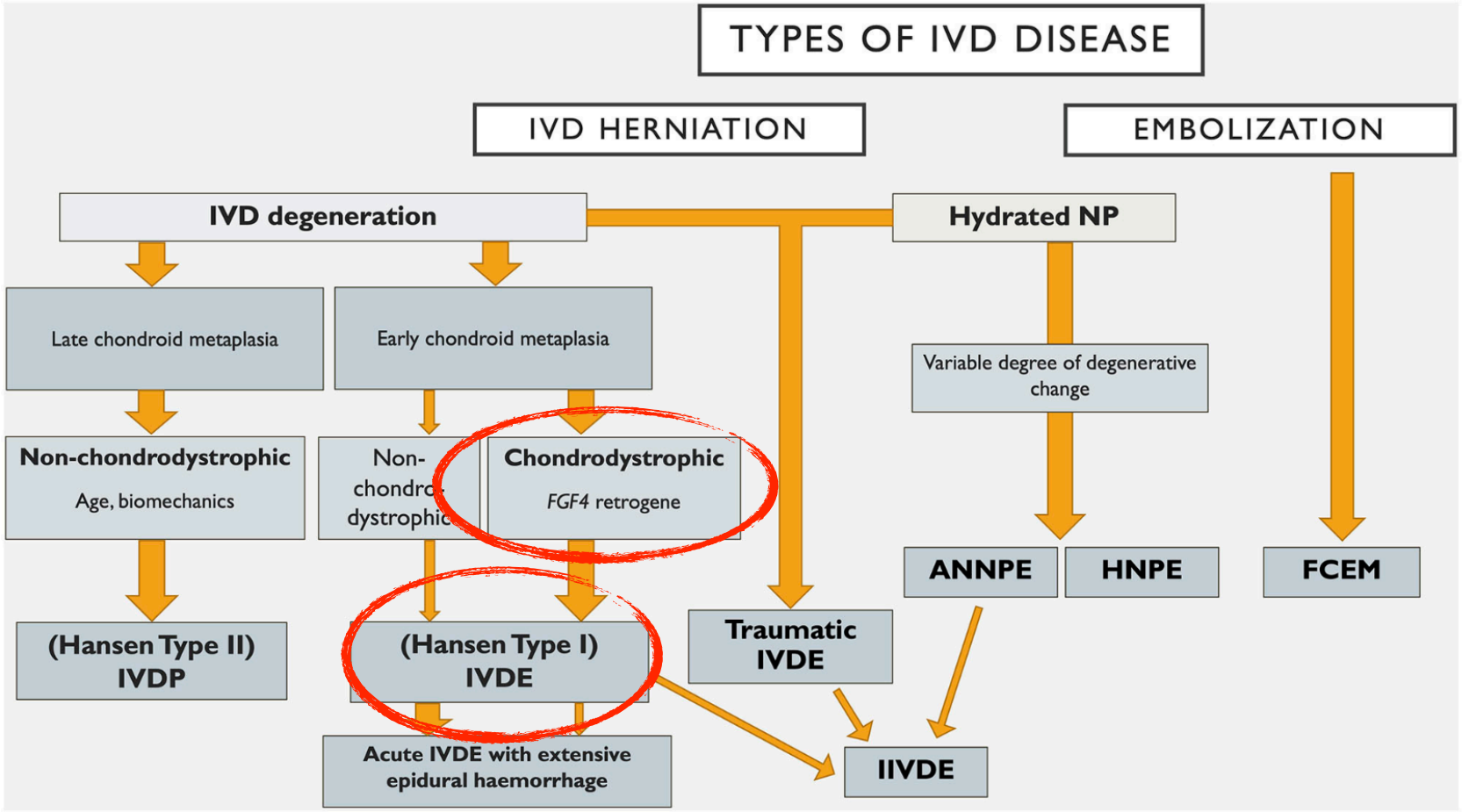
CT


CT
T13-L1

MRI


MRI
L1
L2
L2 terzo craniale
SX
Tra STIR (8)
Tra T1 FSE 2 SPAZI (7)
L2 terzo craniale
SX
L2 terzo craniale
SX


MRI



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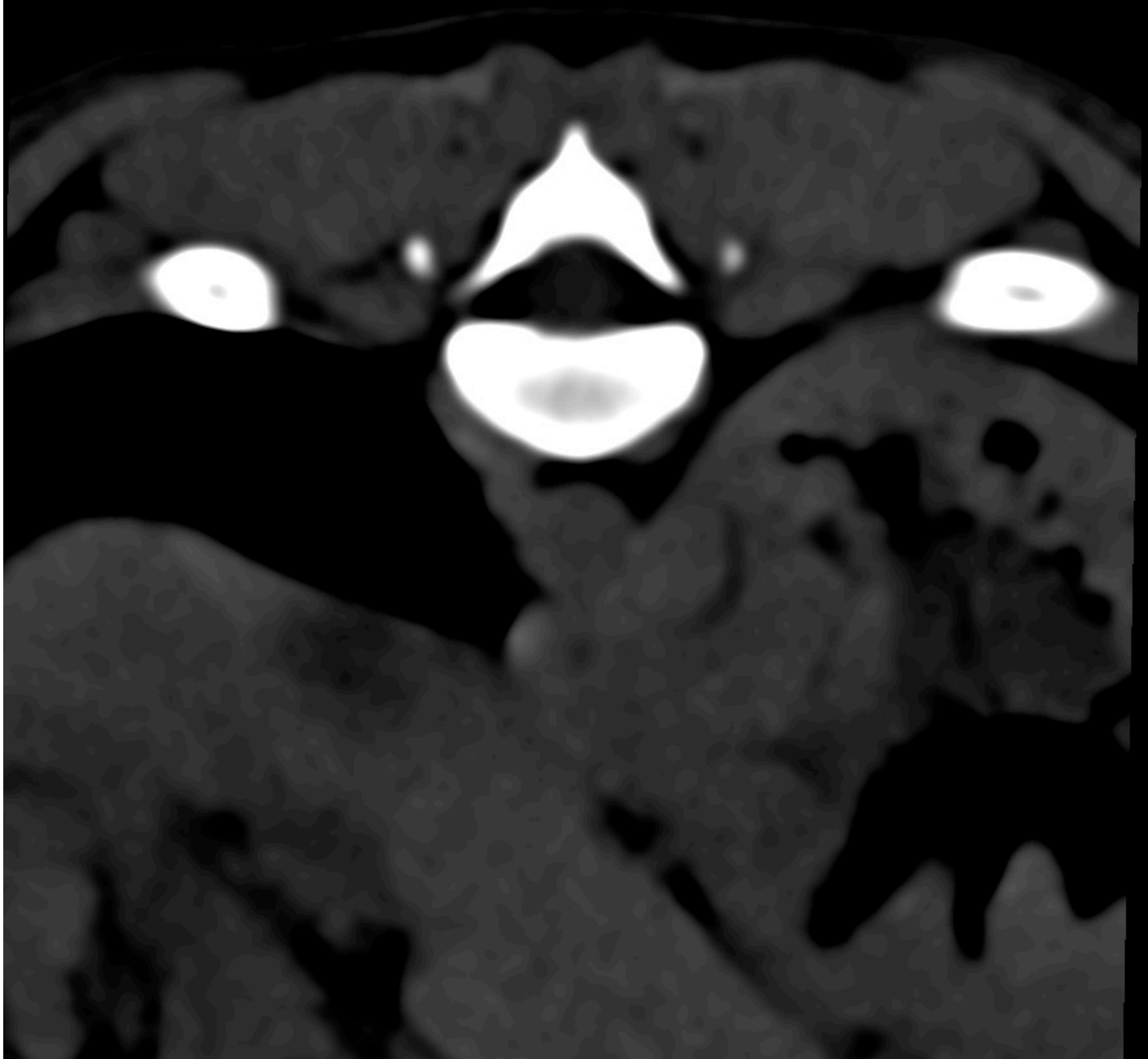
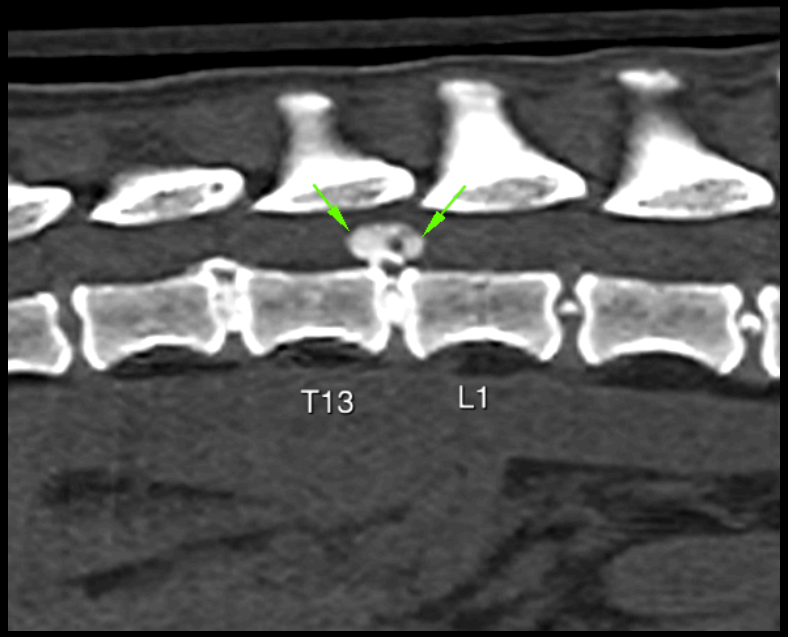
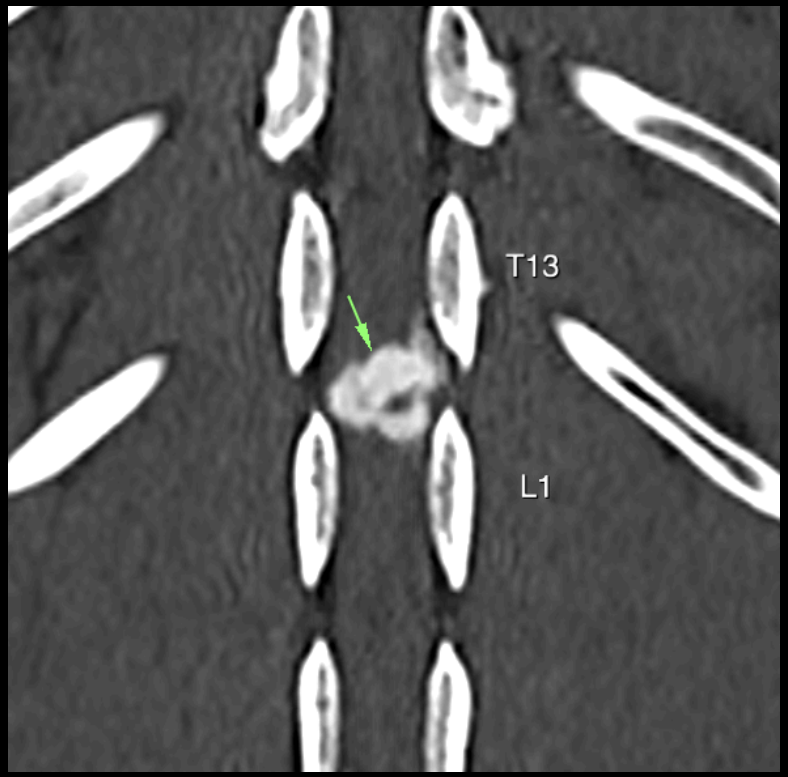
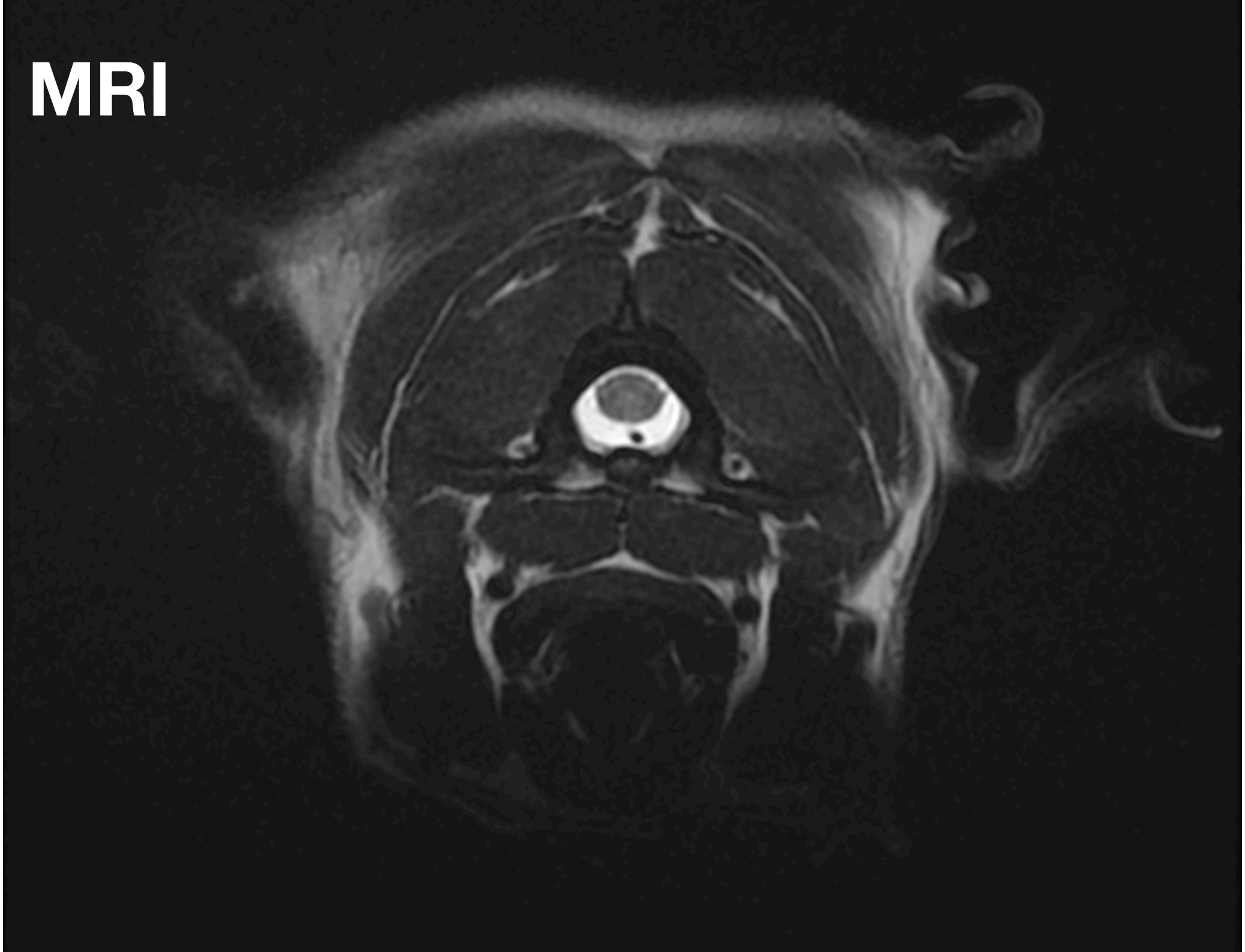
CT



CT



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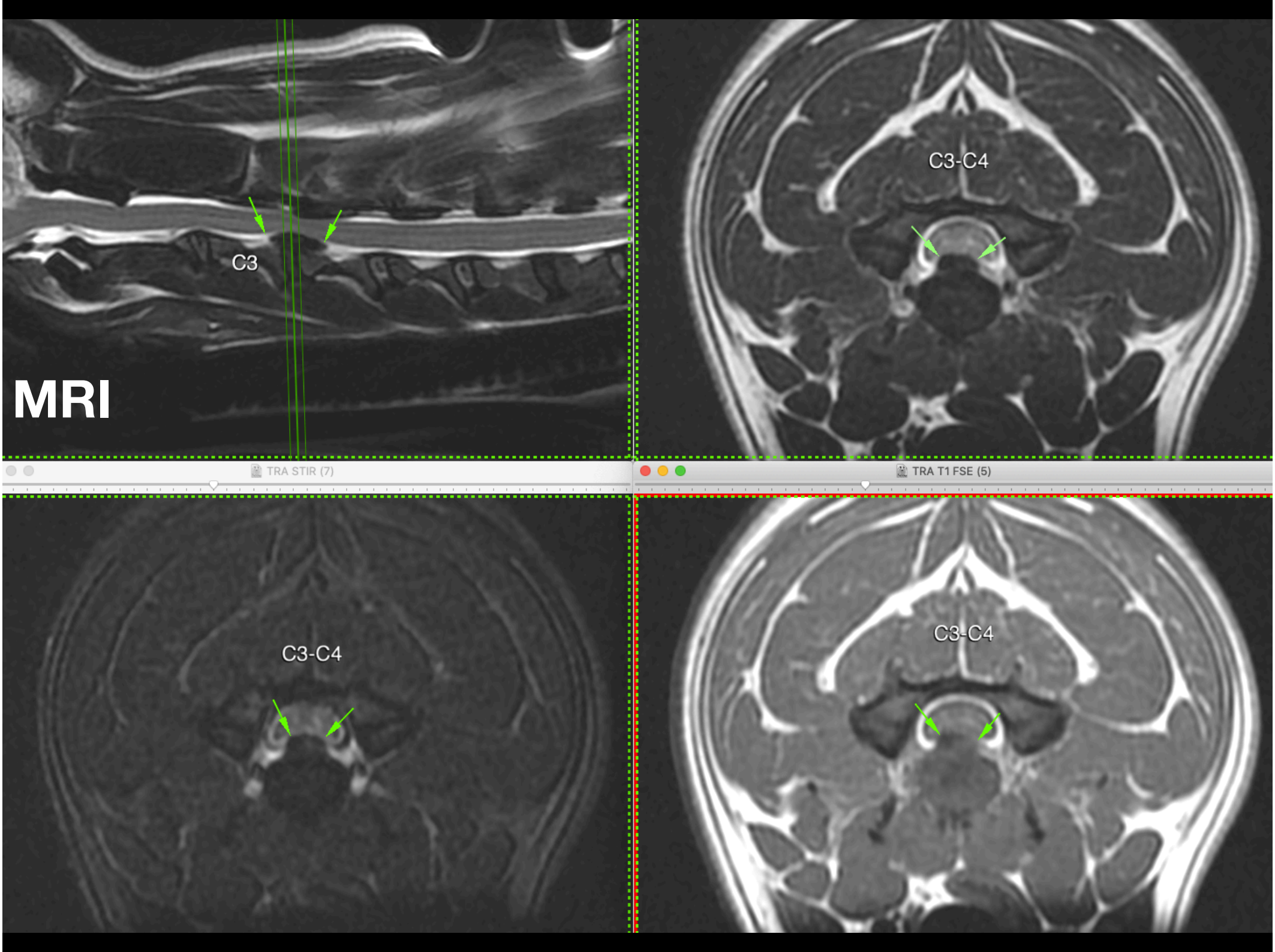

C3
MRI
C3-C4
TRA STIR (7)
TRA T1 FSE (5)
C3-C4
C3-C4

MYELOGRAPHY VS. COMPUTED TOMOGRAPHY IN THE EVALUATION OF ACUTE THORACOLUMBAR INTERVERTEBRAL DISK EXTRUSION IN CHONDRODYSTROPHIC DOGS

SILKE HECHT, WILLIAM B. THOMAS, KATIA MARIONI-HENRY, RITA L. ECHANDI, ANDREA R. MATTHEWS, WILLIAM H. ADAMS

Myelography and/or computed tomography (CT) are commonly used to evaluate acute intervertebral disk extrusion in chondrodystrophic dogs. The purpose of this study was to evaluate the sensitivity of myelography and two different CT protocols in determining level and lateralization of acute thoracolumbar intervertebral disk extrusion in comparison with surgical findings, investigate interobserver variability, and determine examination duration times. Results of conventional CT, helical CT, and myelography were compared with surgical findings in 19 chondrodystrophic dogs with acute thoracolumbar intervertebral disk extrusion. Agreement among investigators was determined for different imaging modalities, and examination times were recorded. In the diagnosis of level of disk extrusion there was agreement of myelography, conventional CT, and helical CT with surgical findings in 94.7%, 100%, and 94.7% of dogs, respectively ($P = 0.144$). In the diagnosis of level and lateralization of disk extrusion there was agreement of myelography, conventional CT, and helical CT with surgical findings in 78.9%, 87.4%, and 85.3% of dogs, respectively ($P = 0.328$). Interobserver agreement was very good for all imaging modalities (myelography $\kappa = 0.87$; conventional CT $\kappa = 0.86$; helical CT $\kappa = 0.95$). There were significant differences in median examination duration times between helical CT (4 min), conventional CT (8 min), and myelography (32 min) ($P < 0.001$). Both helical and conventional CT appear to be accurate for evaluation of acute thoracolumbar intervertebral disk extrusion in chondrodystrophic dogs and are faster to perform than myelography. *Veterinary Radiology & Ultrasound, Vol. 50, No. 4, 2009, pp 353–359.*

COMPARISON BETWEEN NONCONTRAST COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING FOR DETECTION AND CHARACTERIZATION OF THORACOLUMBAR MYELOPATHY CAUSED BY INTERVERTEBRAL DISK HERNIATION IN DOGS

JOCELYN J. COOPER, BENJAMIN D. YOUNG, JOHN F. GRIFFIN IV, GEOFFREY T. FOSGATE, JONATHAN M. LEVINE

Sensitivity CT: 88,6%
Sensitivity MRI: 98,5%

0.542, 0.842, $P = 0.003$). Findings from the current study indicated that MR imaging was more sensitive and accurate than noncontrast CT for diagnosis and characterization of thoracolumbar myelopathy due to IVDH in dogs. © 2013 *American College of Veterinary Radiology.*

Received: 23 May 2017 | Revised: 8 August 2017 | Accepted: 10 September 2017

DOI: 10.1111/vru.12576

ORIGINAL INVESTIGATION

WILEY

Investigation of parameters predicting the need for diagnostic imaging beyond computed tomography in the evaluation of dogs with thoracolumbar myelopathy: Retrospective evaluation of 555 dogs

Lee Emery[1] | Silke Hecht[1] | Xiaocun Sun[2]

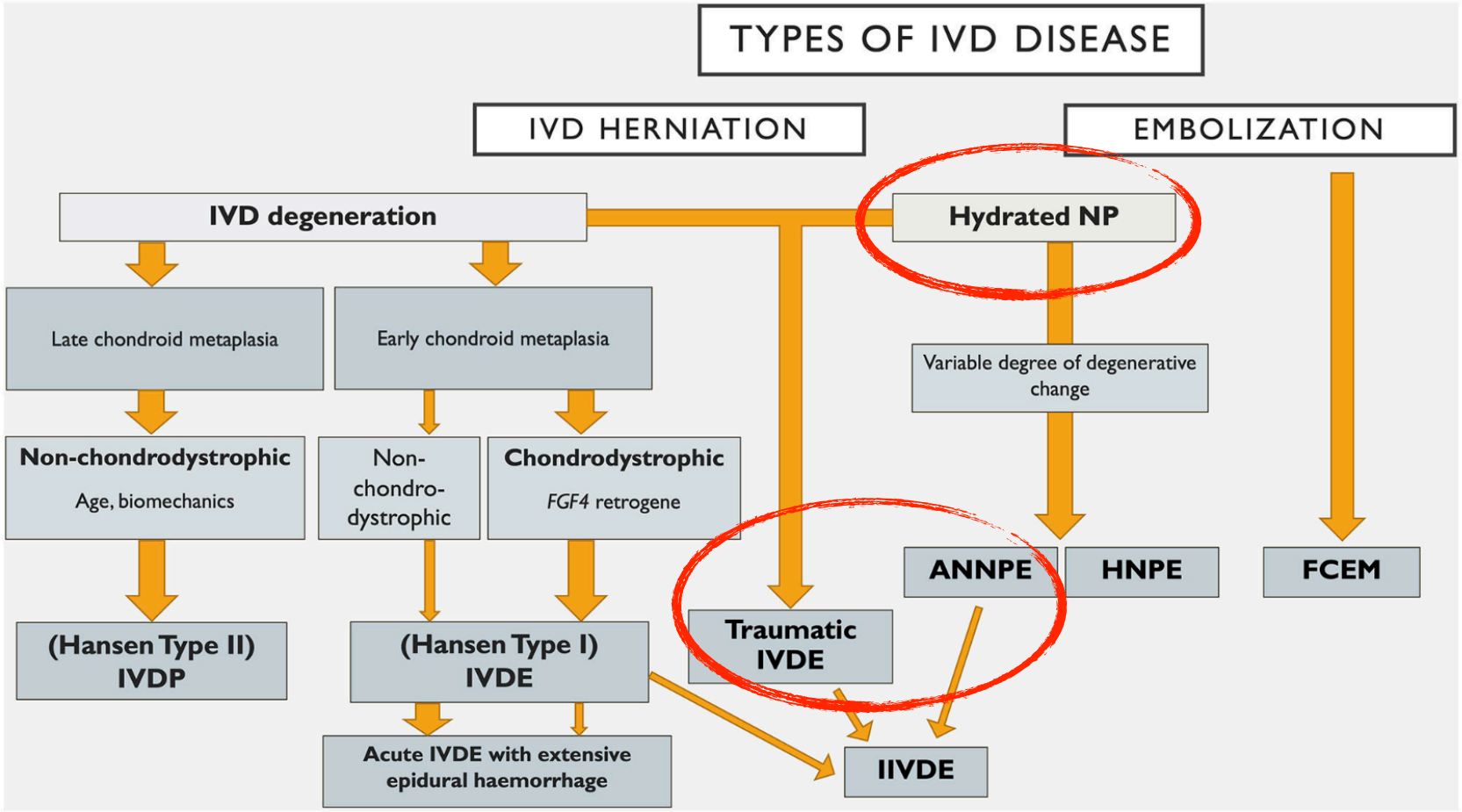
This study found that overall only 7.6% of dogs presenting for thoracolumbar myelopathy required any advanced imaging procedures (in the form of myelography, CT myelography, or MRI) beyond a helical CT scan. There are, however, characteristics of the patient or individual

In summary, findings supported the use of conventional helical CT as a first line imaging modality for dogs presenting with thoracolumbar myelopathy. The likelihood that additional imaging will be required increases with increasing patient age, studies performed after normal business hours, lack of a surgical lesion identified on CT, and in non-Dachshunds.

IMAGING DOGS WITH SUSPECTED DISC HERNIATION: PROS AND CONS OF MYELOGRAPHY, COMPUTED TOMOGRAPHY, AND MAGNETIC RESONANCE

IAN ROBERTSON, DONALD E. THRALL

Myelography, computed tomography (CT), and magnetic resonance (MR) imaging are the diagnostic modalities currently used in the evaluation of dogs with suspected disc herniation. Where high-field MR imaging is available, it is considered the optimal modality for any myelopathy in dogs, including those with disc disease. CT myelography may be the next best option, particularly in nonchondrodystrophoid dogs. In chondrodystrophoid dogs, in which extrusion of mineralized disc material is common, plain CT will enable diagnosis in most cases. Myelography is still considered adequate for diagnosis of disc herniation when MR and CT are unavailable. © 2011 *Veterinary Radiology & Ultrasound, Vol. 52, No. 1, Supp. 1, 2011, pp S81–S84.*



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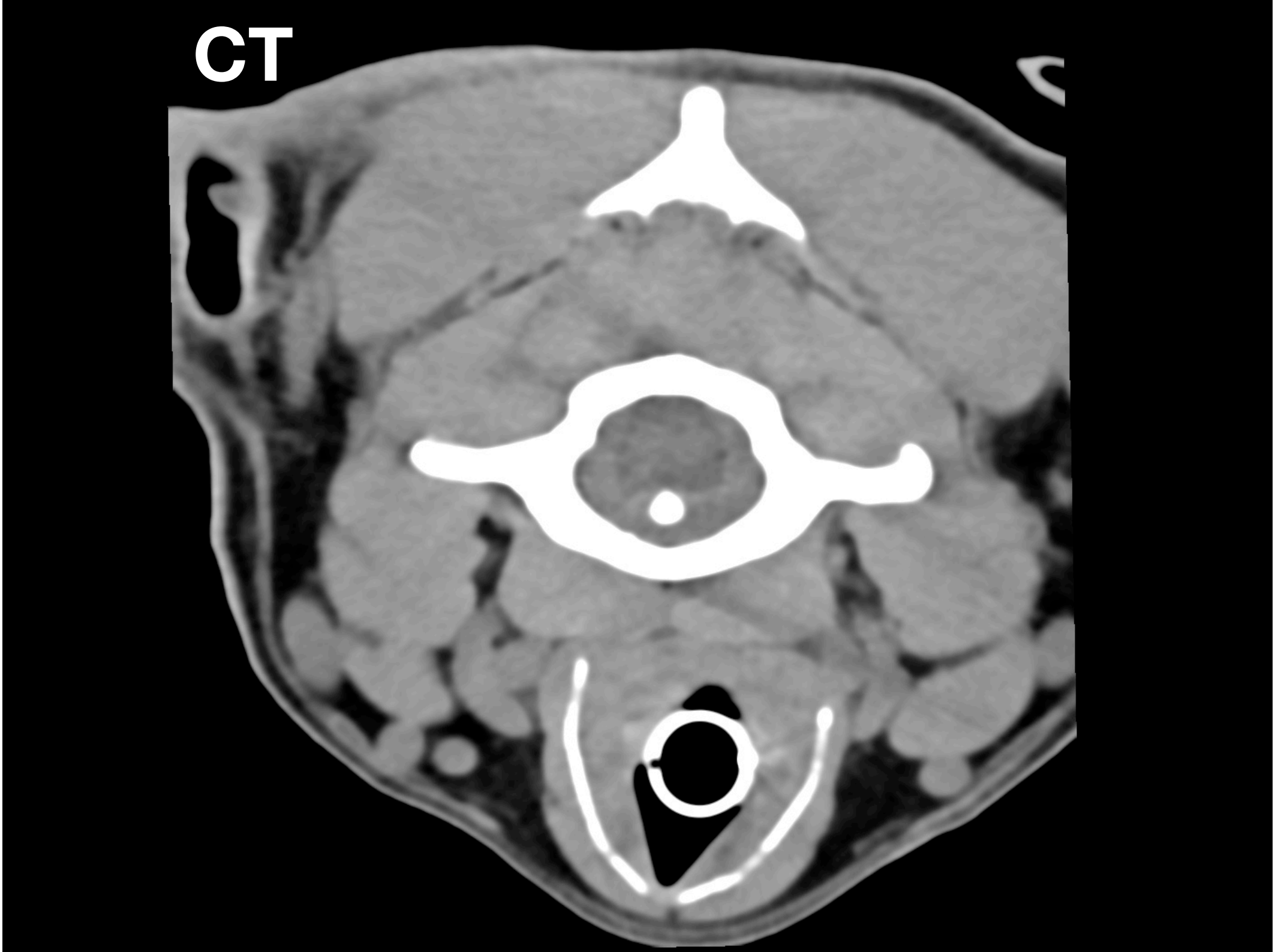
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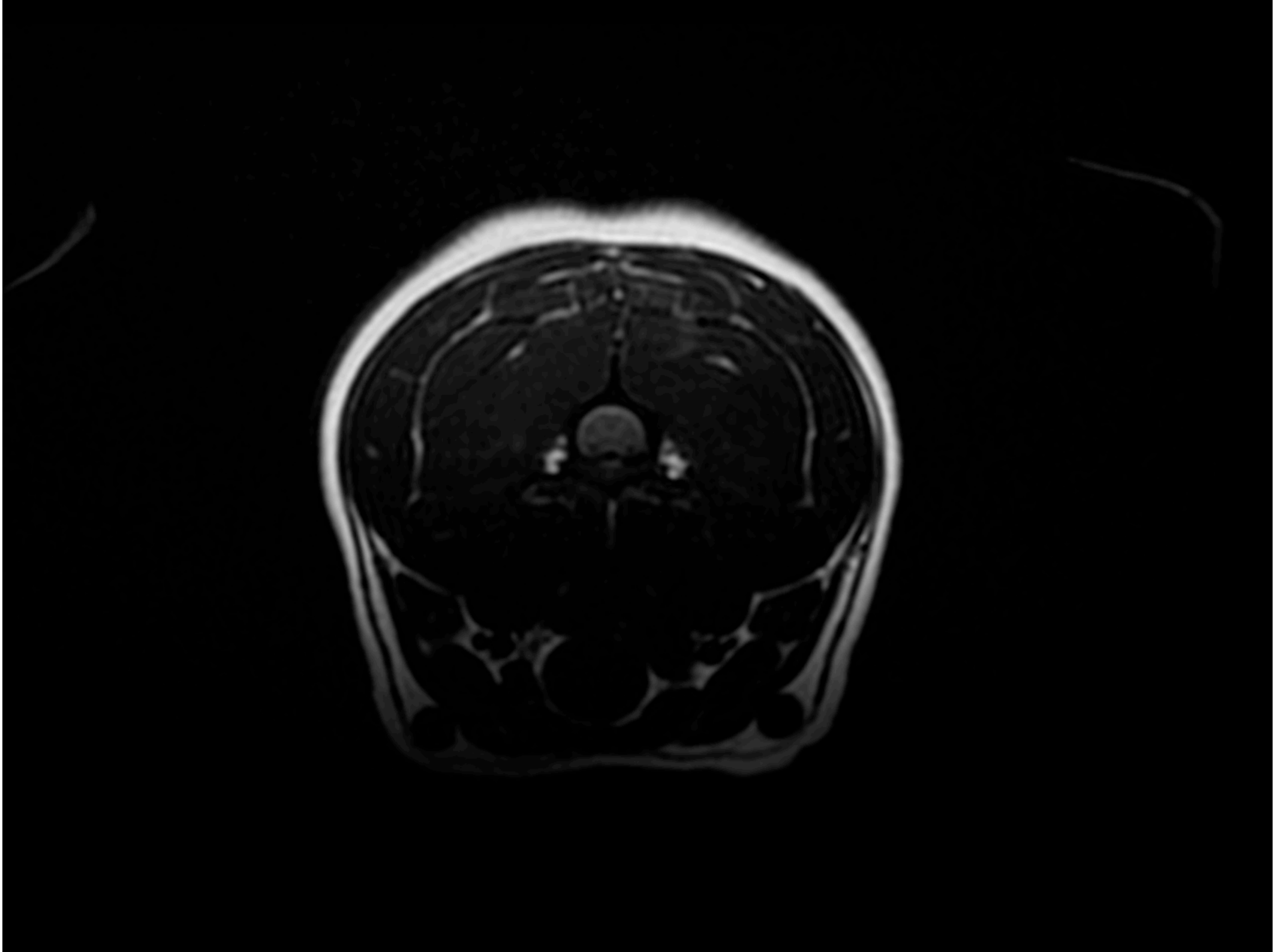

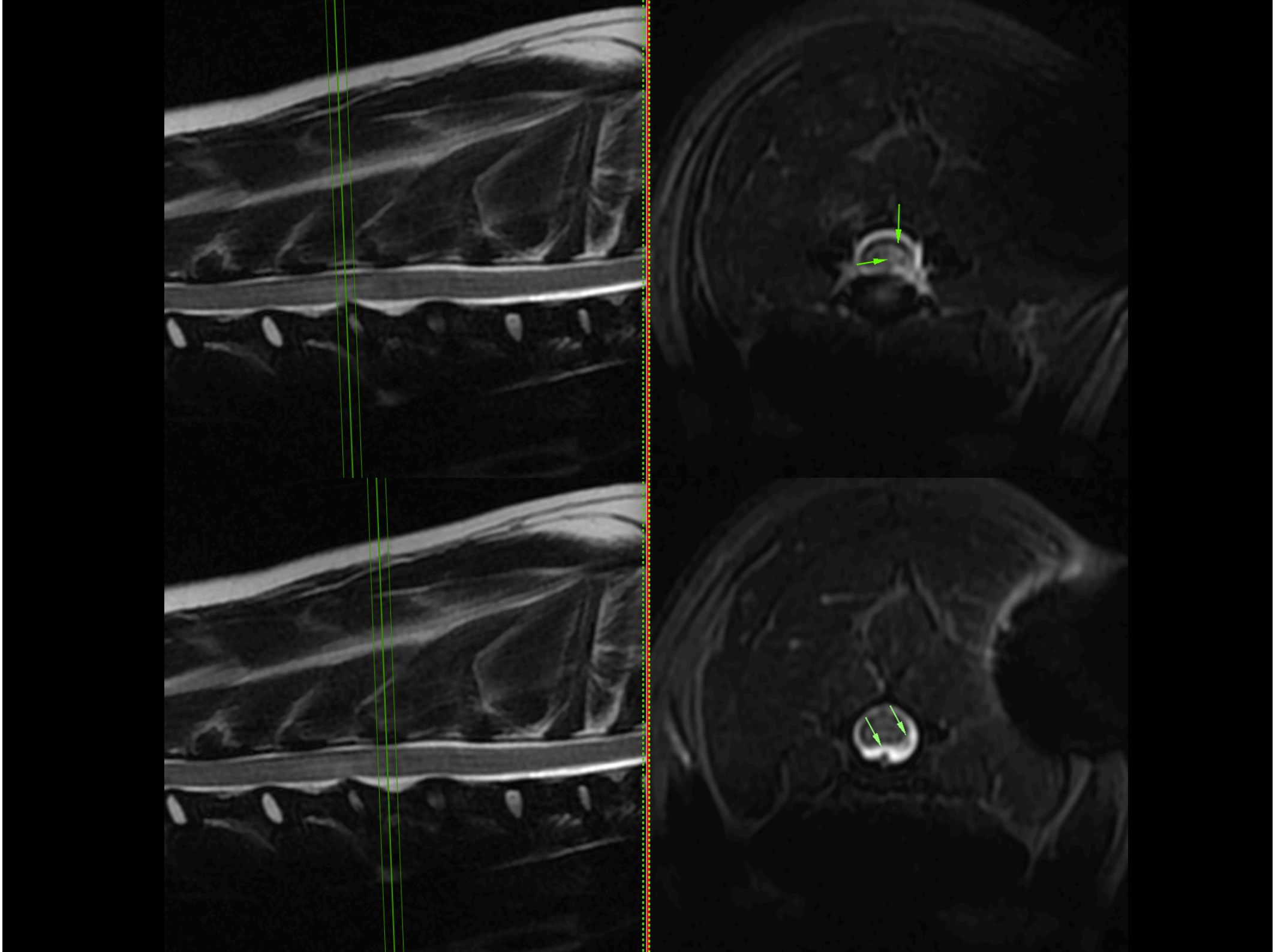

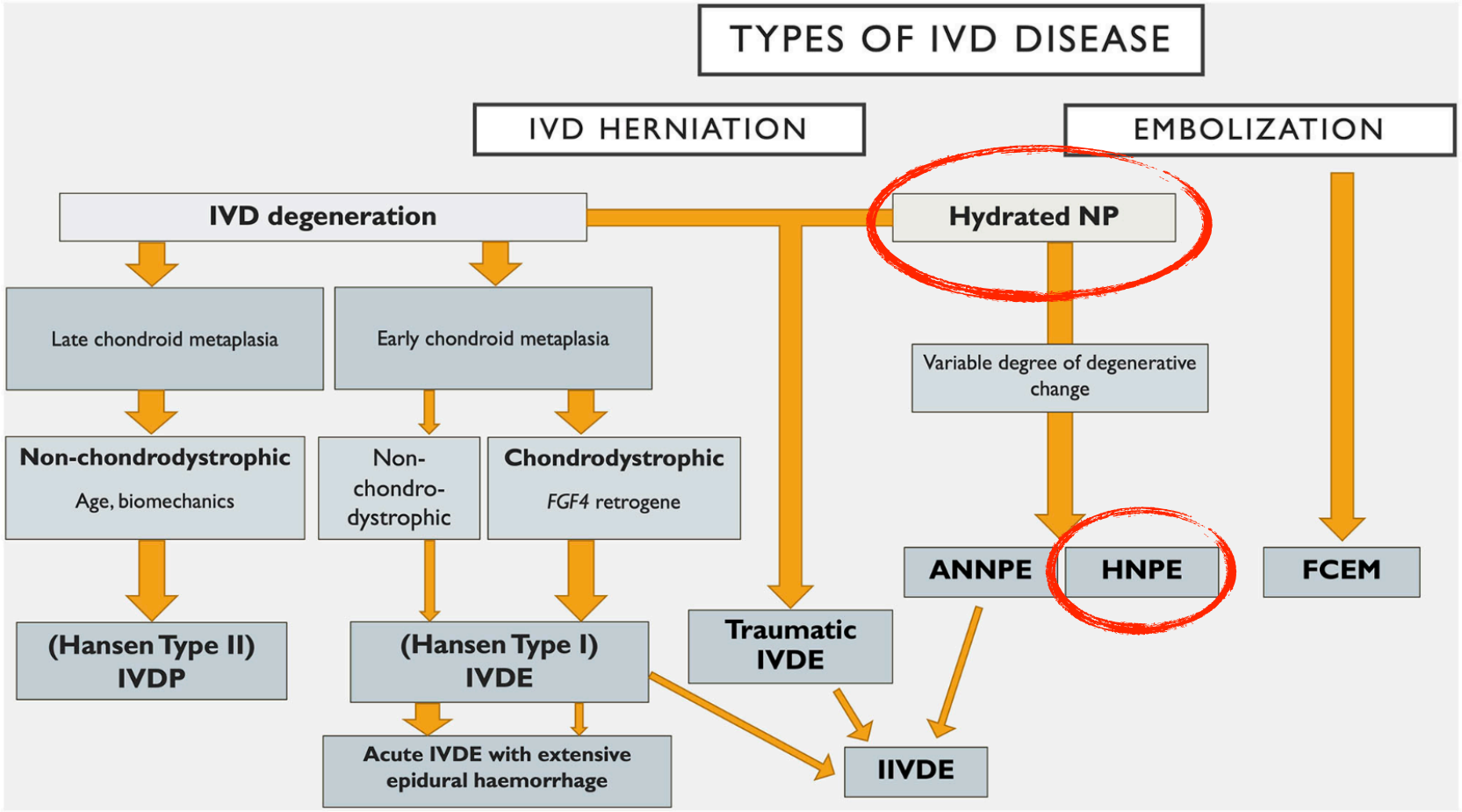

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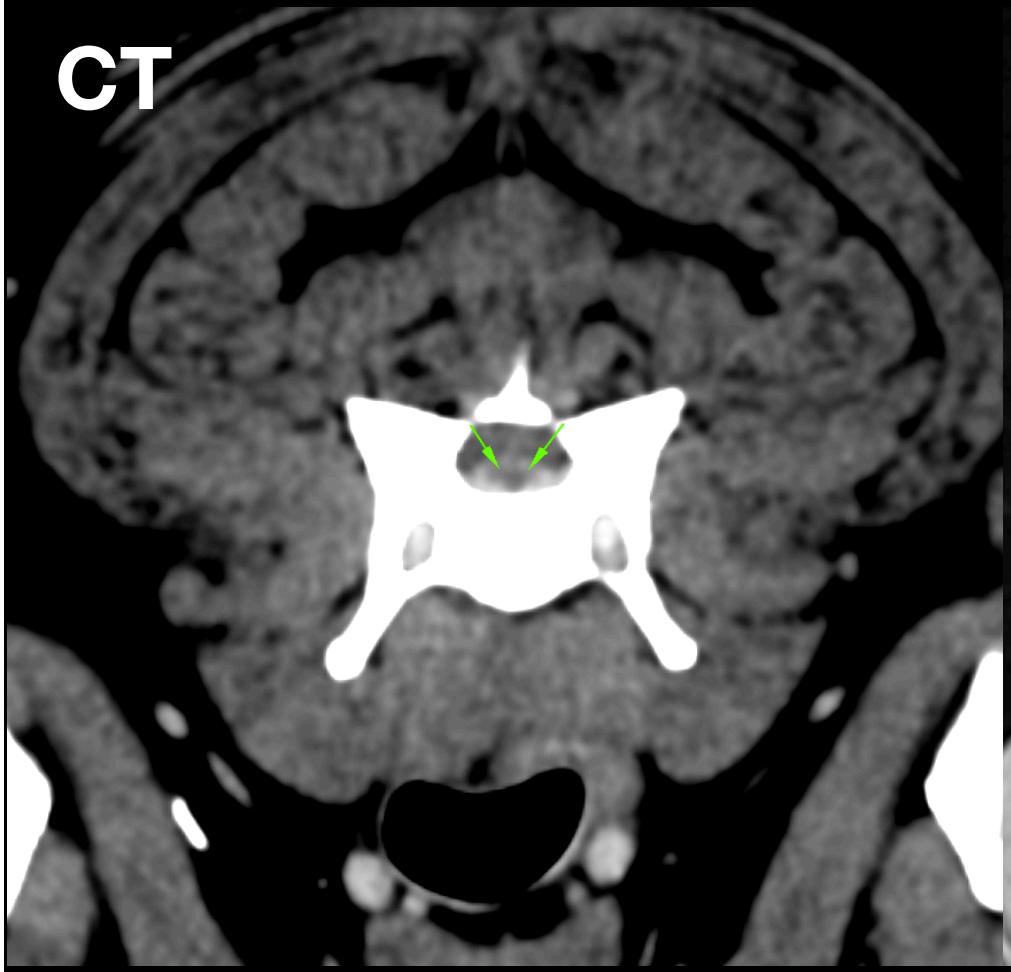
CT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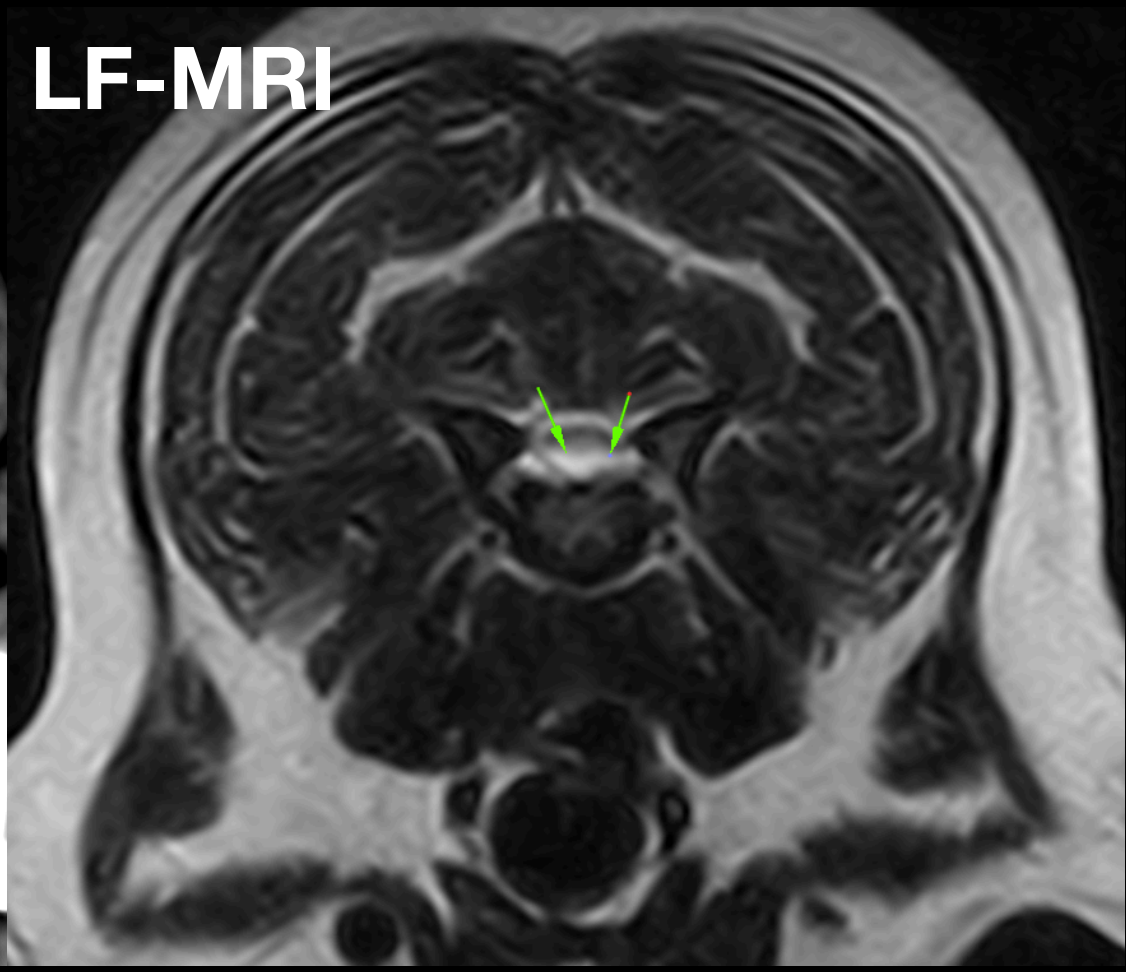
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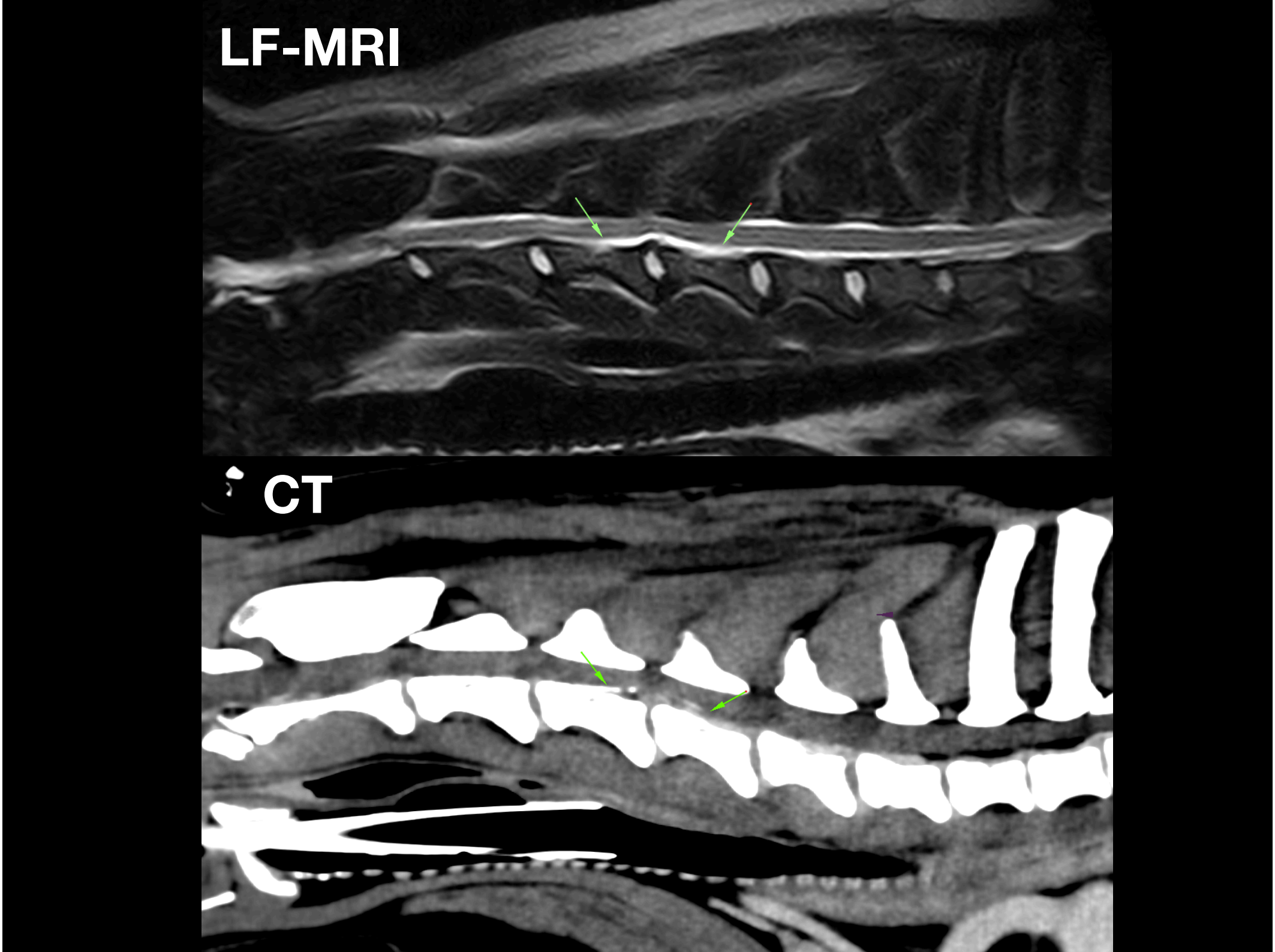
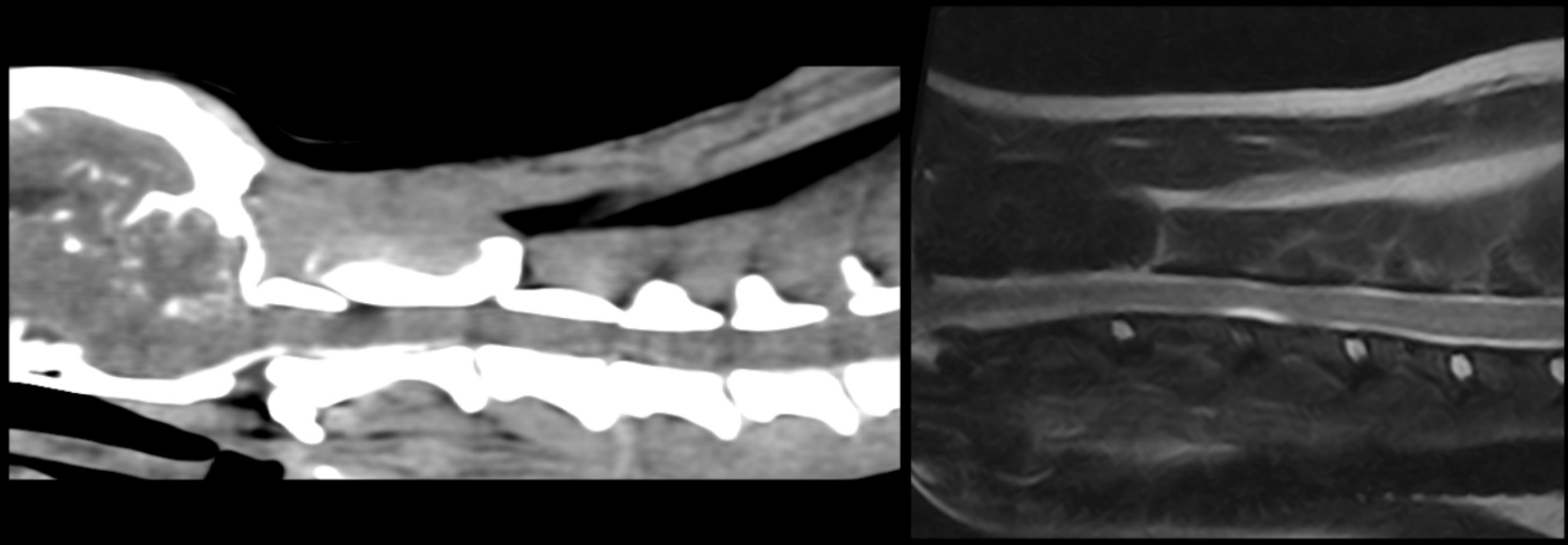
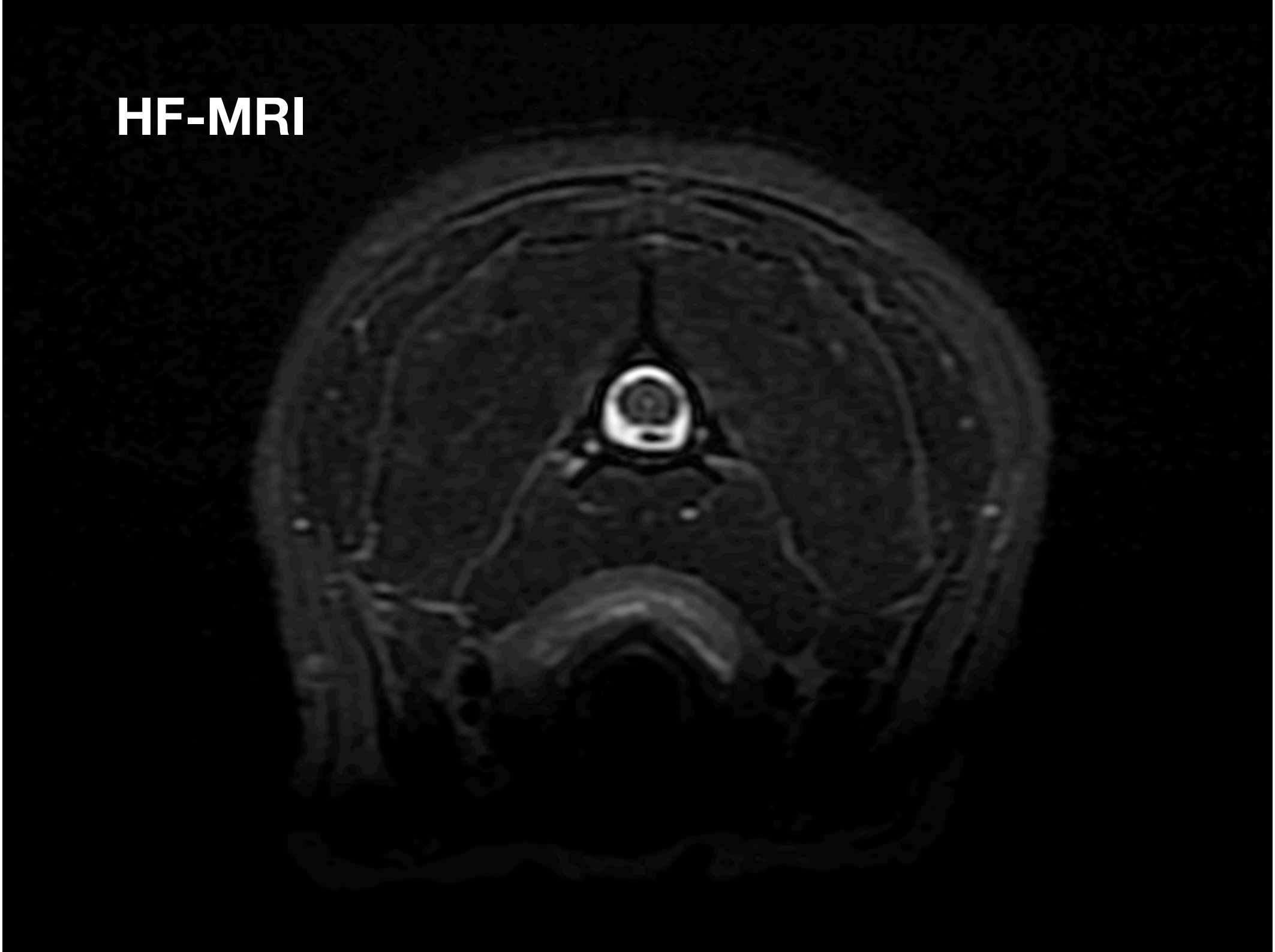
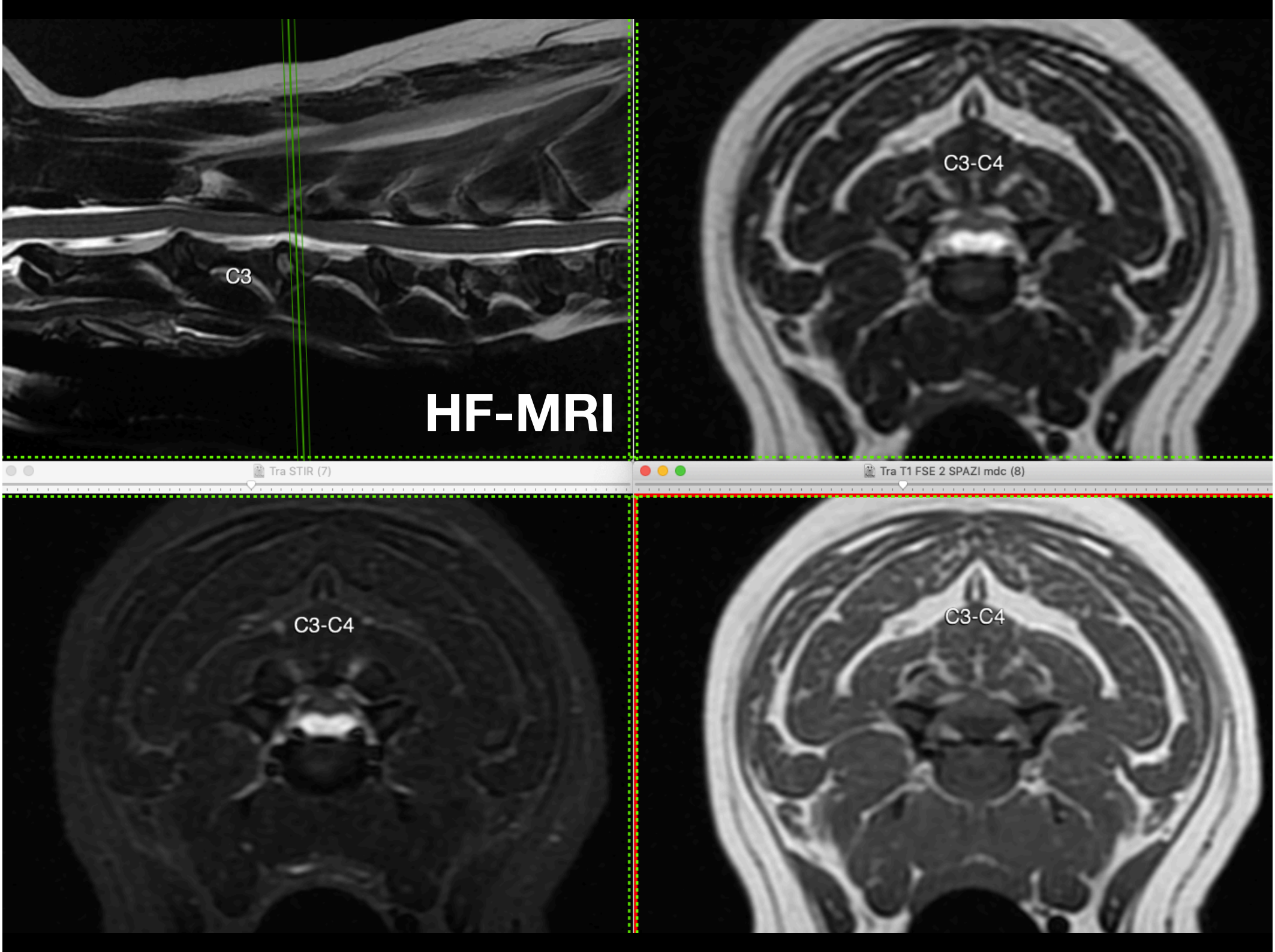

LF-MRI
CT




HF-MRI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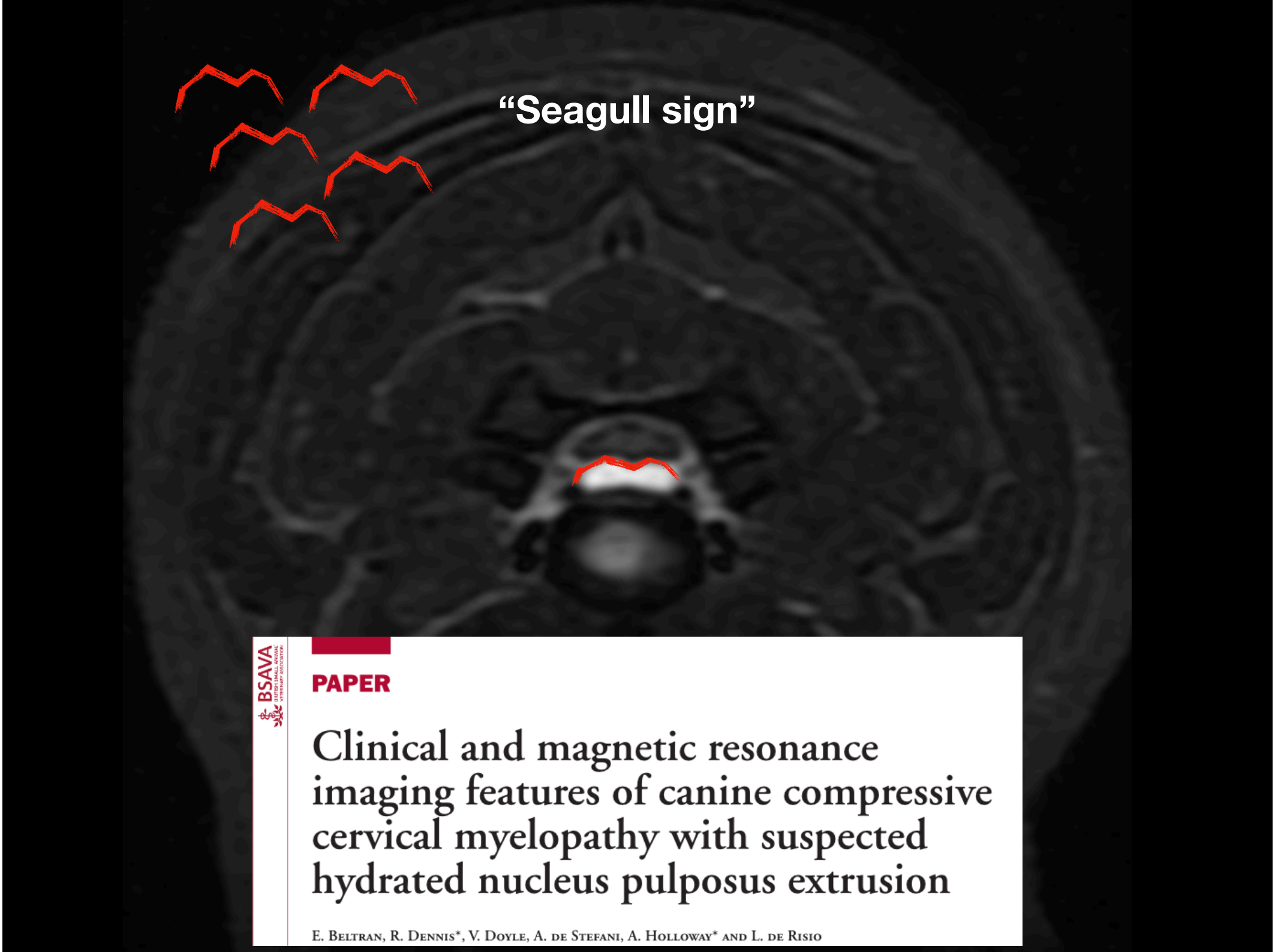
HF-MRI
C3-C4
Tra STIR (7)
Tra T1 FSE 2 SPAZI mdc (8)
C3-C4
C3-C4



PAPER

Clinical and magnetic resonance imaging features of canine compressive cervical myelopathy with suspected hydrated nucleus pulposus extrusion

E. Beltran, R. Dennis*, V. Doyle, A. de Stefani, A. Holloway* and L. de Risio

The Veterinary Journal 216 (2016) 202–206

Contents lists available at ScienceDirect

The Veterinary Journal

journal homepage: www.elsevier.com/locate/tvjl

Detection of compressive hydrated nucleus pulposus extrusion in dogs with multislice computed tomography

E. Royaux [a,*], V. Martlé [a], K. Kromhout [b], E. Van der Vekens [b], B.J.G. Broeckx [c], L. Van Ham [a], I. Gielen [b]

[a] Department of Small Animal Medicine and Clinical Biology, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, Merelbeke, Belgium
[b] Department of Veterinary Medical Imaging and Small Animal Orthopaedics, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, Merelbeke, Belgium
[c] Laboratory of Pharmaceutical Biotechnology, Faculty of Pharmaceutical Sciences, Ghent University, Ottergemsesteenweg 460, Ghent, Belgium

ARTICLE INFO

Article history:
Accepted 23 August 2016

Keywords:
Canine
Intervertebral disc disease
Compressive hydrated nucleus pulposus extrusion
Contrast enhanced computed tomography

ABSTRACT

Compressive hydrated nucleus pulposus extrusion (HNPE) in dogs is defined as acute extradural compression by hydrated nucleus pulposus material at the level of the associated intervertebral disc. Magnetic resonance imaging (MRI) is the imaging modality of choice for diagnosis of HNPE. The aims of this study were to determine the usefulness of unenhanced computed tomography (CT) and contrast enhanced CT (CE-CT), and the sensitivity and specificity of CE-CT, for detection of compressive HNPE. Using CE-CT, HNPE was visualised as a hypodense extradural compressive lesion with rim enhancement immediately dorsal to the intervertebral disc space, with a sensitivity of 91% and a specificity of 100%. CE-CT is a useful technique to detect compressive HNPE in dogs. However, if no clear lesion is identified with CE-CT, or if additional information about intramedullary changes is required, MRI still needs to be performed.

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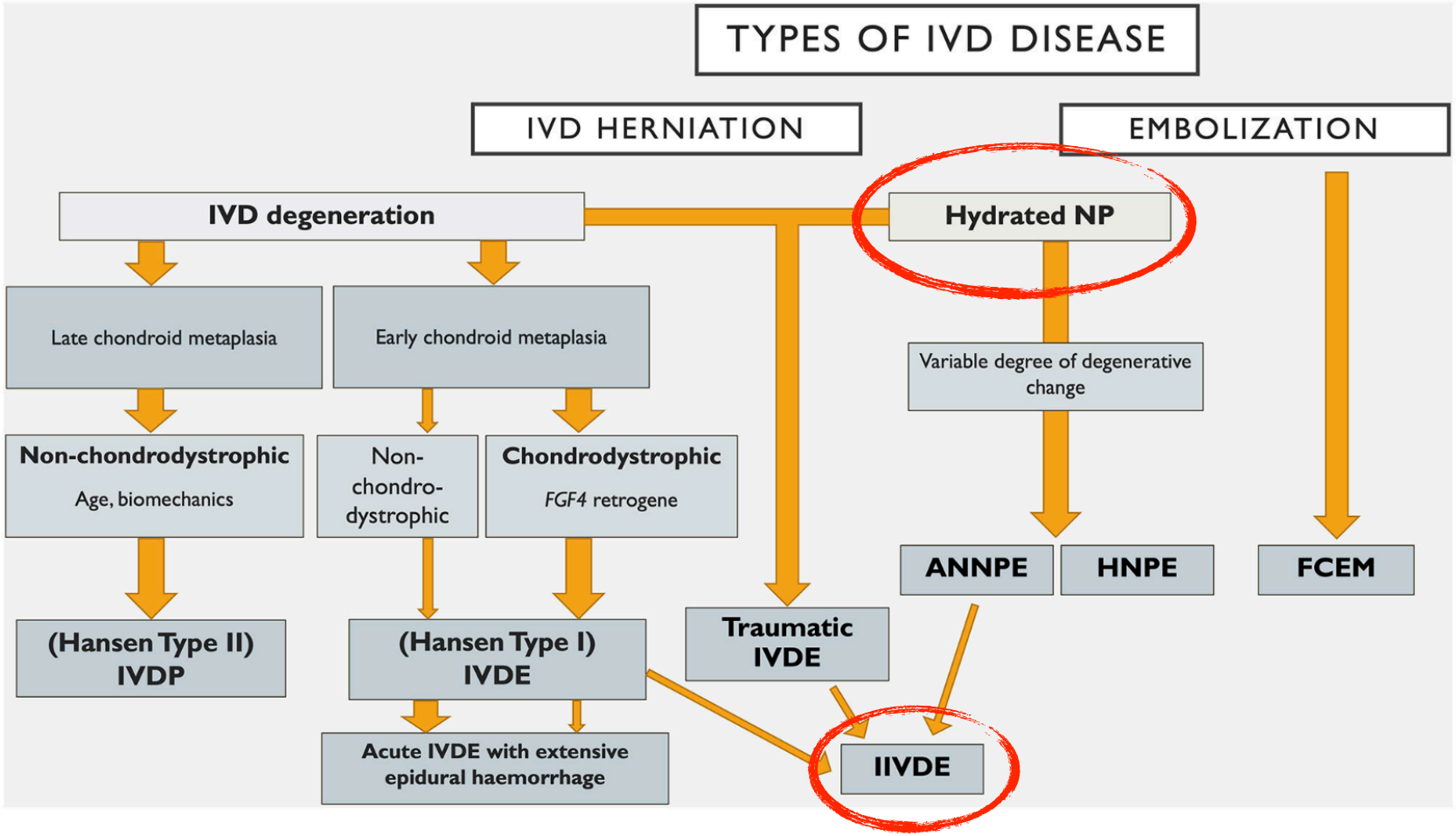
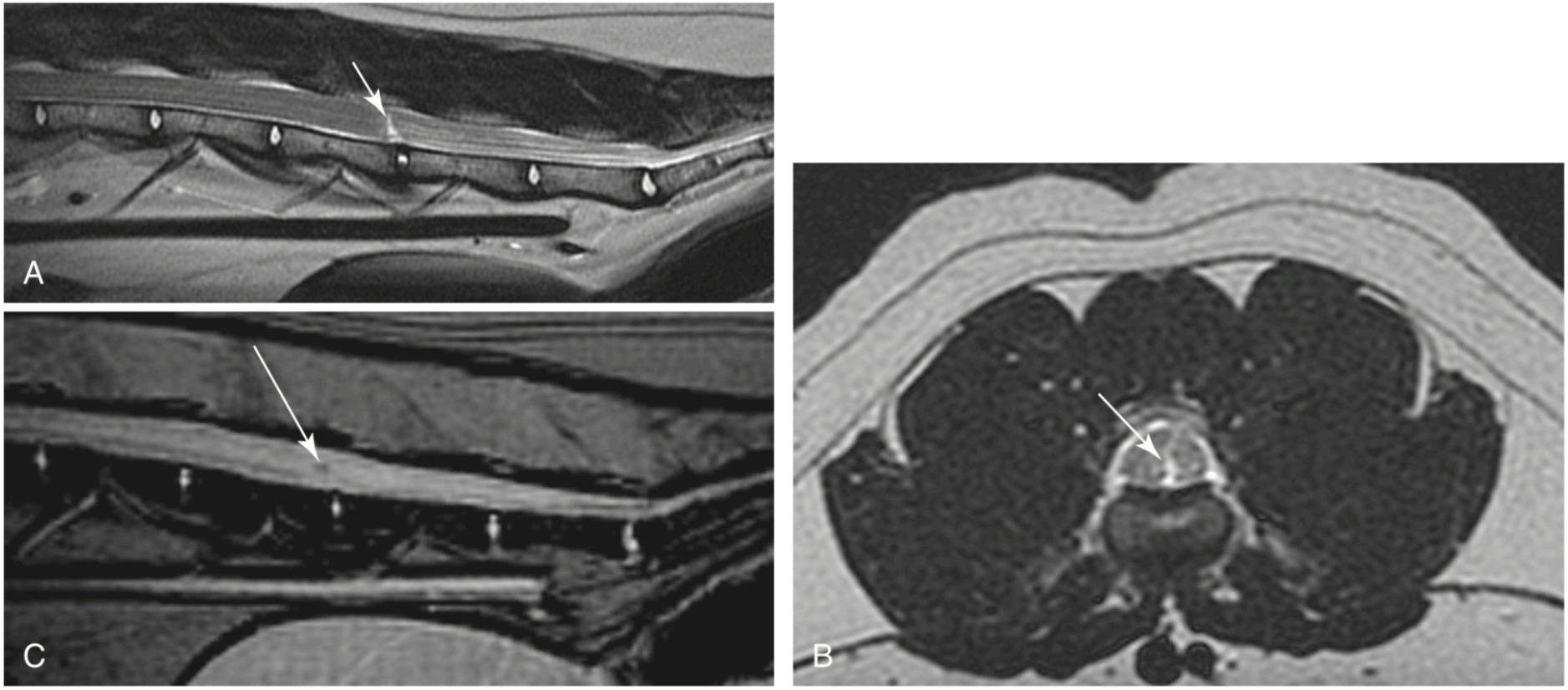


FIGURE 1 | An example of how a classification system for intervertebral disc disease in dogs might evolve. IVD, intervertebral disc; NP, nucleus pulposus; IVDP, intervertebral disc protrusion; IVDE, intervertebral disc extrusion; HNPE, hydrated nucleus pulposus extrusion; ANNPE, acute non-compressive nucleus pulposus extrusion; IIVDE, intradural/intramedullary intervertebral disc extrusion; FCEM, fibrocartilaginous embolic myelopathy.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J Vet Sci. 2020 Jul;21(4):e52
https://doi.org/10.4142/jvs.2020.21.e52
pISSN 1229-845X·eISSN 1976-555X

Journal of Veterinary Science

Original Article

Medical Imaging

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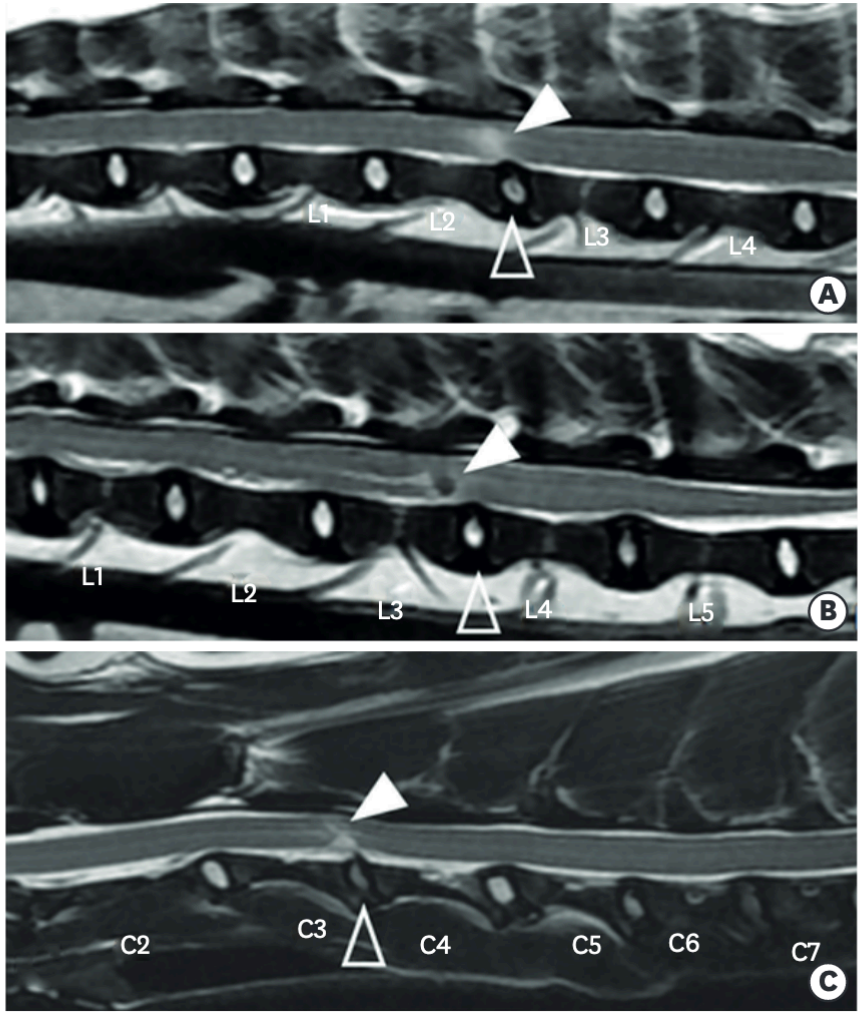
Preliminary study of presumptive intradural-intramedullary intervertebral disc extrusion in 20 dogs

Jaehwan Kim [1], Hyoju Kim [2], Jeongyeon Hwang [2], Kidong Eom [1,*]



PROS AND CONS OF LOW-FIELD MAGNETIC RESONANCE IMAGING IN VETERINARY PRACTICE

MARTIN KONAR, JOHANN LANG

Low-field (LF) (0.2–0.4 T) magnetic resonance (MR) imaging predominates in veterinary practice. Advantages of LF MR include reduced costs, better patient access, and greater safety. High quality examinations can be achieved using appropriate protocols and investing more scanning time than with high-field (HF) systems. The main disadvantage of LF MR is the reduced signal to noise ratio compared with HF systems. LF MR protocols for small animal brain and spine imaging are described. © 2011 *Veterinary Radiology & Ultrasound, Vol. 52, No. 1, Supp. 1, 2011, pp S5–S14.*

myelo-CT

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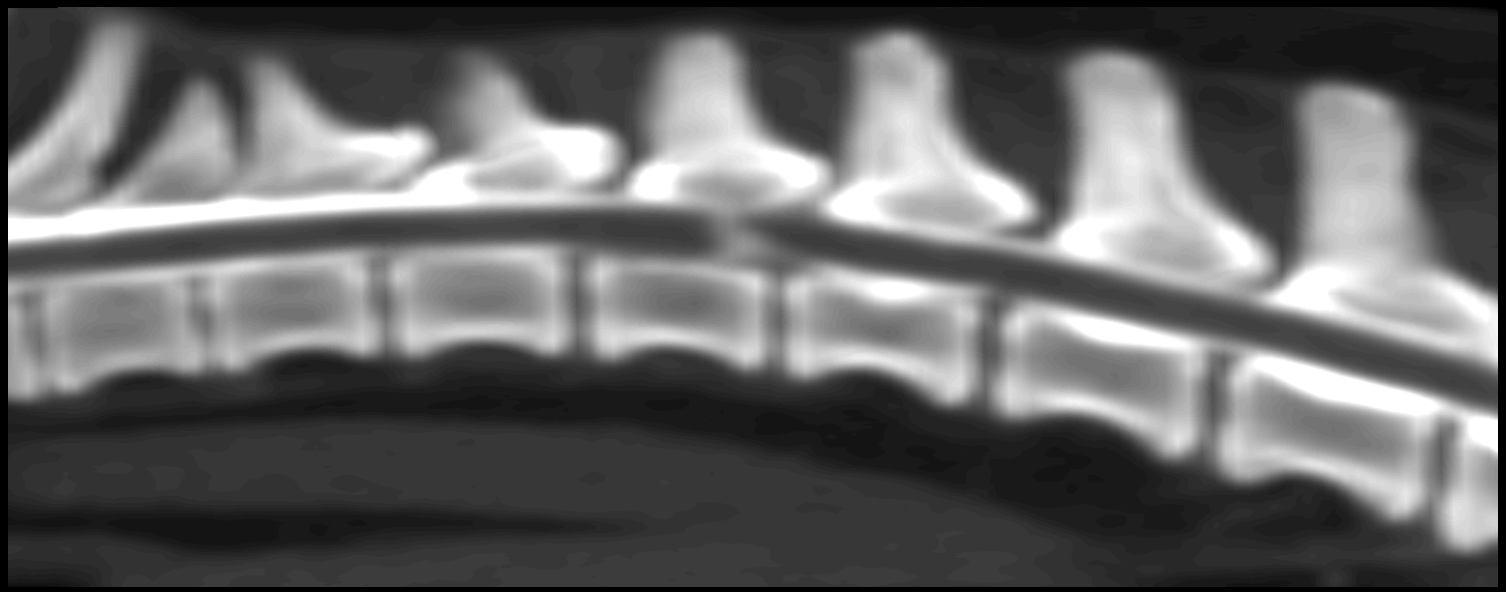

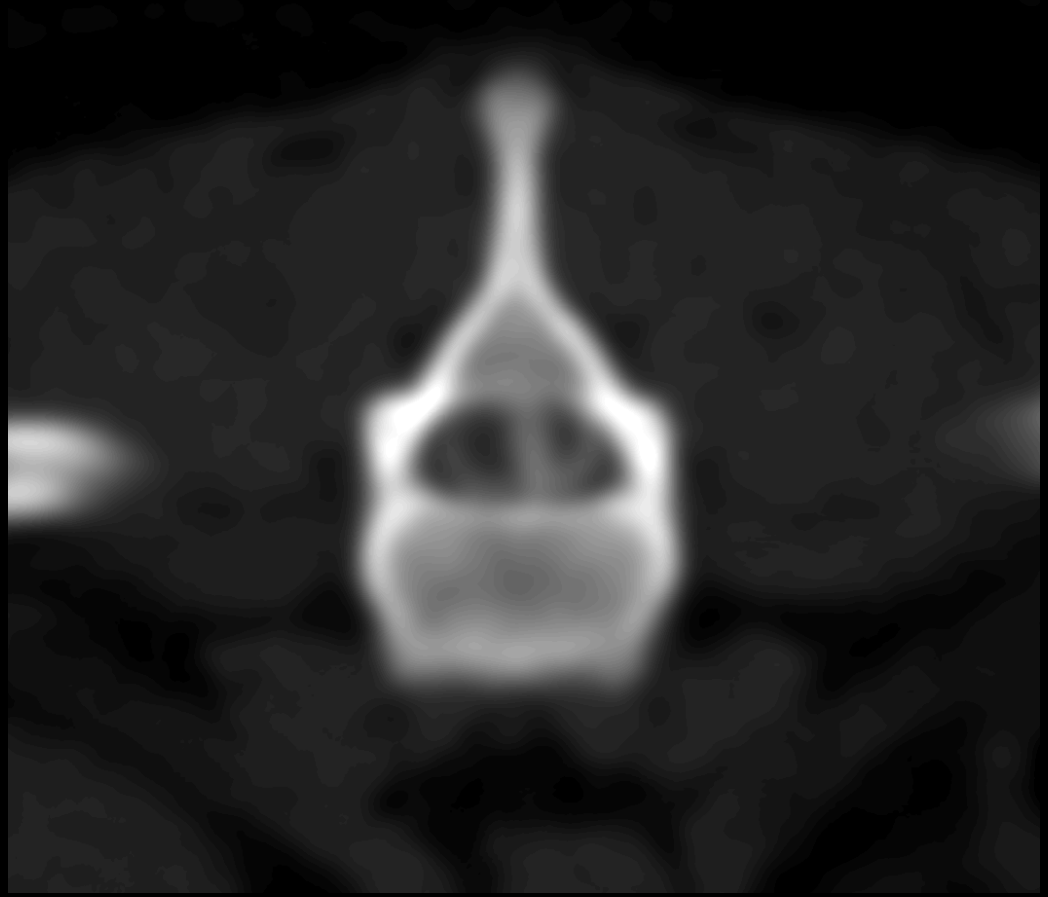

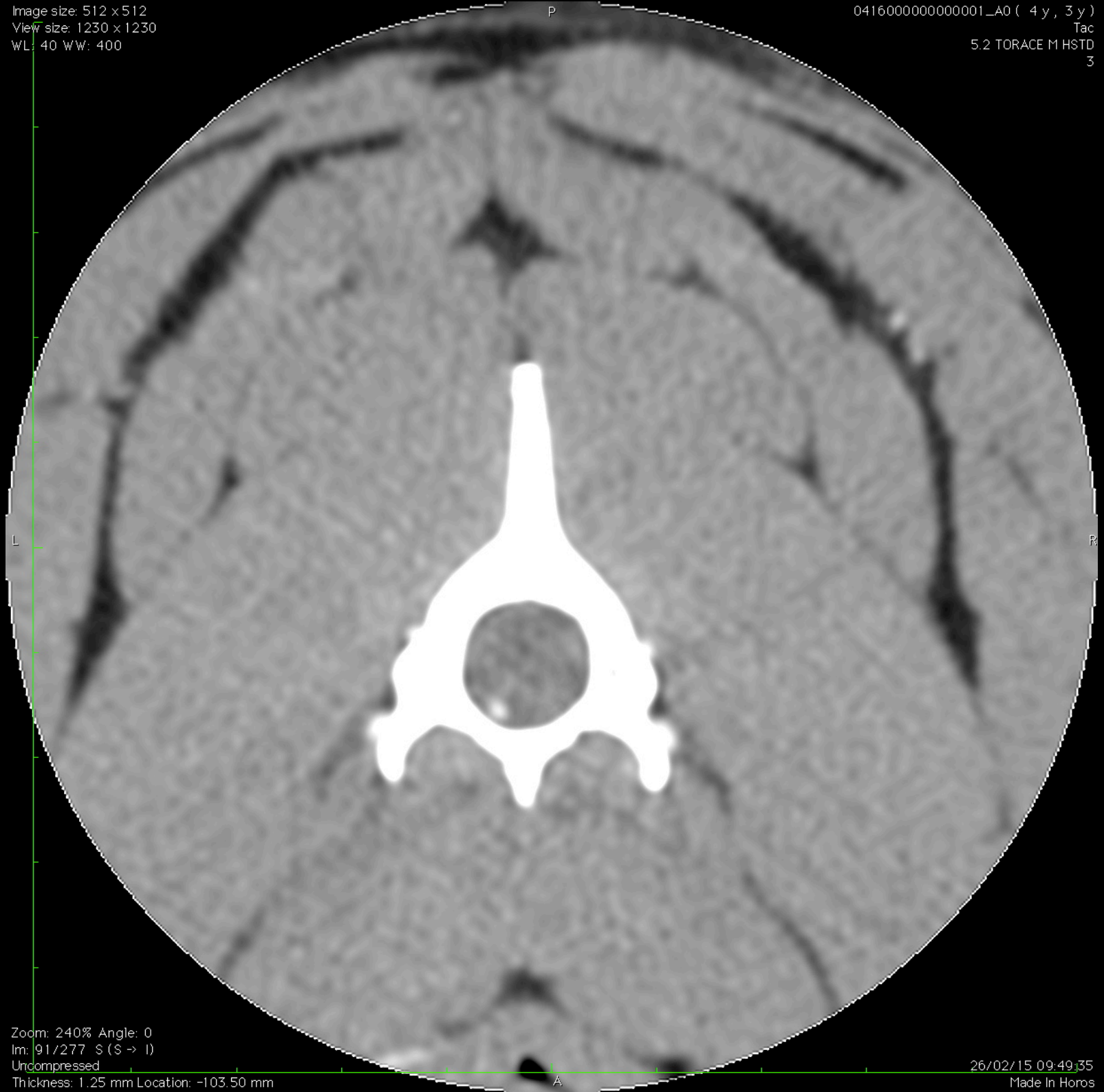
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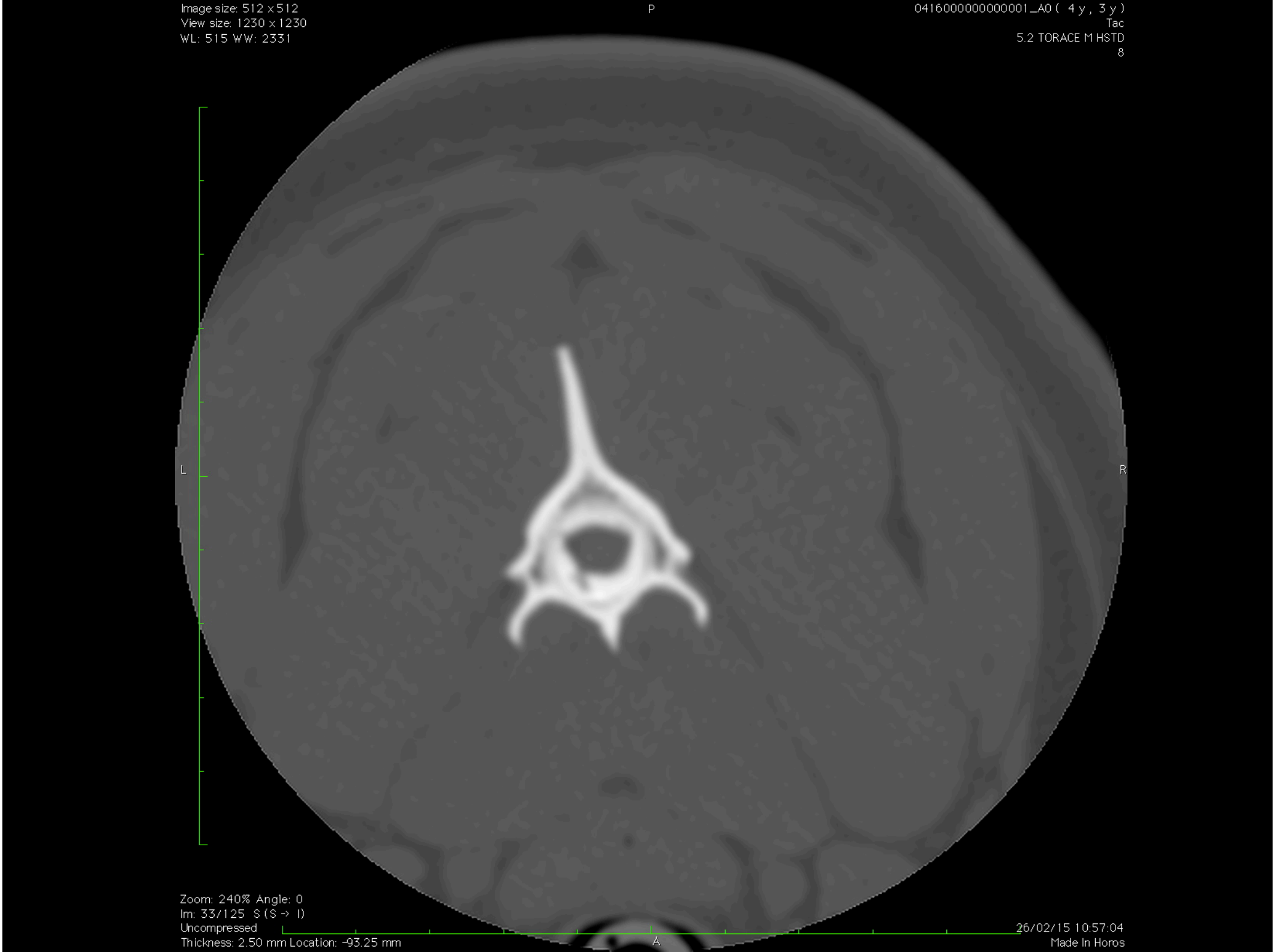
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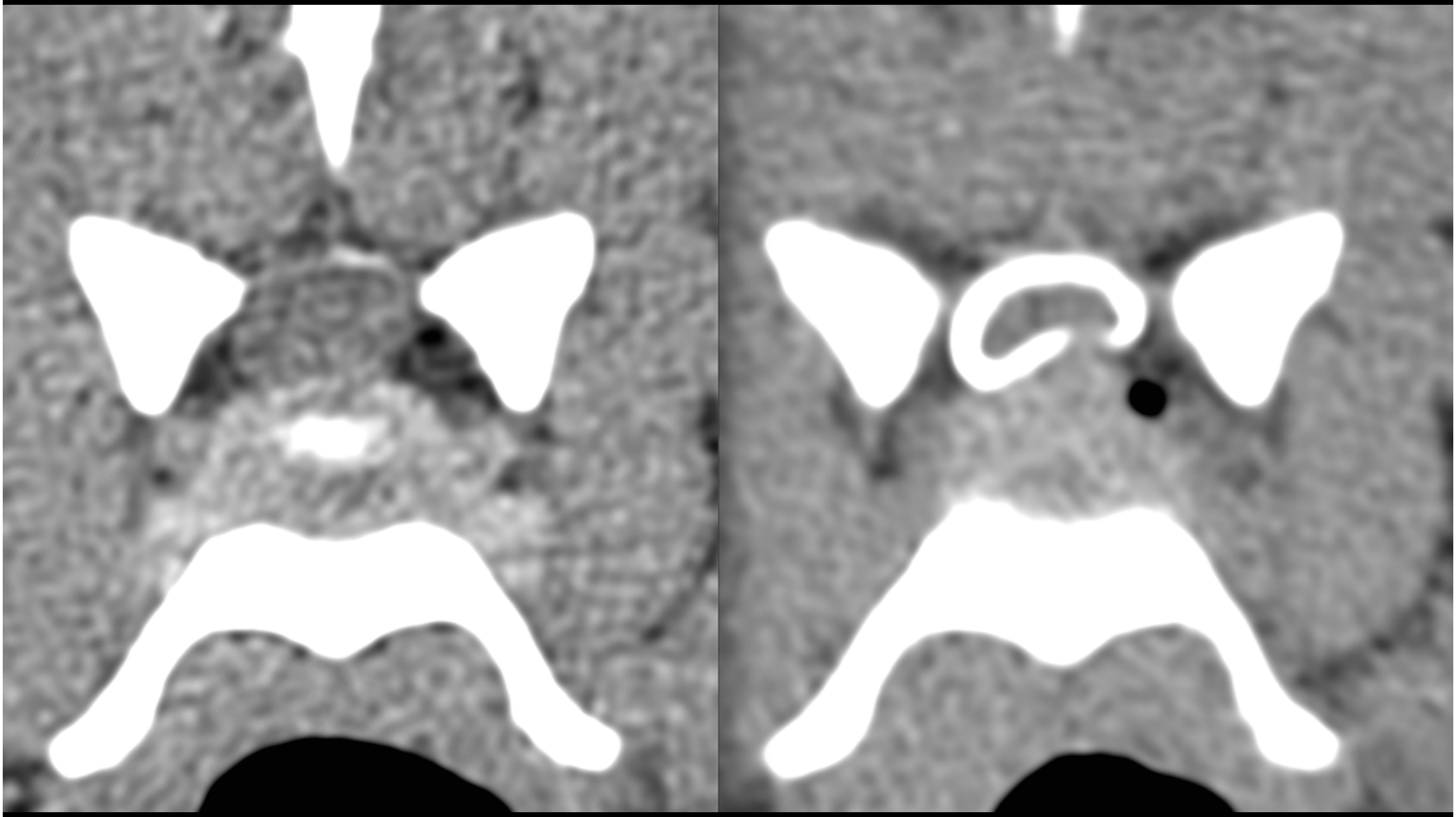

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Received: 3 July 2023 | Revised: 30 November 2023 | Accepted: 28 December 2023

DOI: 10.1111/vru.13331

CASE STUDY

WILEY

Myelo-CT imaging findings in 15 dogs with surgically-treated cervical acute compressive hydrated nucleus pulposus extrusion

Alba Farré Mariné[1] | Marta López Beltran[2] | Sonia Ortiz Nisa[3] | Alejandro Luján Feliu-Pascual[1]

IV Versus Myelography Computed Tomography for Thoracolumbar Intervertebral Disc Extrusion Surgical Planning in French Bulldogs

Marion Signoret, DMV, Lucille Gros, DECVDI, Clément Musso, DECVN, Harriet Hahn, DECVDI, Kévin Le Boedec, DACVIM, Laurent Cauzinille, DECVN, DACVIM-N

Received: 17 April 2020 | Revised: 13 September 2020 | Accepted: 20 September 2020

DOI: 10.1111/vru.12932

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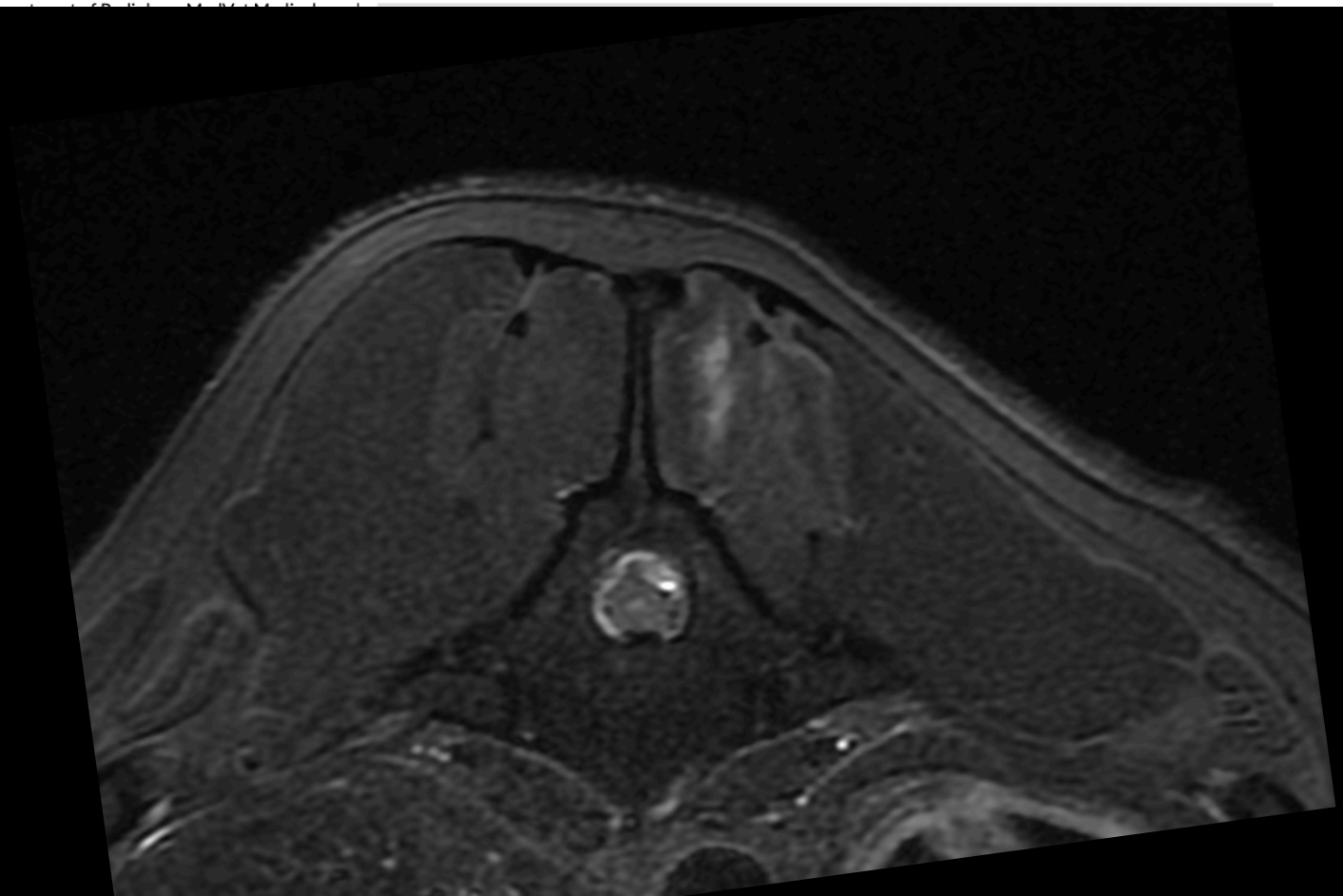
WILEY

ORIGINAL INVESTIGATION

MRI T2/STIR epaxial muscle hyperintensity in some dogs with intervertebral disc extrusion corresponds to histologic patterns of muscle degeneration and inflammation

Emily J. Morrison[1] | Matthew L. Baron-Chapman[1] | Mark Chalkley[2]

[1]Department of Radiology, Med Vet Medical and



IMAGING DOGS WITH SUSPECTED DISC HERNIATION: PROS AND CONS OF MYELOGRAPHY, COMPUTED TOMOGRAPHY, AND MAGNETIC RESONANCE

IAN ROBERTSON, DONALD E. THRALL

Myelography, computed tomography (CT), and magnetic resonance (MR) imaging are the diagnostic modalities currently used in the evaluation of dogs with suspected disc herniation. Where high-field MR imaging is available, it is considered the optimal modality for any myelopathy in dogs, including those with disc disease. CT myelography may be the next best option, particularly in nonchondrodystrophoid dogs. In chondrodystrophoid dogs, in which extrusion of mineralized disc material is common, plain CT will enable diagnosis in most cases. Myelography is still considered adequate for diagnosis of disc herniation when MR and CT are unavailable. © 2011 *Veterinary Radiology & Ultrasound, Vol. 52, No. 1, Supp. 1, 2011, pp S81–S84.*

POINT OF VIEW