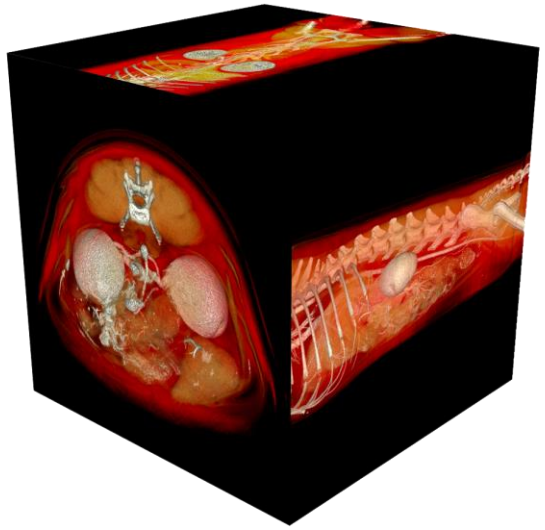
INTRODUCING VIMAGO GT30

CLINICAL DIAGNOSTICS AND APPLICATIONS



MEDICAL IMAGING REIMAGINED

VIMAGO GT30

THE COMPANY

ABOUT US

- **Quality and Design Made in Italy**
  Our machines are designed and produced in Italy. Every need of the customer is satisfied in our headquarters in Florence.

- **Research and Development team**
  A group of young engineers is our beating heart. They are opened to the market requests in order to satisfy them.

- **Ten years of expertise**
  Our team has developed a 10 years of expertise on HDVI technology.

- **From vet market to human**
  Our Company was born as a veterinarian supplier. Our products are thought for vets needs.

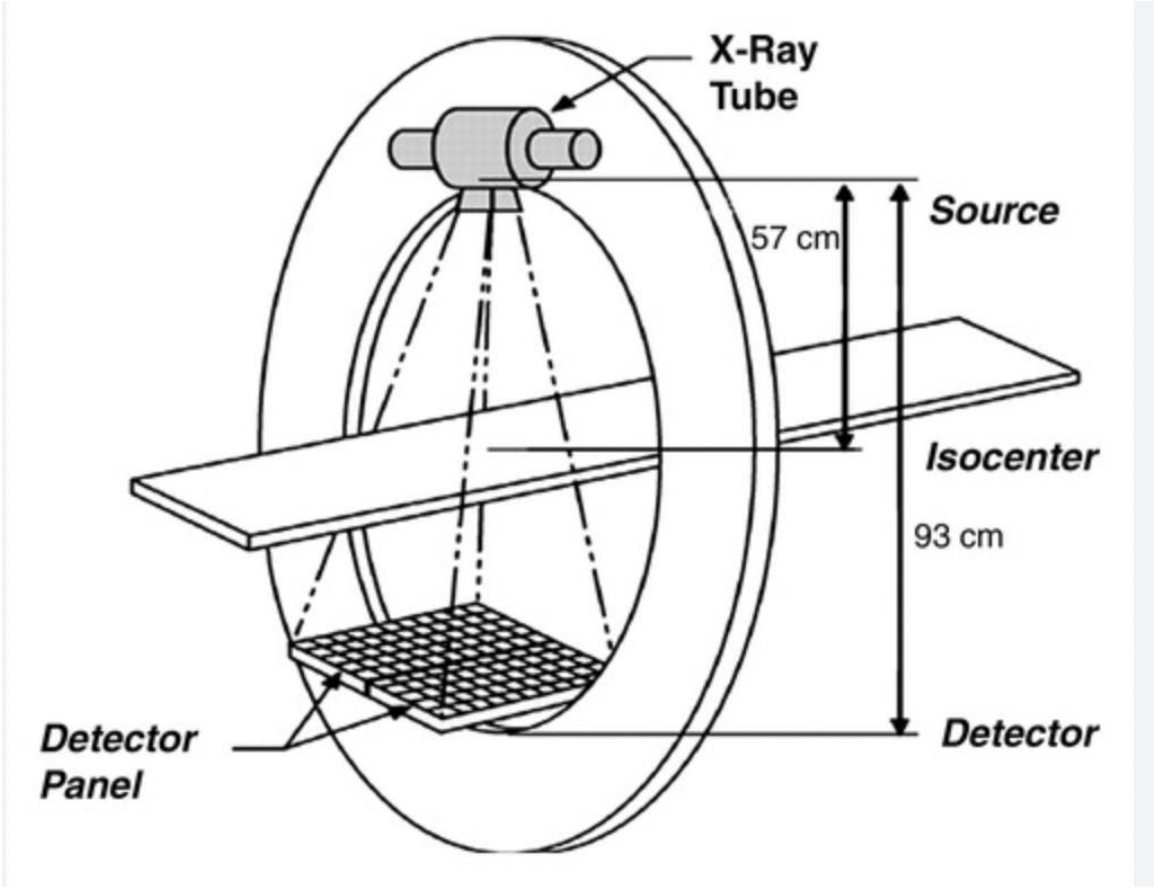
- **Collaboration with Pisa and Florence University**
  We have a joint lab with students and professors of Pisa and Florence University.

VIMAGO GT30

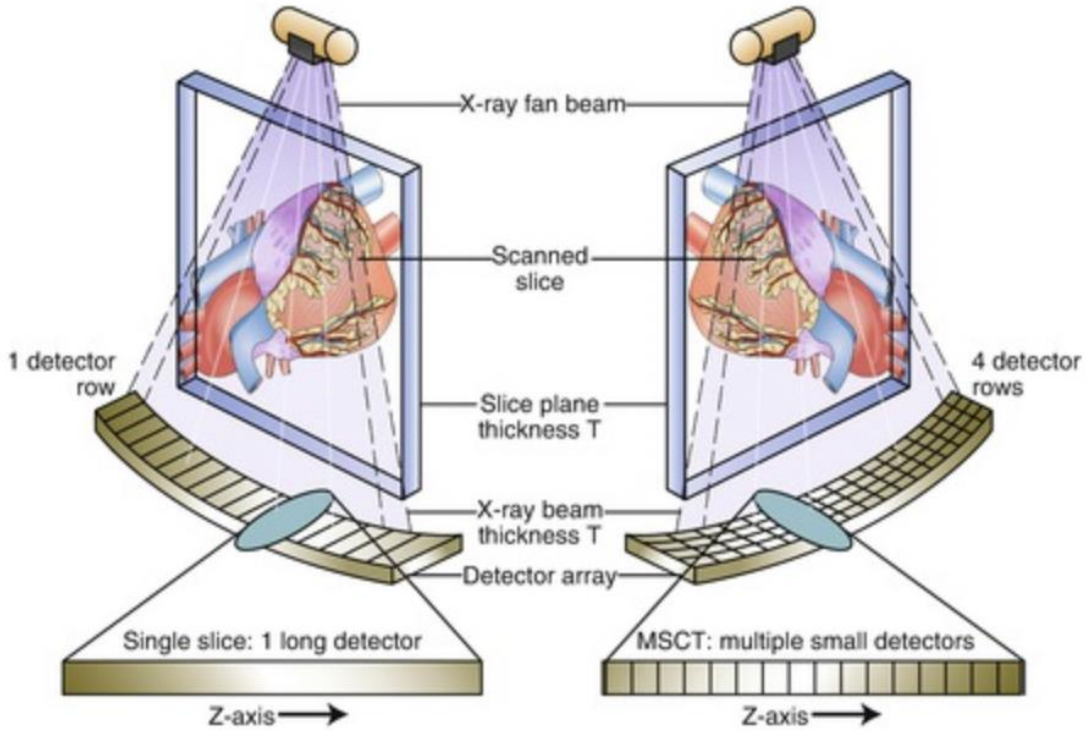
THE HDVI TECHNOLOGY IS DIFFERENT

WHY HDVI-CT IMAGING PLATFORMS ARE DIFFERENT

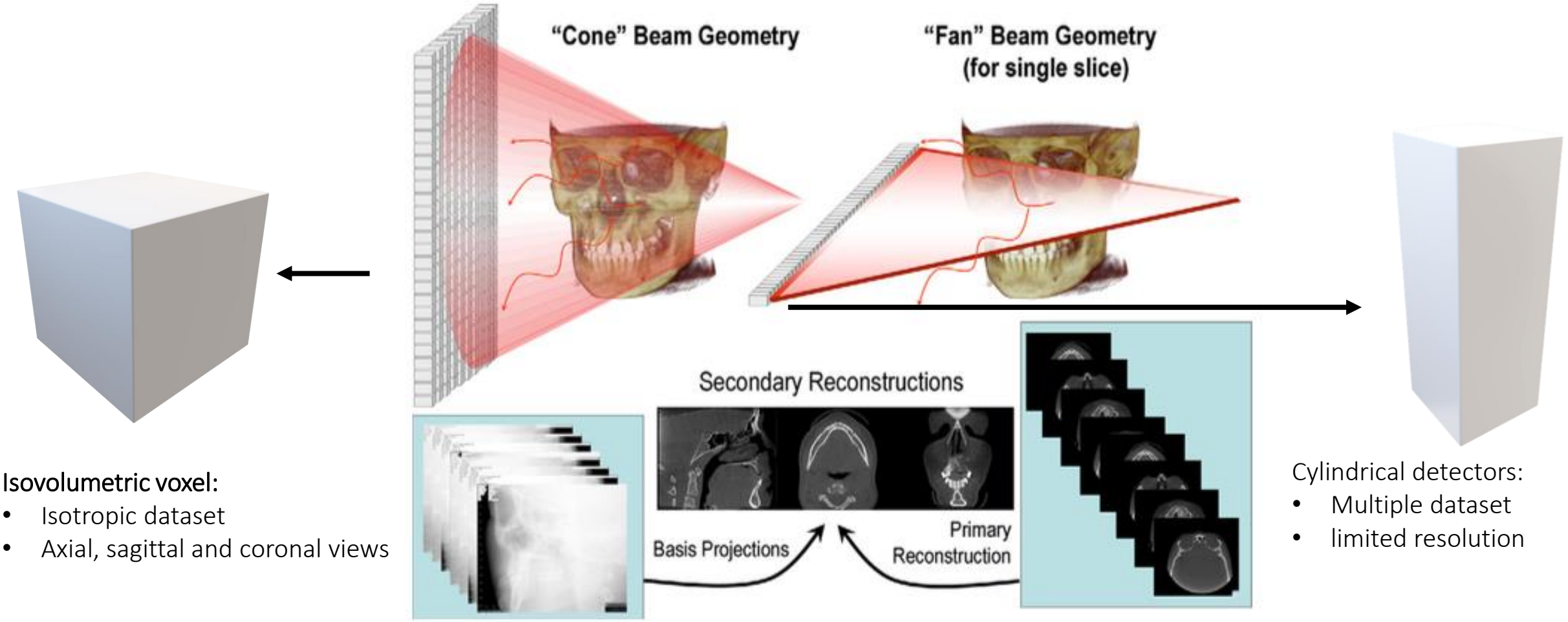
HDVI CT TECHNOLOGY



SLICE CT TECHNOLOGY



WHY HDVI-CT IMAGING PLATFORMS ARE DIFFERENT



Isovolumetric voxel:

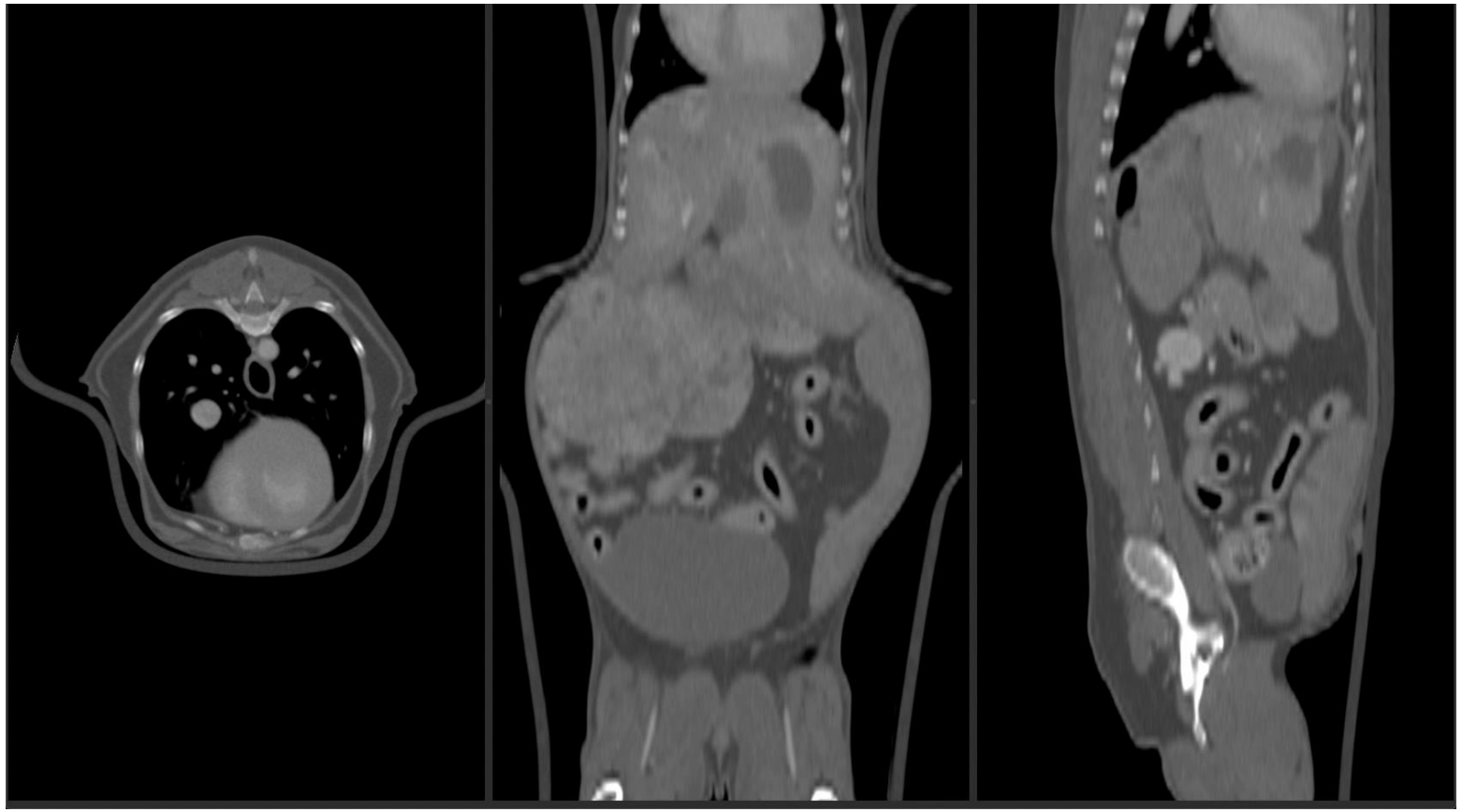
- Isotropic dataset
- Axial, sagittal and coronal views

Cylindrical detectors:

- Multiple dataset
- limited resolution

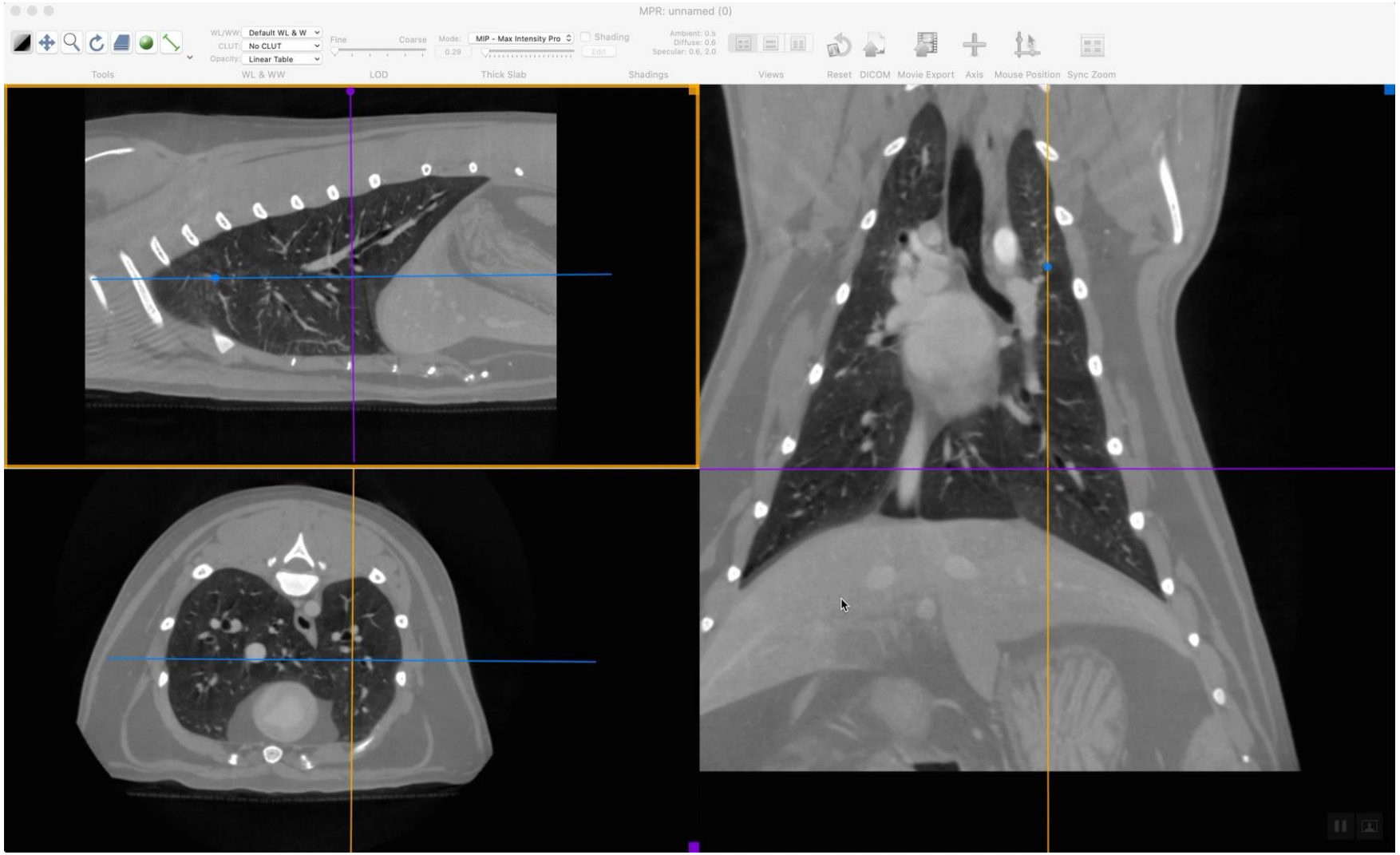
Comparison with conventional CT?

Renal Imaging acquired with a 64-slice conventional CT



In traditional CT, the axial view correspond to reality, but coronal and sagittal views are stretched because the voxel is not isovolumetric. Traditional CT's voxel has a cylindric shape while HDVI has a cubic shape that is seen correctly in all the views (axial, sagittal and coronal).

High-Definition Volumetric Imaging (HDVI)

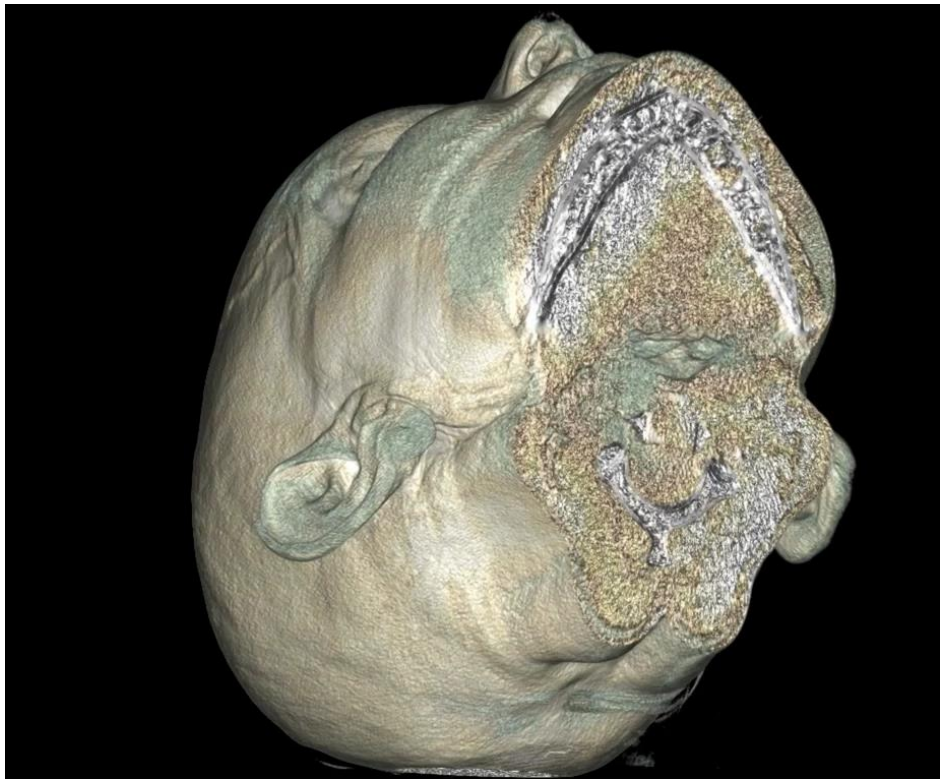


3D MAP OF DENSITIES IN A PATIENT

- Isotropic Voxels (same resolution in all directions)
- Can be viewed at any thickness and any orientation
- Bone and soft tissue
- Highest resolution in clinical imaging (up to 90 µm)

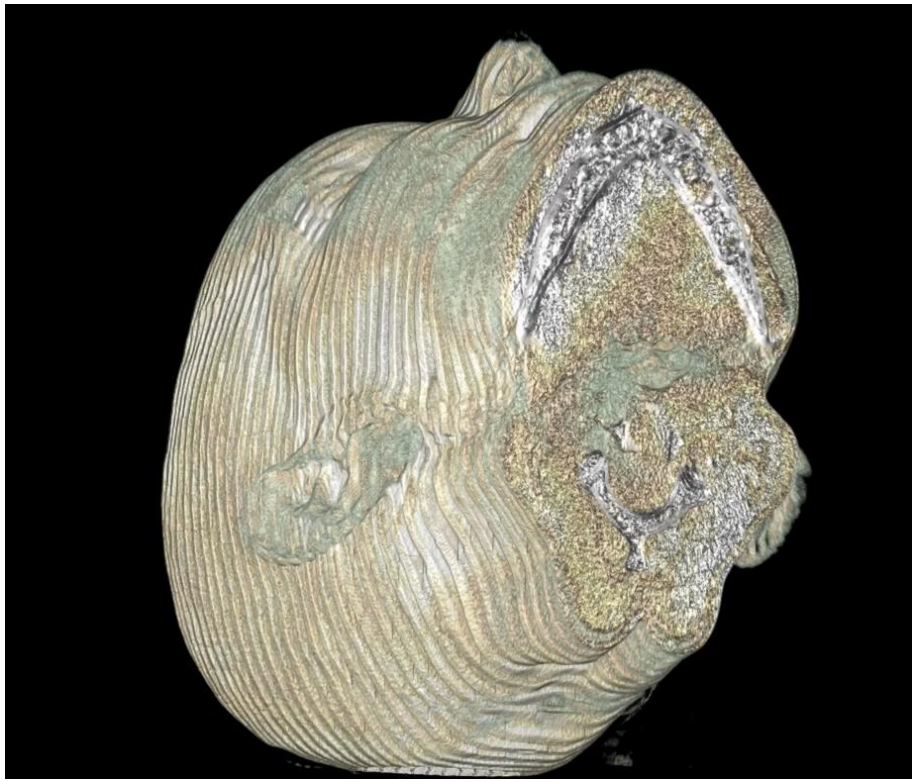
THE PRINCIPAL DIFFERENCE IS IN THE COLLECTED DATA

Epica's HDVI-CT (Vimago GT30)



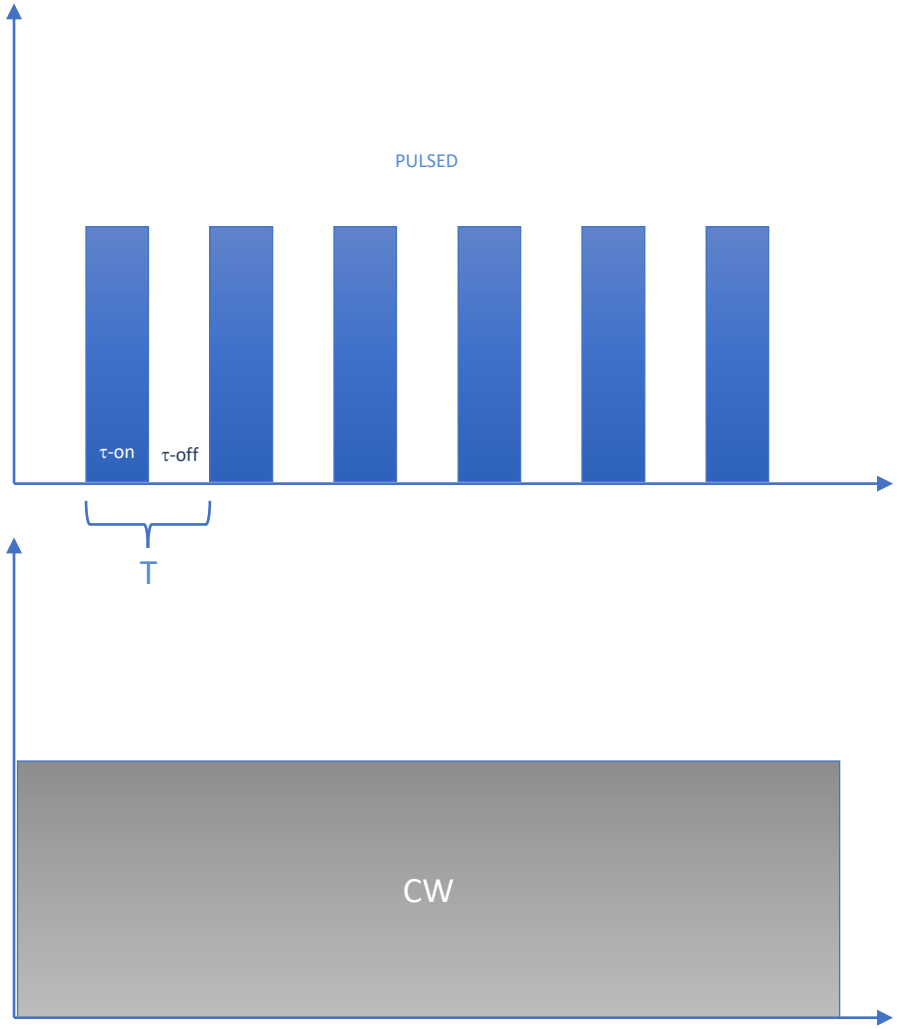
- *Gapless, Volumetric Data with No Interpolation*

Conventional CT Systems



- *Data Gaps require Interpolation*

WHY IS HDVI RADIATION SO MUCH LOWER?



WHY OUR RADIATION IS 25-75% LOWER?

1) HDCT's radiation is **Pulsed** while multi-slice conventional CT's radiation is Continuous (CW)

HDCT Pulsed @ 1 – 2% Duty Cycle

$$Duty\ Cycle[\%] = \frac{\text{t–on}}{\text{T}}$$

HDCT radiation is 50% less than CW emitting beam ray.

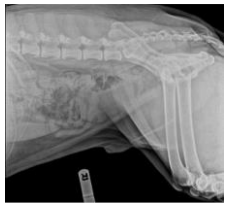
2) **Beam Filtration**

3) **Lower Dose Techniques** – more sensitive detection

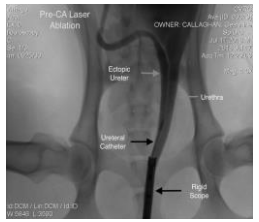
WHY HDVI-CT IMAGING PLATFORMS ARE DIFFERENT?

- **3 in 1 multimodality platform**: CT – FL – DR .
- **Diagnostic + Intra-procedural** dental, spine, ortho, thorax, abdomen, renal, vascular (against only diagnostic conventional CT).
- **Mobility** (can be moved through the clinic doors) or can be used as a fixed platform in imaging space (against fixed conventional CT).
- **Soft & Hard tissue** (diagnostic).
- **Higher Image Resolution** (up to 100 µm against 1mm of conventional CT).
- **Isotropic geometric voxels** without interpolation, 100% real data (against interpolation of conventional CT).
- **Lower Radiation compared to conventional CT** (because of the pulsate emission).
- **Lower cost of maintenance compared to conventional CT** (1 third of electricity expenses).
- **Less infrastructure build-out compared to conventional CT** (just a 220V socket, no special HVAC, less shielding).
- Gantry with **inner diameter of 592** mm **Space efficient:** less space required

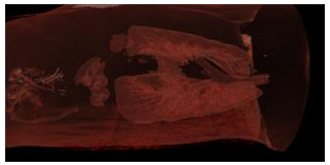
WHY HDVI-CT IMAGING PLATFORMS ARE DIFFERENT?



Digital Radiology



Fluoroscopy



CT Scanner

VIMAGO GT30

3 modalities in one machine

Portable or Fixed

Moves easily through standard sized doors and hallways.

VIMAGO GT30 DIAGNOSTIC REALM

DIAGNOSTIC FIELD (HDVI CT + FL + DR)

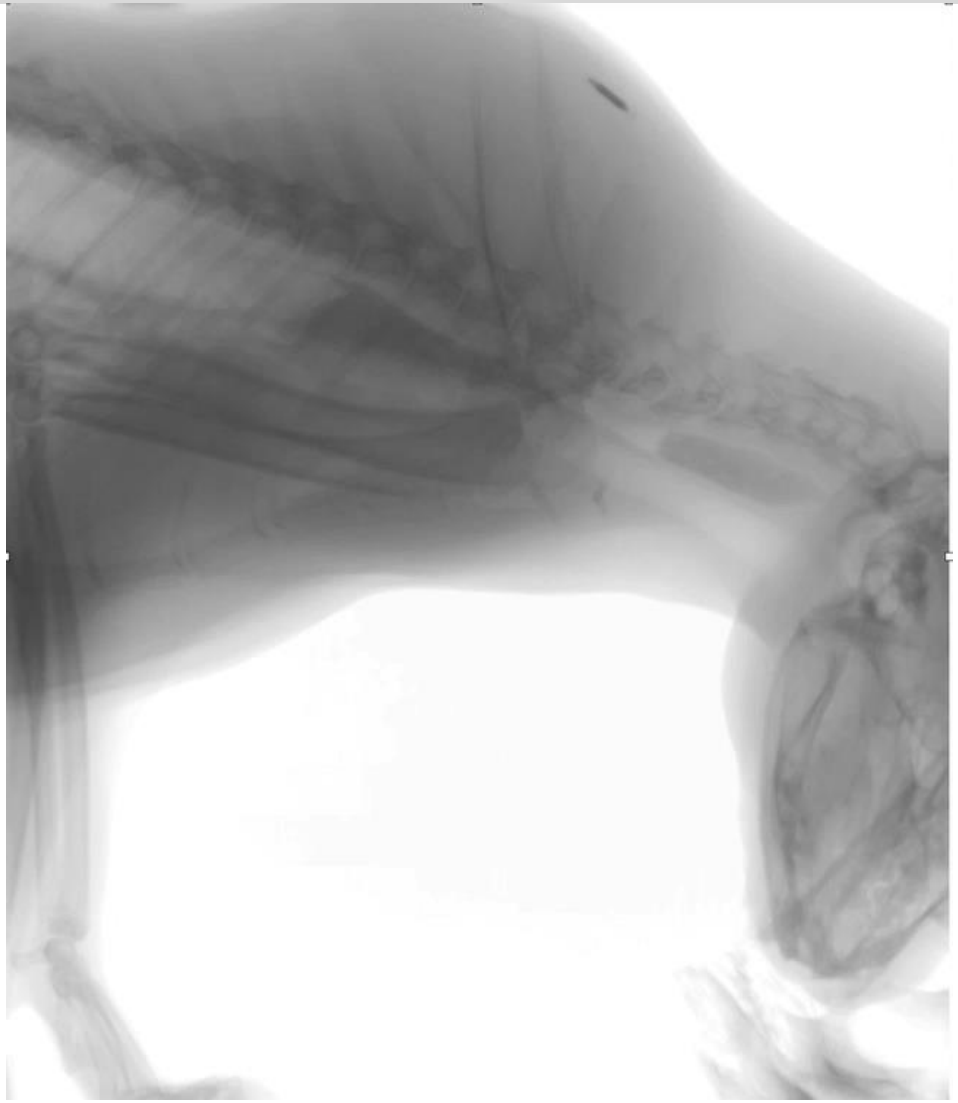
- ✓ Dentistry
- ✓ Ears, Nasal & Sinus
- ✓ Mets & Masses
- ✓ Spine
- ✓ Orthopedics
  - ✓ Joints
  - ✓ Joint Health
- ✓ Renal Disease
- ✓ Respiratory Distress
- ✓ Chronic Vomiting & Swallowing Problems
- ✓ GI Foreign Bodies
- ✓ Shunts & Vascular Anomalies
- ✓ Cancer / Oncology
- ✓ Trauma

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

VIMAGO GT30 INTRA PROCEDURAL REALM

Diagnostic

- Swallow Studies
- Coughing
- Respiratory
- Collapsing Trachea
- Contrast Angiography



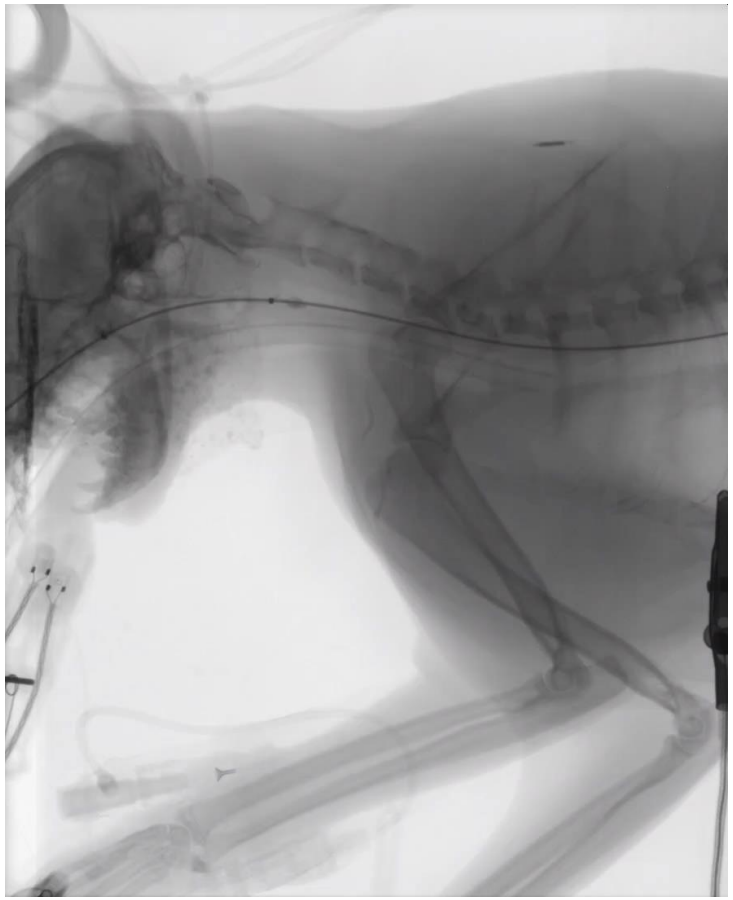
Interventional

- Airway
- Oncology
- Urogenital
- Angio/Cardiac

VIMAGO GT30 – FULL FEATURED FLUOROSCOPY MODALITY

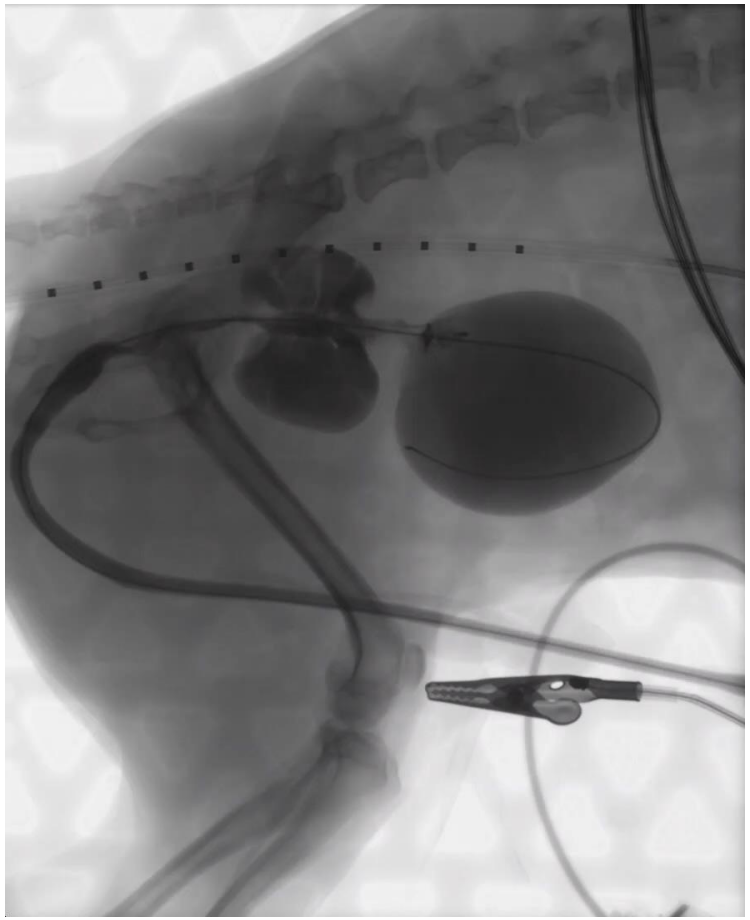
Fluoroscopy-guided Fine-Needle-Aspiration (FNA) of pulmonary nodule in a cat

VIMAGO GT30 – FULL FEATURED FLUOROSCOPY MODALITY



Cat with nasopharyngeal stenosis, ballooning of the structure

VIMAGO GT30 – FULL FEATURED FLUOROSCOPY MODALITY



Urethrogram in a dog with prostatic transitional cell carcinoma (TCC)


VIMAGO GT30
THE MACHINE

VIMAGO'S GT30 FAMILY

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

VIMAGO GT30

VIMAGO GT30 PICO

VIMAGO GT30'S DIAGNOSTIC & PROCEDURE REALMS

CT MODALITY

- ✓ Up to **7 stacks**
- ✓ 1 stack is 15 cm
- ✓ 1 stack in 24 seconds (up to 9 seconds in speed mode)
- ✓ Scan time for a Scan Length of 480 mm: 90 seconds
- ✓ FOV standard is 17,5 cm
- ✓ FOV large is 30 cm
- ✓ Output DICOM resolution: 100-600 µm
- ✓ Pulsed exposure mode
- ✓ X-ray tube voltage **50-120 kV, 10-120 mA, 5-10 ms**
- ✓ Scouting system

VIMAGO'S VOLUMETRIC IMAGING PLATFORM:

FOR SMALL & LARGE ANIMALS

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

VIMAGO GT30'S DIAGNOSTIC & PROCEDURE REALMS

- ✓ SCANNER UNIT (420 kg):
  - ➔ Working Configuration
    - Overall length: 2310 mm
    - Overall height: 1644 mm
    - Overall width: 1485 mm
    - External Gantry Diameter: Φ 1287 mm
    - Opening Gantry Diameter (Bore): Φ 592 mm
  - ➔ Transport Configuration
    - Overall width in transport configuration: 739 mm
    - Overall length in transport configuration: 2310 mm
    - Overall height in transport configuration: 1644 mm
- ✓ WORKSTATION (100 kg):
    - Width (max): 767 mm
    - Height (max): 1819 mm
    - Depth: 770 m

VIMAGO'S VOLUMETRIC IMAGING PLATFORM:

FOR SMALL & LARGE ANIMALS

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

VIMAGO PICO'S DIAGNOSTIC & PROCEDURE REALMS

CT MODALITY

- ✓ Up to **5 stacks**
- ✓ 1 stack is 15 cm
- ✓ 1 stack in 24 seconds (up to 9 seconds in speed mode)
- ✓ Scan time for a Scan Length of 480 mm: 90 seconds
- ✓ FOV standard is 17,5 cm
- ✓ FOV large is 30 cm
- ✓ Output DICOM resolution: 100-600 µm
- ✓ Pulsed exposure mode
- ✓ Table is movable
- ✓ X-ray tube voltage **50-120 kV, 10-120 mA, 5-10 ms**
- ✓ Scouting system

PICO'S VOLUMETRIC IMAGING PLATFORM:

FOR SURGERY PROCEDURES

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

VIMAGO PICO'S DIAGNOSTIC & PROCEDURE REALMS

PICO'S VOLUMETRIC IMAGING PLATFORM:

FOR SURGERY PROCEDURES

AN OPTIMIZED SINGLE PLATFORM FOR ALL IMAGING NEEDS

SCANNER UNIT (470 kg):

➔ Working Configuration

- Overall length: 843 mm
- Overall height: 1876 mm
- Overall width: 1513 mm
- External Gantry Diameter: Φ 1287 mm
- Opening Gantry Diameter (Bore): Φ 592 mm

➔ Transport Configuration (rotated by 90°)

- Overall width in transport configuration: 843 mm
- Overall length in transport configuration: 1513 mm
- Overall height in transport configuration: 1876 mm

PATIENT BED (165 kg):

➔ Working Configuration

- Total Length with table extended: 2330 mm
- Carbon table length: 1404 mm
- Width (max): 460 mm
- Width of table imaging part: 300 mm
- Height (max): 1055 mm

➔ Transport Configuration

- Length: 1730 mm
- Width: 460 mm
- Heigth: 855 m

VIMAGO GT30

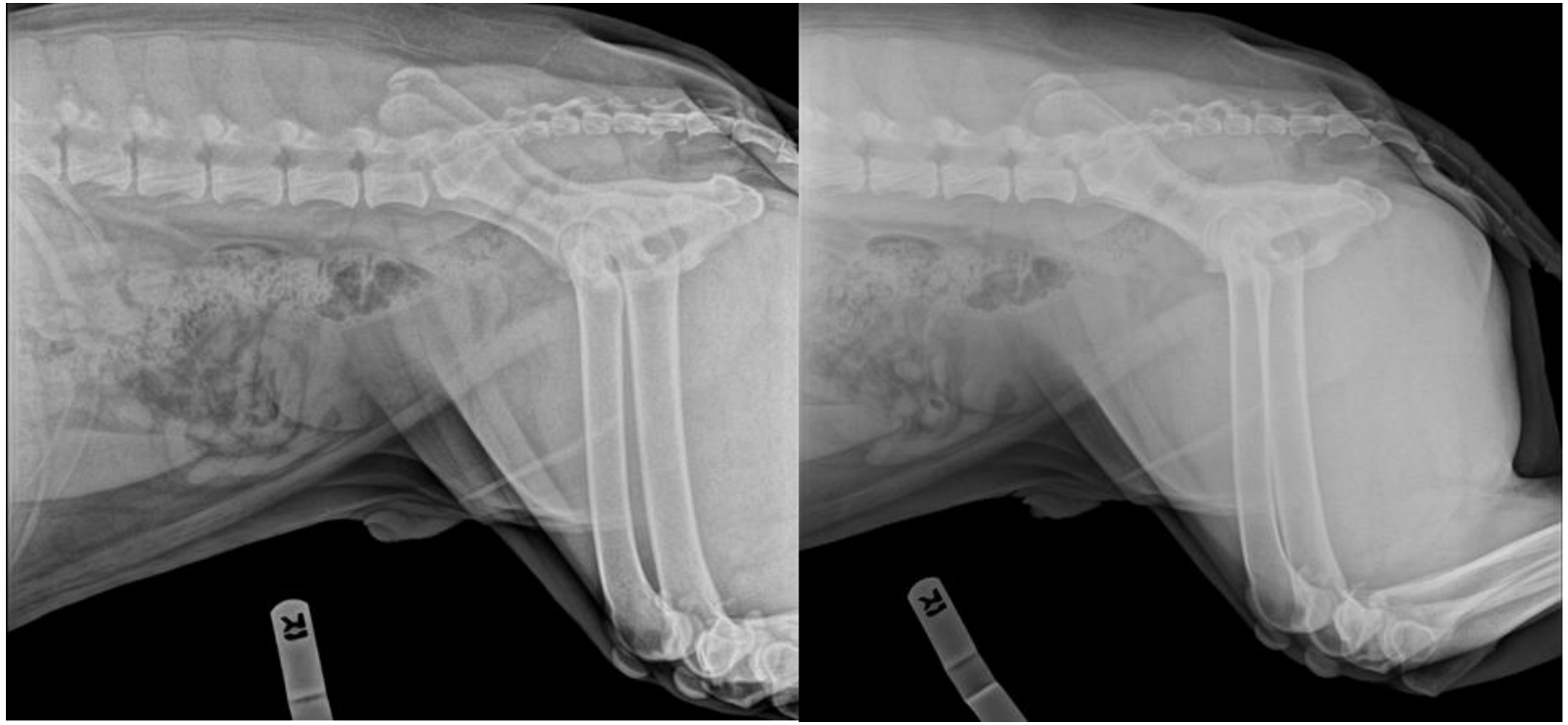
THE CLINICAL CASES

1st CLINICAL CASE

A 40 kg, 8 years old, male Rottweiler couldn't urinate.

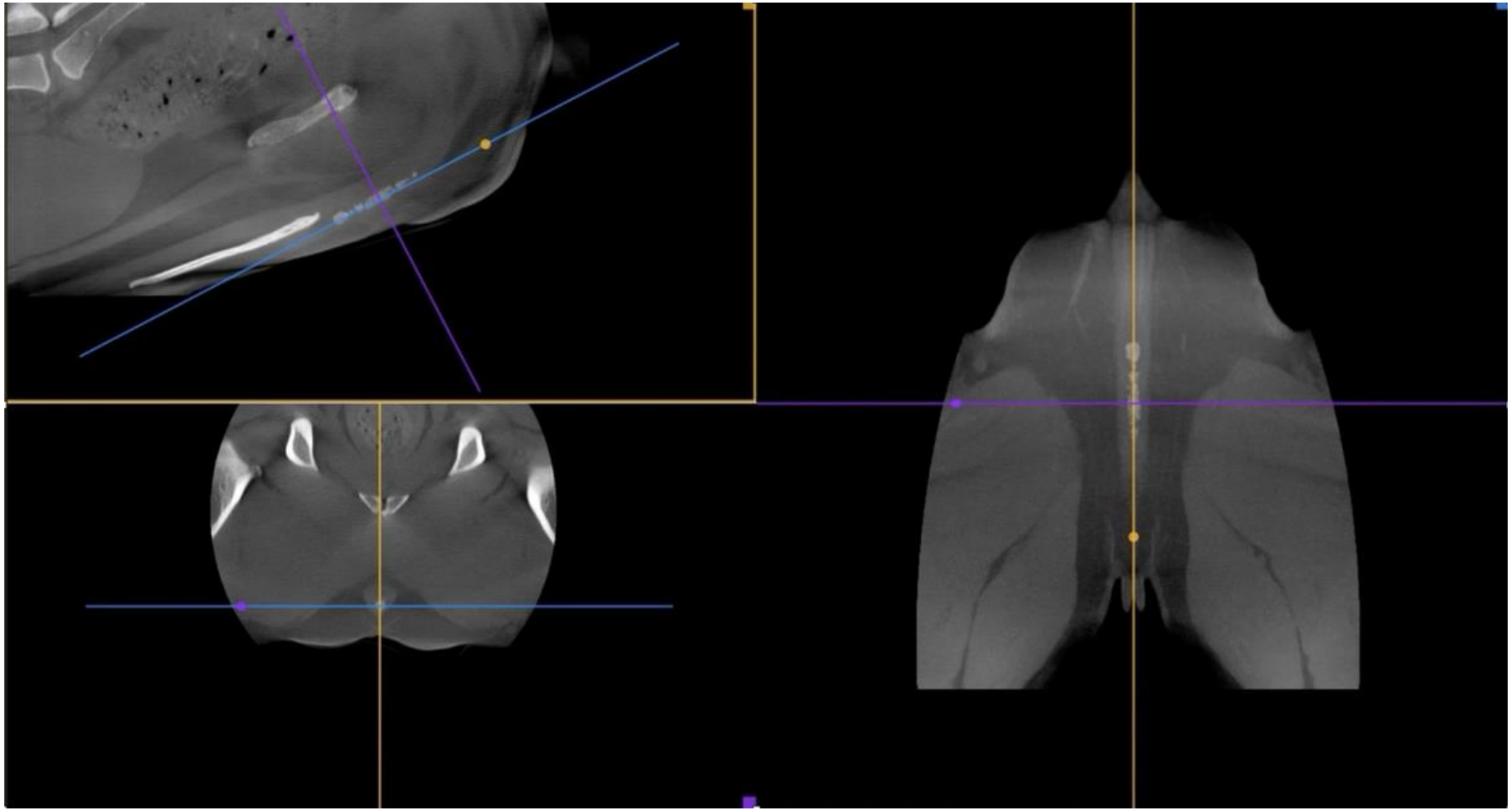
Radiographs were taken by a GP then a Specialist and they were all negative.

An Ultrasound exam showed a "fine dusting of stones in the bladder."



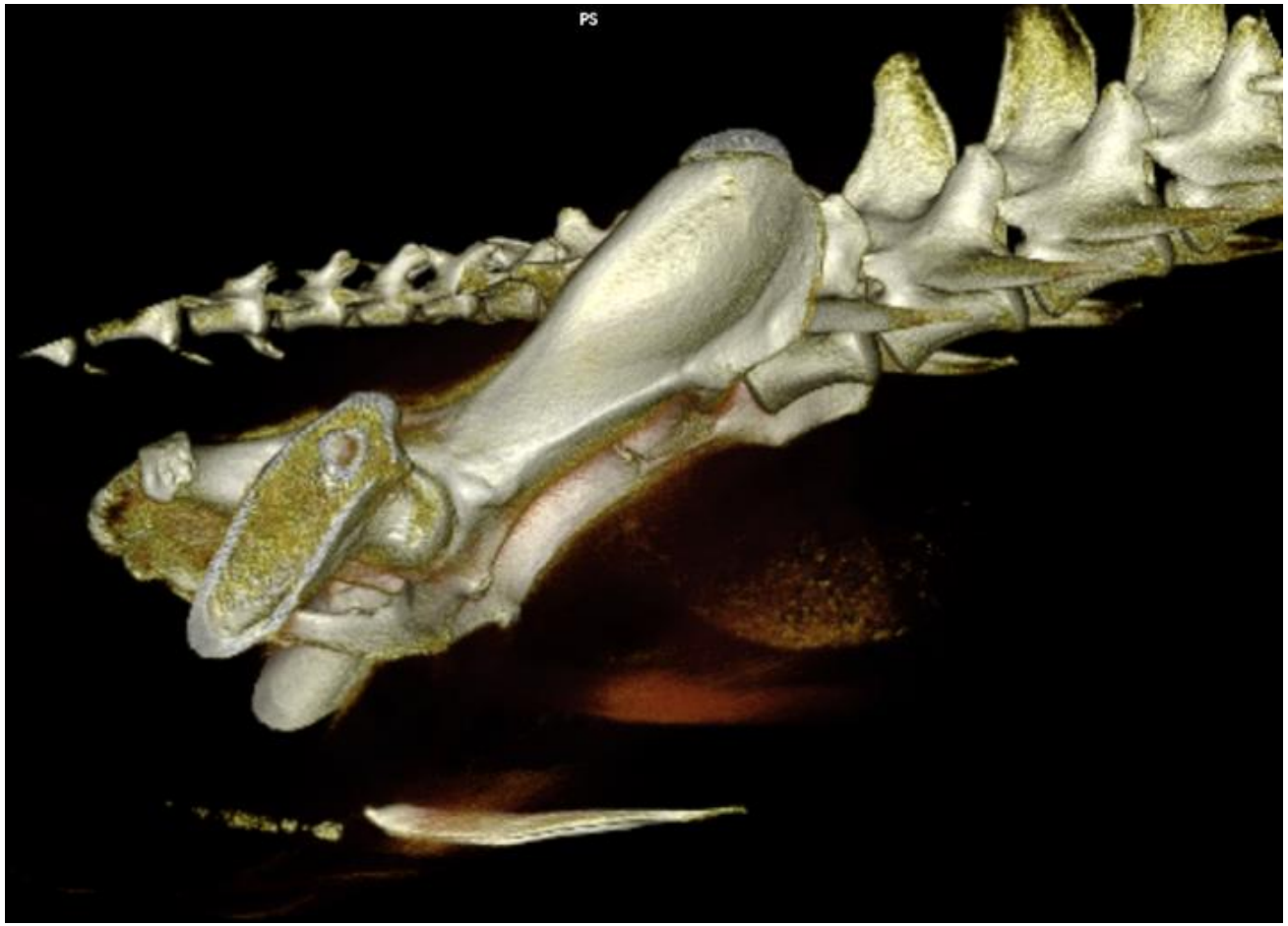
1st CLINICAL CASE

Diagnosis of urethral stones immediately done on a Vimago



1st CLINICAL CASE

Diagnosis immediately done on a Vimago

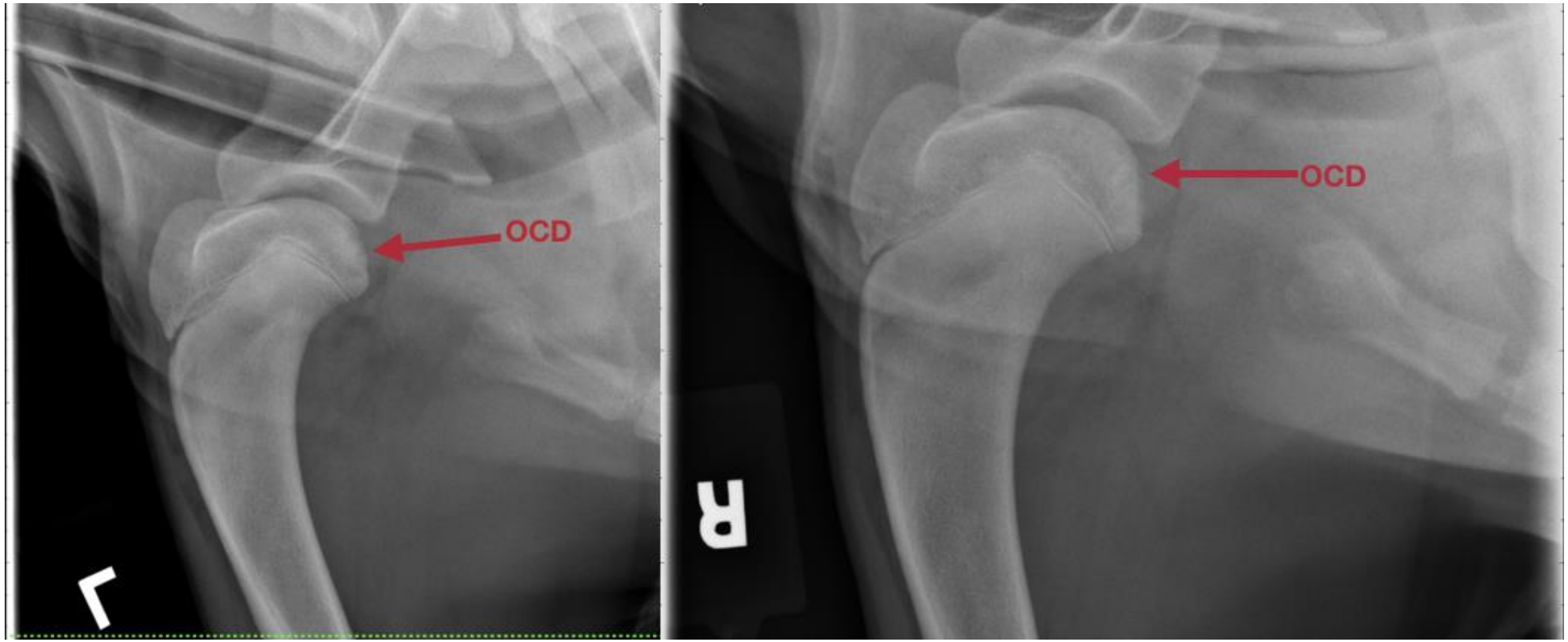


2nd CLINICAL CASE - SHOULDER OCD LESION

A 9-month-old Great Dane was completely down on the front limbs and demonstrating tremendous pain.

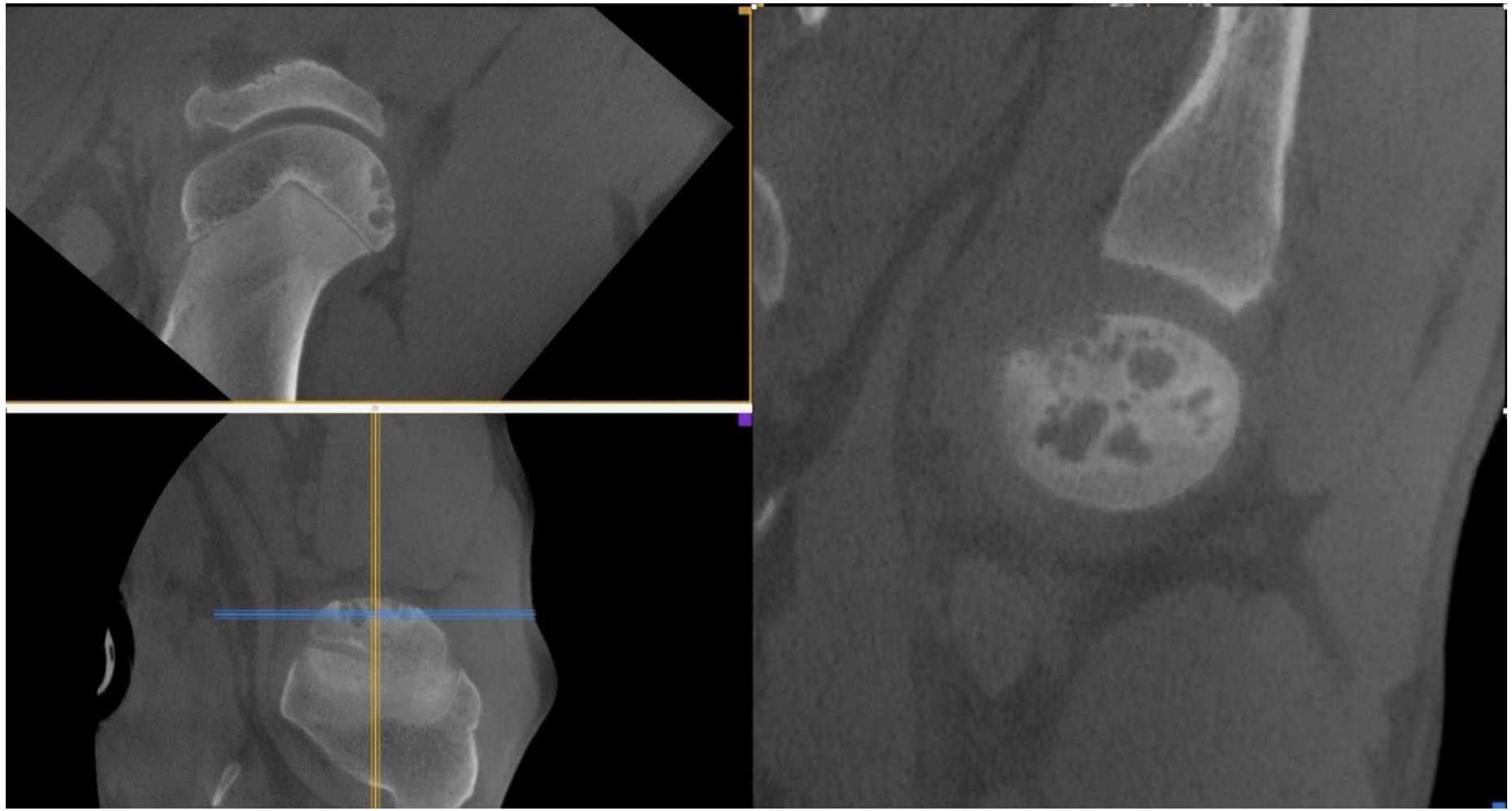
Radiographs showed **Osteochondritis lesions**, but not enough to explain the amount of pain present.

The Clinician sent the dog to a neurologist to check for Wobblers. That neurologist had a Vimago.



2nd CLINICAL CASE - SHOULDER OCD LESION

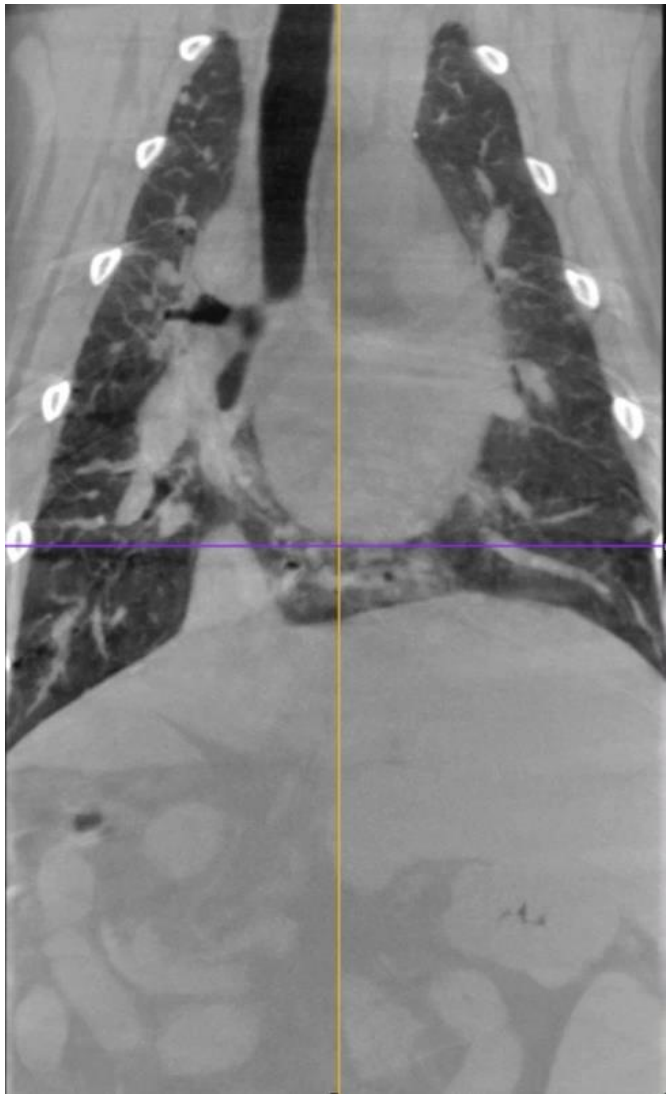
Diagnosis immediately done on a Vimago



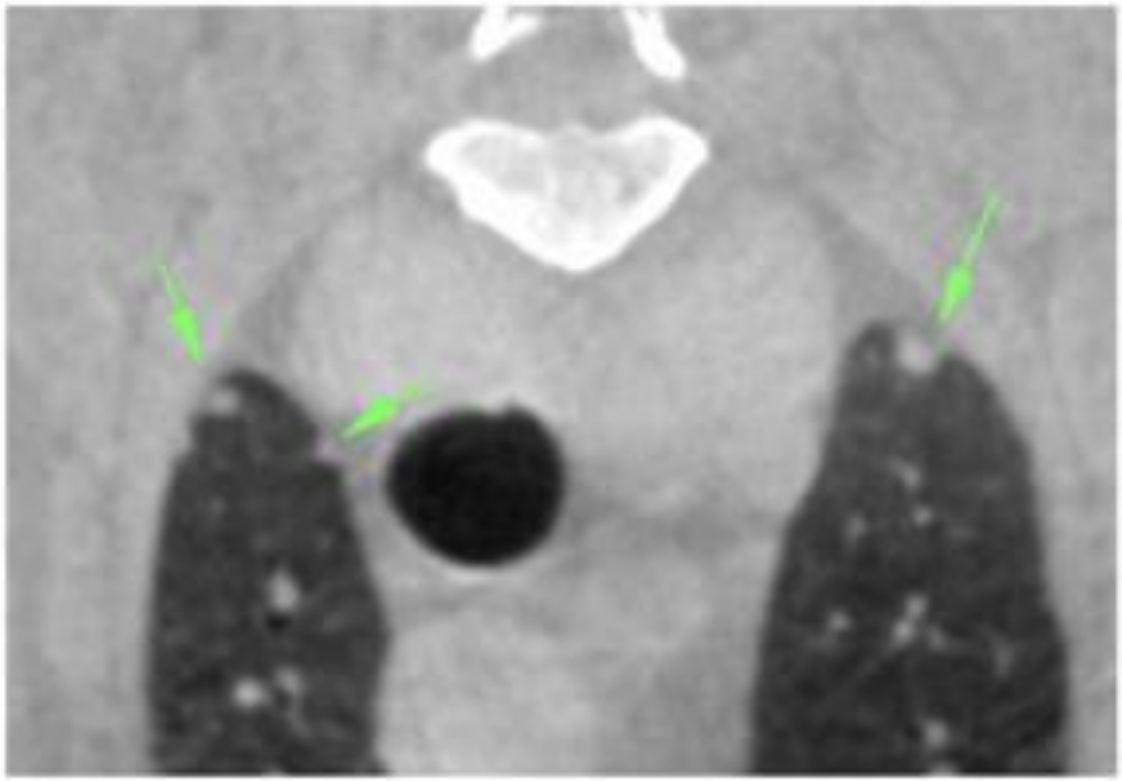
3rd CLINICAL CASE

9-year-old, FS, Canine presented with neck and back pain.

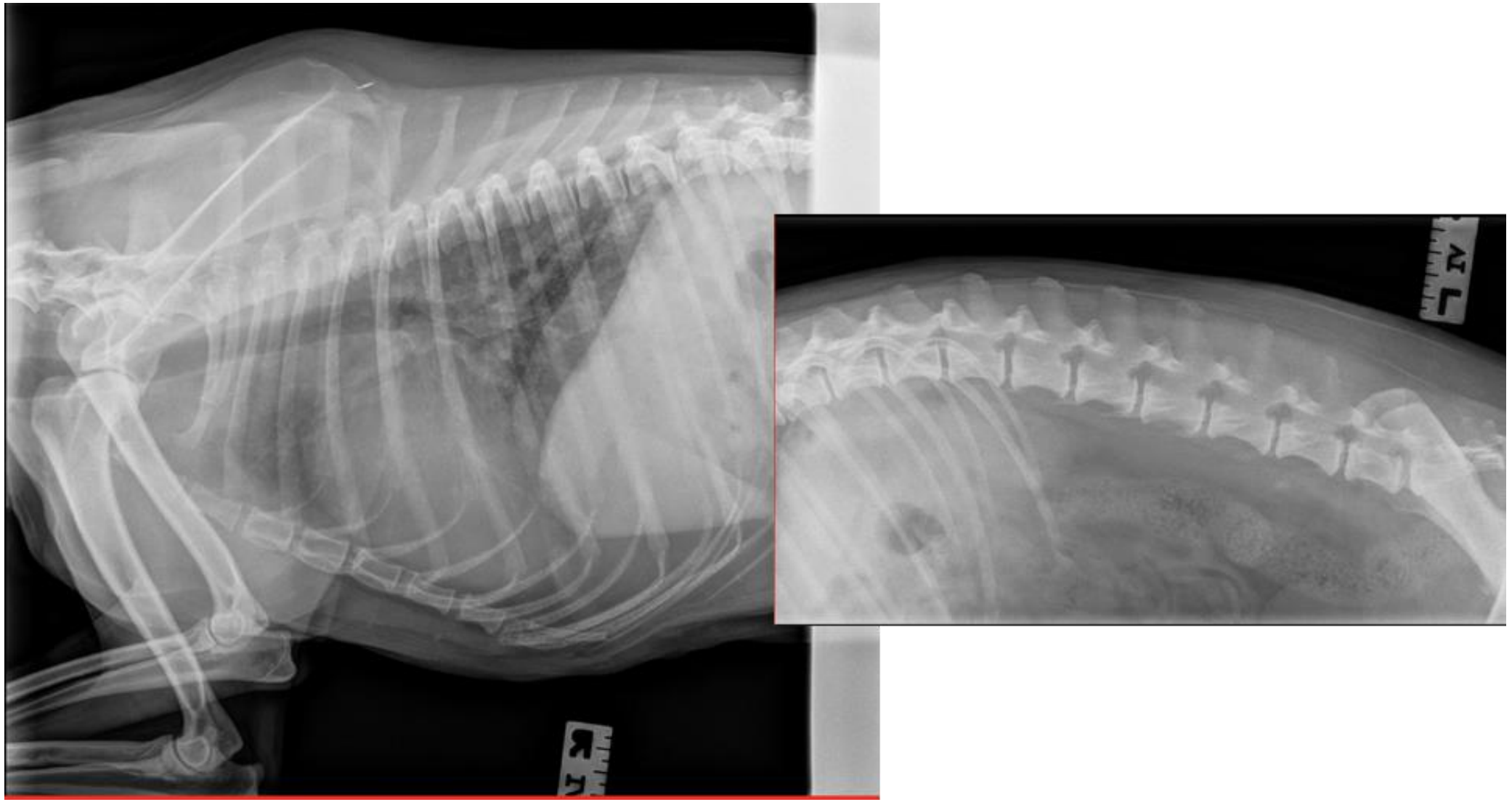
3rd CLINICAL CASE



Many soft tissue nodules throughout the lungs

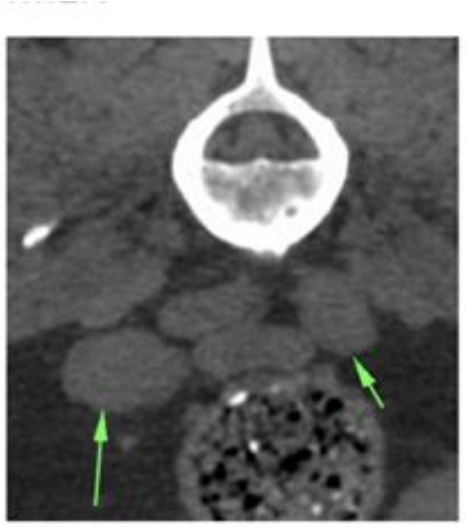


3rd CLINICAL CASE

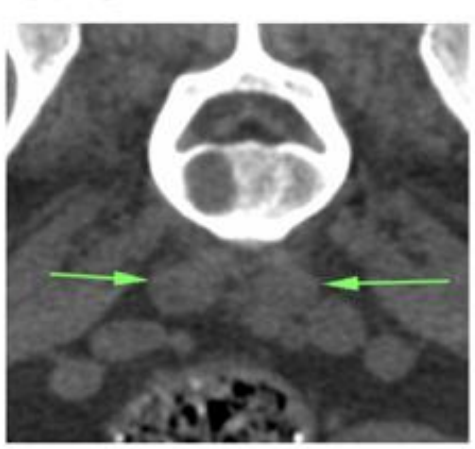


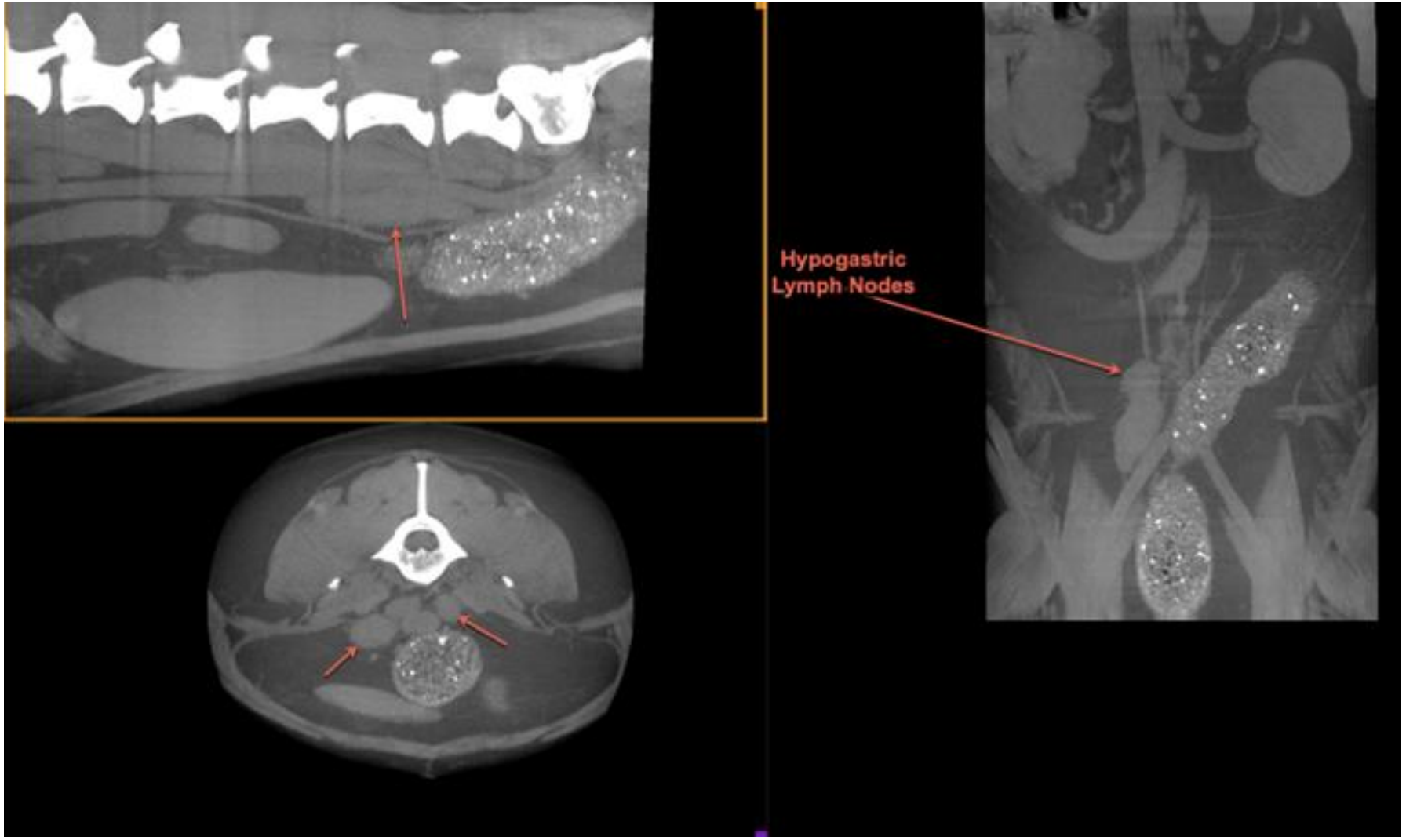
3rd CLINICAL CASE

Medial iliac LN

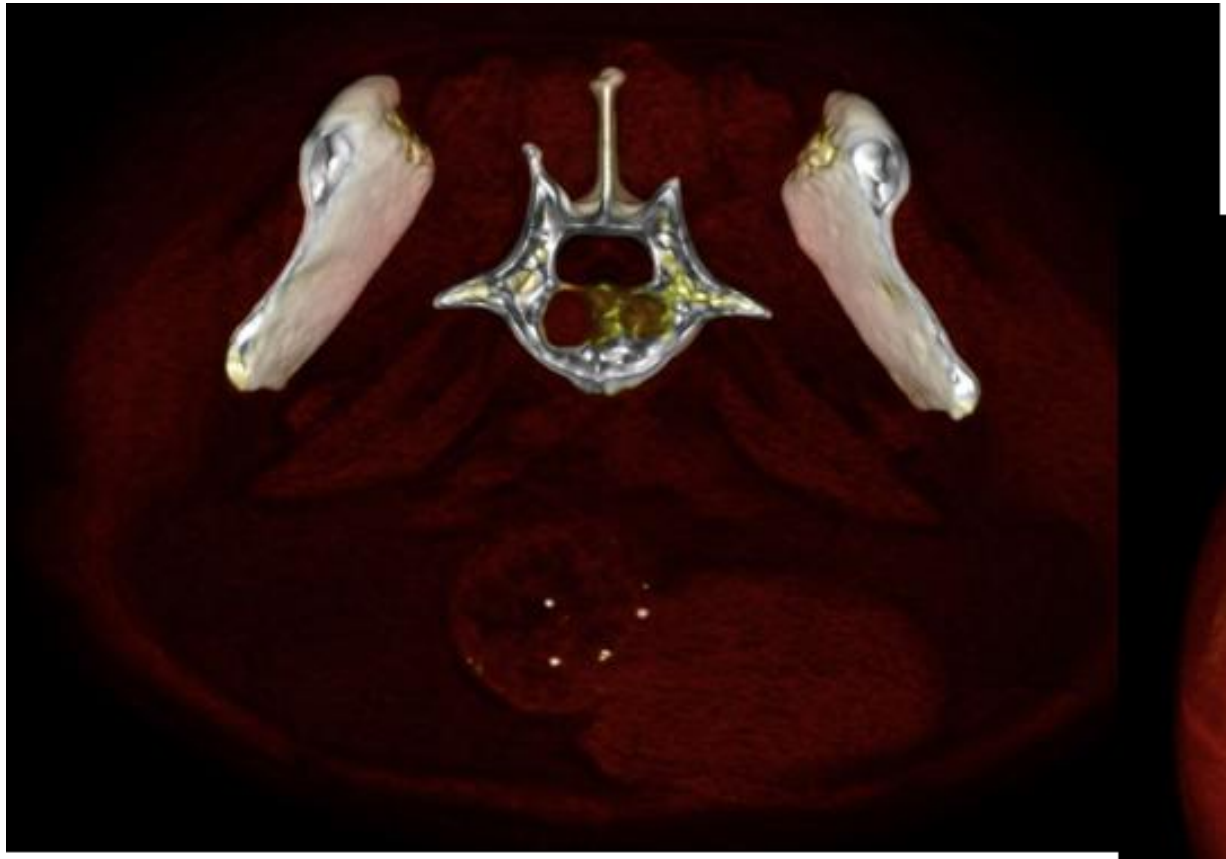


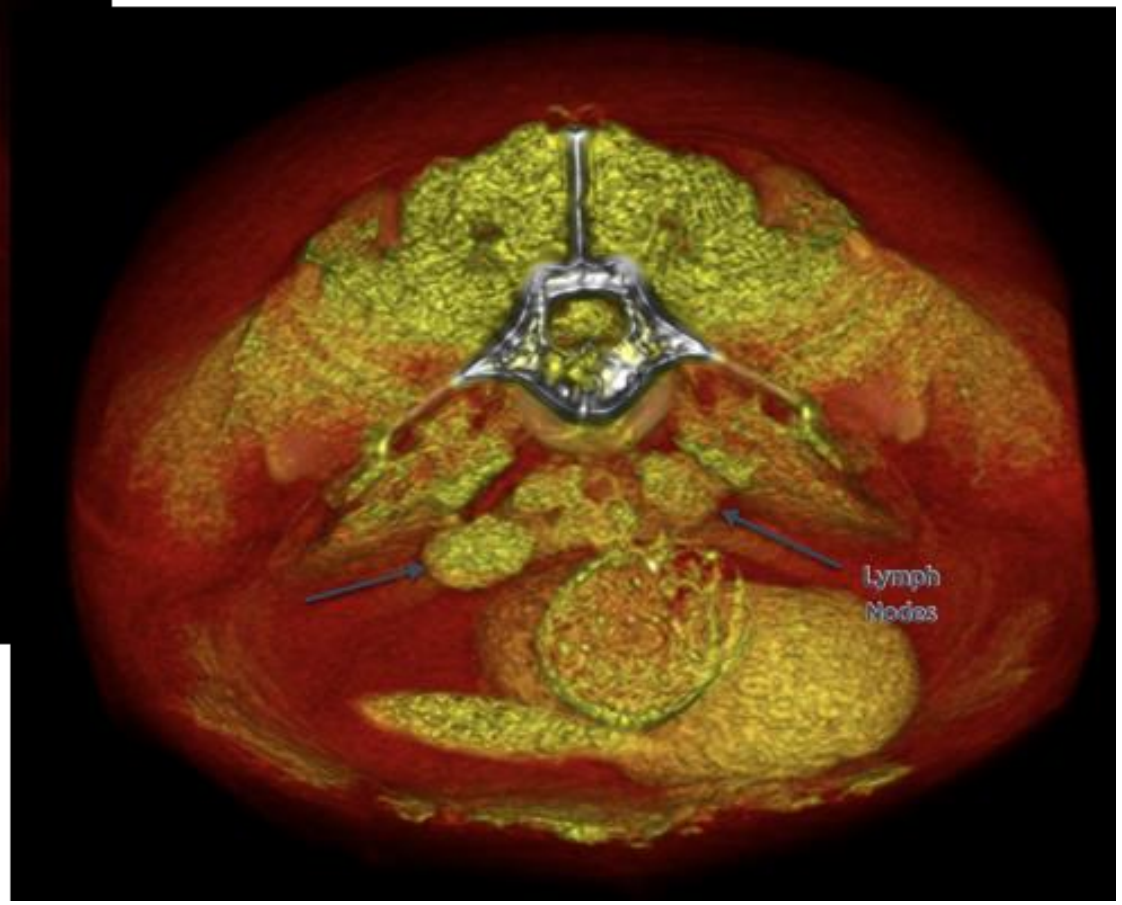
Hypogastric LN



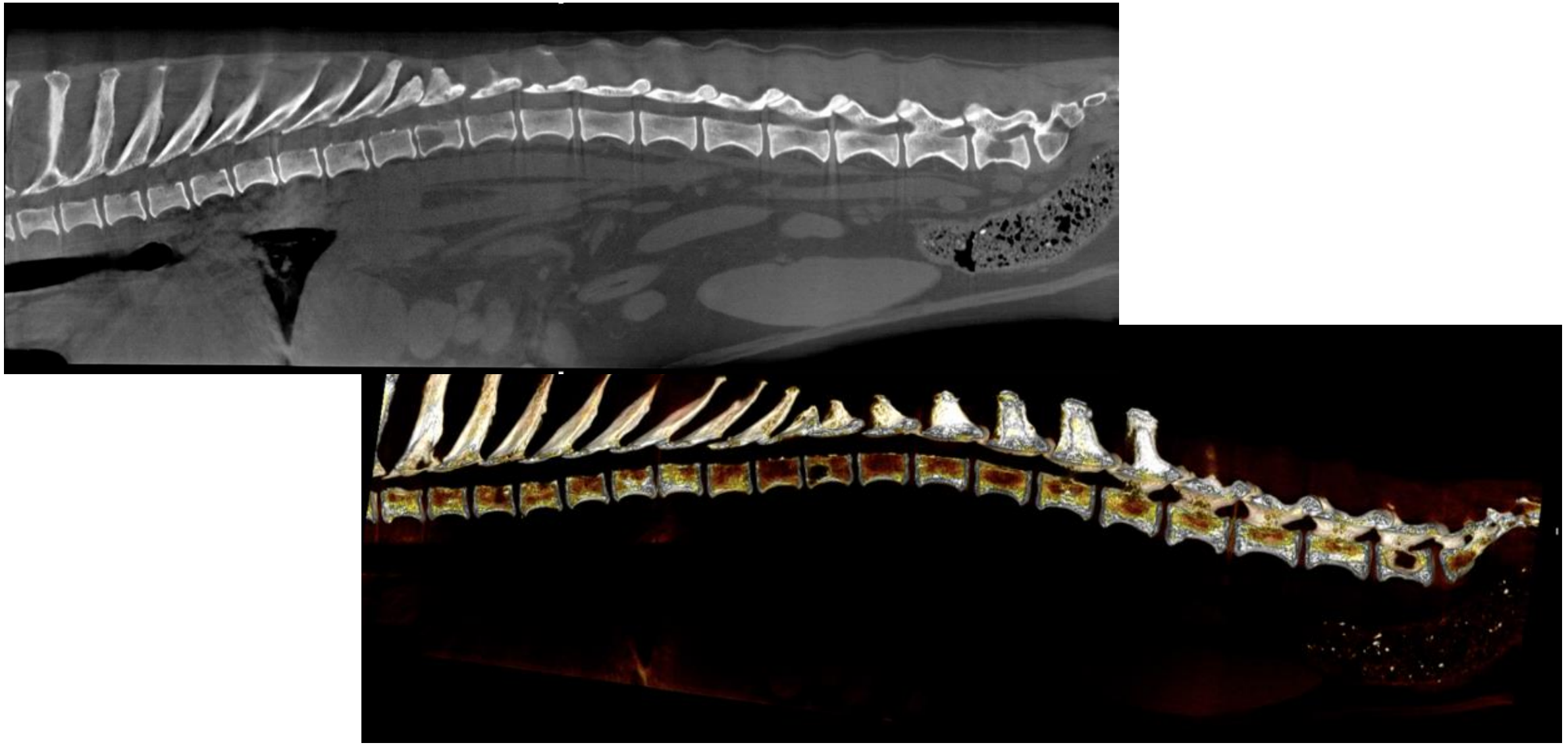


3rd CLINICAL CASE



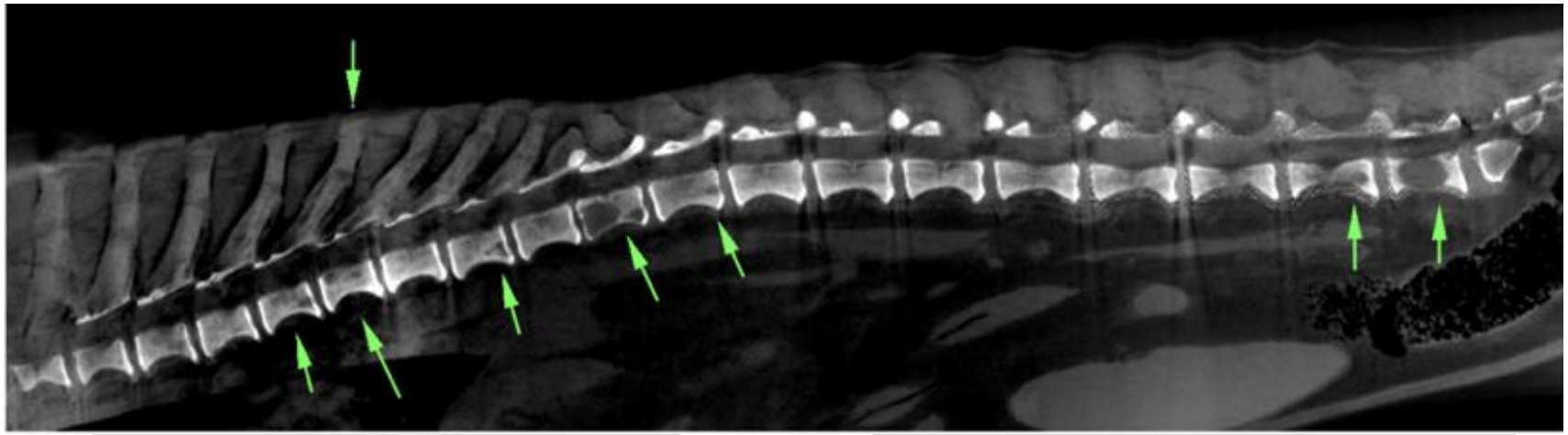


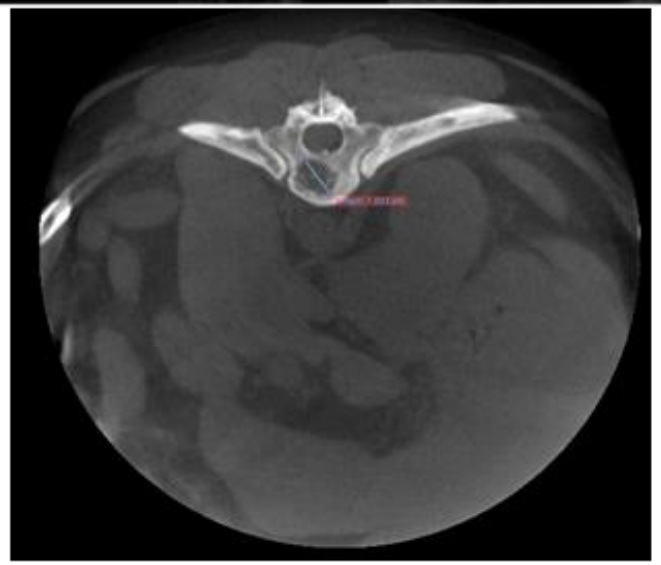
3rd CLINICAL CASE



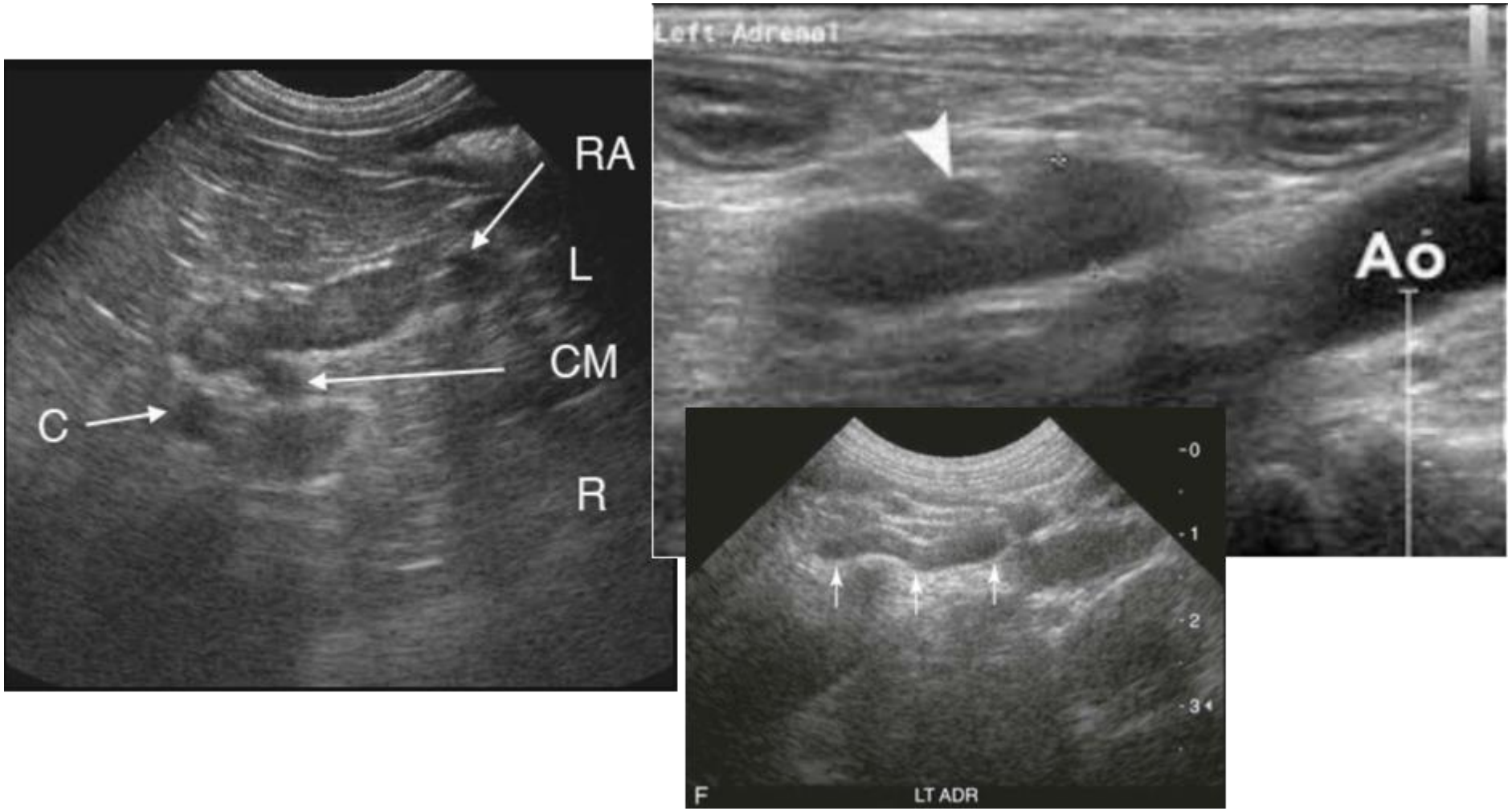
3rd CLINICAL CASE

Well marginated lytic lesions in the body region of T6, 7, 9, 11, L6 and 7.

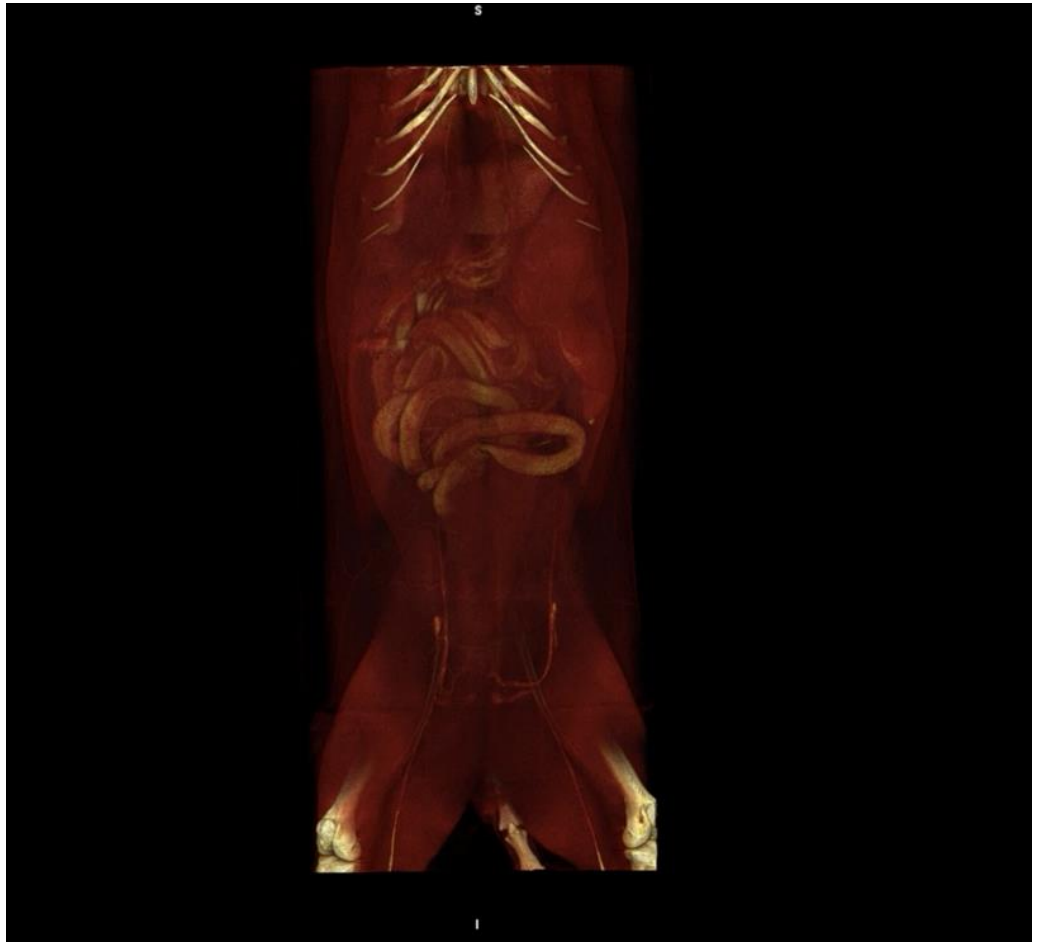




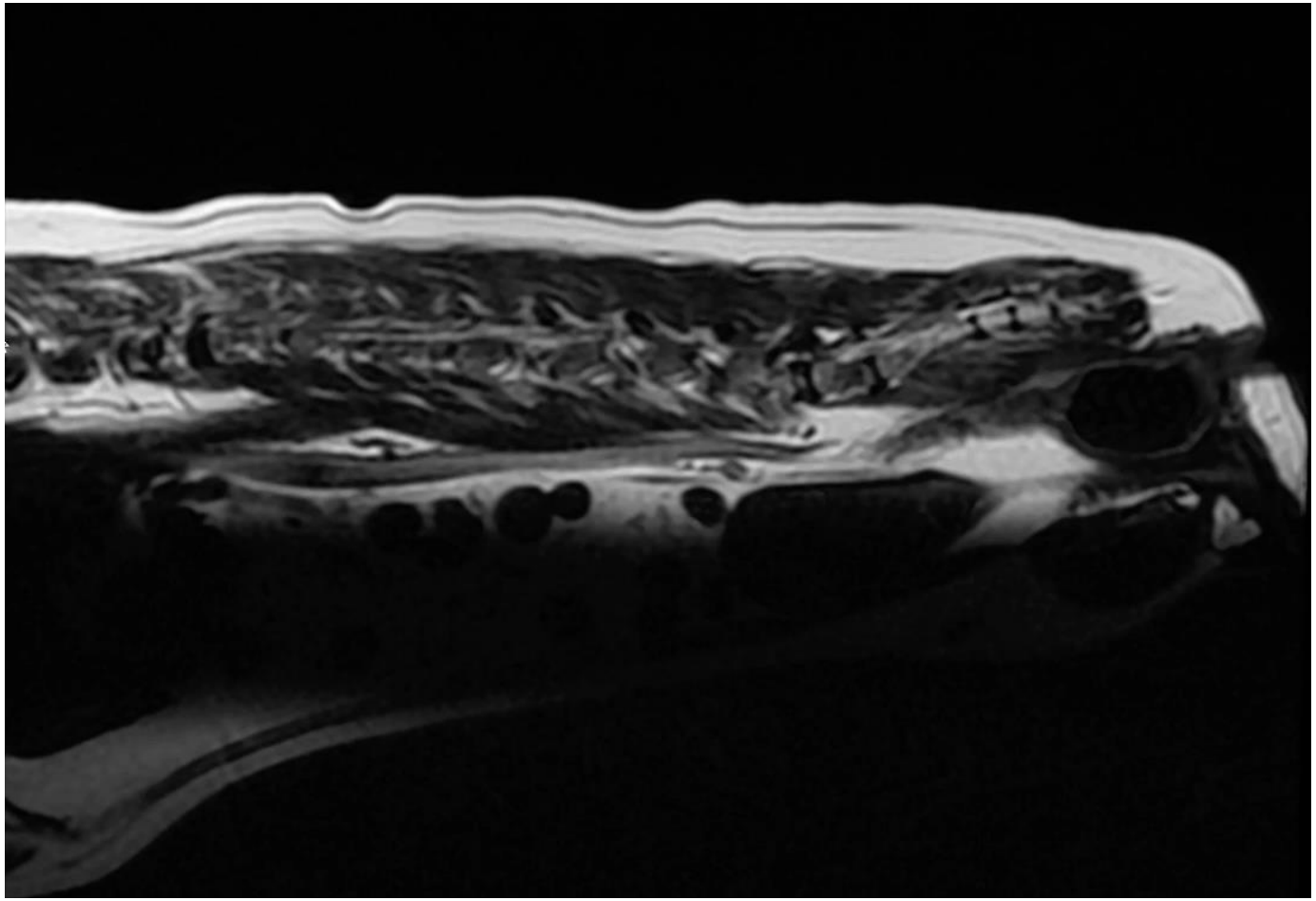
4th CLINICAL CASE - ADRENAL GLAND IMAGING IN ULTRASOUND



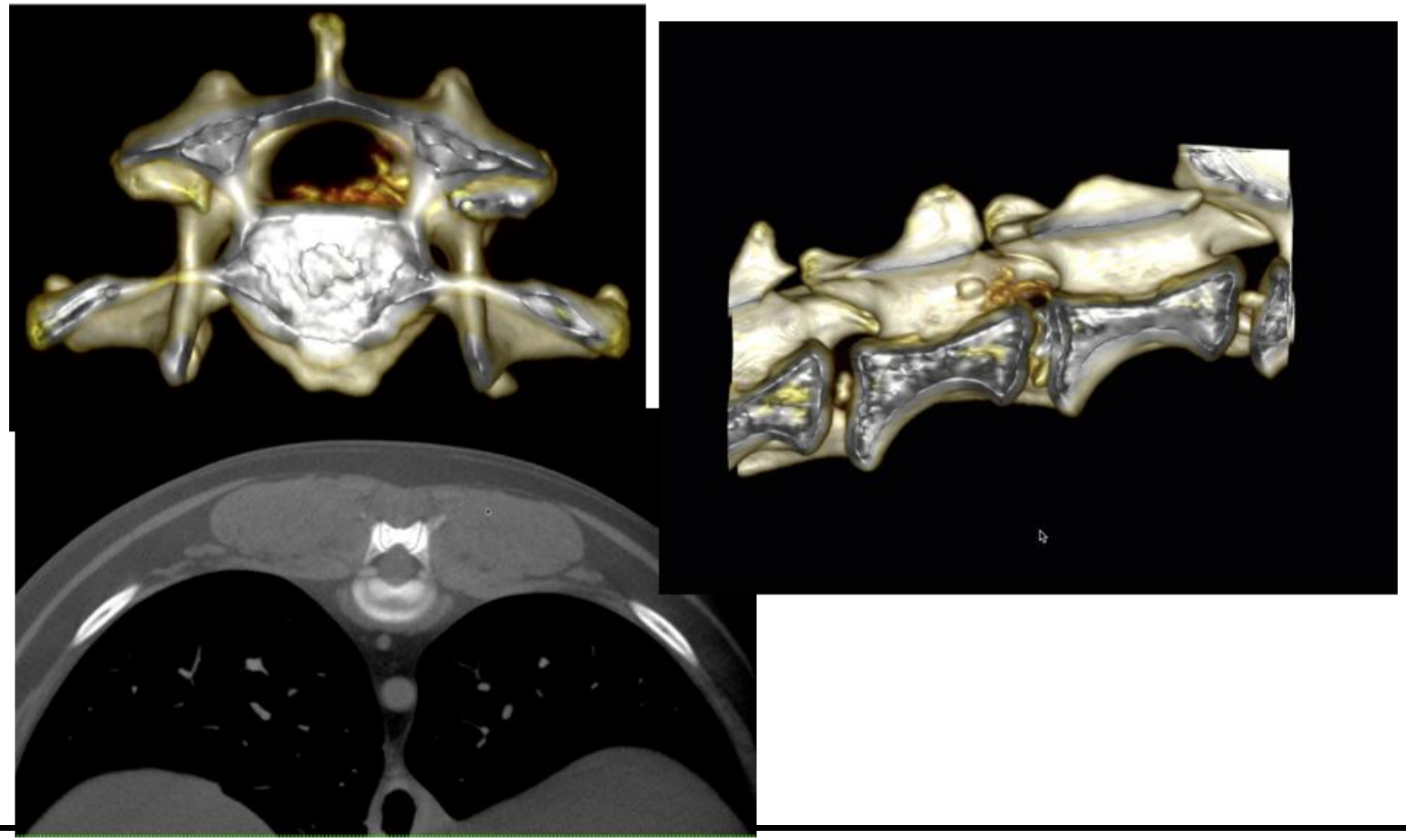
4th CLINICAL CASE - ADRENAL GLAND IMAGING IN ULTRASOUND



5th CLINICAL CASER - SPINE IN MRI

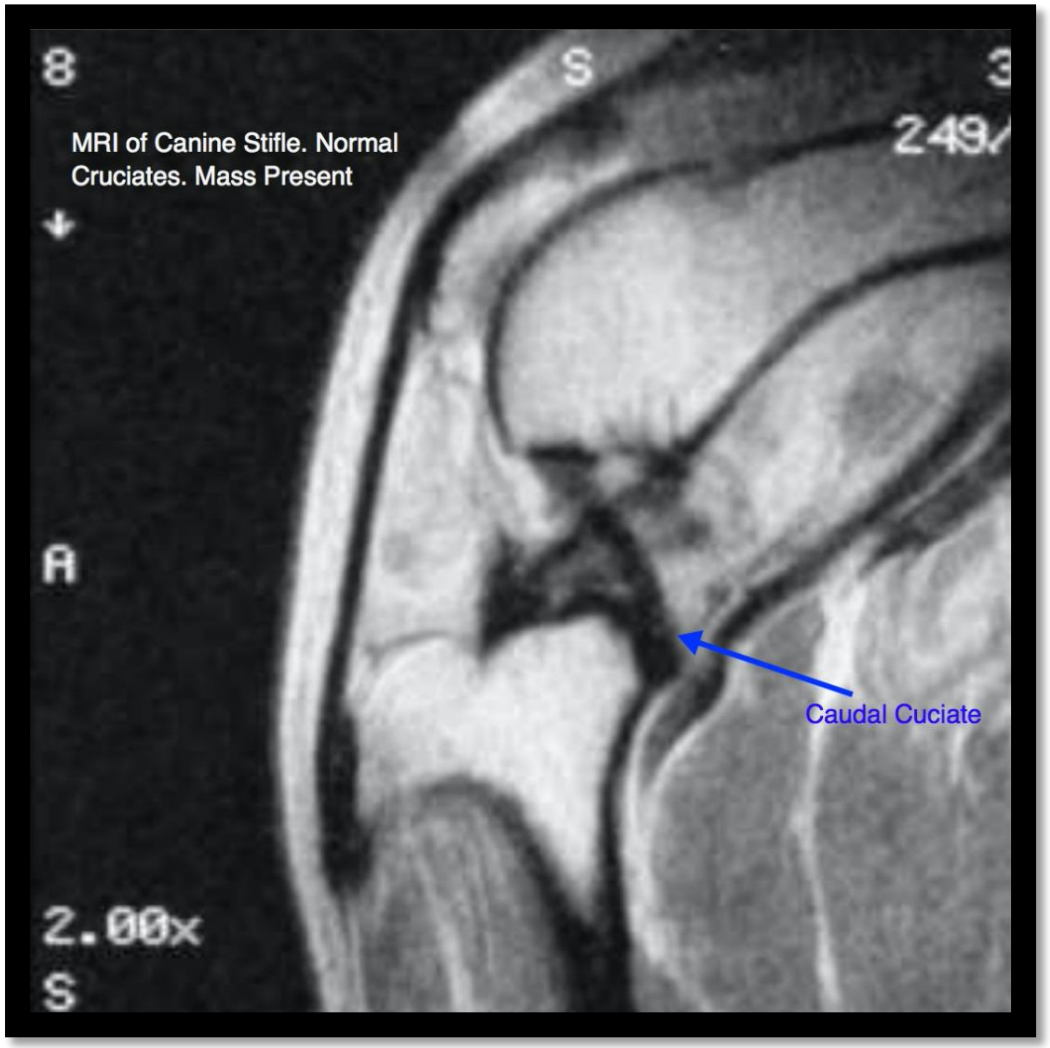


5TH CLINICAL CASE - SPINE WITH VIMAGO GT30

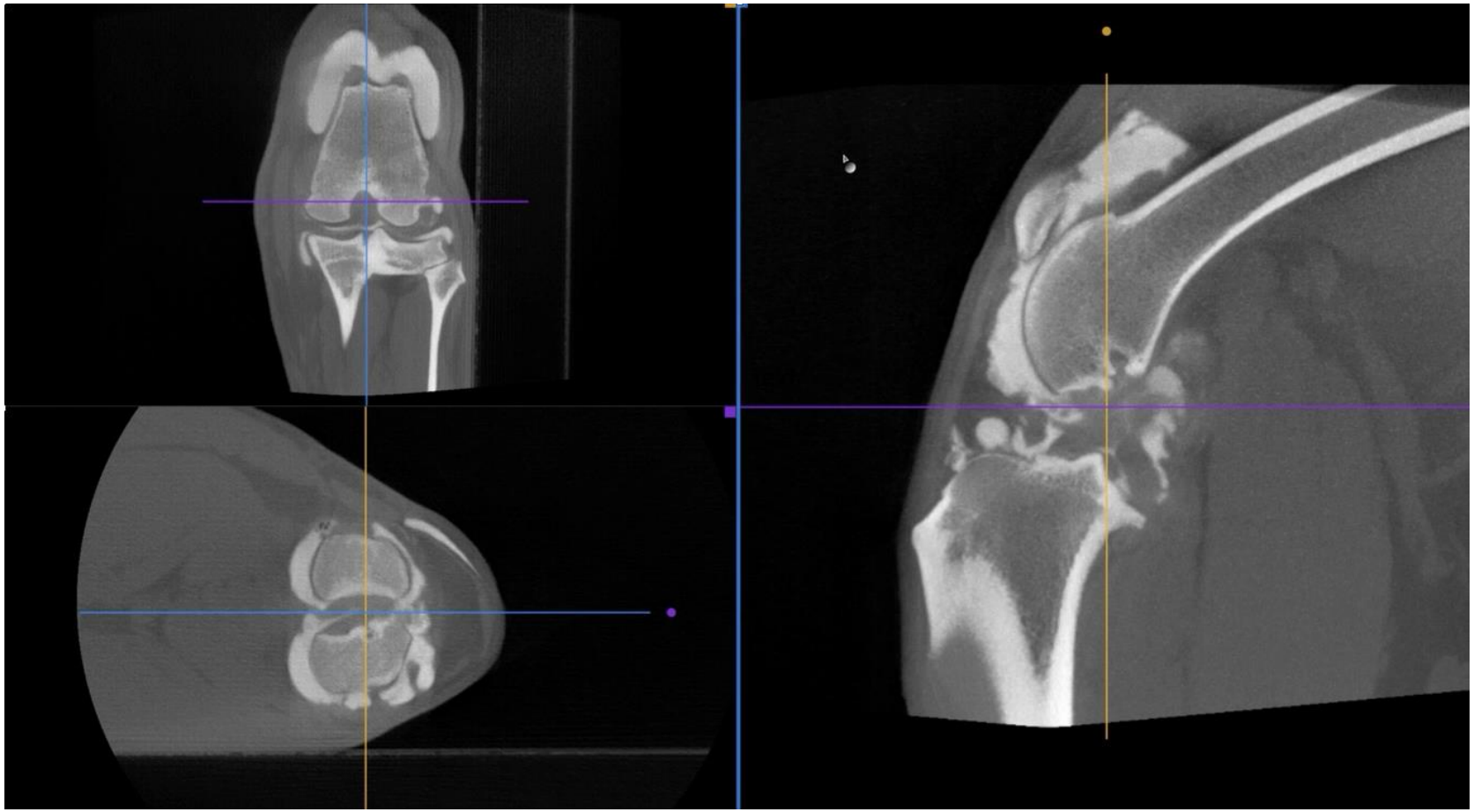


6th CLINICAL CASE - ARTHROGRAM IN MRI

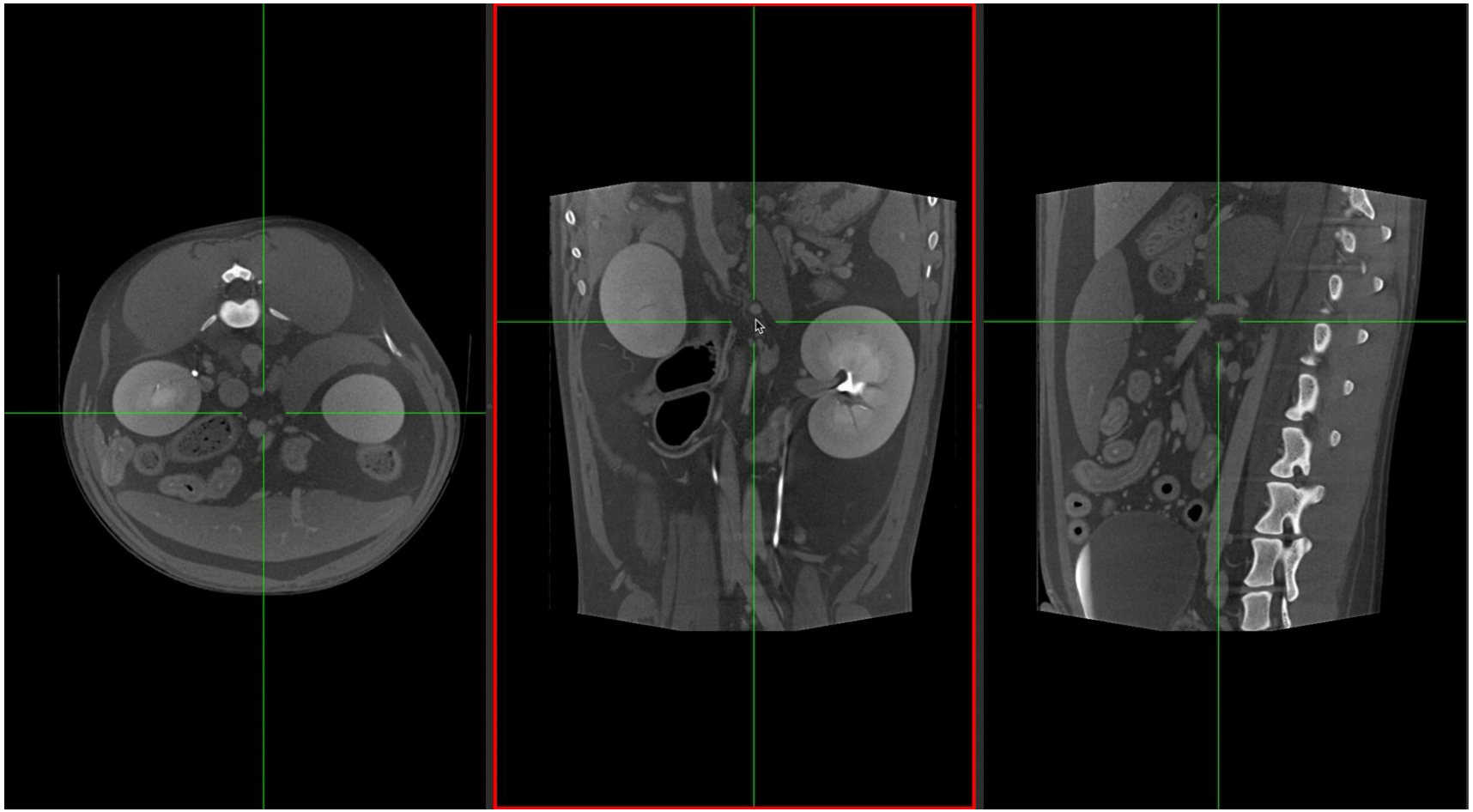
- MRI of stifle (dog)
- Cranial Cruciate Ligament is torn.
- This is how MRI Arthrograms typically appears.
- This study likely took 30-45 minutes of scan time.



6th CLINICAL CASE - ARTHROGRAM WITH VIMAGO HDVI IN LESS THAN 10 MINUTES

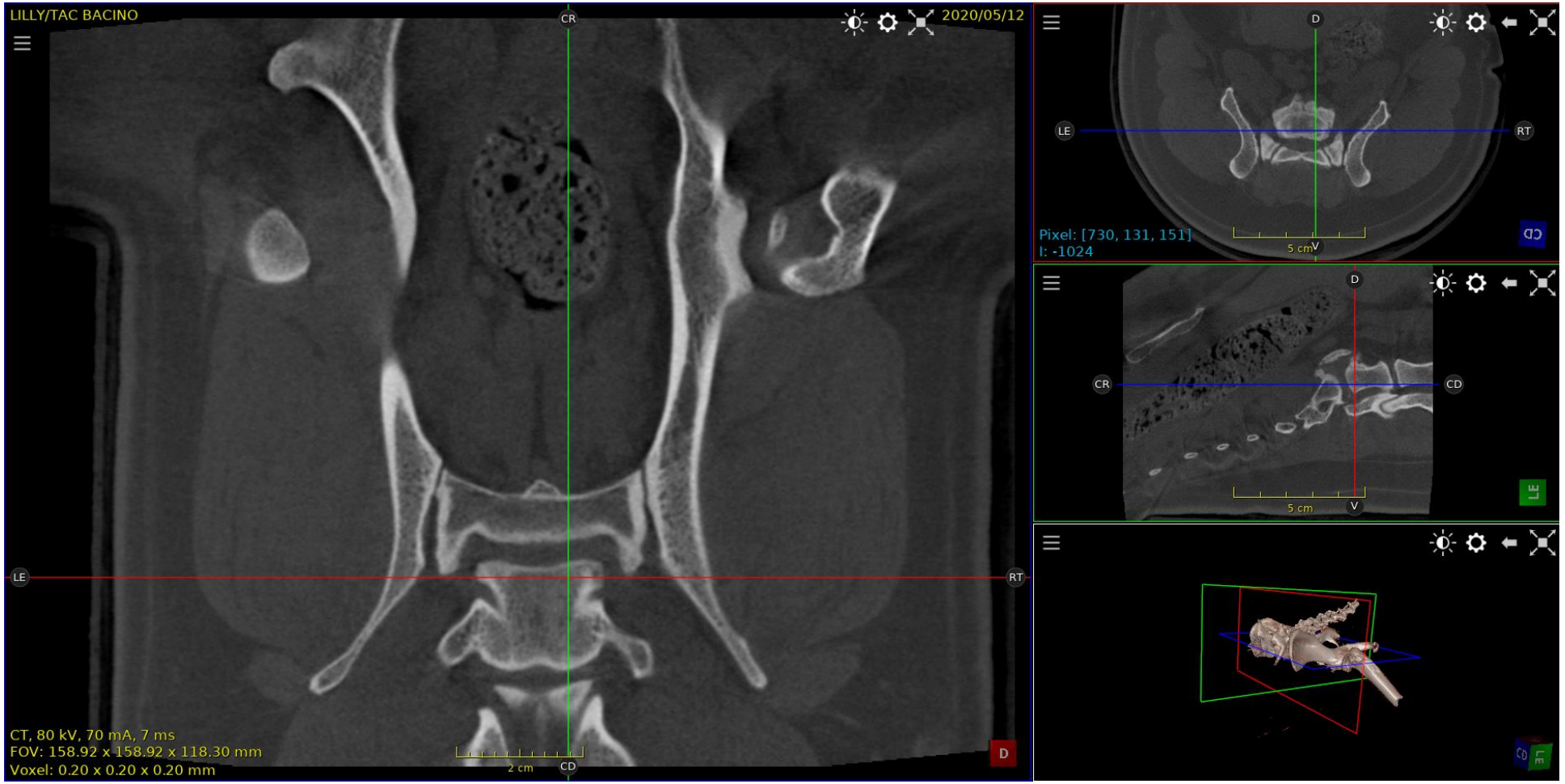


7th CLINICAL CASE - LATE PHASE RENAL IMAGING



8th CLINICAL CASE - RESOLUTION OF 200µm

Vimago HDVI – Higher resolution up to 90µm



VIMAGO GT30

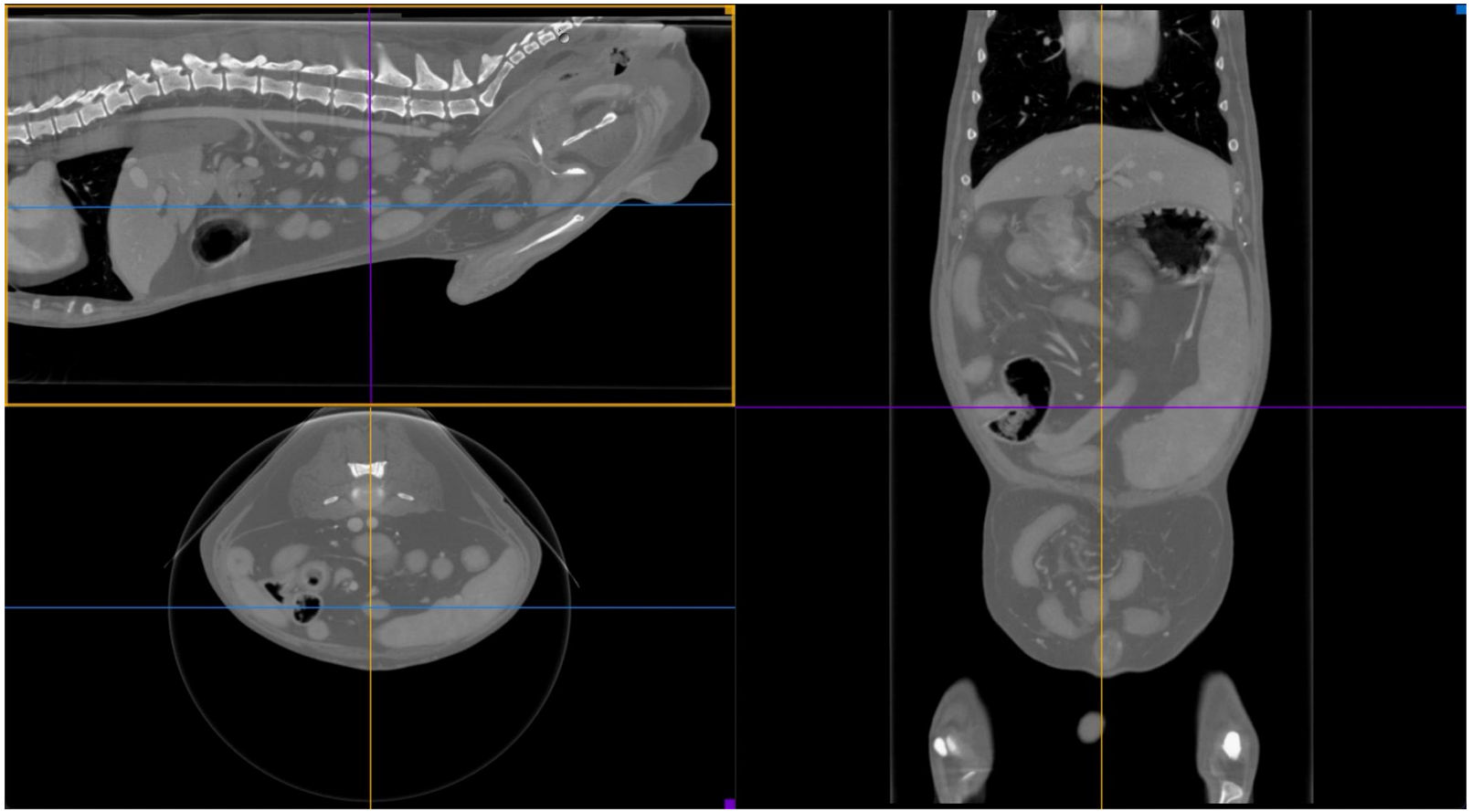
VIDEO CASES

HERNIATED URINARY BLADDER AND SMALL BOWEL

Species: Canine | Breed: Mixed | Age: 12 | Gender: male | Weight: 6 Kg

Clinical Findings | History & Clinical Signs: Presented for inguinal hernia

Contrast Agent Used: Omnipaque (iohexol) 300mgl/ml | Amount: 18ml

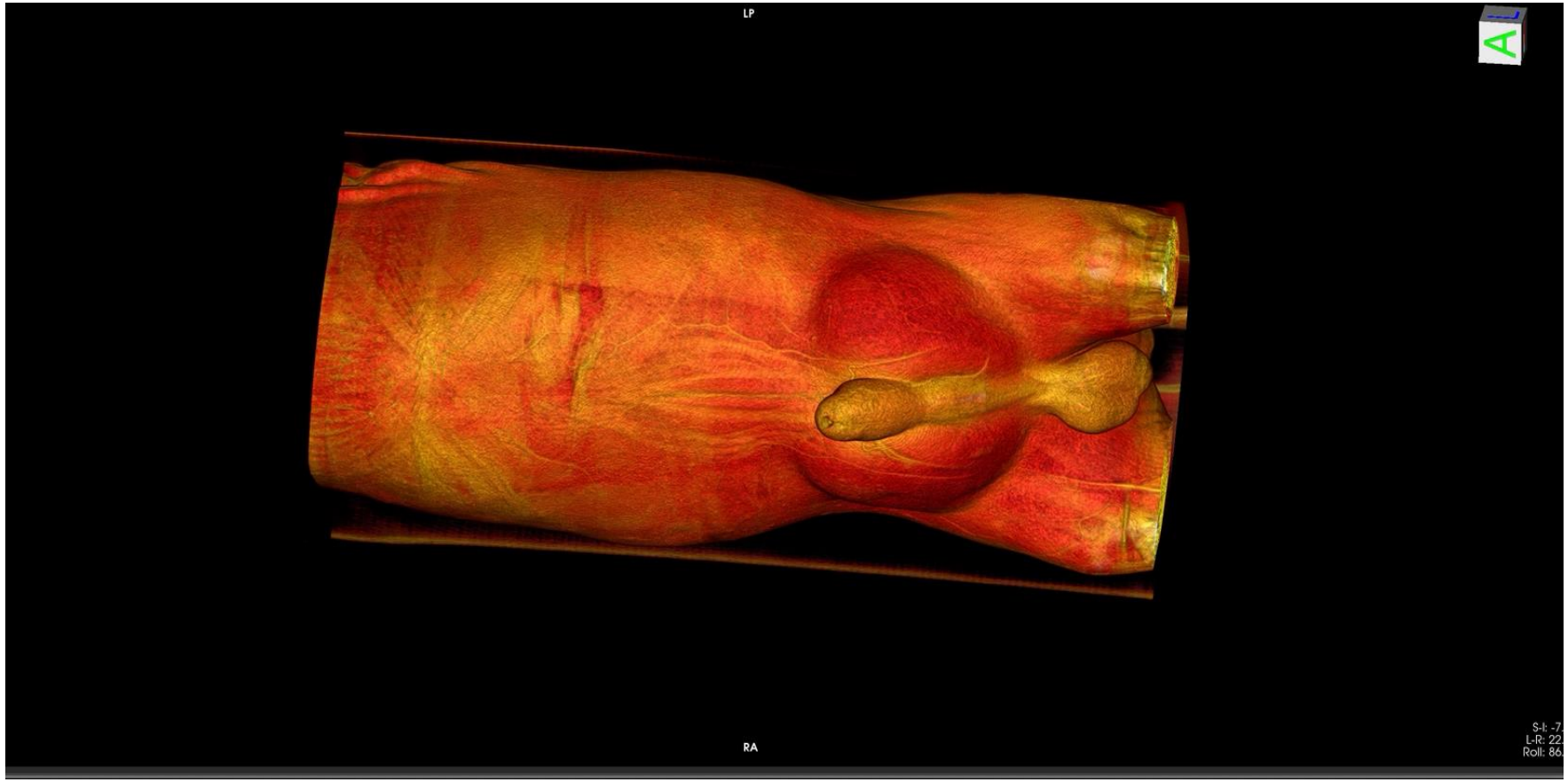


HERNIATED URINARY BLADDER AND SMALL BOWEL

Species: Canine | Breed: Mixed | Age: 12 | Gender: male | Weight: 6 Kg

Clinical Findings | History & Clinical Signs: Presented for inguinal hernia

Contrast Agent Used: Omnipaque (iohexol) 300mgl/ml | Amount: 18ml

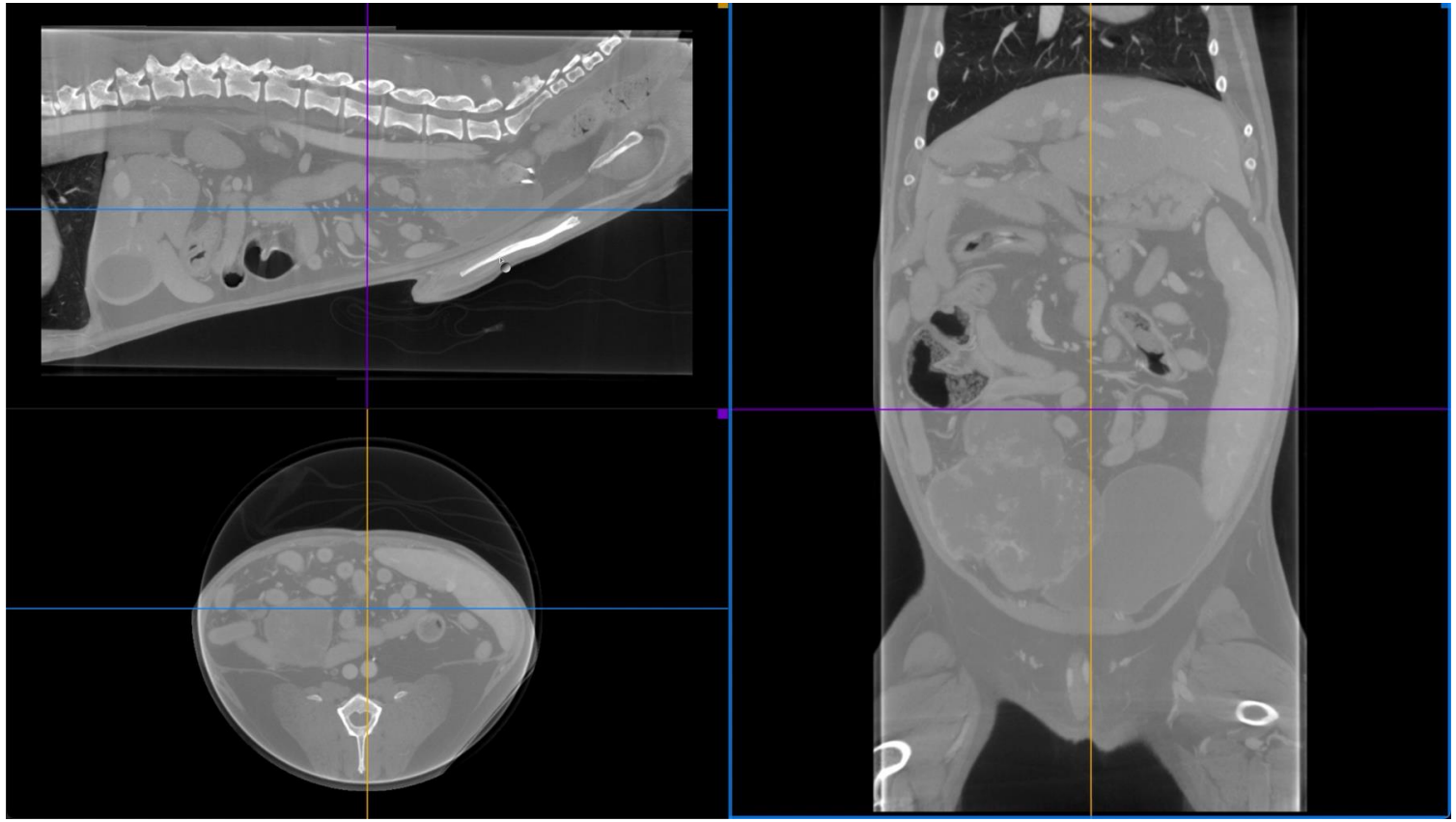


LARGE CAUDAL ABDOMINAL MASS

Species: Canine Breed: Havanese mix Age: 12 Gender: neutered, male Weight: 12 Kg

Contrast Agent Used: Omnipaque (iohexol) 300mgl/ml. Amount: 33

History & Clinical Signs: not eating, mass in the caudal abdomen was palpated and the patient was sent to have an abdominal US. BUN elevated (31).



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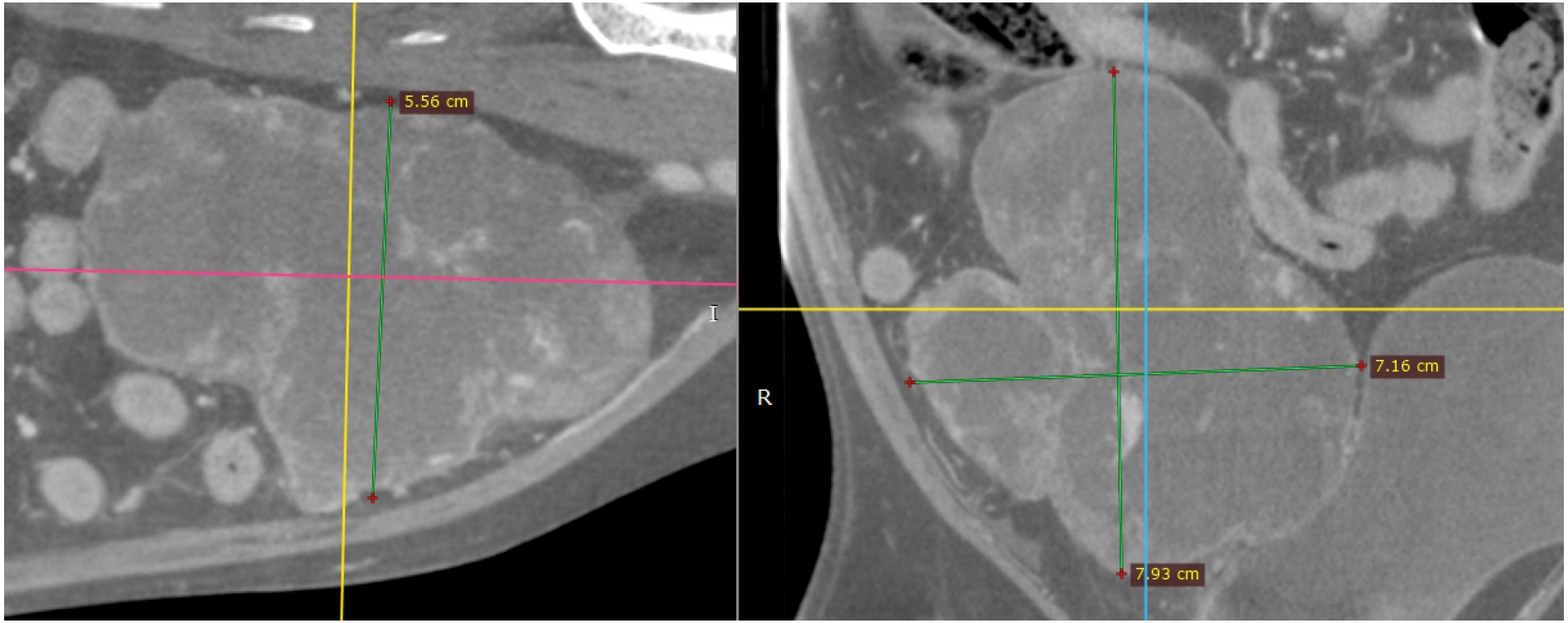
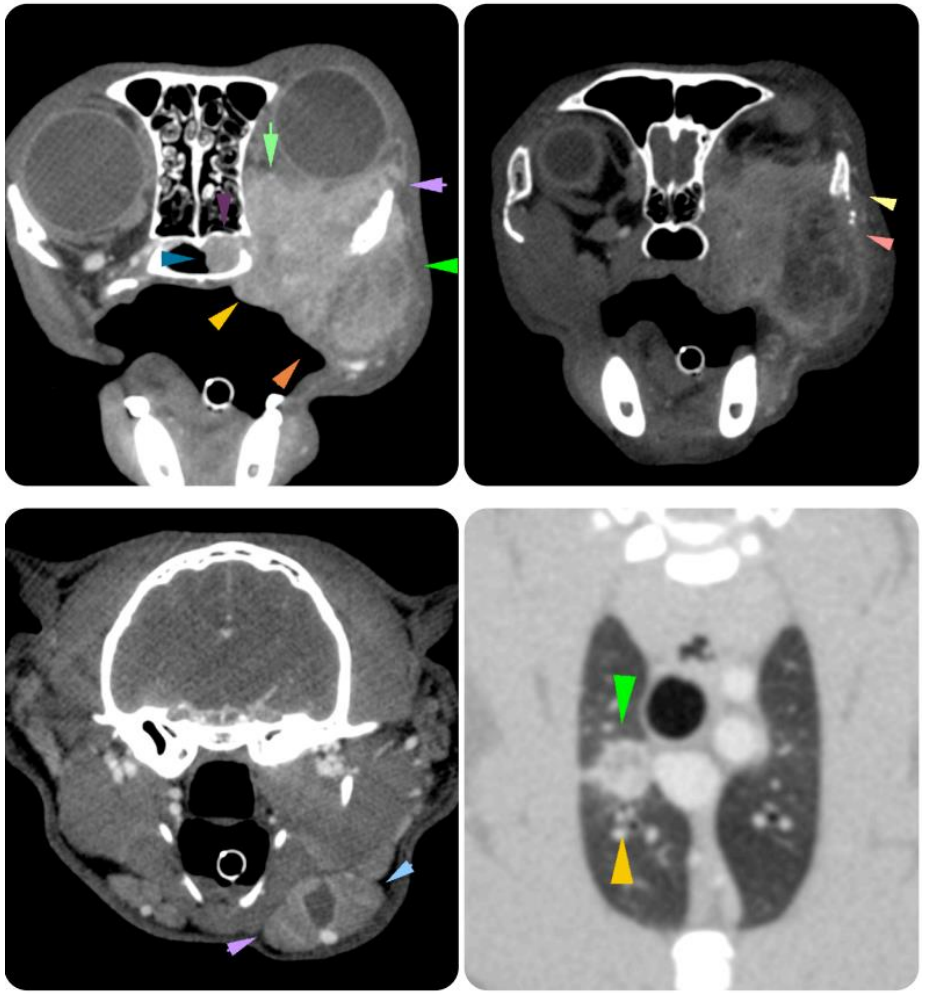
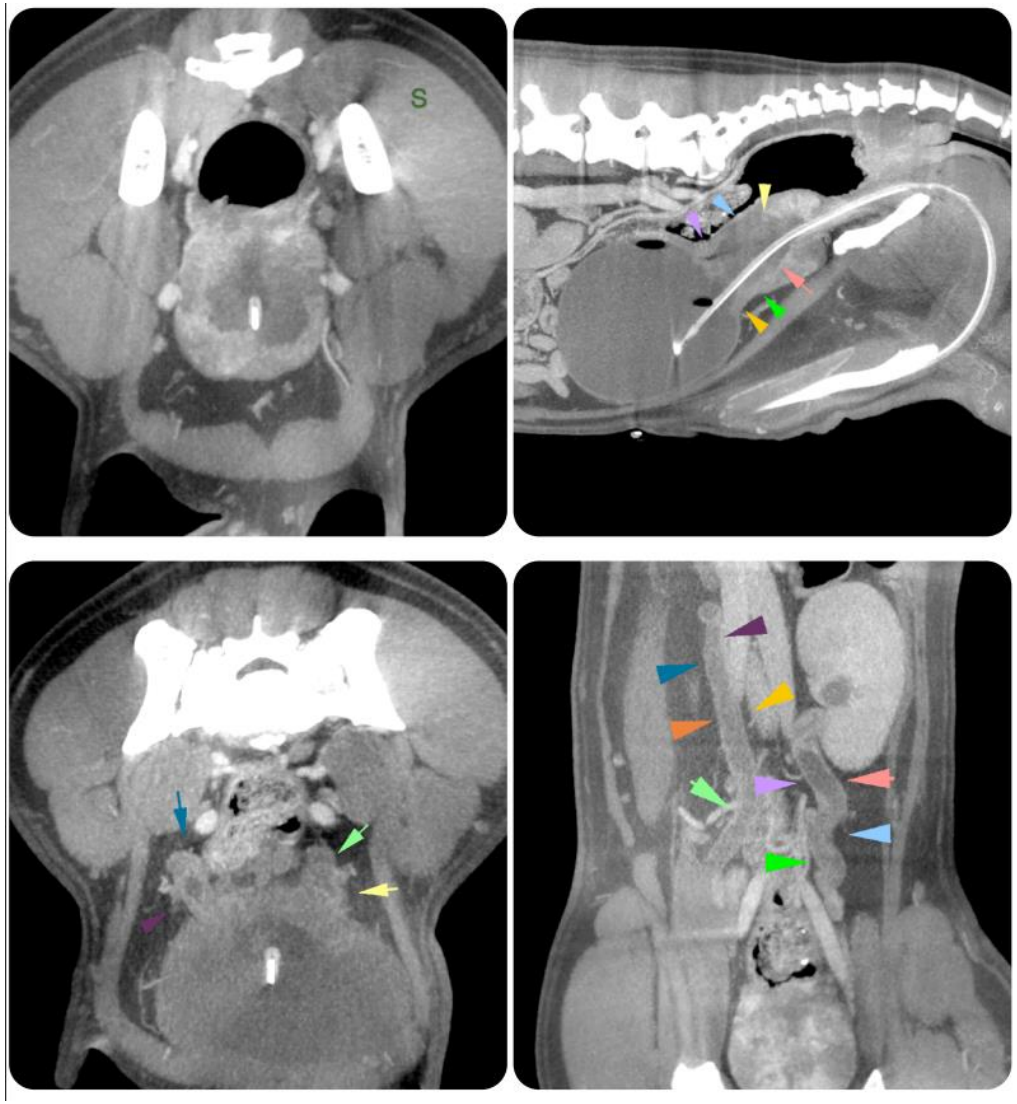




CT of a cat compatible with neoplasia (e.g. carcinoma) starting from the left orbital's soft tissues with infiltrative characteristics (invasion of the nasopharynx and lysis of the ipsilateral zygomatic process).

Right cranial pulmonary lobe: metastases vs inflammatory interstitial disease. Please refer to cyto-histological examination the correct etiological classification of the observed lesions.

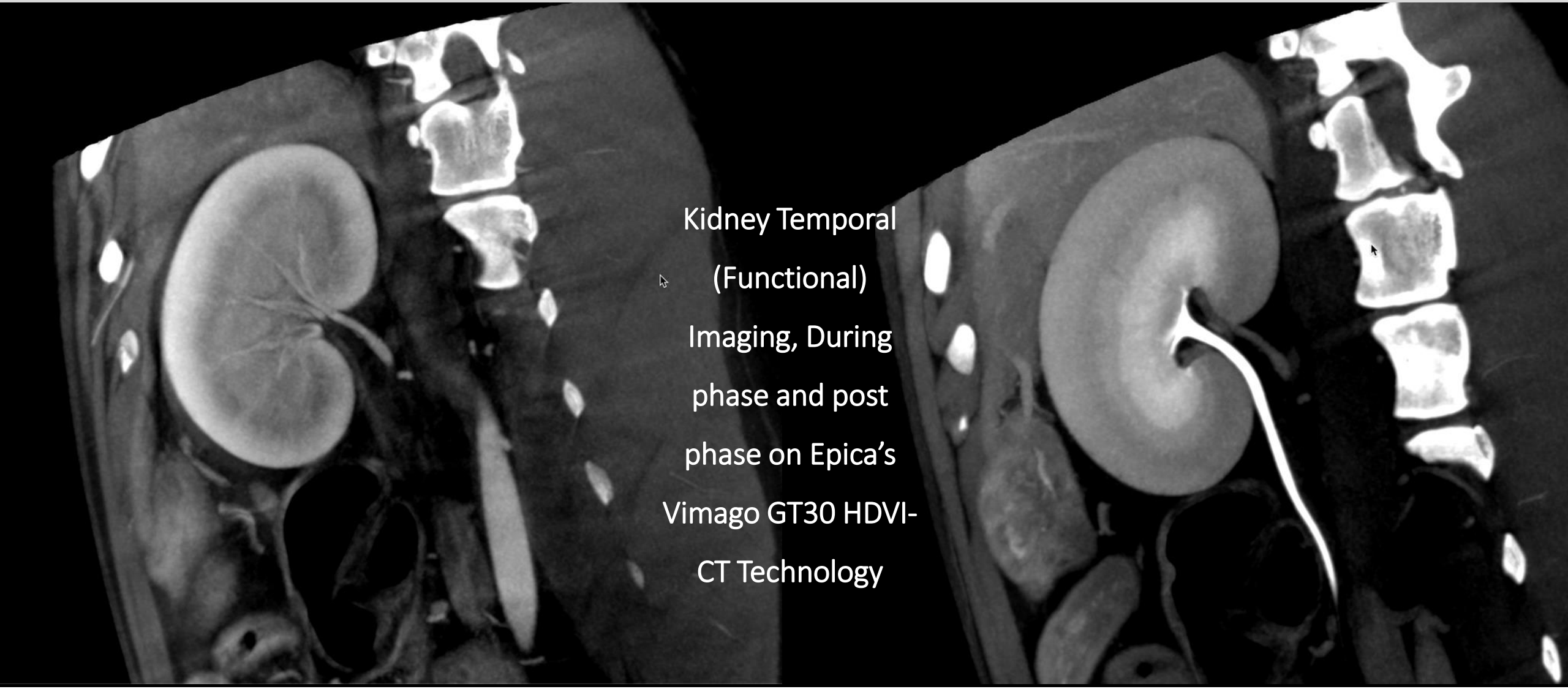


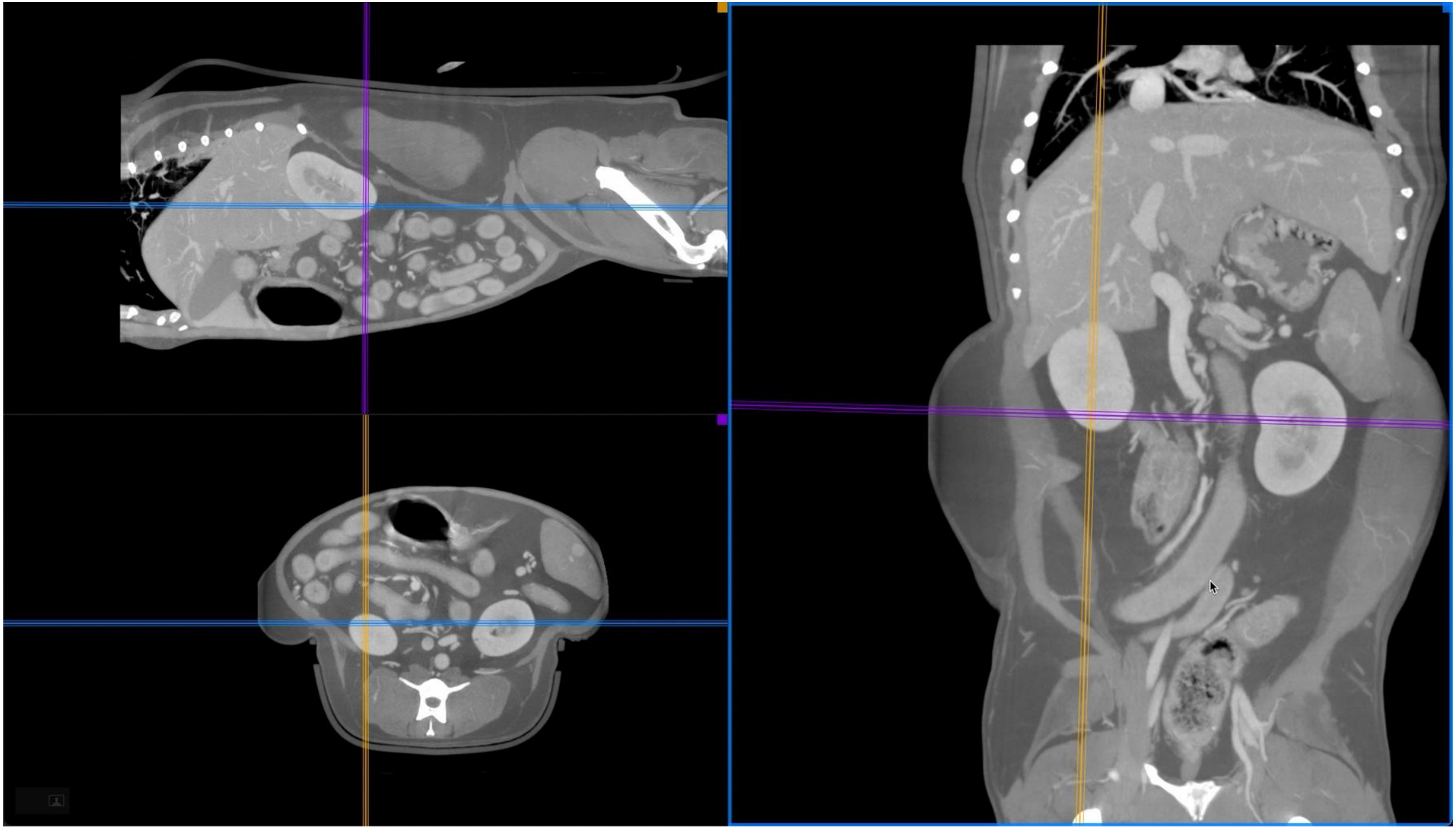
CT compatible with urethral infiltrative neoplasia (e.g. urothelial carcinoma) with involvement of the bladder neck and prostate. Bilateral obstructive hydroureter with pyelectasia.

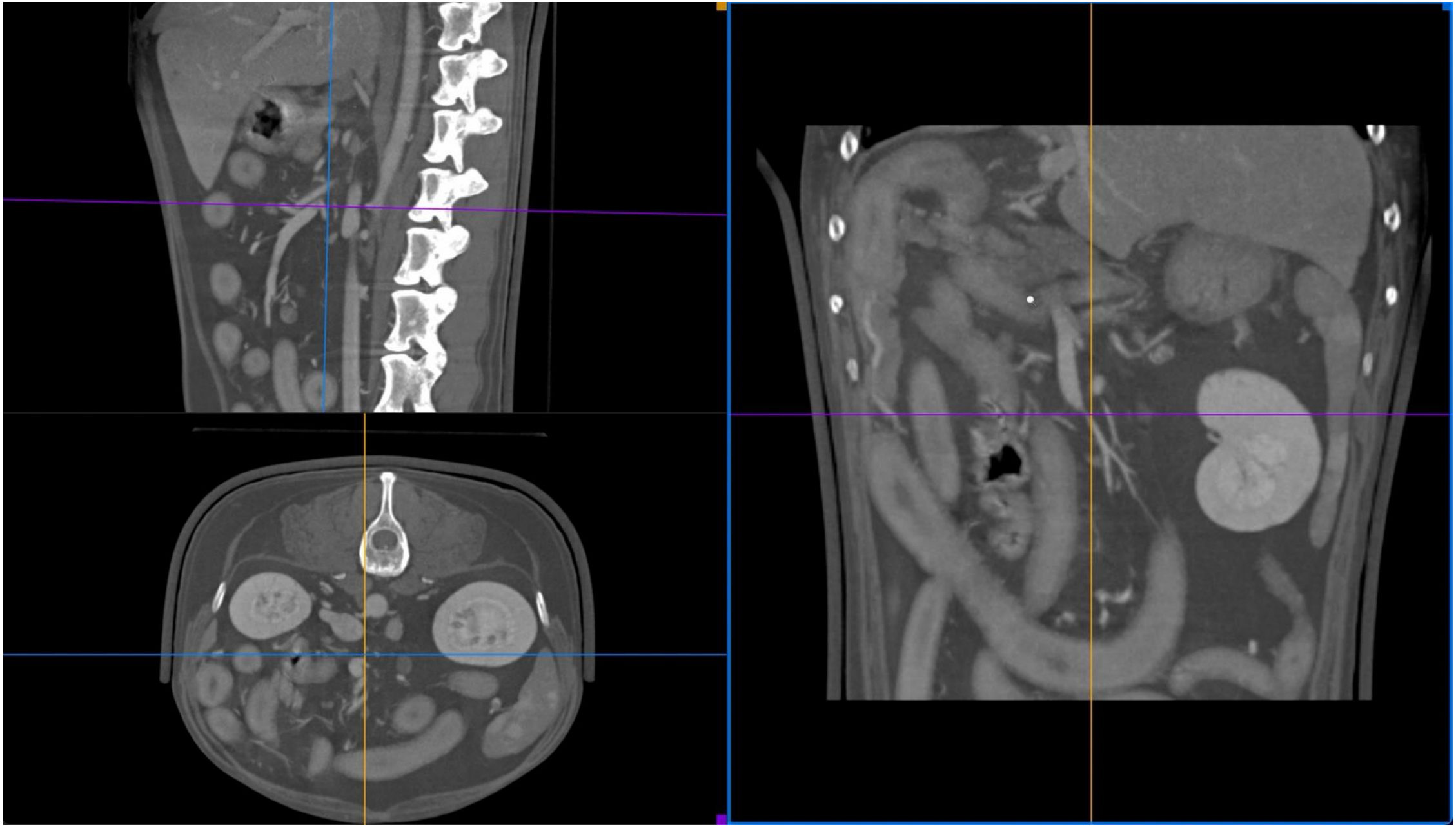
Hypogastric and sacral lymph nodes: metastases.

DD lymphadenitis.

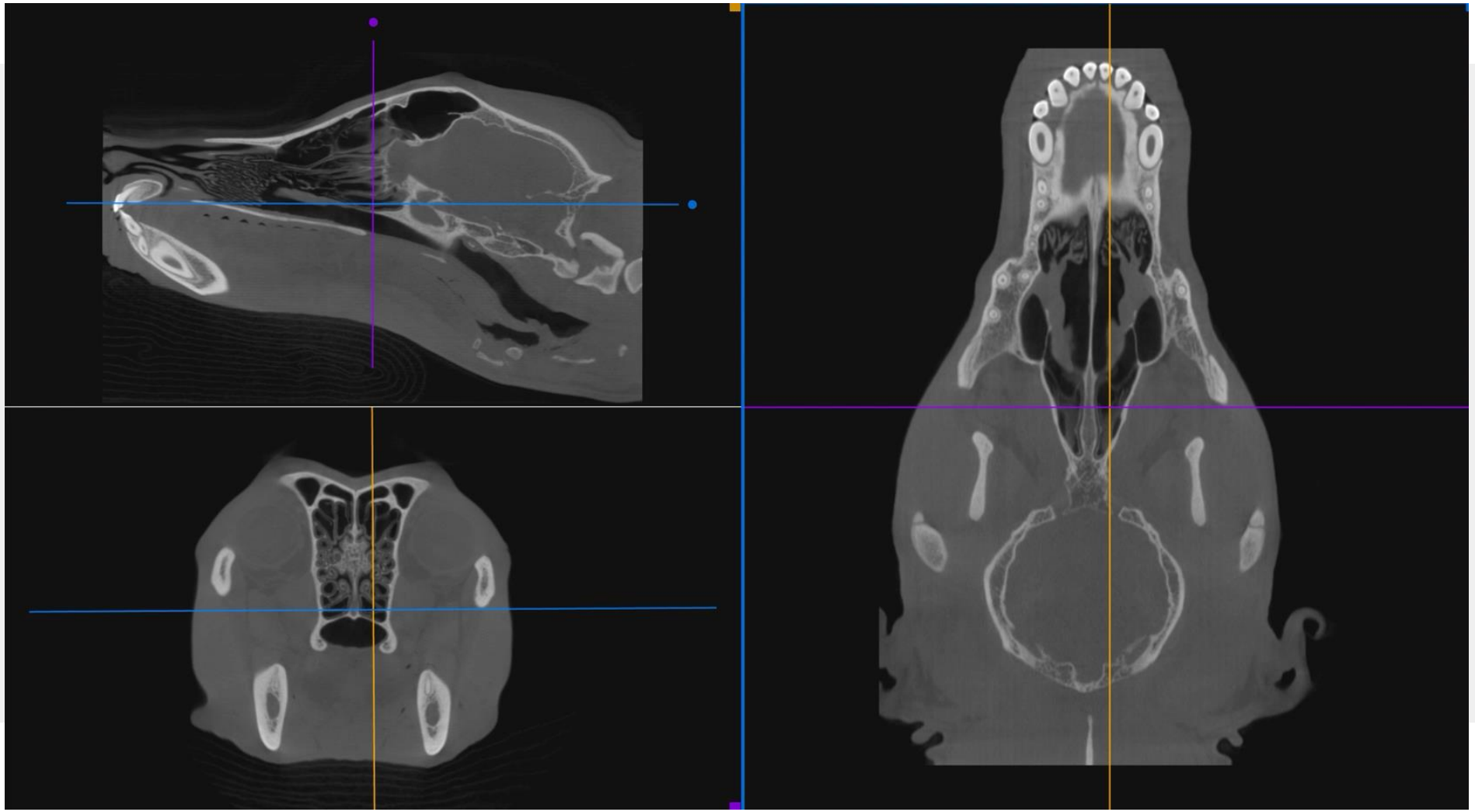
SOFT TISSUE WITH VIMAGO GT30

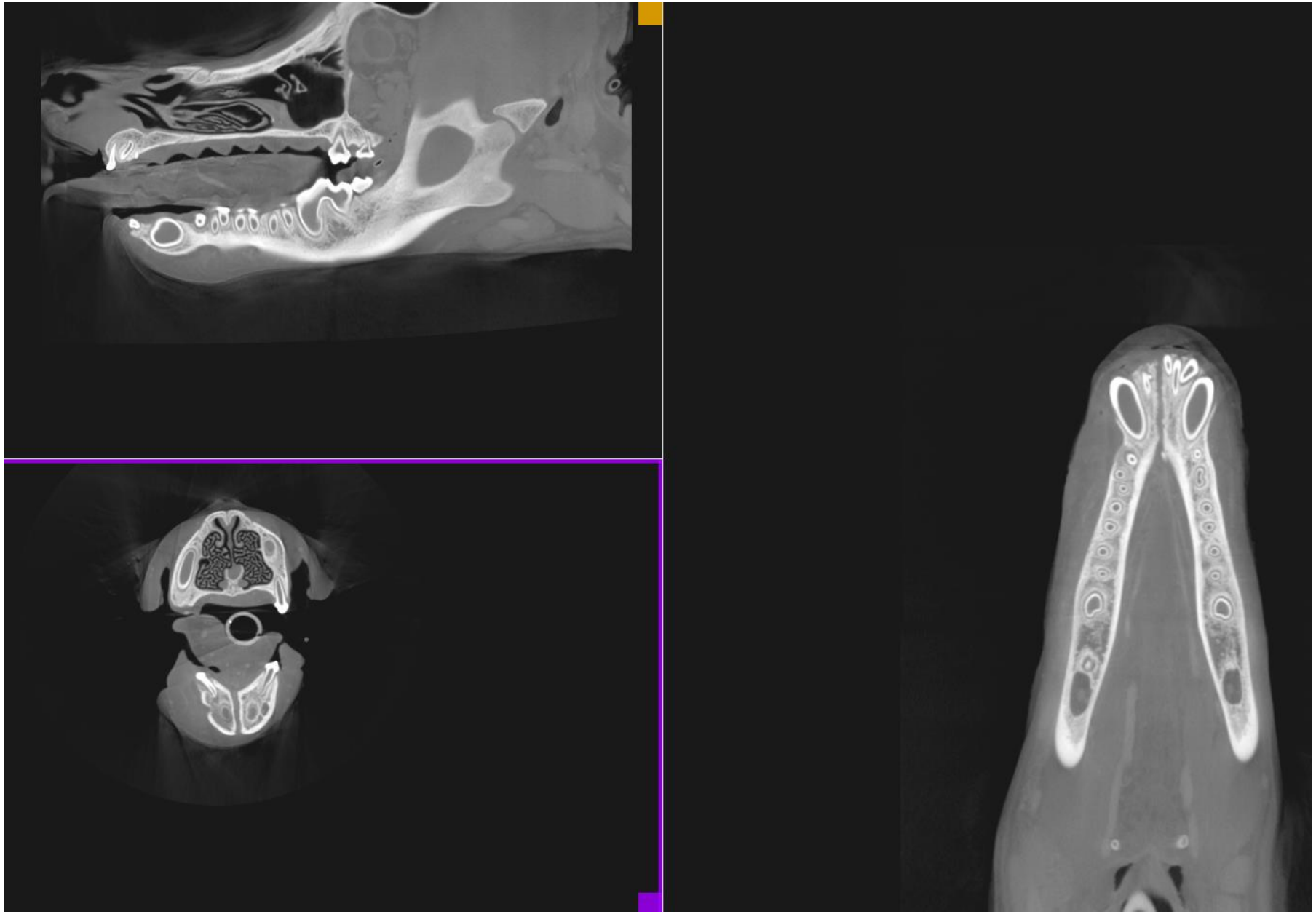






DENTAL WITH **EPICA'S HDVI CT** TECHNOLOGY (3D)





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ORIGINAL RESEARCH
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Localization of the First Mandibular Molar Roots in Relationship to the Mandibular Canal in Small Breed Dogs—A Tomography Imaging Study

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The intimate relationship between the mandibular canal (MC) and the first mandibular molar tooth presents challenges when performing dentoalveolar surgical procedures due to the probability of causing iatrogenic injury to the inferior alveolar neurovascular bundle. Superimposition between the MC and the first molar (M1) tooth roots is often observed on intraoral dental radiographs in small breed dogs. However, due to the radiograph's bidimensional nature, it is impossible to determine the buccal or lingual localization of the first molar roots with respect to the MC. Thus, this study's objective was to determine the localization of the first molar tooth's roots in relation to the position of the MC and their overlapping percentage with the canal in small-bodyweight dogs (<15 kg) using tomographic diagnostic images. For this, cone-beam computed tomography and high-definition computed tomography exams from 103 small breed dogs (under 15 kg) were retrospectively assessed to determine the lingual or buccal localization of the first molar tooth's roots with respect to the MC and the degree of overlap of the roots with the canal. In conclusion, most of the roots of M1 of dogs under 15 kg were located at the MC's lingual aspect (82.7%) with an overall superimposition median with the MC of 100 and 90% for the mesial and distal roots, respectively. Straddle tooth roots were not a common anatomical presentation in the dogs of this study.

Keywords: molar tooth, mandibular canal, tooth root, cone-beam computed tomography, high-definition computed tomography, small breed dogs

INTRODUCTION

The mandibular canal (MC) is a hollow space that carries the inferior alveolar neurovascular bundle, which innervates and provides blood supply to the gingiva, teeth, and rostral soft tissue of the mandible (1, 2). In the dog, the MC begins at the mandibular foramen located at the ventral region of the temporalis muscle insertion on the medial aspect of the ramus of the mandible. The inferior alveolar neurovascular bundle runs rostrally through the MC from the mandibular foramen to its end at the distal, middle, and rostral mental foramina on the buccal surface of the mandible at the level of the second premolar and canine teeth (1, 3). Knowledge of the MC's position

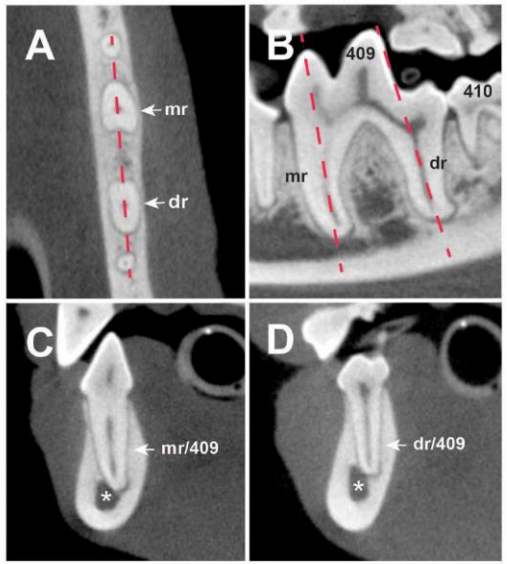

FIGURE 1 | (A) Dorsal, **(B)** sagittal, and **(C,D)** transversal multiplanar cone-beam computed tomography (CBCT) reconstructions of the right mandible of a 4-year-old English Cocker Spaniel. **(A)** Dashed line shows the sagittal reconstruction of 409 displayed on **(B)**. **(B)** Dotted lines present the axis of the mesial (mr) and distal (dr) roots of 409. **(C)** Mesial root transversal reconstruction (mr/409). Distal root transversal reconstruction (dr/409). (Asterisk) Mandibular canal; (409 and 410) right mandibular first and second molar teeth.

amount of superimposed M1 root along the same axis. The tooth root portion overlapping the MC was calculated on the transversal reconstruction. For this, each M1 root, the MC's vertical diameter, parallel to the tooth root axis, was measured. Second, at the MC's dorsal border, a horizontal line was drawn to form a right angle with the line used to measure the MC diameter. This line transected the portion of the root that was subsequently measured and compared with the MC's vertical diameter to determine the superimposition percentage (**Figure 3**).

Statistical Analysis

All statistical analyses were conducted in R version 4.0.2[4] using packages *lme4*, *lmerTest*, and *ggplot2*.[5] Comparisons in rates of root locations were done via Z testing using the Normal approximation to the binomial. Comparisons of rates of root locations with continuous variables were done via mixed logistic regression with a random intercept for each patient. Comparisons of overlap were performed via mixed linear regression with weight and location of root as predictors with a random intercept for each patient; 95% confidence intervals were created using the Normal approximation to the Binomial distribution. Significance was defined as $p < 0.05$.

RESULTS

A total of 103 patients met the inclusion criteria proposed in this study. Twenty-four different breeds were presented within our sample population (**Table 1**). The most prevalent represented breeds were Dachshunds ($n = 24$), Chihuahuas ($n = 14$), and Yorkshire terriers ($n = 10$). Quantitative data were collected

[4] R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Available online at: https://www.R-project.org/.
[5] H. Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.

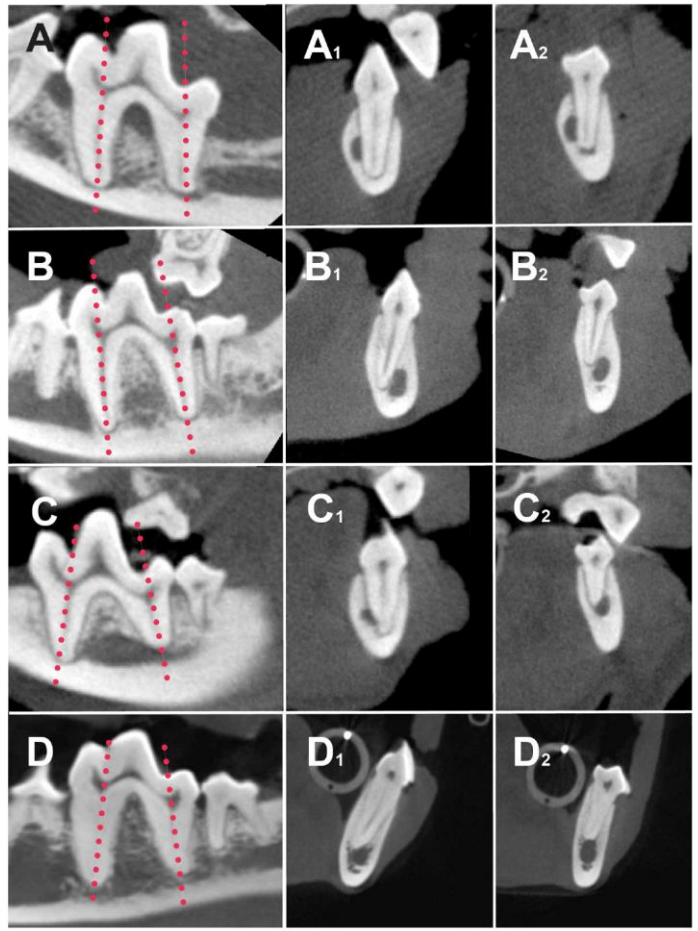

FIGURE 2 | Sagittal **(A–D)** and transversal high-definition computed tomography (HDCT) reconstructions of the mesial **(A_1-D_1)** and distal roots **(A_2-D_2)** of different dogs showing different root localization. Dotted lines on **(A–D)** show the axis of the roots for the transversal reconstructions. **(A_1,A_2)** Both mesial and distal roots are located on buccal side of the mandibular canal (MC). **(B_1,B_2)** Both mesial and buccal roots are located on lingual side of MC. **(C_1,C_2)** Straddle tooth. **(C_1)** Mesial root buccal to the MC; **(C_2)** distal root lingual to the MC; **(D_1)** mesial root lingually located; **(D_2)** distal root dorsally located.

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- Many radiographs and ultrasounds becomes CTs. **DR + US → CT**
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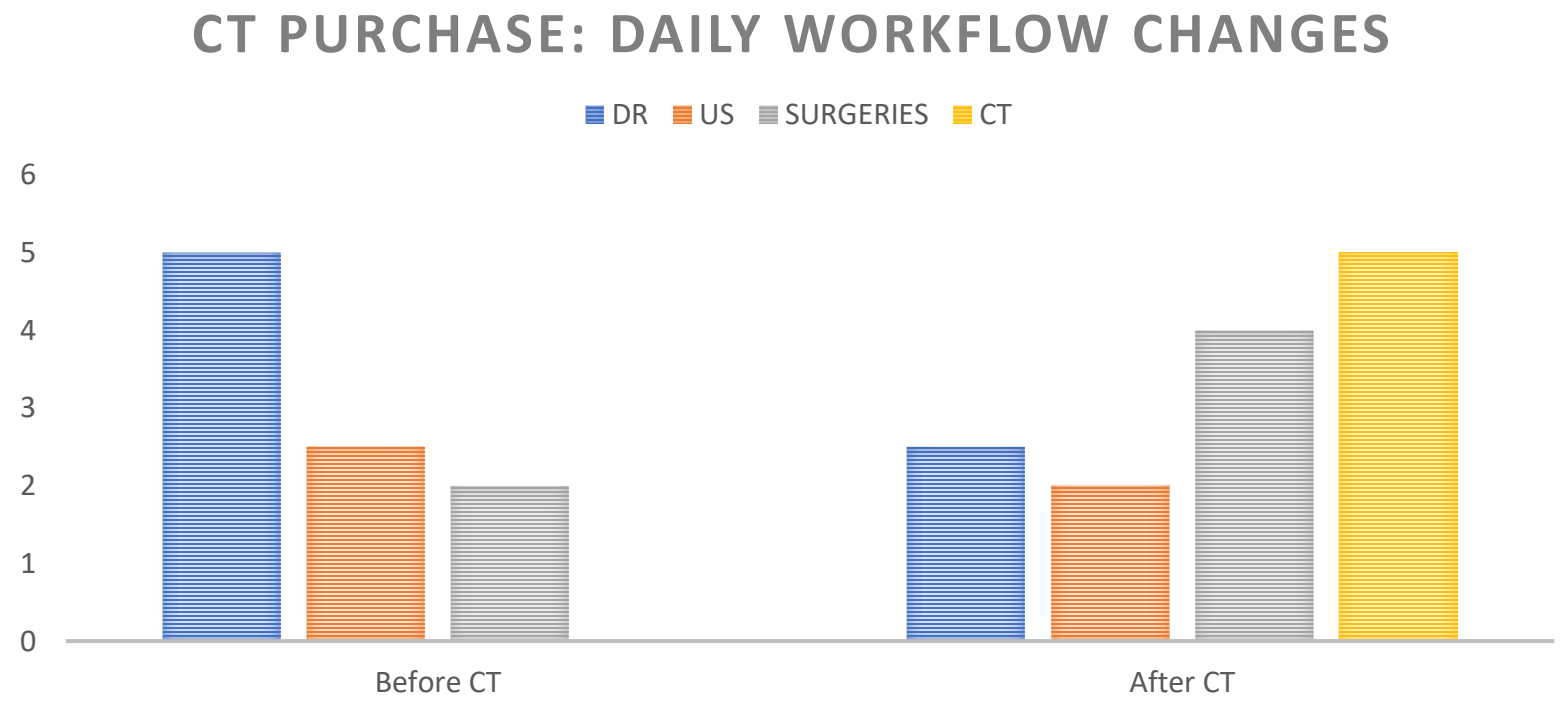

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- ✓ Understanding drives owner confidence and trust: customers increase