



# VTS-DI Case Report Samples

2024 Examination

## Case Study Sample #1:

Name: [REDACTED]  
Modality: CT  
Case Report #3  
Represented Case Log Number 37  
Patient's First Name: Jack  
Date of Exam: [REDACTED]

Jack (12 year old, MN, 36.5 kg, Mixed Breed, canine) presented to the IM Dept for evaluation of further workup of a possible pulmonary mass.

Three months prior, Jack started coughing and rDVM Rads revealed a soft tissue opacity in the cranioventral lung lobe. The cough which was a non-productive, "goose honking", and dry cough was occasionally accompanied by wheezing. Coughing episodes occurred two to three times a day and were not induced by exercise. Prior to presentation, Jack began limping on his LeF in which the owners discovered a small mass.

PE revealed slightly over conditioned at 7/9 BSC, a two inch mass on the ventral thorax, a one cm circular mass LeF digit five, and a two cm mass on the left ventral tail base. All other findings were WNLs. Blood work revealed no significant findings.

To confirm a suspected lung mass and potential staging of the abdominal cavity, a CT Th and Ab using a Lightspeed VCT 64 slice CT (General Electric Signa, Milwaukee, WI) was pursued. Jack was placed under GA by an IM VN using ketamine (1 mg/kg IM), dexmedetomidine (10 mg/kg IM), and butorphanol (0.4 mg/kg IM) for pre-medications, propofol (3 mg/kg IV) and midazolam (0.2 mg/kg IV) for induction and isoflurane for maintenance and gurneyed to the CT suite.

Patient was placed on the CT couch in sternal recumbency head directed away from the gantry. His hind limbs were extended caudally to prevent beam hardening artifacts from the femurs within the abdomen cavity while his front limbs were extended cranially to prevent beam hardening artifacts within the thoracic cavity. Jack was rotated until his spine and sternum were in alignment. With guidance from the CT's laser lights, the patient was "zeroed" mid femurs and approximately halfway between dorsal and ventral at the deepest section of the thorax. The CT couch was advanced further into the gantry until the laser lights were level with the thoracic inlet providing a more accurate estimation for planning and ensuring anesthetic monitoring equipment was the appropriate length. A whole body scout was acquired from cranial (thoracic inlet) to caudal (mid femurs) in both sagittal and dorsal planes. After reviewing the scout, positioning was confirmed and a pre-contrast Ab series was planned from caudal (perineum) to cranial (cranial to the diaphragm). The pre-contrast Ab series was acquired using the following parameters: 64-slice helical, 3.75 mm slice thickness, 1.875 mm interval, 40 mm detector coverage, 0.984:1 mm/rot pitch speed, 1 sec interval, 512\*512 matrix, 36.9X36.9 cm DFOV, 140 kVp, and 340 mA. The Th series was planned from caudal (L2) to cranial (cranial to the scapulothoracic joint). The Th series was acquired with the following parameters: 64-slice helical, 3.75 mm slice thickness, 1.875 mm interval, 40 mm detector coverage, 0.984:1 mm/rot pitch speed, 1 sec interval, 512\*512 matrix, 36\*36 cm DFOV, 140 kVp, 340 mA, and in detail algorithm. Both pre-contrast series were reviewed by a DI resident. 72 ml of nonionic and water soluble Iohexol (Omnipaque, 240 mg I/ml, 1mg/kg, IV) was drawn up via a Medrad PD automatic power injector. A 30" inch extension set was attached to the syringe and air removed. After checking the catheter patency, the extension set was attached to the patient's catheter and the catheter unclamped. Preparations were made on the computer system for a Th three phase post-contrast series and via a switch inside the control room, Jack was administered 3.6 ml of contrast a sec over 20 sec. Th three phase post-contrast series was acquired as follows: arterial phase scanned caudal to cranial 20 sec after the start of injection, venous phase scanned cranial to caudal 20 seconds after completion of arterial phase, and the delay phase scanned caudal to cranial 60 secs after completion of venous phase. A delayed post-contrast Ab series was acquired immediately following the three phase Th series. A DI resident reviewed the images. Post processing, reconstructions were completed with the pre-contrast Th in both a lung and bone algorithm and pre-contrast Ab in a bone algorithm. Reformats were completed with the venous phase in both sagittal and dorsal planes. Images were sent to the PACS. Contrast, contrast amount, kVp, and mA were recorded in the patient's medical record. From the time the patient arrived to completion of post processing the length of time for the study was 20 minutes. After reviewing the images, the DI resident determined samples could be taken from the lung mass and spleen.

## Case Study Sample #1: *(continued)*

Jack was gurneyed to the Philips Ultrasound iU22 SonoCT system (Bothell, Washington) within the CT suite and rotated into dorsal recumbency. The DI Dept resident briefly scanned both the area of the lung mass and spleen using a microconvex probe. The patient was clipped and a rough prep was applied. DI Dept resident collected FNA samples (using US guidance) from the splenic nodules and the lung mass. Samples were given to the IM Dept resident who made preparations for submitting the samples.

Jack was then gurneyed to radiology room two to acquire DR Rads of his LeF manus using a Canon CXDI-80C Wireless Digital Radiography System (VetRocket, Melville, NY). Jack was placed in Le Lat Recumbency for the ML Rad. The RtF was abducted out of the FOV and secured with tape along the thoracic body wall. The LeF was left in a natural walking position. The primary beam was centered on the metacarpals and collimation was opened to include the entire radiocarpal joint and distal portion of the radius proximally, completely off the tips of the toes distally, and skin to skin cranial and palmar. The toes were spayed using ¼" pieces of tape and cotton to help prevent the digits from superimposing over one another. Digit two was rotated cranially and digit four palmarly. The marker was placed on the cranial side of the limb and the calibration ball level with the bone in the FOV. The patient was then rotated into sternal recumbency for the orthogonal DPa view. The LeF was extended cranially and care taken to ensure the palmar surface of the paw was flat against the imaging table. Cotton was used to ensure the digits were separated. The same landmarks and collimation parameters (except now medial and lateral) were utilized. The marker was placed on the lateral side of the limb and the calibration ball was placed level with the bone within the FOV. Technique was measured for each Rad, 55 kVp and 2.5 mAs, and recorded in the patient's medical record. Images were sent to the PACS and the length of study was approximately 15 minutes. Jack returned to the IM Dept for a punch biopsy of the LeF manus mass before being recovered from GA. Total length of time in the DI Department was 45 minutes.

CT revealed an irregularly fluid to soft tissue attenuating mass (H 4.4 cm, W 4.6 cm, L 4.0 cm) with mild heterogeneous contrast enhancement present in the ventrolateral aspect of the left cranial lung lobe, with it abutting the thoracic body wall from the 1st to 3rd rib. Differential diagnosis included pulmonary neoplasia (adenocarcinoma or histiocytic sarcoma). There were several enhancing homogeneous soft tissue attenuations of the lungs and several variably sized rounded, mineral, and mixed soft tissue and mineral attenuating nodules present. Differential diagnosis included intrapulmonary metastasis or granulomas. There were splenic nodules with differential diagnosis including metastatic neoplasia or lymphoid hyperplasia/EMH. Hepatic nodules differential diagnosis included hepatic cysts or hematomas. Other additional CT findings included bilateral renal cortical cysts, iatrogenic intravenous gas, and subcutaneous and inter/intra muscular lipomas.

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**Case Study Sample #1:** *(continued)*

LeF manus Rads revealed a small, round, partially defined soft tissue nodule present on the dorso and dorsolateral aspect of the 5th metacarpophalangeal joint. The nodule was osteolytic and osteoproliferative, with a differential diagnosis of metastatic neoplasia, tissue neoplasia, focal abscess, or fungal granuloma with osteomyelitis. The lung mass FNA revealed carcinoma with marked eosinophilic inflammation. The spleen FNA revealed mild extramedullary hematopoiesis, mild chronic hemorrhage, and mild lymphoid hyperplasia. The spleen FNA showed no evidence of infectious organism or neoplasia. Punch biopsy results from the LeF manus revealed chondrosarcoma.

Jack was discharged the same day. IM Dept gave Jack a grave prognosis as treatment options are very limited for pulmonary carcinoma that has metastasized. Chemotherapy can act as a palliative therapy by helping slow the progression of the disease, but unfortunately the option is not curative. Owners were given options to help reduce Jack's discomfort and to improve his quality of life.

## Case Study Sample #2:

Applicant Name: [REDACTED]

Modality: MRI

Case Report #1

Represented Case Log #23

Patient Name: Sam

Date of exam: [REDACTED]

Sam, a six-month-old, 38kg, male intact, Great Dane canine presented to the [REDACTED] neuro dept on [REDACTED] for a wobblers evaluation after originally presenting to the [REDACTED] ECC on [REDACTED] for neck pain and hindlimb weakness. When he initially presented, he had shifting leg lameness and neck pain that appeared to have gotten worse even after the pain medication that was prescribed by the rDVM. According to the owner he had constantly been yelping out in pain any time he would move his head/neck or anytime he tried to rise.

He presented to the rDVM on [REDACTED] and was prescribed carprofen (75mg, 2mg/kg BID). He seemed to be improving but started to show signs of pain again on [REDACTED]. The owner returned to the rDVM [REDACTED] and at that visit thoracic, abdominal, cervical, and RF limb radiographs were acquired. According to the rDVM the radiographs were unremarkable, and Sam was prescribed gabapentin (300mg, 7.5 mg/kg Q8-12H). When Sam presented to the ECC department on his physical exam revealed neck pain that was palpated during left and right flexion, his conscious proprioception was mildly decreased in the hindlimbs, and his withdrawal reflexes were difficult to elicit on the forelimbs. His vitals were within normal limits. An ECC technician drew blood and urine for a CBC/Chem and urinalysis that was submitted to the clinical pathology department to check for any signs of infection and/or inflammation. The bloodwork and urinalysis results were within normal limits. A neurology consultation was done, and his neuro exam showed mild tetraparesis, mild hindlimb proprioceptive ataxia, and slightly decreased conscious proprioception in the pelvic limbs. Sam's neuromuscular localization was localized to the C6-T2 region. Due to Sam's history of neck pain, changes in gait, and proprioception on neuro exam, it was determined that his top differentials included either Wobblers, or inflammatory conditions within or surrounding the spinal cord/canal. At that time the Neurology department recommended a Neurology workup including an MRI and CSF tap, to which the owners agreed to, so an appointment with the neurology department was made for [REDACTED]. Sam was sent home on gabapentin (300 mg, 7.5 mg/kg Q8-12H) and a fentanyl transdermal patch (100 mcg) while awaiting further diagnostics.

Upon presentation to [REDACTED] on [REDACTED] Sam was QAR, borderline febrile (102.6), and was slightly tachycardic (102). His physical exam showed that he continued to have pain on manipulation of his neck, proprioceptive deficits of his hind limbs, and that his tetraparesis had improved. Having already had a full neuro workup and diagnostics run, Sam had blood drawn from his LeF cephalic by a neuro technician for a PCV/TP (42%/6.2 g/dL) and glucose (127) and was sent to the anesthesia department to be anesthetized for a cervical MRI.

Sam was anesthetized for MRI using a premed protocol of hydromorphone 0.01 mg/kg IV. For induction he was administered propofol 4 mg/kg IV and midazolam 0.2 mg/kg IV and was maintained on isoflurane with a fluid rate of 5 ml/kg/hr of crystalloid fluids. During the procedure using the MRI safe monitoring equipment, his HR, RR, ETCO<sub>2</sub>, SpO<sub>2</sub>, NIPB, ECG, temperature, and expired agent were all monitored and recorded. The anesthetic protocol and monitoring were all administered and performed by the anesthesia department. Patient information was brought up on the MRI computer and the large cervical protocol was chosen. Prior to being brought into the MRI room, Sam and all personnel were checked for ferrous metal and after being cleared, a cervical MRI was performed using a General Electric 1.5 Tesla Signa MRI. He was placed head first in dorsal recumbency in the Phased Array coil and positioned for straightness and symmetry for a cervical MRI. Sam's limbs were all extended caudal, and his neck and head were padded with cotton and taped into position.

A localizer and dorsal GRE scan were done to ensure correct positioning and after a DI resident approval, a complete C-Spine MRI was performed. The scans performed in the cervical protocol included Gradient Recalled ECHO (GRE) images in a dorsal plane, T2 weighted, T1 weighted, and Short Tau Inversion Recovery (STIR) images in a sagittal plane, and T2 weighted and T1 weighted images in a transverse plane. The sagittal images were scanned using 3.0 mm slice thickness, 36 mm FOV, 0.5 mm spacing, and a 4.0 NEX. They were set up to scan from left to right with a FOV that included from T8 caudally to the bulla cranially as well as including the entire spinal cord and cervical vertebra with some of the surrounding soft tissue structures. The dorsal scans were scanned using 3.0 mm slice thickness, 36 mm FOV, 1.0 mm spacing, and a 2.0 NEX. The dorsal images were scanned from dorsal to ventral with a FOV that included the entire cervical spine and some of the surrounding soft tissue and included from the bulla cranially to T2 caudally. The transverse images were acquired using 3.0 mm slice thickness, 18 mm FOV, 1.0mm spacing, and a 3.0 NEX. These scans were planned to acquire from cranial to caudal and they included the entire vertebral column and spinal cord while the specific location was based on the previous scans. For this study the transverse images were planned from C5- T1. For any of the T2 weighted images the TR (repetition time) was adjusted as needed between 3000-5500 to minimize the time of each scan. The TR of the T1 weighted images was adjusted to be in the range of 300-700, for the GRE it was kept between 400-1000, and for the STIR it was kept between 3000-5000. Post contrast scans were acquired after an anesthesia technician gave 8 ml of gadopentetate dimeglumine (0.1 mmol/kg) IV and the T1 dorsal, transverse, and sagittal scans were repeated with the same landmarks and parameters as the pre contrast scans. The MRI procedure lasted approximately one hour. While under GA, additional blood and urine samples were taken by a neuro tech and submitted for culture. The neurologist also performed a CSF tap and the fluid was submitted for cytology.

The MRI was interpreted by a radiologist and showed probable C6-C7 discospondylitis with surrounding soft tissue inflammation/edema. There was also mild ventral displacement of the C7 vertebral body relative to the C6, and a narrowing of the C6-C7 intervertebral disc space was noted. The narrowing of his caudal spinal cord was consistent with Wobblers but the signs of inflammation around his caudal vertebrae and intervertebral disk spaces were consistent with discospondylitis. Sam's CSF tap was unremarkable, making inflammation within the spinal canal unlikely. Due to Sam's lack of progressive clinical signs, historic borderline fever, and changes seen on imaging, it was determined that discospondylitis was the cause for his current condition.

Discospondylitis is an infection of the intervertebral disc and adjacent vertebral endplates. It is a relatively uncommon disease seen in dogs, though giant breed dogs such as Sam are predisposed. A majority of cases are bacterial, with the most common organisms being Staphylococcus, Streptococcus and E. coli. Fungal infections are infrequent, though Aspergillus is the most common. Infection is usually spread via the blood but can be related to foreign body migration or trauma. Frequently, by the time discospondylitis is diagnosed, the initiating infection cannot be documented. The diagnosis can often be made on survey radiographs however, it is important to note that radiographic changes lag behind by up to two weeks or more, thus making MRI a more sensitive diagnostic imaging technique. To search for the cause of Sam's suspected bacterial infection resulting in discospondylitis, samples were taken of his blood and urine for culture which showed no bacterial growth. Sam's MRI findings were not classic for discospondylitis, thus close monitoring and continued rechecks with the neurology service will be important to determine if Sam is responding to his therapy, or if more diagnostic testing will be required.

At the time of discharge, Sam was still uncomfortable on manipulation of his neck, and kept his head dropped. However, he was brighter and more comfortable than on his initial presentation and continued to have a good appetite. Additionally, his borderline hyperthermia had resolved (102.7 to 101.4) since starting antibiotics. Sam was started on a broad spectrum antibiotic therapy in addition to a pain management plan consisting of amoxicillin (19mg/kg), gabapentin (15 mg/kg), and continued use of a fentanyl patch (100 mcg/hg) that was placed on Sam's dorsal trunk. Sam was discharged on [REDACTED] and a recheck appointment was made for in order to monitor his discospondylitis and recheck his neuro status.