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## Discospondylitis in a cat

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*Discospondylitis is uncommon in cats. We describe a cat with discospondylitis of the L2-3 intervertebral disc. Radiographic, computed tomographic, magnetic resonance and histological findings are presented. Cultures of blood and bone yielded no growth. Urine and spinal fluid cultures were not carried out. Corpectomy was performed, the cat was successfully treated with amoxicillin/clavulanic acid. Clinical signs resolved completely; the patient was observed for one year after the surgery.*

**Key words:** discospondylitis, radiography, computed tomography, magnetic resonance imaging, cat.

## Дискоспондилит у кошки

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*Дискоспондилит редко встречается у кошек. Мы описываем случай дискоспондилита у кошки на уровне L2-3. Представлены данные рентгенографии, компьютерной томографии, магнитно-резонансной томографии и гистологического исследования. Микробиологическое исследование крови и кости (из замыкательных пластин L2-3) не дали роста. Микробиологическое исследование мочи и спинномозговой жидкости не проводилось. Была выполнена корпектомия, назначен амоксициллина клавуланат, в итоге пациент был успешно вылечен. Клинические признаки полностью исчезли, отдаленное наблюдение спустя год после хирургического лечения.*  
**Ключевые слова:** дискоспондилит, рентгенография, компьютерная томография, магнитно-резонансная томография, кошка.

**Abbreviation (Сокращения):** CBC — Complete Blood Count (общий анализ крови), CT — computed tomography (компьютерная томография), MRI — magnetic resonance imaging (магнитно-резонансная томография), STIR — Short tau inversion recovery (последовательность инверсия-восстановление спинового эха)

## Introduction

The case deals with inflammation of intervertebral discs associated with penetration of bacterial or fungal microflora. The condition affects intervertebral discs and vertebral endplates. The disease is well described in dogs [1], while there are just a few publications on discospondylitis in cats [2...6]. In dogs, the onset of the disease is associated with hematogenous spread of microbiota to intervertebral discs from various foci of bacterial inflammation, such as skin wounds or urinary tract infections [7], or migration of foreign bodies [8...10]. As well, brucellosis is believed to be an important driver of the development of discospondylitis in dogs [11]. Cats get infected usually as a result of injuries, mainly bites, in most cases with concomitant meningomyelitis [2]. The case described deals with discospondylitis in a cat associated with *Streptococcus canis* and *Actinomyces viscosus* [3]. In the work of Norsworthy GD 1979, bacterial growth was not obtained; two cats were diagnosed with *E. coli* [2]; also it describes a case of discospondylitis presumably associated with *Enterococcus* sp. and *Clostridium perfringens* [5]. Clinical signs of discospondylitis in cats do not differ from those described in dogs and include pain, restriction of movements, lameness, weight loss and anorexia, ataxia and paresis. In one case, a cat was diagnosed with concomitant pyelonephritis [6].

## Signalment and History

The patient (a Maine Coon cat, male, aged 1 year 8 months, weight 8 kg) got to the veterinary hospital of the Innovation Veterinary Center of Moscow Veterinary Academy with manifestations of pain in the lumbar spine suffered for one month. The owners also mentioned an increased level of aggression, decreased appetite and activity. Bowel movement was absent for 2 days. The cat, vaccinated, fed with commercial cat foods, kept at home at all times and not let outside, did not have contacts with other pets, thus bites could be ruled out. A few days before admission to hospital, the cat was examined at a local clinic (the exact time of the visit not known) and prescribed prednisolone in the dose of 2 mg/kg. The treatment with prednisolone had no effect.

## Physical Examination

While being examined, the cat showed pain in the lower back, responding aggressively to any sort of manipulations. The cat was able to move around without signs of ataxia or paresis. Palpation of the abdomen was difficult; no signs of pain in the abdominal organs were detected. Rectal temperature was within normal reference values (38.5 C/101.3 F); auscultation did not reveal any murmur in the lungs. Rotation of hip joints caused pronounced discomfort. Spinal reflexes: patellar reflex +1; cranial tibial reflex +1; flexor reflex (sciatic nerve) N; achilles tendon reflex +1; deep pain N. Postural reflexes: hopping

N; proprioception N. The cat was sedated to perform diagnostic imaging, which was preceded by a repeated examination with a view to external wounds, abscesses, or inflammation of the oral cavity. No signs of external injuries were revealed.

## Laboratory Findings

No deviations in CBC and biochemistry panel blood analyses were detected. Aerobic and anaerobic culture/sensitivity of fragments of an intervertebral disc and endplates was performed after diagnostic imaging.

## Radiography

For radiography the cat was sedated. Radiography was performed in lateral and ventrodorsal projections (Fig. 1). Radiographically, irregular bone proliferation of endplates and spondylosis of L2-L3 was revealed. In the lateral projection, clear signs of lytic destruction were visible only in the ventral part of the L3 endplate. As well, in the lateral projection a clear evidence of spinal stenosis at the level of L2-L3. In the ventrodorsal projection, lytic destruction of endplates L2-L3 was visible (Fig. 1), the destruction being most pronounced on the left side. These radiographic findings were most consistent with spondylosis and discospondylitis. The decision to perform a surgery was made upon comparing the results of neurological examination and radiographic imaging. It was decided to perform a CT scan for more detailed visualization of the level of destruction, as well as to facilitate the planning of corpectomy.

## Computed tomography

The 16-slice spiral computed tomography protocol (Siemens Somatom Emotion 16, Siemens Healthineers, Erlangen GE) was implemented with the following characteristics: 110kv, 100mA, slice thickness 0.75 mm, pinch

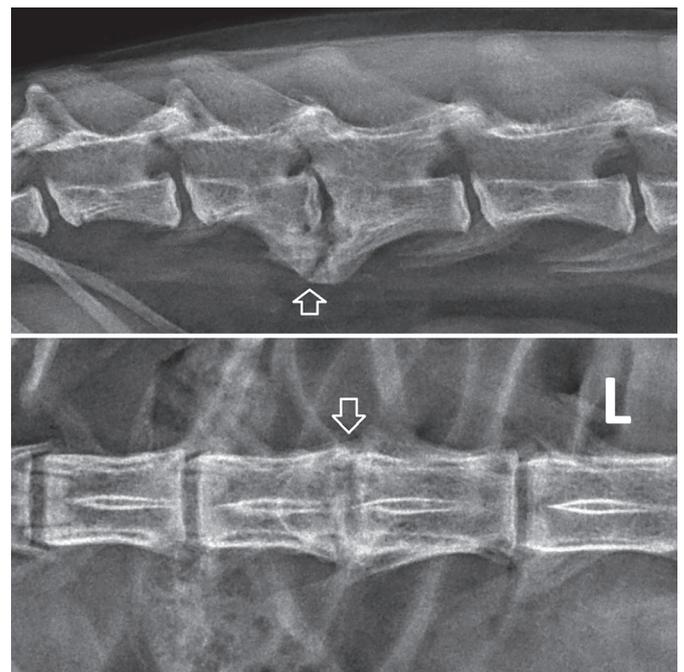


Fig. 1. Lateral and ventrodorsal radiography of the spinal column at the level of L2-L3. Note the irregular margins and lytic appearance of the caudal endplate of L2 and cranial endplate of L3, characteristic of discospondylitis

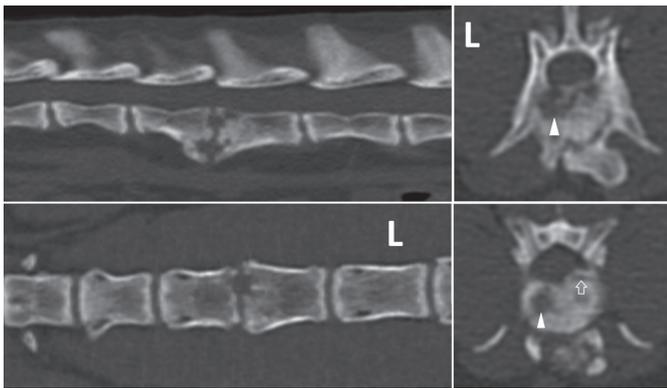


Fig. 2. CT scan of the lumbar spine at the level of L2-3. Bone window. The most pronounced area of lytic destruction of endplates is visible on the left side (arrowhead). A slight narrowing of the spinal canal is visible on right side (arrow)

0.8, rotation time 0,6 s, collimation 0.6 cm. Bone window reconstruction with convolution kernel B60s, soft tissue window reconstruction with convolution kernel B30s, FOV 6 x 6 cm. Level of research Th10-S1. The CT images

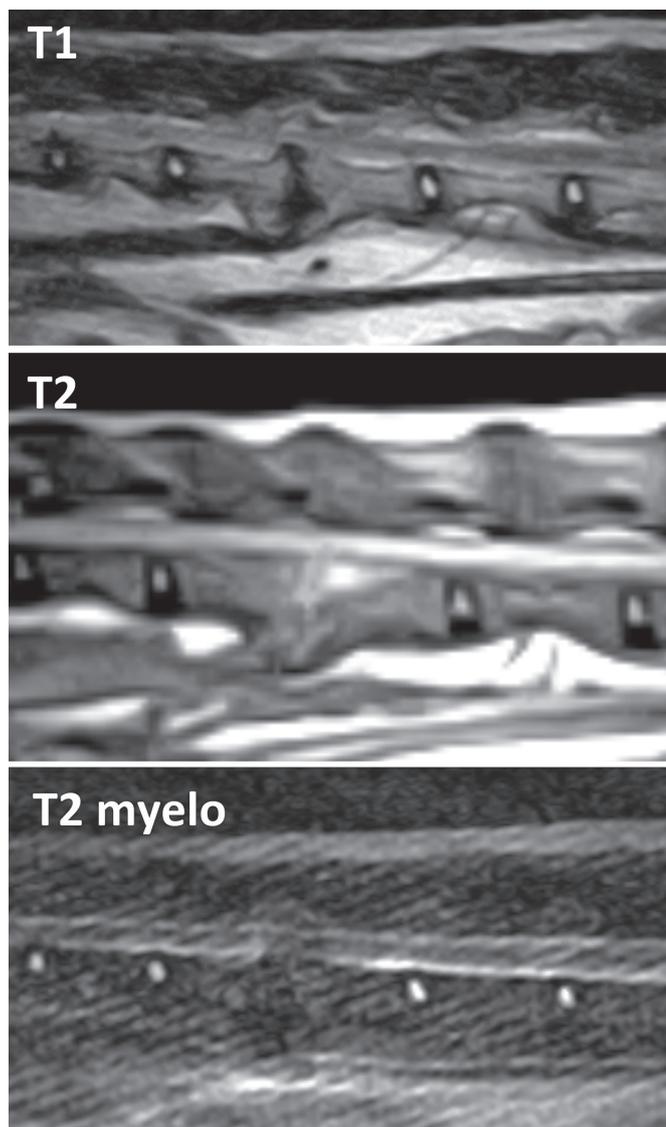


Fig. 3. Sagittal projections in T1, T2 and T2-myelo modes. In the T1 mode, a hyperintense area in the endplate and the L3 vertebral body can be seen very well

revealed bone hypertrophy, spondylosis, and irregular bone proliferation of endplates of L2-L3, as did the x-ray images (Fig 2). The quality of CT imaging was not much better than that obtained with radiographic method, which can be explained by the severity of pathological changes. As well, the CT scan revealed that the main site of the spinal canal stenosis was located on the right side and represented by a fragment of bone tissue, 2 mm in height. Myelography was not performed, intravenous contrast agent was not administered.

### Magnetic resonance imaging

In order to assess the degree of compression of the spinal cord, magnetic resonance imaging (Fig 3, 4) was performed with an open type scanner (Hitachi Airis Mate, Hitachi Healthcare, Ltd, Tokio JA) with the magnetic field intensity of 0.2 T. The protocol included T2-weighted (repetition time 2500 ms, echo time 100, 3.0 ms), T2-myelo (repetition time 3000 ms and echo time 580, 3.0 ms), T1-weighted (repetition time 320 ms and echo time 100, 3.0 ms) and STIR (repetition time 2560 ms and echo time 40, 3.0 ms). Contrast agent was not administered. In the T1 mode, the endplates and the vertebral bodies emitted a hyperintensive signal; in the T2 mode, the signal was isointensive with hyperintensive inclusions in the projection of the intervertebral disc. In the T2 myelo mode a significant decrease of signal from the dorsal and the ventral cerebrospinal fluid columns was visualized. Additionally, the STIR mode was performed. In the STIR mode, the endplates and the vertebral bodies emitted a hyperintensive signal.

### Pathologic Findings

In the fields of cortical bone, zones of inflammatory infiltration were detected. Inflammation represented by lym-

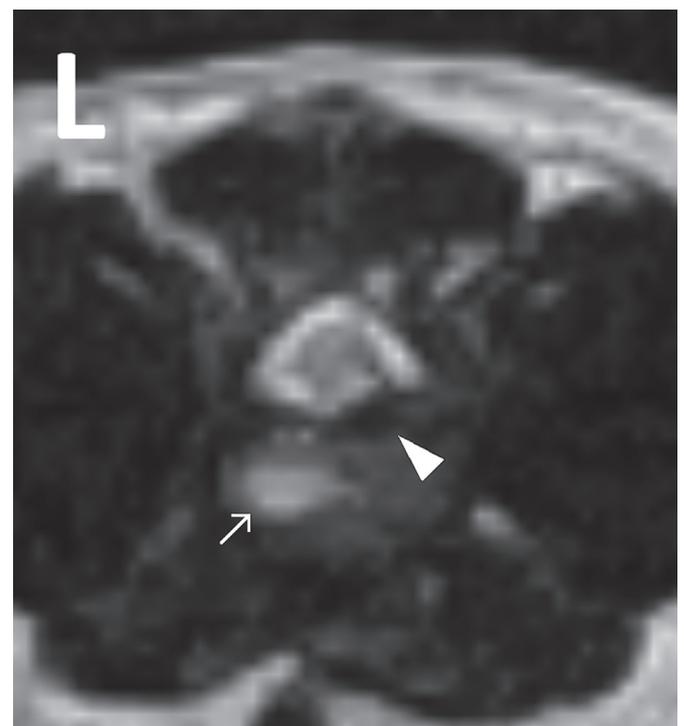


Fig. 4. Sagittal projections in the T2-myelo mode: a hypointensive contour of the spinal cord at the level of L2-3 can be visualized, which is an evidence of its compression

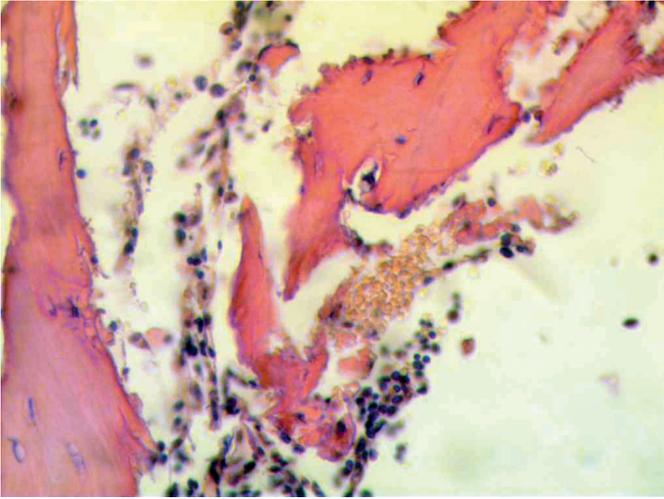


Fig. 5. Photo of the specimen taken from the discospondylitis-affected area. Hematoxylin and eosin stain, x 400

phocytes and plasma cells was revealed. Trabeculae of bone of different degrees of mineralization and pronounced signs of resorption were observed. Haematopoiesis appeared to be presented poorly; bone marrow cells were found to be situated in the fine-fibered edematous connective tissue. The hyaline cartilage was observed as present in a small amount manifesting no morphological changes. Sites with the bone tissue replaced by fibrous tissue of coarse fibrous structure, were detected. Based on these data, the pathologist diagnosed the patient with discospondylitis (Fig. 5). Culturing was performed only with respect to the material taken from the lesion in the spine; no bacterial growth was observed.

## Treatment

The cat was subjected to corpectomy in order to provide decompression of the spinal cord as well as for the purposes of biopsy sampling (histological and bacteriological research). Despite the fact that no bacterial growth was observed, amoxicillin clavulanate was prescribed (Sinulox®; Pfizer Animal Health, Exton, PA) 20 mg/kg PO BID for six weeks pursuant to the recommendations of Sykes JE, Kapatkin AS 2014 [14], as well as on the basis of the statistical occurrence of bacteria in discospondylitis in dogs [1]. After the surgical operation, the patient was discharged from the hospital. No recommendations as to restriction of movement of the animal were given to the owners. The subsequent examination 4 days later revealed positive dynamics, no neurological deficit and a significantly lower level of aggression. The latest telephone conversation with the owners took place 8 months after the surgery. The owners reported high quality of life, high activity, and absence of pain.

## Discussion

In this clinical case, we were not able to detect the exact causative agent; at the same time, treatment based on decompression of the spinal cord and empirical antibiotic therapy produced good results. In our opinion, one of the weak sides of the chosen treatment was the lack of use of fluoroquinolones because discospondylitis in the cat could have been caused by *E. coli*. X-ray and CT findings were not different from those observed in dogs. In this

case, CT scan was performed in order to facilitate surgical navigation, as well as for training purposes. The authors did not find any works with descriptions of MRI findings concerning discospondylitis in cats. Another shortcoming of this work is the use of low-field MRI 0.2T.

Comparing the visual image of discospondylitis in this cat (radiography, CT, MRI) with that described in dogs [12, 13], the authors did not detect any difference. The fact that the specimen contained lymphocytes and plasmacytes, as well as the absence of histologic signs of bacterial and fungal growth in the tissues of the intervertebral disc, endplates and blood, suggest that this case of discospondylitis was caused by sterile lymphocytic/plasmocytic inflammation. We believe that the outlook in cats suffering from discospondylitis is significantly better than in dogs; however, in order to state it as a fact we need to perform more observations. Since cases of discospondylitis are rare in cats, the authors believe that each case of the disease should be described.

## LIST OF AUTHOR CONTRIBUTIONS

### Category 1

- (a) Conception and Design: Kemelman Evgeniy, Koreshkov Artem
- (b) Acquisition of Data: Kemelman Evgeniy, Koreshkov Artem
- (c) Analysis and Interpretation of Data: Kemelman Evgeniy, Koreshkov Artem

### Category 2

- (a) Drafting the Article: Kemelman Evgeniy, Koreshkov Artem
- (b) Revising Article for Intellectual Content: Kemelman Evgeniy, Maxim Lapshin, Koreshkov Artem

### Category 3

- (a) Final Approval of the Completed Article: Kemelman Evgeniy, Koreshkov Artem, Yuliya Uvarova

## Credits

The authors would like to thank Lapshin Maxim (IVC MVA), Natalia Mitrokhina (Veterinary center of pathomorphology and laboratory diagnostics Dr. N.V. Mitrokhinoini, 3, Natashi Kovshovoi str., Moscow, RF, 119361) for the description of the histological study that she performed.

## Conflict of interest

The team of authors did not receive any sponsor aid from manufacturers or suppliers of equipment and consumables used in this work.

## Ethical issues and plagiarism

This study was conducted in accordance with the legislation of the Russian Federation and the internal Charter of the Academy and the Clinic. The owner was warned that the data obtained in the process of diagnosing and treatment of the animal would be used for publication in a scientific journal. The owner did not sign any document concerning processing of personal data, therefore we do not specify the name and the address of the owner, as well as the name of the animal. The owner was repeatedly informed about the aforementioned conditions before the

article was sent to the editor of the journal. The owner further sent an e-mail, in which he once again confirmed his consent to the publication of the clinical case. Having studied the norms of international law, the author sees no violations thereof.

In its structure, the article appears to resemble other similar articles indicated in the list of references, however, we provide a description of a separate clinical case.

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## Сложности диагностики опухоли основания сердца у собак (разбор клинического случая)

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Опухоли сердца являются редкой и до недавнего времени малоизученной патологией у человека и животных. В настоящее время частота прижизненного обнаружения опухолей сердца и их успешное лечение растет в связи с использованием высокотехнологичных методов диагностики, таких как эхокардиография, компьютерная и магнитно-резонансная томография, биопсия миокарда с гистологическим и иммуногистохимическим исследованием опухоли. Однако в ряде случаев даже использование широкого спектра диагностических возможностей не дает достаточных данных для подтверждения диагноза. Клинические проявления опухолевого роста в сердце вариабельны и зависят от вида опухоли и ее локализации. Наиболее частым первичным новообразованием сердца является гемангиосаркома, на втором месте по инцидентности стоит опухоль основания сердца — нехромафинная паранглиома (хемодектома). Наш клинический случай свидетельствует о возможных трудностях диагностики опухолей основания сердца, даже с применением широкого спектра высокотехнологических методов обследования.

**Ключевые слова:** опухоли сердца, хемодектома, перикардэктомия, собака

## Difficulties in diagnosing heart base tumor in dogs (case study)

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Tumors of the heart are a rare and, until recently, poorly studied pathology in humans and animals. Currently, the frequency of intravital detection of heart tumors and their successful treatment is increasing due to the use of high-tech diagnostic methods, such as echocardiography, computed tomography and magnetic resonance imaging, myocardial biopsy with histological and immunohistochemical examination of the tumor. However, in some cases, even the use of a wide range of diagnostic capabilities of intravital diagnostics does not provide sufficient data and confirmation of the diagnosis is possible only by the results of postmortem autopsy. The clinical manifestations of tumor growth in the heart are variable and depend on the type of tumor and its location. The most common primary neoplasm of the heart is hemangiosarcoma, the second most frequent tumor is the base of the heart tumor - nonchromophinous paraganglioma (chemodectoma). Our clinical case indicates possible difficulties in the diagnosing of heart base tumors, even with the use of a wide range of high-tech diagnostic methods.

**Keywords:** heart tumors, chmoadectoma, pericardectomy, dog.