

SPINAL CORD DECOMPRESSION BY HEMILAMINECTOMY SURGERY IN T12-T13 DISC HERNIATION AND RECOVERY PROCESS IN 6-YEAR-OLD PARAPLEGIC DOG - CASE STUDY

DECOMPRESIUNEA MEDULARĂ PRIN OPERAȚIA DE HEMILAMINECTOMIE ÎN HERNIA DE DISC T12-T13 ȘI PROCESUL DE RECUPERARE LA UN CÂINE DE 6 ANI PARAPLEGIC - STUDIU DE CAZ

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ABSTRACT | REZUMAT

Spinal cord compression syndrome with paraplegia due to spinal disc herniation is a common problem in dogs. The T12-T13 intervertebral disc herniation with paraplegia is often recorded in the small and agile dog breeds. Spontaneous intervertebral disc herniation includes congenital defects of some dog breeds due to a weakening of the column in this body region - between T10-L3 - and due to these dogs' lifestyles like jumping on different surfaces and walking on stairs. The imaging confirmation of a herniated disc such as computed tomography or MRI before surgery is essential. In this case, we had confirmation of the diagnosis of T12-T13 herniated disc by the result of the computer tomography. The T12-T13 hemilaminectomy is performed on a single side of the vertebral column to modify the regional anatomy and stability as less as possible with very good results and fast recovery.

Keywords: paraplegia, dog, hemilaminectomy, disc herniation

Sindromul de compresie a măduvei spinării cu paraplegie din cauza herniei de disc este o problemă frecventă la câini. Hernia de disc intervertebral T12-T13 cu paraplegie este descrisă frecvent la rasele de câini mici și agile. Hernia de disc intervertebral spontană poate evolua ca defect congenital la unele rase de câini, din cauza slăbirii coloanei vertebrale la nivelul vertebrelor T10-L3 și datorită stilului de viață al acestor câini precum săritul pe diferite suprafețe și mersul pe scări. Confirmarea imagistică a unei hernii de disc, cum ar fi tomografia computerizată sau RMN, înainte de operație, este esențială. În acest caz am avut confirmarea diagnosticului de hernie de disc T12-T13 prin rezultatul computer-tomografiei. Hemilaminectomia T12-T13 se efectuează pe o singură parte a coloanei vertebrale pentru a modifica cât mai puțin anatomia regională și stabilitatea, cu rezultate foarte bune și recuperare rapidă.

Cuvinte cheie: paraplegie, câine, hemilaminectomie, hernie de disc

Disc herniation in the thoracic vertebral space T12-T13 is very common among small dog breeds such as Bichon, Tekel, Shi-Tzu, Yorkshire Terrier, Pekingese, and Pinscher, but is also found in other breeds of dogs of different sizes as well as in crossbreeds. This change in the anatomy and regional functionality of the spine causes spinal cord compression syndrome with posterior train paraplegia. Usually, paraplegia sets in suddenly or gradually within a few days of the onset of a herniated disc. The severity depends on the intensity of the forces exerted on the spine in that region as well as on the amount and volume of the pulpal nucleus of the herniated intervertebral disc inside the medullary canal where it exerts compression on the spinal cord more or less. The T12-T13 area is very frequently affected because usually the highest bending and torsional forces are exerted on the spine in dogs. It has also been observed that muscle mass is weaker in

some dogs in this region. For a quick and correct diagnosis, it is necessary to perform a computer tomography or MRI examination (6). In this case, as in other similar ones, the CT Scanner is successfully used. If the result of the CT scan indicates a herniated disc with extrusion of disc material inside the spinal canal and spinal cord compression, a spinal decompression operation should be performed as soon as possible so as not to damage the noble nerve tissue. As surgical techniques, there are two basic methods for spinal decompression, namely 1. Through the total laminectomy operation and 2. Through the hemilaminectomy operation. Next, we will approach the surgical method by hemilaminectomy and we will highlight both the advantages of these methods and the degree of difficulty in performing these surgical techniques.

MATERIALS AND METHODS

Place of the research activity

Veterinary Clinic CMV Dr. Laurențiu Ispas (Ploiești, Prahova County, Romania) and Faculty of Veterinary

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Period of the case study

Between 25 August 2020 and 15 April 2022.

Case description

A Bichon Frise breed, neutered male, 6-year-old, name Bijou, weighting 5 kg was presented at the Veterinary Clinic with the paraplegic syndrome (Fig. 1).



Fig. 1. The paraplegic syndrome in a Bichon Frise breed, neutered male, 6-year-old patient

The dog presented paraplegia in the back half of the body, inability to move on the hind legs, inability to stand, apathy, and body temperature of 38.8°C. Paraplegia settled spontaneously. It was a very active dog that jumps frequently on the stairs and in bed and out of bed, on the couches of the crowd habits. The dog sits on its front paws and its hind legs crawl and cannot stand up or stand on its hind legs and cannot move or use them in any way. The neurological reaction was absent at the pinching of the extremities; almost absent reaction to deep pain.

X-Ray

The dog underwent a radiological examination in which nothing conclusive could be observed (Fig. 2).



Fig. 2. X-ray image (left: lateral view; right: dorsoventral view) of a dog in which nothing conclusive could be observed (dog, Bichon Frise breed, neutered male, 6-year-old)

CT Scan

Subsequently, computed tomography examination revealed a disc herniation (7) in the T12-T13 inter-

tebral space with compression exerted on the spinal cord (Fig. 3 and 4).

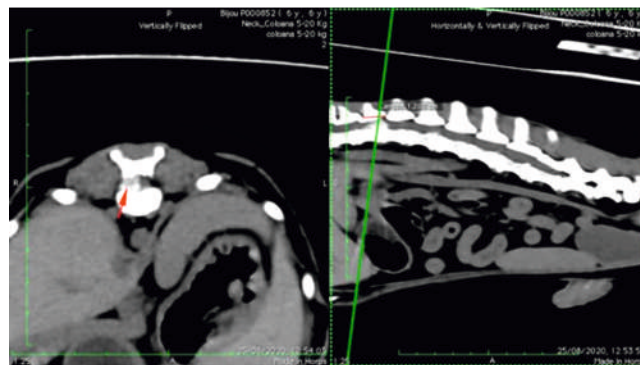


Fig. 3. CT scan sagittal and transversal images (dog, Bichon Frise breed, neutered male, 6-year-old)

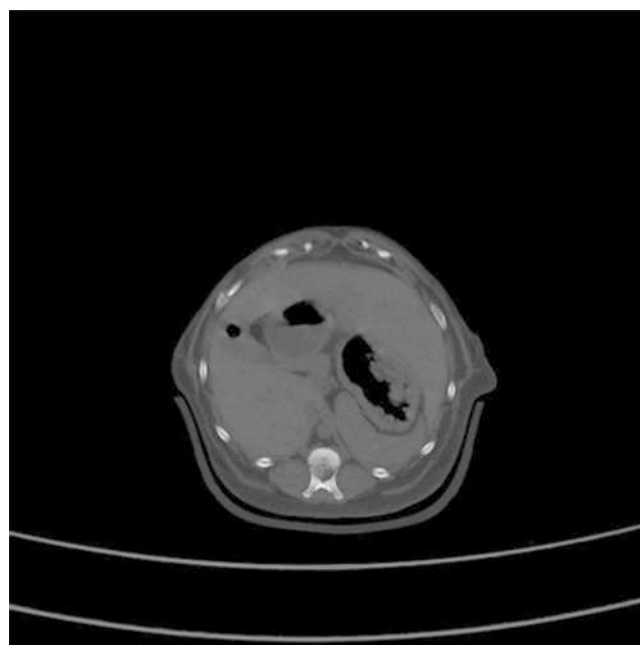


Fig. 4. Transversal CT scan image (dog, Bichon Frise breed, neutered male, 6-year-old)

Treatment

Spinal decompression surgery on the 2nd day after CT was performed by using the hemilaminectomy surgical technique. This consisted in eliminating only on the right and partial side of the vertebral arch the T12 and T13 vertebrae and the posterior articular process of the T12 vertebra and the anterior articular process of the T13 vertebra. Through the window thus created (Fig. 5-7) by osteotomy of the vertebral arch, it was carefully extracted and cleaned the extruded and herniated disc from the medullary canal (Fig. 5 and 6) on the right and ventral side of the medullary canal and the spinal cord was decompressed (Fig. 7) in order to resume severely affected nerve functions (Fig. 5).

Antibiototherapy with Ceftriaxone, i.v., 150mg/12 hours, 5 days postoperatively.

Anti-inflammatory and analgesics therapy with Tramadol im 10mg/day 2 days and after another 14 days with Carprofen 10 mg/day oral.

Neurological neuro-stimulants Catosal (Buta-fosfan 100 mg/ml, Vit B 12 0,05 mg/ml) inj 1 ml/ 7 days sc, Neurovet 1 cp/day oral-30 days, Megaflex (RX Vitamins) 1 cp/day oral-30 days, Vit AD3E (Vit A 100000 UI, Vit D 10000 UI, Vit E 50 UI/ml) 1 ml sc 1 time at 30 days, Vit B1-B6 (Vit B1 30 mg, Vit B6 20 mg/ml) sc 0.5 ml/day- 5 days, Vitamine C (100mg/ml) 0,5 ml/day, sc -5 days, Vetri Science Canine Plus ¼ cp /day-10 days.

Local Topics

Zoetis Terramycin Spray, 3-4 times/day, 10 days.

Physiotherapy is necessary and useful after surgery like massage, neuromuscular electrostimulation, and swimming. In our case study, we used only massage and neuromuscular electrostimulation because the recovery process was very good.



Fig. 5. Parts of herniated disc extracted from the medullary canal (dog, Bichon Frise breed, neutered male, 6-year-old)



Fig. 6. Spinal cord decompression - hemilaminectomy surgical technique (intraoperative image, dog, Bichon Frise breed, neutered male, 6-year-old)

Urinary bladder therapy management

Bladder infections and dysfunctions are common pathologies associated with spinal cord compression syndrome with paraplegia. These are bladder wall dis-

tension, bladder wall paralysis, increased urinary bladder volume, bladder wall fibrosis, and sometimes urinary stones. (5) To prevent these possible complications, both the degree of filling of the bladder and the volume of urine and the frequency of its elimination must be checked. Initially, I probed the dog before and after the operation 3-4 times a day, even if in this case I did not encounter any difficulties. I also administered Urinovet, 1cp / day, and food Royal Canin urinary diet which to prevent the formation of urinary stones.

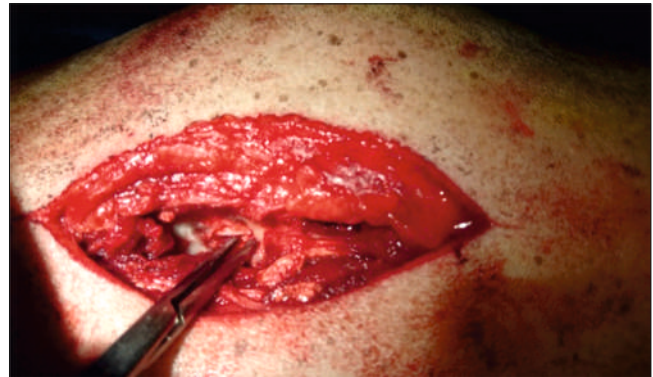


Fig. 7. Careful removal of broken parts from the extruded disc intraoperative image (dog, Bichon Frise breed, neutered male, 6-year-old)

RESULTS AND DISCUSSIONS

The medullary decompression thus performed by hemilaminectomy allowed the resumption of the nervous influx in the spinal cord with the resumption of the muscular mechanics. The dog started walking again just 24 hours postoperatively and started to get up on his own after about 12 hours postoperatively. He presented to the veterinary clinic after 36 hours postoperatively walking on a leash with the owner. The recovery process continued and evolved very well in the next 14 days postoperatively. After 7 days postoperatively the dog was doing very well and was leashing the movements being almost completely normal. At 14 days postoperatively the patient presents himself excellently jumping on 2 feet on his owner. This involuntary test performed by the dog by bending and lifting in 2 legs on the hind limbs is the best proof of his recovery in a very short time (Fig. 8-11). Prove that he is feeling very well and that he has resumed all his normal activities before the T12-T13 herniated disc (6). I followed the evolution of this patient for 19 months postoperatively and I noticed very good stability of the spine as well as of the motor and sensory functions which are the same as before the herniated disc. The dog runs salt plays and urinates defecation very well can be seen in the link: <https://www.youtube.com/watch?v=4bVynOPR2TA>.

The hemilaminectomy surgical technique for spinal

cord decompression in herniated discs has several advantages over the laminectomy surgical technique:

1. The incision is made on one side and not on both sides of the spine (4).

2. The muscle mass on the opposite side of the incision and the vertebral skeleton remain intact and perfectly functional.

3. Postoperatively, better stability of the spine is ensured on the T12-T13 area in which the surgery was performed - only the resistance to lateral bending of the dog becomes more unstable and can favour recurrences in neighbouring areas (2) but dogs do not often do so strong lateral bends but require a lot of spine through vertical movements in running in the area T12-T13.

4. Recovery is usually faster.

5. Surgical bleeding is less abundant.

6. The risk of infection is lower.

7. The postoperative pain felt by the animal is only on one side and not on both sides.

8. The spinous processes are not surgically removed and remain in the anatomical places, which leads to more solid preservation of the structure of the spine.

9. The greater bone protection surface of the spinal cord that remains postoperatively formed by the medullary canal and the spinous processes better prevent possible spinal cord injuries that may occur after surgery.

10. It maintains a much better and natural anatomical continuity of the bones, muscles, and vascular structures of the spine.

At the same time, the operation of spinal decompression using the hemilaminectomy surgical technique is more difficult to perform than the laminectomy surgical technique, which also has some risks and disadvantages for the following reasons:

1. The incision is smaller and shorter.

2. The space created in the operating field is much smaller (4).

3. Visibility on the spinal cord is reduced in the operating field being made only from the side on one side and not from above.

4. Access to the arch is more difficult (3).

5. It is necessary to remove the cranial and caudal intervertebral joint processes from the area of interest for the realization of a window in the vertebral arch of T12 and T13

6. Extracting the extruded disc around and below the spinal cord is much more difficult.

7. Aspiration of very small parts of the extruded disc material and hematomas around the spinal cord becomes much more difficult.

8. Requires superior dexterity as well as increased attention in osteotomy manoeuvres of the vertebral arch, joint processes, and the removal of extruded disc material from the medullary canal.

9. There is a higher risk of intraoperative accidents and spinal cord injury.

10. Haemorrhage triggers intraoperatively by injury to the ventral vascular bed in the medullary canal could frequently occur.



Fig. 8. The patient at 36 hours after surgery (Bichon Frise breed, neutered male, 6-year-old)



Fig. 9. The patient at 7 days after surgery (Bichon Frise breed, neutered male, 6-year-old)

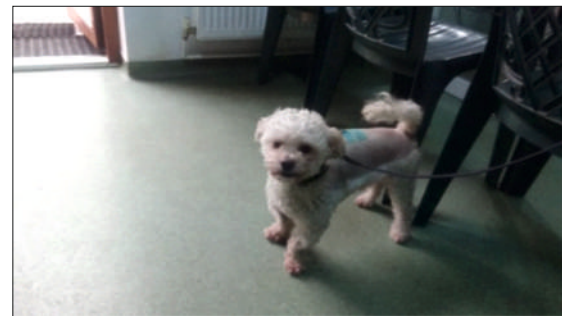


Fig. 10. The patient stands and walk at 8 days after surgery (Bichon Frise breed, neutered male, 6-year-old)

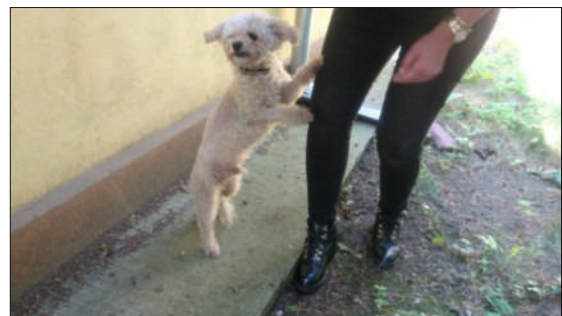


Fig. 11. The patient standing on the back limbs at 14 days after surgery (Bichon Frise breed, neutered male, 6-year-old)

CONCLUSIONS

The importance of surgical spinal cord decompression is essential and the only chance of recovery in dog intervertebral disc herniation especially in T12-T13 area. Hemilaminectomy surgery is a very efficient method with very good results.

The operated area showed to be very stable in time. The recovery process is fast and the injuries of the anatomic parts like muscles, blood vessels, and bones are limited.

Ensure better protection of the spinal cord after the surgery in any possible accidents that could occur because the spinal process remains in the vertebrae structure.

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