

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Our Experience Of Performing Partial Lateral Corpectomy In Thoracic-Lumbar Region Of The Vertebral Column In Dogs.

Nikolay A Kozlov*, BishalBhattarai, Taisiya A Bykovskaya, Michail S Borisov, Igor B Samoshkin, Victoria S Starynina, and Arina B Sklyarova.

Moscow State Academy of Veterinary Medicine and Biotechnology, Academic Skryabin Street 23, Moscow city, 109472, Russia.

ABSTRACT

Studies related to treatment technique of spinal cord injuries, remains actual. Discopathy are the most common pathology, causing paresis and paralysis in dogs. Currently, the majority of surgical interventions used for management of spinal cord compression in thoracic-lumbar region of the vertebral column are carried using dorsal laminectomy or hemilaminectomy. In this study, we have used new technique for the management of this pathology.

Keywords: Intervertebral disc disease, partial lateral corpectomy, thoracic-lumbar region.

**Corresponding author*

INTRODUCTION

Intervertebral disk degeneration (IVDD) is a natural and an inevitable part of aging and results in series of progressive disorder in structure of intervertebral disc in human beings and in animals. However, this degenerative process would have minimal clinical importance if its extrusion/protrusion would not cause injury of spinal cord and associated nerves, followed by serious neurological problems. The overall prevalence of disc herniation in dogs has been reported as 2%[3].

Studies related to treatment technique of spinal cord injuries, remains actual.[2,3,10,11]Discopathies are the most common pathology, causing paresis and paralysis in dogs. Currently, the majority of surgical interventions used for management of spinal cord compression in thoracic-lumbar region of the vertebral column are carried using dorsal laminectomy or hemilaminectomy[1,7,9]. As modern surgical techniques in veterinary vertebratology, facetectomy, mini-hemilaminectomy and foraminotomy are also used. But, in practice these methods are not always helpful because they do not provide sufficient space and visualization of spinal cord and vertebral canal for atraumatic removal of compressing factors which are located ventrally within the vertebral canal[1,3]. Partial lateral corpectomy as new technique has been one of the reliable method for removal of compressing factors of spinal cord like chronic disc extrusion/protrusion, epidural and vertebral body tumor in dogs and cats. In this study, we have used this technique for the management of pathology related with IVDD.

The objective of this study is to determine the neurological outcome and factors affecting the result after the PLC, in dogs with of the intervertebral disc resulting in ventral compression of the spinal cord.

MATERIALS AND METHODS

In this study, 27 dogs of different breeds and age groups with intervertebral disc disease (Hansen type I and II) between (Th9 to L4), and managed by partial lateral corpectomy (PLC) were included. Data taken into account were: breed, age, sex, body weight, duration of clinical signs, results of neurological examination, used methods of diagnostic imaging computed tomography (CT) or magnetic resonance imaging (MRI), affected intervertebral disk, as well as complications during surgery. Dogs with clinical signs more than 1 week were classified as acute and more than 2 week as chronic.

Out of 27 dogs 12(44.4%) were of giant breeds with average age of 8 years and 15 (56.6%) chondrodystrophic breeds with average of 7.5 years. German shepherd was the most repeated amongst giant and pug in chondrodystrophic breeds. Dogs were excluded from the surveillance if they had already carried out any operations on the spine, or if the PLC has been combined with any other surgical procedures.

Neurological status

Neurological status of each dog were classified using modified Frankel score based on neurological examination[9]: 1=paraplegic and absent of nociception; 2=nonambulatory paraparesis; 3=ataxia or ambulatory paraparesis; 4= proprioceptive deficits only; 5=pain without neurological deficits. Neurological status was assessed in 5 time points: initial presentation, 1 day after operation, 7 days after surgery, on the days of suture removal, and 4 weeks.

Pre- and Post-surgical diagnostic imaging

After initial checkup all animals included in this study were recommended to perform either MRI or CT. Out of 27, owner of 7 dogs choose to perform CT pre- and post-surgical procedure, rest of the dogs had MRI before surgery and CT after surgery. Evaluation of images and measurements were performed using e-film work station (Version 3.4 MERGE Healthcare) for MRI and (RadiAnt DICOM Viewer 4.2.1) for CT. Spinal decompression and slot morphometry were evaluated after evaluation of spinal cord compression caused by chronic extrusion/protrusion on MRI (T2-W myelo) and CT myelography.

3-point scale was used to determine spinal cord decompression on post-surgical cross-sectional CT images. Normal shape of the spinal cord was determined as complete decompression, good decompression (<25%) and insufficient (>25%).

None of the dogshad reoperation. In 17 (62.96%) dogs, after analysis post-surgical CT axial images were determined to be completely decompressed, 9 (33.33%) good decompression and 1 (3.71%) insufficient. In owners request dog without insufficient spinal cord decompression was not reoperated.

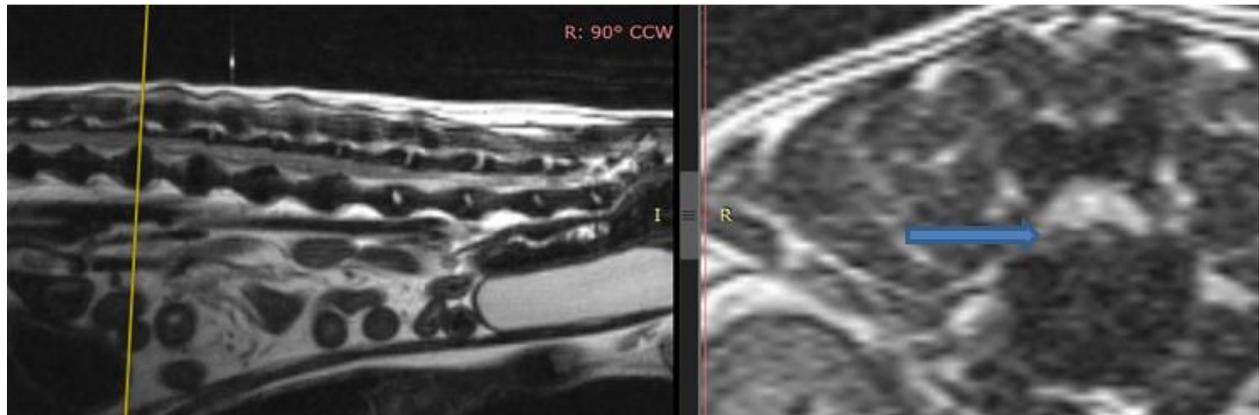


Fig 1: MR images of 5 year old Pekinese with spinal cord compression at the level of Th13-L1. Saggital T2-W image on the left (yellow vertical line at the level of compression), axial image on the right where compressing factor (histologically confirmed chronic disc extrusion) is visualized- arrow.

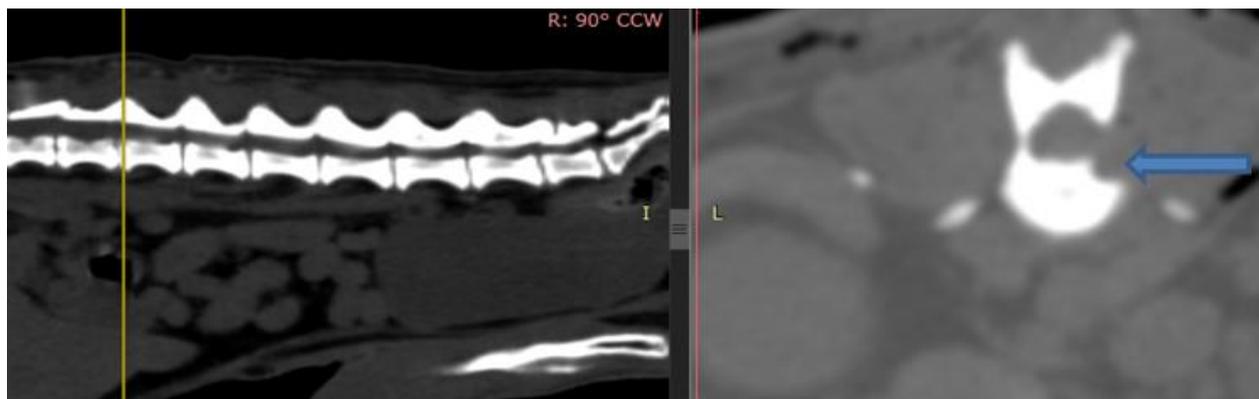


Fig 2: Post-operative CT of the same dog.Saggital image at the level of decompression-Th13-L1 (yellow vertical line).Axial CT image at the level of decompression on the right (region of partial lateral corpectomy is visualized- arrow).

Surgical Techniques

Twenty-five dogs had single PLC and 2 PLCs in 2 dogs. All compressive factors including longitudinal ligament and disc material were attempted to remove during surgery for complete decompression of spinal cord. Injury of the spinal cord or spinal nerves was not observed during surgery. The only complication was intraoperative hemorrhage from venous sinus in 3 dogs (11.1%).

Anesthesia was performed as follows. Dogs were premedicated with Dexdomitor (5 μ /kg), and anesthesia was induced with Zoletil (4 mg/kg) and maintained with Isoflurane/Sevoflurane(1.5-2%- 1.5 L/min) in oxygen and Zoletil(2-5 mg/kg/h - constant infusion rate). Surgery was performed using the technique documented in Fligel T. et al [3].

Intervertebral disc disease within Th9-L1 was diagnosed in 7(25.9%) dogs and between L1-L4 in 20 (74.1%) was established intraoperatively and histology. Eleven (40.7%) out of 27 had type 2 (Hansen II) disc herniation where 16(59.3%) had type 1(Hansen I). Before surgical intervention 2(7.40%) dogs, had first level of neurological deficit, 5(18.50%) with 2 level, 7(25.90%) with third level, 10(37.03%) with fourth level and 3 (11.17%) with fifth level of neurological deficit according to modified Frankel score.

In postoperative period, recovery of neurological deficit started within 5 hours in some dogs, which proves PLC to be an effective surgical procedure. Overall progress was seen in almost all the dogs. By seventh day after surgical procedure 1 dog (5.9%) had 1 level, 1 (3.7%) had second level, 2 (7.4%) had third level, 2 (7.4%) had fourth level and 1 (3.7%) had fifth level of neurological deficit according to modified Frankel score. Rest of other 20 (74.1%) dogs totally recovered within 7 days. By, 45 days after surgical intervention except 1 dog who had no deep pain sensation from the beginning for 3 days, completely recovered.

CONCLUSION

From this study we can conclude that PLC could one of the best choices of surgical intervention for management of chronic intervertebral disc disease in thoraco-lumbar region. In order to achieve effective decompression of the spinal cord, exact localization of chronic extruded / protruded intervertebral disc is very important. MRI, CT, combined with a simple radiography and neurological examination, minimize the risk of error during surgical approaches and localization of intervertebral disk herniation in the spinal canal, followed by its removal. The disadvantage of this method is longer surgical procedure and time consumed compared with hemilaminectomy.

REFERENCES

- [1] Kozlov NA Development and justification of methods for the diagnosis and treatment of dogs with herniated intervertebral disc. Dissertation doctor of veterinary sciences 2013.
- [2] Yagnikov SA et al. Tumors of spinal cord and column vertebrae in dogs Russian veterinary journal 2005;4: 7-11
- [3] Bray JP, Burbidge HM. The canine intervertebral disk: part one: structure and function. J Am Anim Hosp Assoc 1998;34:55–63.
- [4] Brisson B.A. Intervertebral disc disease in dogs. The Veterinary clinics of North America. Small animal practice/. 2010 Sep;V40(5):829-858.
- [5] Flegel T et al. Partial lateral corpectomy of the thoracolumbar spine in 51 dogs: assessment of slot morphometry and spinal cord decompression. Vet Surg. 2011;40:14–21.
- [6] Griffin J.F. et al. Canine thoracolumbar intervertebral disc disease: diagnosis, prognosis and treatment. Compendium on continuing education for the practicing veterinarian. 2009;17:E1-E14
- [7] Moissonnier P, Meheust P, Carozzo C. Thoracolumbar lateral corpectomy for treatment of chronic disk herniation: technique description and use in 15 dogs. Vet Surg. 2004;33:620–628.
- [8] Platt S.R. BSAVA Manual of Canine and Feline Neurology. 3-rd edition BSAVA, 2004.: p350
- [9] Pierre M. et al. Loss of deep pain sensation following thoracolumbar intervertebral disc herniation in dogs: Treatment and Prognosis. Compendium 2003:54-58
- [10] Salger F., Ziegler L., Böttcher Ch. Neurologic Outcome After Thoracolumbar Partial Lateral Corpectomy for Intervertebral Disc Disease in 72 Dogs. Vet Surg 2014;43: 581–588.
- [11] Bracken MB, Holford TR. Neurological and functional status 1 year after acute spinal cord injury: estimates of functional recovery in National Acute Spinal Cord Injury Study II from results modeled in National Acute Spinal Cord Injury Study III. Journal of neurosurgery. 2002 Apr;96(3 Suppl):259-266.
- [12] Forterre F. et al. Incidence of spinal compressive lesions in chondrodystrophic dogs with abnormal recovery after hemilaminectomy for treatment of thoracolumbar disc disease: a prospective magnetic resonance imaging study. Vet Surg. 2010;39(2):pp 165-72.