

Retrospective study of thoracolumbar ventral fenestration through intercostal thoracotomy and paracostal laparotomy in the dog

CORRESPONDENCE TO:
João Guilherme Padilha Filho
Departamento de Clínica e
Cirurgia Veterinária
Faculdade de Ciências Agrárias e
Veterinárias da UNESP
Campus de Jaboticabal
Rodovia Carlos Tonanni, Km 5
14870-000 - Jaboticabal - SP
e-mail: padilha@fcav.unesp.br

Estudo retrospectivo da fenestração toracolombar ventral através de toracotomia intercostal e laparotomia paracostal no cão

1-Departamento de Clínica e Cirurgia
Veterinária da Faculdade de Ciências
Agrárias e Veterinárias da UNESP,
Campus de Jaboticabal - SP

João Guilherme PADILHA FILHO¹; André Luis SELMI¹

SUMMARY

The records of 29 dogs, grouped according to breed, sex, age and neurological status, as well as duration of symptoms, T-L disks involved, time elapsed for functional recovery, and success rates were studied. The Dachshund represented 55.18% (n = 16) of the cases, mongrel dogs, 13.8% (n = 4), Poodle, Basset Hound and English Cocker Spaniel, 6.89% each (n = 6) and German Shepherd, Beagle and Pinscher, 3.45% each (n = 3), being 51.72% males and 48.28%, females, with a mean age of 68.03 months. The neurological status corresponded to 13.8% of the dogs belonging to GI (pain), 41.8% to GII (paresis), 27.6% to GIII (paraplegia, with positive deep pain) and 17.2% to GIV (paraplegia with loss of deep pain). Symptoms varied in duration between two and 60 days, corresponding the averages of 18.5 days (GI), 12.3 days (GII), 8.28 days (GIII) and 4.2 days (GIV). Percentage of affected disks was: T_{10/11} (10.81%), T_{11/12} (24.33%), T_{12/13} (40.55%), T_{13/L1} (16.21%) and L_{1/2}, L_{2/3} and L_{3/4}, 2.7% each. Mean time of recovery, in days, was: 16 (GI), 19.1 (GII), 20.6 (GIII) and 30.6 (GIV), when 100% of dogs in groups I, II and III recovered both neurological and motor functions. Group IV showed 80% of success. It is concluded that ventral fenestration yields excellent results, although proper case selection must be considered.

UNITERMS: Fenestration; Thoracotomy; Dogs.

INTRODUCTION

The incidence of intervertebral disk disease (IVDD), in the canine population as a whole, is around 2%^{24,25}. Thoracolumbar disk disease is the main cause of neurological dysfunction in small animals, affecting mainly chondrodystrophoid breeds. Clinical signs vary from pain to paralysis to mielomalacia^{15,20,23}.

The pathophysiology of intervertebral disk protrusion and extrusion are well described in the literature^{2,24}, however there is much controversy concerning the most appropriate surgical procedure because of the broad range of clinical signs presented and the results obtained with various techniques.

The intervertebral disks more commonly affected in

the dog are between T₁₁ and L₂^{15,23}. Thoracolumbar disk herniation accounts for approximately 59.7% of disk disease in dogs²⁰. The degree of the disease, urgency, economic factors as well as the veterinarian's training and need of appropriate material to accomplish the several existent surgical techniques affect the surgical treatment of disk disease. Treatment should be based on the patient's classification with relation to its neurological status^{23,24}. Dogs are normally grouped into four categories based on neurological signs, which are: GI- back pain only, GII- paresis, GIII- paraplegia with positive deep pain and, GIV- paraplegia with loss of deep pain¹⁹.

Treatment methods include: preservative therapy, chymionucleolysis, acupuncture, hemilaminectomy, laminectomy and fenestration of intervertebral disk^{8,10,12,16,19}.

Surgical therapy has been recommended to those dogs not responding to conservative therapy, or those presenting worsening of the clinical signs or loss of the neurological function in a sharp and severe way¹².

The purpose of this paper is to evaluate thoracolumbar disk fenestration in the dog using a ventral approach, concentrating on neurological status following surgery, recurrence and success rates.

MATERIAL AND METHOD

Medical records of 29 dogs that had a ventral fenestration for thoracolumbar disk disease during the period from September 1, 1986 to August 31, 1997 were reviewed. Dogs with incomplete records or those where follow-up was lost based on the criteria of this study were not included.

The following data was obtained from records of the 29 dogs evaluated: breed, sex, age and neurological status at presentation, weight, duration of signs, radiographic interpretation, days of standing and walking after surgery and percentage of success regarding the neurological status before surgery. All dogs were reevaluated at 15, 30, 60 and 90 days after surgery.

Dogs were placed in one of four categories according to neurological status before surgery. Group I included dogs with back pain only; Group II included those dogs that were paretic; Group III was formed by those animals that were paraplegic, without loss of deep pain perception, and Group IV was formed by dogs with loss of deep pain perception for less than 24 hours.

The diagnosis was made following plain radiographs, with the beam centered at the thoracolumbar region, based on typical radiographic signs as disk space narrowing, and protrusion or presence of disk material within the vertebral canal. Clinically, the site of the lesion was based on the panniculus and other spinal reflexes.

Ventral fenestration of disk spaces T₉₋₁₀ through L₅₋₆ was performed by the same surgeon at the Veterinary Teaching Hospital - UNESP (VTH-UNESP) at Jaboticabal, through left or right intercostal thoracotomy at the 11th intercostal space and paracostal laparotomy, depending upon clinical signs and neurological deficits. The disks were incised with a scalpel blade n. 15 and meticulously curetted with dental scrapers.

Clinical follow-up was determined either by a phone call to the owners at the time of this study, or by return of the dog to the Veterinary Teaching Hospital.

RESULTS

Thoracolumbar disk disease was seen mainly in chondrodystrophoid dogs, with exception of a four and half

year old German Shepherd. Three mongrels were dachshund mixed. Among the dogs examined in this study, Dachshunds were at highest risk (Tab. 1). Males accounted for 51.72% of cases. Time elapsed from fenestration surgery to evaluation time ranged from two months to three years. Average age at presentation was 69.8 months, ranging from 24 to 140 months. Four per cent of the dogs were younger than three years of age, 60% were between three and six years, and 36% were older than six years of age.

Number of dogs in the categories with respect to neurological signs at presentation and surgery, as no change in neurological status was observed from admission to surgery, was - Group I: four dogs; Group II: twelve; Group III: eight; and Group IV: five. Duration of clinical signs for each group was: Group I- 18.5 days; Group II-12.3; Group III- 8.28; and Group IV- 4.2. Two dogs returned to the VTH-UNESP after T-L fenestration (group III and IV, respectively), but these episodes were related to cervical disk disease. The first dog was returned 13 months after fenestration because of acute onset of neck pain. The neurological and myelographic signs were conclusive of cervical disk extrusion at C₃₋₄. A ventral slot and cervical disk fenestration were performed, and the dog recovered uneventfully. The second dog presented ataxic gait and neck pain nine months following thoracolumbar fenestration. Radiographic exams revealed cervical disk disease, and the dog was operated via ventral fenestration of disks spaces C₂₋₃ to C₆₋₇. Four months after surgery this dog was doing very well.

One dog belonging to group I died 48 hours after surgery from unrelated causes. Recurrence of signs related to thoracolumbar disk disease was not observed during the period of this study. Mean time for recovery was six days to dogs in GI, 19.1 days in GII, 20.6 days in GIII and 30.6 days in GIV. The overall mean time of recuperation, for all groups, was 19 days. Dogs of groups I, II and III recovered successfully from surgery. Eighty per cent of dogs in GIV recovered successfully. The results are summarized in Tab. 2.

DISCUSSION

Treatment of thoracolumbar disk disease is highly controversial and revolves which surgical procedure is the best method of treatment, and whether it is indicated at all, because of the broad range of clinical signs presented and the results obtained with various surgical procedures.

Intervertebral disk fenestration has been recommended as a means of treatment and also as a prophylactic measure in thoracolumbar disk disease^{7,16,19}. Other methods for the treatment of T-L disk disease include conservative treatment⁶, hemilaminectomy²², mini-hemilaminectomy¹⁴, laminectomy^{11,21}, pediclectomy¹⁷ and chymionucleolysis¹⁰.

In this study, an almost exclusive representation of chondrodystrophoid breeds was observed, with higher frequency of the Dachshund, in agreement with data mentioned in the literature^{16,19,22}. The age, at which a larger incidence of such condition occurs, in chondrodystrophoid breeds, is between the third and sixth year of life. No sex predilection was found in this study, although a higher predominance in males has been reported^{3,11}.

The disk space most affected in our study was T_{12/13} (40.55%), proceeded by T_{11/12} (24.33%) and T_{13/L1} (16.21%), in accordance to other studies^{17,19,22}.

Several factors must be considered when planning which surgical procedure should be performed and when should one choose such a technique. All surgical techniques have advantages and disadvantages, but, in our opinion, one must also consider other factors such as: morbidity, recovery rate, time to recovery, recurrence rate, and ease in performing the technique. With these factors in mind, probably it would be easier to compare results of different studies.

The elapsed time from surgery to recovery is particularly important, since it implies directly in the time of the patient's hospitalization, and aftercare to be taken by the veterinarian and the owner. The overall mean time of recuperation, for all groups, was 19 days. A shorter overall time for recuperation has been reported, however recurrence rates for groups II and IV were greater than observed in our study¹⁹. Dogs treated by means of decompressive procedures such as laminectomy, hemilaminectomy and fenestration and mini-hemilaminectomy showed a recovery time between 15 and 21 days, whereas recurrence rate varied from 23 to 32%^{1,18}. The major factor for recurrence of clinical signs was incomplete removal of nucleus pulposus^{5,13,16}. It seems that recovery rates in patients of the groups III and IV treated by fenestration are similar to those obtained in patients submitted to hemilaminectomy, although the time of recovery in this latter is shorter²³.

Recovery rates in patients treated by lateral fenestration are greater than 92%^{4,7,9}. Paraplegic dogs, with intact deep pain perception, treated by laminectomy presented a recovery rate of 79%, whereas paraplegic dogs (groups III and IV) treated by hemilaminectomy and fenestration showed a recovery rate of 81%¹⁸. In this study it was observed a similar recovery rate for dogs of group IV treated by means of ventral fenestration alone. Extensive curettage of the intervertebral disk may have been implicated in our results, although the potential decompressive effect of fenestration remains unproved.

In this study, all dogs of groups I, II and III presented satisfactory clinical results. Such results may be attributed to the complete, gentle and intense scaling of intervertebral

spaces. Previous studies have shown that ventral fenestration alleviates spinal cord compression, allowing herniated disk material to be pushed back out of the vertebral canal¹⁹. The beneficial effect of the fenestration depends on the amount of nuclear material removed¹⁶. Some authors have mentioned that the greatest advantage of fenestration is the low recurrence rate, but when accomplished by a small opening, it may cause deterioration of clinical signs due to the fact that nuclear material may be forced into the vertebral canal instead of being removed⁵.

By performing a ventral approach to the intervertebral disks, one exposes the whole ventral surface of the disk and may be able to meticulously scale the intervertebral space.

CONCLUSION

Although percentage of disk removal was not evaluated in this study, we can affirm that the ventral approach to the disks allows the surgeon to remove a

Table 1

Breeds and number of dogs affected with thoracolumbar disk disease referred to the Veterinarian Teaching Hospital - UNESP/Jaboticabal from January, 1992 to December, 1996.

Breeds	Number of dogs	%
Dachshund	16	55.18
Mongrel	4	13.80
Miniature Poodle	2	6.89
Basset Hound	2	6.89
English Cocker Spaniel	2	6.89
Beagle	1	3.45
Miniature Pinscher	1	3.45
German Shepherd	1	3.45
Total	29	100

Table 2

Recovery rates after ventral thoracolumbar disk fenestration performed at the Veterinarian Teaching Hospital - UNESP/Jaboticabal from January, 1992 to December, 1996.

Grade	Number of dogs	Recovery rate (%)
I	4	100 [†]
II	12	100
III	8	100 ^c
IV	5	80 ^c

† - One dog died after surgery;

C - Dogs presenting cervical disk disease after ventral fenestration (n = 1).

significant portion of the ventral annulus fibrosus and perform a thorough curettage of the disk space, which explains the improved clinical results and low recurrence rates obtained in this study.

It can be concluded that ventral fenestration yields very good results, does not require any special surgical instrument to

be performed but a tartar scraper, the recurrence rate after ventral fenestration is extremely low, and recovery rates equal those obtained by other authors using decompressive surgeries. Based on the results the authors indicate the ventral approach to disk fenestration for dogs included in groups I to IV, considering they have not lost deep pain sensation for more than 24 hours.

RESUMO

Foram analisados os resultados da fenestração ventral dos discos toracolombares em 29 cães agrupados segundo a raça, sexo, peso, idade, graus de déficits neurológicos, duração dos sinais, discos intervertebrais envolvidos, tempo para recuperação e porcentagem de sucesso. A raça Dachshund representou 55,18% (n = 16), cães sem raça definida, 13,8% (n = 4), Poodle e Basset Hound e Cocker Spaniel Inglês 6,89% cada (n = 6), e Pastor Alemão, Beagle e Pinscher, 3,45% cada (n = 3), sendo 51,72%, machos e 48,28%, fêmeas, com idade média de 68,03 meses. O grau de déficits neurológicos correspondeu a: 13,8% dos cães pertencentes ao GI (dor), 41,8% ao GII (paresia), 27,6% ao GIII (paraplegia com dor profunda presente) e 17,2% ao GIV (paraplegia com dor profunda ausente). Os sinais clínicos variaram em duração entre 2 e 60 dias, correspondendo às médias de 18,5 (GI), 12,3 (GII), 8,28 (GIII) e 4,2 dias (GIV). A porcentagem de discos intervertebrais acometidos foi: T_{10/11} (10,81%), T_{11/12} (24,33%), T_{12/13} (40,55%), T_{13/L₁} (16,21%) e L_{1/2}, L_{2/3} e L_{3/4}, 2,7% cada. O tempo médio de recuperação, em dias, foi: 16 (GI), 19,1 (GII), 20,6 (GIII) e 30,6 (GIV), onde 100% dos animais dos grupos I, II e III recuperaram ambas as funções neurológicas e motoras. O grupo IV apresentou 80% de sucesso. Conclui-se que a fenestração ventral produz excelentes resultados pós-operatórios desde que bem selecionados os casos.

UNITERMOS: Fenestração; Toracotomia; Cães.

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