

OBSERVATIONS CONCERNING DISC FENESTRATION IN DOGS

By

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INTRODUCTION

Ever since *Dexler's* work in 1896 it has been known that a kind of neoformation proceeding from the discs may cause compression of the spinal cord in dogs. Not until the last decade have we, however, become aware of the actual character of these "neoformations".

Tillmanns, in 1939, and *Fankhauser*, in 1948, emphasize that at least some of these "neoformations" consist of protruded tissue of the *nucleus pulposus*. In 1946 *Riser* (quite independent of *Tillmanns*) describes the changes as identical with disc protrusion in man.

Hansen, who elsewhere in this publication gives an account of his investigations, has definitely established that these so-called neoformations are disc protrusions.

He has further pointed out that in dogs the disease *disc degeneration*, of which a protrusion is only one symptom, seems to be a systemic disease which mainly strikes breeds of a chondrodystrophic type.

Disc protrusions in dogs almost exclusively cause compression of the spinal cord or of the spinal cord and nerve roots together, on account of existing anatomical conditions (the spinal cord extends to the 7th lumbar vertebra). Compression of only the nerve roots is very seldom seen.

Paresis and paraplegia are common symptoms.

Hitherto our knowledge of the symptoms and pathogenesis of the disease has had to be built up from severe cases which have not recovered, and in which the diagnosis has finally been verified at autopsy.

No other possibilities of definite diagnosis have been tried. Therefore, it has not been possible to limit the disease clinically. No surgical therapy has ever been employed.

Since 1949 roentgenological and surgical studies of disc protrusion in dogs have been pursued, however, at the Veterinary College in Stockholm.

The results of these investigations are reported in Supplement No. 8 of *Acta Orthopædica Scandinavica*. Only a brief account will be given here of some observations which may be of general interest. (Regarding the pathological anatomy of disc protrusions in dogs, Hansen's previously mentioned work is referred to).

ROENTGENOLOGICAL AND PATHO-ANATOMICAL STUDIES

At first comparative studies of roentgenograms and sectional pictures have shown that disc degeneration and disc protrusion are manifested somewhat differently in the roentgenograms of dogs and in those of man.

Calcification of discs and allied calcified protrusions are *very common* phenomena in breeds of dogs that are predisposed to disc degeneration. Abnormal mobility between surrounding vertebrae, which is found in man, does not seem to play any important rôle in dogs. In other respects the roentgenological changes seem to be similar in dogs and in man, and many disc protrusions never cause changes on the roentgenogram. Myelography has therefore had to be employed for localization.

The best method of myelography in dogs has proved to be the one suggested by *Nosik and Mortensen* (1938). According to this method, thorotrast is used as contrast medium and after the myelography forced drainage of the cerebrospinal fluid is carried out. In the present investigation the method has only been modified in so far as the contrast medium has also been injected lumbarly when necessary. Such myelography has been performed on about 60 dogs with disc protrusions.

Of these dogs 20 have been subjected to section after myelography. Hence, it has been possible to examine the results of the method in detail.

One of the most important results of these myelographic investigations is the finding that disc protrusion in dogs seems to be much more widely spread than one has previously been apt to believe.

In every case, in which there has been some reason to suspect disc protrusions, they have been confirmed by means of myelography.

The diagnoses myalgia and rheumatism to a great extent disap-

peared after it was seen that disc protrusions very often cause symptoms regarded as typical for these diseases.

Experience supports the opinion that the symptoms are extremely variable and that in dogs paraplegia and paresis, caused by disc protrusions, often have a tendency to spontaneous healing. Relapses often occur, however.

These facts have been verifiable through after-examinations of cases treated at the Veterinary College.

As the question why the disease runs a course like that has been considered of importance for a likely therapy, special attention has been given to the problem.

Roentgenologically and patho-anatomically it has been possible to state that the size of two protrusions, even if their localization is identical, is not proportional to the severeness of the symptoms which they cause. *But the rate of development of a protrusion often seems to have a determining influence on the symptoms.*

The adaptability of the spinal cord in cases of slowly increasing compression seems to be very great in dogs. Symptoms already visible often disappear in spite of persisting compression of the spinal cord.

In most cases the relapses seem to be caused when other discs protrude. It often happens, however, that the animal has had several relapses, but that at section protrusion of only one disc is found. *Evidently an enlargement of the protrusion has then occurred by degrees owing to the fact that more nuclear material has been pressed out through the rupture of the annulus fibrosus upon sudden increase of pressure in the disc. Such a development in a protruded disc has been definitely proved in at least two cases.*

SURGICAL STUDIES

In order to discuss surgical treatment against the background of the mechanism of natural healing, the following facts may be noted.

The symptoms fairly often disappear without apparent change in the protrusion in any other respect than that the surrounding acute inflammation in the epidural space becomes chronic, thus causing a slight decrease in the compression. Even if the protrusion itself in certain cases should decrease in size, considerable compression of the spinal cord will usually be found at section in cases where the symptoms have totally disappeared.

Why does a protrusion then in one case cause very prolonged symptoms, while the symptoms from a protrusion of the same size and appearance in another case quickly disappear?

From the present investigation the impression is gained that protrusions which include a dynamic factor constantly set up an irritation of the spinal cord and the nerves. But protrusions which are quickly stabilized (stationary), also quickly cease to cause symptoms.

A protrusion may be mobile (dynamic) by being in contact with the centre of the disc and hence capable of being influenced by the changes in pressure which appear there in connexion with the animal's motion.

Thus in many cases natural healing seems to consist of some sort of stabilization of the protrusion, in such a manner that the protrusion becomes partly enveloped in connective tissue.

As long as a great deal of nuclear material is left within the disc, the protrusion may however increase via the existing rupture and hence cause relapses.

A surgical method of treatment aiming only at stabilization of the protrusion and not at resection, would therefore seem satisfactory in dogs. Besides, such a method ought to be safer.

It was also seen that laminectomy and resection of protrusions in dogs caused post-operative paraplegia. The previously injured medulla could not stand the operation even if it was performed with the very greatest care.

Several circumstances thus contributed to the idea of trying the method of fenestration¹, suggested in 1943 and modified in 1950 by Lindblom.

This method, which simply consists in making a large hole outside the vertebral canal, extending into the *annulus fibrosus* and as far as the *nucleus pulposus*, aims at elimination of the dynamic factor in the disc.

Pressure which may be brought about within the disc by external influence, and which causes more nuclear material to be pressed out through the rupture in the *annulus fibrosus*, may after fenestration be conducted out through the fenestra.

M A T E R I A L

Twenty-nine dogs with one disc protrusion or more were operated on according to the method of fenestration. The dogs were between 1.5 and 8 years of age. Most dogs were not operated on until conservative treatment (rest and injections of vitamin B₁) had been tried for different periods of time.

¹ Note Hult's article in this publication.

SURGICAL TECHNIQUE

Three different methods of operation were used, depending on which discs had protruded.

In protrusion of a cervical disc, entry into the disc was made from the ventral side. The dog, which was anaesthetized with nembutal intravenously, was placed on its back. Incision of the skin was made along the trachea. The disc was then easily reached by using only blunt instruments. Fenestration was performed with a lancet, making a square hole of about 3×3 mm. Nuclear material was then scooped out of the disc with a fine scoop.

In cases in which the protrusion was located in the thoracic portion of the spine the operation was performed transthoracally. These dogs were usually anaesthetized with pentothal sodium intravenously, in combination with inhalation anaesthesia of trilene + oxygen administered by hyperpressure.

Resection of ribs was performed in the usual manner, retaining the periosteum. Fenestration was carried out ventrolaterally to the disc.

The lumbar discs were fenestrated dorsolaterally after the muscles had been stripped from the vertebrae down to the *processi transversi*. In these cases nembutal anaesthesia was used.

RESULTS

Naturally, it is difficult to estimate the results of treatment of a disease which in many cases can heal spontaneously.

It is remarkable, however, that very quick healing followed operation in all the cases in which paresis and paraplegia had not dominated the symptoms.

A very interesting fact is that as many as 9 dog owners declared that their animals had become more vital after operation than they had been for months or years before the time given for their falling ill.

The only explanation of this seems to be that the disease must have had a much more chronic course than had been suggested. In these cases operation seems to have eliminated the pain totally.

No such effect is produced by conservative treatment.

Furthermore, the operation often had such decisive effect that one can hardly doubt its efficiency in such cases.

Only one example will here be given.

M 141/51. Dachshund, 6 years old, ♀

Anamnesis. About one month before the dog had been admitted to the clinic it had had a violent attack of pain. After that it had not been able to move as usual. It

had manifested tender abdominal muscles and had kept its back very arched. It had been treated with vitamin B₁ but had gradually become worse.

Status on arrival at the clinic.

The dog was rather thin and seemed very apathetic. It was unwilling to lie down and would stand up with its back very arched and keep its neck stretched. It moved stiffly and seemed to suffer from pain when touched. When lying down it would lie flat on its side. On account of pain, no examination of reflexes could be made.

Course.

The dog's condition gradually grew worse in spite of intensive treatment with vitamin B₁, rest and heat. The dog began to show poor balance and ataxia. Further, evident radial paresis of the right front leg could be noticed. In addition, the dog fell ill with pneumonia but recovered after treatment with aureomycin. When the dog was remitted to the roentgen department for myelography, after having been at the clinic for 4 weeks, the status was as follows.

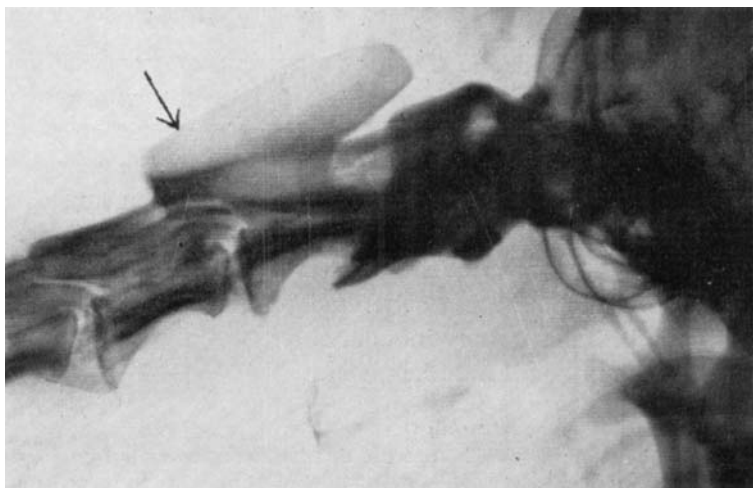
The dog would lie on its side and moan. When it was placed upright, it would take a few wobbling steps and then fall over. Extensor paresis of the right front leg. Head and neck bent somewhat to the right. Purulent rhinitis and conjunctivitis.

Myelography.

Total block at disc C. 2-C. 3. The contour of the spinal cord can be clearly noticed as far as this disc. The contrast lines are here pressed against each other and are elevated towards the vertebral arch exactly over the disc. (Cf. Fig.).

Operation and results.

Four days after myelography the disc (C. 2-C. 3) was fenestrated from the ventral side in the manner previously described.



The very next day after operation the dog seemed to be relieved of pain. In spite of the large wound from the operation it could move its head and neck. Improvement continued day by day. After a week the dog was able to walk and even climb up into its cage. Its radial paresis was gone. Improvement continued and after 4 weeks the dog had recovered.

Of the 29 dogs operated on, 25 recovered (in some cases of paraplegia no *restitutio ad integrum* occurred, and slight ataxia remained).

One dog still had slight paresis after 5 months.

One dog was killed 2 months after operation, having shown only slight improvement after paraplegia.

One dog died unimproved from an intercurrent disease 1 month after operation.

One dog died during operation (puncture of the aorta).

SUMMARY

The author briefly gives an account of 29 cases of disc protrusion in dogs in which the surgical treatment was carried out according to a method called fenestration suggested by *Lindblom*. Moreover, he reports some observations giving an explanation of the typical course of disc protrusion in dogs. In the author's opinion, the mechanism of natural healing in disc protrusion in dogs supports the belief that fenestration is here the most suitable surgical method of treatment. The author refers to a more detailed report in Supplement No. 8 of *Acta Orthopædica Scandinavica*.

RESUME

L'auteur rend compte de 29 cas de prolapsus discal chez les chiens opérés d'après la méthode dite de fénestration suggérée par *Lindblom*. D'autre part, il rapporte quelques observations en vue de donner l'explication du cours typique du prolapsus discal chez les chiens. Suivant l'auteur, le mécanisme de la guérison naturelle du prolapsus discal chez les chiens appuie la thèse que la fénestration est ici la méthode de traitement chirurgical la plus appropriée. L'auteur se réfère à un rapport détaillé publié dans le Supplément No. 8 des *Acta Orthopædica Scandinavica*.

ZUSAMMENFASSUNG

Der Verfasser berichtet in Kürze über 29 Fälle von Bandscheibenvorfall bei Hunden, bei denen die chirurgische Behandlung nach einer Methode, die als Fensterung (fenestration) bezeichnet wird und von

Lindblom vorgeschlagen wurde, ausgeführt wurde. Ausserdem berichtet er über einige Beobachtungen, die eine Erklärung des typischen Verlaufes des Vorfalles bei Hunden geben können. Der Verfasser ist der Meinung, dass der natürliche Heilungsvorgang von Diskusprolapsen bei Hunden die Auffassung unterstützt, dass Fensterung (fenestration) in diesen Fällen die Methode der Wahl ist. Der Verfasser weist auf einen ausführlicheren Bericht im Supplement nr. 8 der *Acta Orthopædica Scandinavica*.

REFERENCES

- Dexler, H.*: Oesterreich. Ztschr. f. Wissenschaftl. Veterinärkunde. 7: 1, 1896.
Fankhauser, R.: Schw. Archiv f. Tierheilk. 90: 143, 494, 1948.
Hansen, H. J.: Acta Orthop. Scand. . . . 1951.
Lindblom, K.: Ergeb. d. Inn. Med. u. Kinderheilk. 2: 281, 1951.
— Personal communications.
Nosik, W. A., Mortensen, O. A.: Am. Journ. Roentgenol. 39: 727, 1938.
Riser, W. H.: The North. Am. Vet. 27: 633, 1946.
Tillmanns, S.: Diss. Giessen. 1939.