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**AN INVESTIGATION INTO THE
EFFECTIVENESS OF COLLAGENASE FOR
THE PERCUTANEOUS DISCOLYSIS OF
THORACOLUMBAR INTERVERTEBRAL
DISCS IN THE DOG**

A thesis presented in partial fulfilment
of the requirements for the degree of
Master Of Veterinary Science
at Massey University

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1993

Abstract

This investigation compared the effectiveness of chemonucleolysis with 500 units of collagenase, to lateral fenestration of the thoracolumbar intervertebral discs of the non-chondrodystrophoid dog. Effectiveness was based on the amount of nuclear material removed from the disc and the associated modifications to intervertebral disc structure, as determined by histological examination. The object was to determine whether the percutaneous injection of collagenase enzyme could be an alternative to fenestration as a prophylaxis against herniation of a degenerate intervertebral disc.

Eight one year old, non-chondrodystrophoid mongrel dogs were used in the experiment. Apart from two dogs which remained untreated, the remaining six dogs were from two litters which had been sired by the same animal. Two of these dogs had six intervertebral discs (T10/11 to L2/3) injected with 500 units of collagenase VII_s delivered percutaneously. Another two dogs had their equivalent discs surgically fenestrated by the lateral approach as described by Flo and Brinker. The remaining two dogs were subjected to a placebo injection of physiological saline.

The animals were examined clinically, neurologically and radiologically before treatment and at regular intervals following treatment. Six months following treatment, the dogs were euthanased.

The results showed that collagenase caused almost complete removal of normal nuclear material from within the disc. The centre of the disc was replaced by a variable combination of fibrocartilage and hyaline cartilage, which appeared to develop from the collapsed inner lamellae of the annulus fibrosus. Complications were recorded in only one dog, who suffered a transient hind limb paralysis in the two days immediately following injection. A massive dorsal extrusion of nuclear material was observed in one disc at post-mortem in this dog and was believed to be the cause of the paralysis. The dog recovered without treatment and remained normal on clinical, neurological and radiological examination six months after injection. The annulus fibrosus, dorsal and ventral longitudinal ligaments remained intact in all other dogs.

Fenestration was found to cause a variable disruption to the normal architecture of the nucleus pulposus. In most discs, cellular aggregations from the normal nucleus pulposus were undergoing a transformation to fibrocartilage. These cell groups were separated by an increased amount of amorphous matrix material which stained moderately with alcian blue. In the remaining discs (3/12), an increased fibrosus of the nucleus pulposus was seen, but no other

disruption to the normal architecture was recorded. No complications occurred in these dogs. The injection of the discs with physiological saline caused remarkably similar histological effects to the disc as did fenestration.

The investigators concluded that collagenase appeared to be an attractive alternative to fenestration for the prophylaxis of intervertebral disc herniation, on the basis of its completeness of removal of nuclear tissue, and its simplicity, cheapness, non-invasiveness and the lack of medium and short term complications. Since intervertebral disc protrusions occur more commonly in chondrodystrophoid breeds of dog, the effect of collagenase should be studied in degenerate disc of these breeds before it can be recommended for clinical use.

Acknowledgements

I would like to thank my supervisors for their work in the preparation of this thesis: Hilary Burbidge for her constant support, guidance and perpetual good humour; Brian Goulden for his desire for excellence, and his clear guidance and thinking; Elwyn Firth and Keith Thompson for their positive comments and criticisms. I would also like to thank Andy Bray for his assistance with the layout design of this thesis.

The collagenase used in this experiment was supplied by Sigma laboratories, and their support is acknowledged.

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