SPINAL STAPLING AND DORSAL LAMINECTOMY IN A PARAPLEGIC GREAT DANE DOG- A CASE REPORT

George Chandy[1] and M.S. Vasanth[2]

Introduction

Companion animals may suffer from paraplegia following traumatic spinal cord injury. The most common causes are automobile accidents, falling from heights, intervertebral disc prolapse, attack by other animals and man, heavy objects falling on the back *etc.* Unfortunately, most of these animals don't get the ideal treatment and suffer and die on their own or get euthanized. Premature death of a beloved pet breaks the heart of the most stoic of owners and depresses the mind of any sincere practitioner of veterinary medicine.

This article reports an attempt to treat paraplegia in a Great Dane dog by spinal stapling combined with dorsal laminectomy and its successful outcome.

Case History

A five years old female Great Dane dog weighing 47 kilograms was presented to the Bangalore Veterinary College Hospital with a history of having been hit by a motor vehicle (Tata Sumo) three weeks earlier. The dog had been unable to lift its hindquarters and had been dragging itself around on its front limbs since then. It did not have any control over defecation and urination.

Medical treatment had been undertaken by the local practitioner in the form of corticosteroids, NSAIDS and vitamin injections without any improvement.

Clinical Signs

The dog was paraplegic (Fig. 1 & 2).

The tail and the hind limbs had flaccid paralysis. Pedal reflex was absent and patellar reflex was sluggish in both hind legs. However, the dog was

able to sense pain when the toes of the hind legs were pressed using an artery forceps.

The muscles of the hind limbs were atrophied. Decubital ulcers were beginning to develop at the pressure points on the hind limbs. The distended urinary bladder could be easily emptied by pressing it through the abdominal wall. Urine was found to be cloudy with flakes of pus and was blood tinged.

Diagnosis

Pain was evinced by the dog when the cranial lumbar vertebrae were palpated. However, no gross deviation of the vertebral column was seen. Panniculus reflex (skin-jerk reflex) was present cranial to the mid lumbar dorsal midline suggesting a spinal cord injury in the cranial lumbar region.

Plain radiographs (lateral and ventro-dorsal views) of the thoraco-lumbar vertebrae revealed a compression fracture of the first lumbar (L_1) vertebral body. Myelography by cisterna magna puncture using iohexol (a non-ionic, water soluble, iodine containing positive contrast agent) revealed compression of the spinal cord at the level of the L_1 vertebra.

Based on the above findings, the condition was diagnosed as paraplegia caused by spinal cord

[1] Assistant Professor, Dept. of Surgery and Radiology, Veterinary College, Hebbal, Bangalore 560 024
[2] Dean, Veterinary College, Haassan, Karnataka

compression due to compression fracture of the L_1 vertebra.

Treatment

After premedication with atropine (0.045 mg/kg IM) and diazepam (0.5 mg/kg IV), the dog was anaesthetized with a 2.5 % solution of thiopentone sodium IV. Ceftriaxone (20 mg/kg) was administered IV before premedication.

The dog was positioned on sternal recumbency and the dorsal midline from the level of the scapulae to the base of the tail was prepared for aseptic surgery. A dorsal midline skin incision was made extending from the level of the 11th thoracic vertebra (T_{11}) to the level of L_4 vertebra.

The epaxial muscles (the muscles over the vertebral column) were elevated away from the dorsal spinous processes of T_{12} to L_3 vertebra using a periosteal elevator. The dorsal spine and lamina of L_1 vertebra were removed (laminectomy) using a pair of rongeurs.

Holes were drilled at the base of the dorsal spinous processes of T_{12} to L_3 vertebrae. A 3 mm Steinmann pin was bent into a "U" shape and passed through the hole on the dorsal spinous process of L_3 vertebra. The free ends of the pin were made to lie anteriorly on either side of the exposed dorsal spinous processes of T_{12} to L_2 vertebrae. 20 gauge stainless steel wire pieces were passed through the holes drilled on these spinous processes. The wires were then individually tightened well around the free ends of the "U" shaped implant using wire twister to stabilize the fractured L_1 vertebra (the whole technique is called spinal stapling).

The epaxial muscles and fascia were sutured using No. 1 chromic catgut and the skin incision was closed using No. 1-0 polyamide sutures.

Post operative care

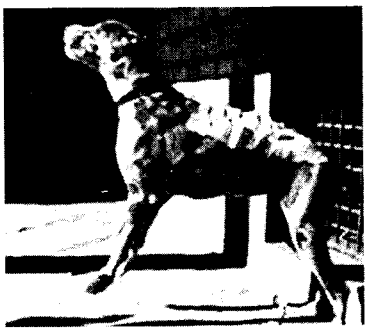
Ceftriaxone was administered @ 20 mg/kg BID IV for seven days after surgery. The surgical site was dressed on alternate days with povidone iodine ointment.

Passive physiotherapy in the form of massaging of the muscles of the hind legs and flexion and extension of the joints was performed for 15 minutes two to three times a day. The skin sutures were removed on the 10th postoperative day.

Clinical Outcome

The urine started clearing by the second day of initiation of antibiotic therapy. Voluntary urination was seen on the third day after surgery. Voluntary leg movements were seen by the end of the first week. The leg movements became stronger and the dog could stand when supported to its legs by the end of two weeks. By the end of three weeks, the dog could stand on its own (Fig. 3).

There was progressive improvement and one month after surgery the dog could walk for short distances and could raise its forequarters with full weight bearing on the hind legs (Fig.4), following which it was discharged from the hospital.



Discussion

Prognosis for recovery following paraplegia of traumatic origin is determined by the degree of damage to the spinal cord. Dogs which have suffered severe damage to the spinal cord have poor chances of improving. However, prognosis is better when the spinal cord has not been severely traumatized and when the animal can still sense pain when the toes are pinched.

In the present case, even though the injury had occurred three weeks earlier to presentation to the hospital, the vertebral fracture was compression type with some degree of innate stability. This ensured that further damage to the spinal cord during movement by the animal was avoided. Relieving of the compression on the spinal cord by laminectomy and complete stabilization of the

injured part of the vertebral column helped rapid spinal cord functional improvement leading to clinical recovery of the patient by the end of the first post operative month.

Even though few specialized instruments like periosteal elevator, bone drill, wire twister and rongeurs were required for the surgery, the implants were inexpensive and the technique could be performed without difficulty. The skill for this surgery may be easily learned by any surgeon with a basic training in orthopaedic surgery.

Conclusion

Most paraplegic animals are deprived of a radical cure for their malady because of the fear of the cost of treatment and the complexity of the surgical technique. However, popularization of inexpensive and relatively simple techniques like spinal stapling will save at least a few paraplegic animals from unexplainable suffering. Moreover, seeing our paraplegic patients returning to a normal or close to normal life would definitely make us more proud of being veterinarians. ❑

Anti-cancer chicken eggs produced

UK scientists have developed genetically modified chickens capable of laying eggs containing proteins needed to make cancer-fighting drugs. The breakthrough has been announced by the same research centre that created the cloned sheep, Dolly. The Roslin Institute, near Edinburgh, says it has produced five generations of birds that can produce useful levels of life-saving proteins in egg whites. The work could lead to a range of drugs that are cheaper and easier to make. Professor Harry Griffin, director of the institute, told the BBC: "One of the characteristics of lots of medical treatments these days is that they're very expensive. "The idea of producing the proteins involved in treatments of flocks of laying hens means they can produce in bulk, they can produce cheaply and indeed the raw material for this production system is quite literally chicken feed." Roslin has bred some 500 modified birds. Their existence is the result of more than 15 years' work by the lead scientist on the project, Dr Helen Sang. But it could be another five years before patient trials get the go-ahead and 10 years until a medicine is fully developed, the Roslin Institute cautioned. Therapeutic proteins such as insulin have long been produced in bacteria; but there are some complex proteins that can only be made in the more sophisticated cells of larger organisms. Scientists have successfully made a range of these molecules in the milk of genetically modified sheep, goats, cows and rabbits. The work at Roslin shows it is now possible to use chickens as "biofactories", too.

Some of the birds have been engineered to lay eggs that contain miR24, a type of antibody with potential for treating malignant melanoma, or skin cancer. Others produce human interferon b-1a, which can be used to stop viruses replicating in cells. The proteins are secreted into the whites of the eggs. It is a fairly straightforward process then to extract and purify them. Dr Sang said the team was highly encouraged by the level of the birds' productivity, but further improvements were required. "We're probably getting a high enough productivity if you want to make a very active protein like interferon, but not enough yet if you want to make an antibody because people need large doses of these over long periods; so one of our next challenges is to try to increase the yield in egg white," she told BBC News.

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Complication of infection has to be treated with antibiotics/chemotherapeutic agents. Many of the aminoglycosides are nephrotoxic and are to be avoided.

In chronic disorders, uraemia/azotemia will have to be corrected with use of diuretics or by dialysis, haemodialysis or periotoneal dialysis. Chance of anaemia is more in chronic renal syndromes and treatment for anaemia will enhance recovery.

In urolithiasis, dietary management in animals with recurrent problem has been suggested. Low protein diet with salt supplementation in small animals and Magnesium salt supplementation in ruminants have been advocated. But efficacy is not absolute. ❑