CRITICAL EVALUATION OF TREATMENT METHODS FOR CERVICAL SPONDYLOMYELOPATHY

Ronaldo Casimiro da Costa, DMV, MSc, PhD, DACVIM – Neurology
College of Veterinary Medicine
The Ohio State University

INTRODUCTION
The treatment of cervical spondylomyelopathy (CSM) is controversial. Few diseases in veterinary medicine have had so many surgical techniques proposed to treat it as CSM. To the author’s knowledge at least 30 surgical techniques have been proposed to treat CSM and more continue to be put forward every year. This clearly means one thing – we are treating a disease that we have yet to fully understand it.

NATURAL HISTORY
Ideally, the natural history of a disease should be known to properly decide on treatment recommendations. Unfortunately, the natural history of CSM has not been defined. It appears that the disease progress slowly in many dogs with disc-associated CSM. The same appears true for giant breed dogs with osseous compressions.

TREATMENT METHODS
CONSERVATIVE TREATMENT
Traditionally, medical treatment for CSM has been considered a temporary measure to alleviate clinical signs. Without surgery, the disease was thought to be progressive, and euthanasia would have to be contemplated. The only evidence to support these statements came from a study of primarily Great Danes that essentially received no treatment, more than 30 years ago. Medical management for CSM was recently revisited in two studies. One of the studies compared the outcome of dogs treated medically and surgically and found that 54% of dogs treated medically improved and 27% were unchanged in a long-term follow-up.

SURGICAL TREATMENT
Surgical techniques for CSM can be grouped into 3 categories: direct decompressive techniques, indirect decompressive or vertebral distraction techniques, and motion preserving techniques. Direct decompressive techniques reported include dorsal laminectomy, dorsal laminoplasty, ventral slot, inverted cone slot, and hemilaminectomy. Indirect decompressive techniques typically are grouped into the distraction-stabilization category, and have been reported using bone grafts of several types, pins (smooth, threaded) or screws and polymethyl methacrylate, interbody screws, washers, metallic spacers, metallic plates, plastic plates, k-wire spacer, Harrington rods, interbody polymethyl methacrylate plug, and fusion cage, all of these combined with either diskectomy, partial or complete ventral slots. Intervertebral disc fenestration has also been used, and more recently, motion preserving techniques, with disc arthroplasty, or artificial disc replacement have been proposed.

DIRECT DECOMPRESSIVE TECHNIQUES
Ventral Slot
Ventral slot is primarily indicated for single ventral “static” compressions. Ventral slot offers adequate spinal cord decompression; subsequent vertebral fusion is expected to occur at the slot site 8 to 12 weeks postoperatively. The reported long-term success rate of the ventral slot procedure for the treatment of CSM is 72%.
Dorsal Laminectomy
Dorsal laminectomy is indicated for dorsal compressions associated with osteoarthritic changes of the articular facets, dorsal lamina malformation, or ligamentum flavum hypertrophy. A problem with the dorsal laminectomy technique is the high postoperative morbidity rate (70%) or even higher in a recent report in dogs with osseous-associated CSM. Most dogs will improve over time (mean time to optimum recovery= 3.6 months) and the success rate for dorsal laminectomies ranges from 79 to 95%, although 30% of dogs can have signs of recurrence postoperatively.

INDIRECT DECOMPRESSION - VERTEBRAL DISTRACTION TECHNIQUES
Pins and Polymethyl methacrylate (PMMA)
This technique is mostly recommended for single ventral dynamic compressive lesions. Either a partial or complete ventral slot is created. The metal implants used can be either two Steinmann pins, threaded pins or bone screws. Positive profile pins provide more rigid fixation than smooth pins. The long-term success rate of this technique is 73%. There are modifications of this technique using corticocancellous bone for distraction.

Distraction using the PMMA plug
This technique can be used for single or multiple ventral and dorsal compressions, either static or dynamic. The original report focused on ventral disc-associated dynamic lesions and the authors commented that it would not be indicated for dorsal or ventral static lesions. The incidence of bone fusion with the traditional technique is currently unknown. The reported long-term success with the PMMA plug technique is 82%.

Locking Plate
Locking plates have been reported for the treatment of CSM. Screws of the locking plates are less likely to loosen than conventional screws and can be inserted monocortically with sustained stability, reducing the risk of vertebral canal penetration and spinal cord injury. Locking plates were used with either partial ventral slots or discectomies. The success rate based on the follow-up information of 3 case series is 73%. A significant disadvantage of this system is the cost of the plate and screws.

MOTION PRESERVING TECHNIQUES
Cervical disc arthroplasty
Disc arthroplasty is currently an area of intense investigation in humans with cervical spondylotic myelopathy. While no consensus exist, disc arthroplasty appears to have some logical benefits in the treatment of CSM. Fusion or distraction may increase the risks of adjacent segment disease or “domino” syndrome by altering the biomechanics of the adjacent segments. An artificial disc was recently introduced for treatment of CSM in dogs. The proposed system offers the advantage of allowing decompression of the spinal cord with a ventral slot prior to insertion of the artificial disc. The number of treated dogs and the long-term outcome is still limited, but the initial experience warrants further investigation.

OUTCOME
Comparison of treatment methods for CSM is complicated due to the fact that the vast majority of the studies are retrospective, have limited numbers, varied follow-up times and different criteria for a successful outcome. In general though, surgical treatment for disc-associated CSM is successful, with approximately 80% (70% to 90%) of dogs improving after surgery. No surgical technique stands out as being clearly superior. Considering the success rate of surgical and medical treatments for CSM, surgery should always be considered in the treatment of dogs with CSM. Surgery, however, does not appear to alter the long-term survival of dogs with CSM. The survival time of 76 dogs with
CSM (33 dogs treated surgically and 43 dogs treated medically) has been reported. The median survival time of dogs with CSM was identical (36 months), regardless of whether the dog was treated medically or surgically.

References