The wobbler dog: a surgical dilemma

B. Meij
Yalelaan 108, 3508 TD, Utrecht, The Netherlands
Corresponding author: b.p.meij@uu.nl

The wobbler dog
Caudal cervical spondylomyelopathy (CCSM) causing wobbler syndrome is a condition of young dogs (1 year; Great Dane, Basset Hound) or middle age to older animals (6-8 years; Dobermann, Rottweiler). Anatomic abnormalities include stenosis of the cranial apertura of the cervical vertebral canal, vertebral body deformation, and asymmetry of the articular facets. Degenerative lesions include intervertebral disc degeneration (IVDD) and Hansen type II fibrinoid disc herniation (protrusion), ligamentous hypertrophy of the dorsal longitudinal ligament (ventral to the spinal cord) and the ligamentum flavum (dorsal to the spinal cord), and joint capsule proliferation. Wobbler syndrome (syndrome = the clinical description of a complex of signs) is characterized by posterior paresis and ataxia, proprioceptive deficits, forelimb lameness and mild cervical pain. The neurological deficits can eventually progress to the thoracic limbs and evolve into tetraparesis and tetraparalysis. The clinical signs in the wobbler dog can typically be a mix of upper motor neuron disease (spinal cord) and lower motor neuron disease (compression of nerve roots that contribute to the plexus brachialis). CCSM is usually a progressive disease that has a slow onset but neurological deficits may also progress acutely bringing the dog down.

Cervical radiography under sedation or anesthesia of the C4-T1 region may show spondylosis, vertebral body malformation, tapered cranial cervical apertura, endplate sclerosis and collapsed intervertebral disc space. Also cervical instability may already be evident on the neutral views but may be evoked by stress views (flexion, extension, and linear distraction and compression). The cervical instability shows the dynamic component of the disease: compression on the spinal cord worsens in extension and lessens in flexion. Myelography with stress views (Figure 1) visualizes the effect of the dynamic compression: instable vertebrae, ligament hypertrophy and disc protrusion contribute to a ventral and/or dorsal component in the spinal cord compression. Stress views are essential to provide the localization, and the static or dynamic nature of the spinal cord compression. With the availability of magnetic resonance imaging (MRI), MRI has replaced myelography but specifically with CCSM the dynamic component of the disease may be missed when (low field) MRI is only performed in a neutral position. Myelography followed by CT (myelo-CT), and CT and (high field) MRI scanning in different postures of the neck (flexion, extension) may also be very informative. In the Dobermann usually one junction is involved (C5-C6, C6-C7, or C7-T1) and in the Great Dane more vertebrae can be affected (C4-T1).

Since the wobbler dog is a clinical diagnosis the clinician should always be aware of the differential diagnosis. Discospondylitis (= infection of the IVD usually caused by Staphylococcus) or neoplasia (e.g. lymphoma of the vertebral body) in a Dobermann may resemble exactly the same wobbler dog as CCSM.

The surgical dilemma
In mild cases of wobbler syndrome medical treatment is the first strategy. Conservative treatment consists of a chest harness for life, body weight reduction when applicable, exercise regulation (omit exercises from the daily pattern that worsens the ataxia), animal physiotherapy (hydrotherapy or exercises for proprioception), and administration of non-steroidal anti-inflammatory drugs or corticosteroids. This will usually lead to some clinical improvement and may slow down the progression.

However, since the disease is progressive there may come a decision point to proceed for surgical treatment. The dilemma in surgery has several aspects. When a dynamic component has been diagnosed a surgical technique like ventral decompression that only deals with static compression may not be sufficient. In the case of a dynamic component, in addition to decompression, the cervical region needs also to be stabilized but here we have a paradox: the cervical region is a highly flexible region and surgical techniques to stabilize the instable cervical junction are prone to surgical failure. When spinal segments have been fixated and fused another problem arises in the so-called adjacent segment disease (‘domino effect’), stabilization of one junction may re-locate the stress to the next weak link in the chain. Another dilemma is the time point in the disease process to advise surgery: in many textbooks it says that the aim of surgery is to slow down or stabilize the neurological deficits but in that view it may be the best approach to stabilize early in the disease onset. The goals of surgical treatment are decompression, stability or both. The myelographic examination, myelo-CT, or MRI findings usually determine...
which surgical technique is chosen as the best treatment option.

Ventral decompression (‘ventral slot’) is indicated in static ventral compressive spinal cord lesions but these are rare in the true wobbler dog. Ventral distraction and stabilization is indicated in one or multiple dynamic ventral compressive spinal cord lesion(s), e.g. cervical instability, type II disc degeneration, and dorsal longitudinal ligamentous hypertrophy. Linear distraction of cervical vertebral bodies results in decompression at the site of the dynamic lesion and (temporary) fixation of the vertebral bodies allows fusion to take place which is promoted by cancellous or corticocancellous bone grafts harvested from the proximal humerus. Surgical techniques that have been performed in the past decade are: distraction with a cylindrical cortical allograft kept in place with a plastic Lubra plate, distraction with Steinmann pins or screws and fixation with a polymethyl methacrylate (PMMA) bridge, Harrington rod distraction device, screw and washer technique (Figure 2), and the modified distraction-stabilization technique using an interbody PMMA plug. Fusion or arthrodesis of the cervical vertebrae is promoted by packing cancellous bone around the affected cervical junction. Fusion of cervical vertebrae by the surgical techniques listed is usually by ventral spondylosis as interbody fusion is obstructed by metal implants or PMMA plugs. The ideal spinal fusion would be direct continuous bone bridging at the level of the vertebral bodies and techniques to stimulate this are now reported or under development. Cervical locking plates and interbody titanium cages or smart devices will probably offer a better way to treat cervical instability and promote fusion than the techniques reported in earlier days. Recently spinal cages have entered the veterinary field of spinal surgery. The titanium C-LOX cage is available in various sizes and these cages are fixated with 4 titanium screws. The cage can be filled with cancellous bone, a bone substitute, or BMP-2. However, the paradox between a highly flexible cervical spine and rigid implants remains a tension field.

Dorsal decompression (e.g., by continuous dorsal laminectomy) is indicated in static or dynamic dorsal compressive spinal cord lesions, e.g., osteophytes around articular facets or interarcuate (flaval) ligamentous hypertrophy.

At the Utrecht University 23 dogs (21 Dobermanns and 2 Great Danes) were surgically treated for CCSM. The surgical procedures included Lubra plate and cortical graft (2 dogs), Steinmann pins and PMMA bridge (3 dogs), Harrington rod distraction device (4 dogs), ventral decompression (‘ventral slot’, 3 dogs), dorsal (hemi)laminectomy (1 dog), and screw and washer (10 dogs). The Lubra plate and Harrington rod techniques had a high rate of surgical implant failure and the procedures were abandoned. The ventral decompression technique resulted in neurological worsening in 2 of 3 dogs. Clinical and neurological stabilization or improvement was seen with the Steinmann pin and PMMA technique (2 out of 3 dogs), the screw and washer technique (8 out of 10 dogs) and following dorsal laminectomy in a Great Dane. Complete surgical arthrodesis by spondylosis of the cervical vertebrae was observed only with the screw and washer technique. With long term follow up, the radiographic complications that were seen with screw and washer were migration of the washer in the endplates (so-called subsidence) and adjacent segment disease.
**Figure 1** Myelography in an 8-year-old Dobermann with caudal cervical spondylomyelopathy at C6-C7. Neutral (A), extension (B), flexion (C) views.

**Figure 2** Myelography in an 8-year-old Dobermann with caudal cervical spondylomyelopathy at C5-C6. Before (A) and after screw and washer fixation B).