Atlantoaxial Subluxation

What is atlantoaxial instability?

The first vertebrae in the spine (called the atlas) articulates with the second vertebrae in the spine (called the axis). Instability of these two vertebrae allows excessive flexion (downward bending) of the joint and causes compression and concussion of the spinal cord in the neck.

What causes atlantoaxial subluxation?

Atlantoaxial subluxation results from a ligament or bony abnormality between the atlas and axis. Several congenital and developmental abnormalities of the atlantoaxial joint cause instability of the vertebral column, which leads to atlantoaxial subluxation. These abnormalities include dysplasia (abnormal growth), hypoplasia (decreased growth) or aplasia (absent growth), dorsal angulation, separation of the dens, absence of the transverse ligament, block vertebrae or incomplete ossification of the atlas. Any abnormality of the dens can cause instability of the atlantoaxial joint.

Traumatic subluxation can also occur in any breed or age of dog. This results from trauma causing excessive flexion (downward bending) of the head, which can cause a fracture of the dens or axis, or tear the supporting ligaments.

Are there certain breeds at risk?

Small breeds of dog, such as Chihuahua’s, Miniature Poodles, Yorkshire Terriers, Pomeranians and Pekingese are most often affected by atlantoaxial subluxation. This is because the dens is prone to abnormal development in miniature breeds.

Atlantoaxial subluxation has also been reported in large breed dogs, but this is much less common.

What clinical signs will my dog have?

Neck pain is the most common sign associated with atlantoaxial subluxation. Associated neurological deficits depend on the degree of damage present in the spinal cord. Neurological deficits that may be seen can range from mild postural reactions to tetraplegia. Neurological deficits can be asymmetrical (worse on one side) and worse in the hind limbs compared to the fore limbs.

How is atlantoaxial subluxation diagnosed?

Atlantoaxial subluxation is strongly suspected on the basis of clinical signs, however diagnostic imaging is required to confirm the diagnosis.

Survey radiographs of the cervical spine can reveal an increased space between the atlas and axis, or malalignment of the two vertebrae. The presence and size of the dens can be seen on
radiographs. If no signs can be found on normal radiographs, the neck may be flexed carefully to check for instability; which is shown when this increases the space between the atlas and axis).

A myelogram (where radiographic contrast dye is injected around the spinal cord) can confirm spinal cord compression associated with atlantoaxial subluxation, however is rarely performed as it adds little benefit to plain radiographs.

CT and MRI can help with diagnosis and planning treatment options for individual patients. CT is more useful for assessing the conformation of the dens or fracture of the vertebrae. MRI can determine if the spinal cord has been damaged, which helps with advising owners of the prognosis.

How is atlantoaxial subluxation treated?

Conservative management: Conservative treatment may be useful in cases where atlantoaxial subluxation is due to ligament tears, and is used to stabilise the atlantoaxial joint whilst the ligaments are healing. Conservative treatment includes strict cage confinement for 6 weeks, pain relief and a rigid neck brace. The neck brace is placed on the neck, holding the neck in extension, from the jaw bone to the chest.

Non-surgical, or conservative, treatment is more likely to result in recurrent or worsening of clinical signs, and must be elected on a case-by-case basis.

Surgical management: The goal of surgery is to stabilise the atlantoaxial joint to prevent further spinal cord damage. Surgery should be considered in all dogs as it fuses the joint and prevents the chance of catastrophic recurrence.

There are two techniques to stabilise; dorsal and ventral approaches. A number of different procedures can be performed with each approach. Atlantoaxial wiring, nuchal ligament technique, dorsal cross pinning and an atlantoaxial tension band can be performed via the dorsal approach. Ventral approaches include transarticular lag screws or pins, pins and polymethylacrylate, or screws and polymethylacrylate to stabilise the atlantoaxial joint. The best approach is decided on a case-by-case basis in conjunction with diagnostic imaging obtained on your pet, and will be discussed with you at the time of electing to perform surgery. Ventral techniques have a lower complication rate compared to dorsal techniques.

What happens to my dog after surgery?

After surgical repair, post-operative radiographs will be obtained to confirm correct implant placement and alignment of the joint.

Immediately after surgery your pet will be recovered from anaesthetic peacefully, under the watchful eye of our trained nurses. Post-operative analgesia and intensive care will be provided in our designated recovery ward where your patient will be monitored and nursed by a dedicated team of nurses and vets. Your pets breathing will also be monitored closely to ensure that there are no problems.

In some cases, a neck splint will be applied after surgery to support the patient in the immediate post-operative period. This will be decided on a case-by-case basis.

The following day your pet will be reassessed by the surgeon and an initial physiotherapy assessment will be performed, with a physiotherapy programme being designed to cater individually for your pet. Physiotherapy plays a vital role in the recovery of animals, with inactivity resulting in decreased joint movement, stiffness, muscle weakness and contracture.
Strict cage restriction will be advised for up to 8 weeks after surgery. Post-operative radiographs will be performed at 6 weeks after surgery to ensure that the implants have remained secure. You will be advised that a collar should not be used when walking your pet, instead a harness is suitable to avoid pressure on the neck.

**When can my dog go home after surgery?**

The length of stay in hospital following atlantoaxial stabilisation varies from patient to patient and is determined by their comfort levels and their recovery following surgery. We ensure that your pet can urinate normally before being discharged.

At the time of discharge, you will also have an appointment with one of our physiotherapists where you will be taught how to perform the necessary physiotherapy techniques to ensure your pet continues to improve and that their muscles remain active and functional. At this time we also recommend you make additional appointments for out-patient physiotherapy and/or hydrotherapy through our very own in-house rehabilitation service at North Coast Veterinary Specialists and Referral Service.

**What is the prognosis?**

Patients with this condition who are managed conservatively have a much lower long-term success rate than those managed surgically. However, patients with more severe neurological deficits before surgery have a lower prognosis than patients with less severe clinical signs.

**What complications can occur?**

Complications are most commonly associated with conservative treatment and the use of a splint. These include recurrence of disease, corneal ulcers, migration of the splint, moist dermatitis, pressure sores, hyperthermia, respiratory compromise, anorexia, ear infections, and accumulation of food between the splint and the jaw.

Complications associated with surgical management include neurologic deterioration, respiratory compromise, implant failure, fracture of the vertebrae, and recurrent pain.