SOUTHEAST VETERINARY NEUROLOGY

Spinal Malformations:
Spina Bifida and Hemivertebrae

Spinal malformations are congenital conditions that affect the development of the spine in dogs and cats. Two notable spinal malformations in pets are spina bifida and hemivertebrae.

Spina bifida occurs when the neural tube, which eventually forms the brain and spinal cord, fails to close completely during embryonic development. This results in incomplete formation of the spinal column, the bones that typically encase the spinal cord. In serious cases, the spinal cord or its surrounding tissues may be exposed, leading to neurological problems.

Hemivertebrae occur when two or more vertebrae fuse and develop with an irregular, wedge-like shape instead of their normal cylindrical forms. This disrupts the spine's alignment and can cause it to twist, potentially leading to spinal cord compression.

Breeds at Risk

Spina bifida is relatively rare in pets but occurs more frequently in specific breeds, especially the English bulldog and Manx cat:

- English bulldogs
- French bulldogs
- Pugs
- Boston terriers
- Manx cats

Hemivertebrae are particularly common in these same dog breeds, bred for their distinctive "screw tails," especially the French bulldog.

The screw tail itself is actually caused by hemivertebrae in the tail region, which is harmless because the spinal cord does not extend into the tail. However, breeding for this trait has inadvertently increased the likelihood of hemivertebrae appearing in other parts of the spine, which can result in spinal cord compression.

Signs

Spina bifida is classified into two main forms. *Spina bifida occulta* is a mild form involving only the bones. It often causes no symptoms and is discovered incidentally during X-rays. *Spina bifida manifesta* is a more serious form that impacts the spinal cord or surrounding tissues, causing neurological symptoms. Common signs of spina bifida include:

- Abnormal movement in the hind limbs
- Difficulty controlling urination and bowel movements
- Potential leakage of cerebrospinal fluid, which is essential for spinal cord health
- Tethered cord syndrome, where the spinal cord abnormally attaches to the spine and restricts normal growth

Much like spina bifida occulta, many pets with **hemivertebrae** show no symptoms, and the condition is often discovered incidentally on X-rays.

However, when the spinal cord is affected, pets may exhibit the following signs:

- Weakness or unsteadiness in the hind legs
- Difficulty controlling urination and bowel movements

The symptoms of hemivertebrae typically stabilize by around nine months of age, when the vertebrae finish growing. However, pets with hemivertebrae often have other spinal abnormalities that require investigation.

Causes

Spina bifida is believed to result from a combination of factors, including:

- Genetic predisposition
- Nutritional deficiencies during pregnancy
- Maternal exposure to toxins during pregnancy
- Selective breeding or inbreeding

The primary cause of **hemivertebrae** is selective breeding for physical traits, such as screw tails. While these malformations in the tail are harmless, their presence in other spinal regions can cause serious neurological issues.

Diagnosis

Spina bifida and **hemivertebrae** are both diagnosed from a combination of imaging techniques:

- X-rays can identify vertebral abnormalities
- MRI or CT can assess the spinal cord and surrounding tissues

However, it is important to elaborate that finding hemivertebrae on an X-ray in an adult dog should not be assumed to be the cause of any symptoms. Hemivertebrae symptoms are rare and tend to stabilize before adulthood, but pets with hemivertebrae do tend to have other spinal problems. It is almost always a disc or other spinal abnormality causing clinical signs. That's why MRI is so important. It will either uncover or rule out other possible causes.

Treatment

Treatment for both conditions depends on the severity of each case.

In **spina bifida**, mild cases do not typically require treatment, and can be managed with supportive care alone if necessary. Moderate cases might benefit from reconstructive surgery, medications to manage pain and incontinence, and physical rehabilitation. Severe cases, unfortunately, are often considered untreatable. Euthanasia may be recommended to prevent suffering due to significant pain, inability to control bodily functions, or paralysis.

In **hemivertebrae**, pets with minor symptoms may only require monitoring, rest, or corticosteroid treatments during flare-ups to reduce inflammation. For pets experiencing significant spinal cord compression or instability, surgery may be necessary to stabilize the affected area and alleviate pressure on the spinal cord.

Prognosis

No two cases of **spina bifida** are exactly alike, with symptoms and severity varying widely. Some animals may lead relatively normal lives with minimal intervention, while others may face significant neurological challenges or, in some cases, compassionate end-of-life decisions. The prognosis depends entirely on the individual case.

The prognosis for pets with **hemivertebrae** depends on the location, severity, and whether or not it is causing clinical symptoms. Although most cases are harmless and found incidentally, others can lead to complications. In these cases, the outcome depends on the extent and duration of neurological damage before treatment. However, in most cases, hemivertebrae do not seriously impact a pet's life expectancy or quality of life, especially when managed promptly and appropriately.