KEEPING IT HIP: LTV IN CANINES

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Mike Guilliard examines common problems and solutions to lumbosacral transitional vertebrae in the dog

THE vertebral canal is anatomically divided into five sections dependent on the morphology of the vertebrae: cervical, thoracic, lumbar, sacral and caudal.

A vertebra found at the junction of two of these divisions that takes on the morphological characteristics of both is referred to as a transitional vertebra.

These have been reported to occur at every junction, but are most commonly found at the thoracolumbar junction, where the first lumbar vertebra may develop one or two vestigial ribs, or at the lumbosacral junction. The main clinical significance is that by altering the biomechanics of the spine, degenerative changes develop that can lead to vertebral canal stenosis.

A study of the radiographs of 4,000 medium to large breed dogs, routinely screened for hip dysplasia, found a 3.5 per cent incidence of lumbosacral transitional vertebrae (LTV). There was a higher prevalence in the German shepherd dog and greater Swiss mountain dog than in the other breeds, suggesting a genetic predisposition (Damur-Djuric et al, 2005).

A review of pelvic radiographs submitted to the Orthopedic Foundation for Animals (OFA) for hip scoring with 24,463 evaluations showed an incidence of 2.25 per cent, and, of the 57 affected breeds, the prevalent breeds were the German shepherd dog, Brittany spaniel, Rhodesian ridgeback and Dobermann pinscher (Larsen, 1977). The high incidence in the German shepherd dog is noted in other publications (Morgan et al, 1993; Morgan J P, 1998; Fluckiger et al, 2005).

Morphology and classification

On the lateral view of the pelvis, a radiolucent disc space between the first and second sacral vertebrae may be present. However, the main abnormalities are identified on the ventrodorsal radiographic view with abnormalities in the transverse processes of the LTV and in the sacroiliac attachments ([Figures 1] to [3]).

The transverse processes of the first sacral vertebra have been classified into lumbar ([Figures 2] and [3]), intermediate ([Figure 1]) and sacral types and these processes can be symmetric or asymmetric. There is a similar frequency of occurrence between the two types of symmetry.

Highly asymmetric LTV are often angled relative to the adjacent vertebra, and the point of contact of the pelvis with the LTV is often cranial or caudal to the normal position (Damur-Djuric et al, 2005). This results in pelvic rotation with one hemipelvis being more cranial to the contralateral.

Clinical significance

LTV can predispose to lumbosacral vertebral canal stenosis, with a resultant cauda equina syndrome (CES) and to unilateral hip dysplasia. In a study of 92 dogs with CES, 16.3 per cent had a LTV with the lesion occurring between the last lumbar vertebra and the LTV.

Dogs with an LTV were eight times more likely to develop CES than dogs with a normal sacrum. In addition, the German shepherd dog was eight times more likely to develop CES compared with other breeds (Fluckiger et al, 2005). This is partly due to the increased incidence of LTV within this breed (Morgan et al, 1993).

Unilateral hip dysplasia is occasionally seen during routine screening and can be the result of pelvic tilt from an LTV (Larsen, 1977) giving less coverage of the head of the femur by the dorsal acetabulum. The decreased capture of the femoral head allows a dorsal subluxation during weight bearing, with subsequent osteoarthritis in that hip joint ([Figure 1]).

Poor positioning

Asymmetric LTV can present a frustrating problem for the radiologist attempting to get a good hip-extended view, due to the pelvic deformity.

A clue to the possibility of the dog having an LTV is the inability to achieve uniformity of limb length where one foot lies one or two centimetres forward of the other when positioned on the x-ray table.

Poor positioning is a common problem when taking radiographs for hip dysplasia schemes and the fault can rarely be blamed on an LTV.

Pelvic tilt will affect the hip scores by improving the degree of subluxation in one hip and making it decidedly worse in the other. If the degree of tilt is mild then the overall score (both hip scores added together) will be accurate.

A more dangerous interpretation is the false assumption that the hip is the seat of lameness due to its apparent subluxation. The radiographer should be able to assess the radiograph for positioning faults and, if present, correct them on subsequent exposures.

Pelvic symmetry is assessed by comparing:

• the obturator foramina;

• the pubic bones; and

• the width of the body and wings of the ilium.

Body tilt will cause asymmetry of the lumbar facet joints and transverse processes as well as the pelvis. Correction of tilt is by determining its direction.

The author’s preference is to look and compare the dorsal acetabular coverage of the femoral heads. If the pelvis is symmetrical then any difference in coverage is genuine. To correct the tilt, the hip containing the femoral head with the most coverage is rotated dorsally towards the midline together with the trunk if necessary.

The other common positioning fault is lateral bending of the pelvis with the lumbar spine, which will also give a degree of twisting. The classic sign of this is an apparent craniocaudal asymmetry with one hemipelvis appearing to lie more cranial than the contralateral. In addition, one foot will extend beyond the other as seen with an LTV.

This fault can be avoided by checking the dog lies parallel to the x-ray table. The author ensures the cradle is parallel to the edge of the table and is centred by measuring the distance from its lateral margins to the table edge. Likewise, the greater trochanters and feet are positioned centrally by measurement. Visual assessment is difficult with hairy dogs.

Manual correction of the pelvic asymmetry is possible, as with pelvic tilt, but the femurs will be angled to the body ([Figure 4]). It is more desirable to completely reposition.

Genetic factors

Most published papers allude to the likelihood that LTV has a genetic aetiology.

This is further supported by the high incidence of LTV in a closed wolf colony that originated from only three individuals (Raikkonen et al, 2006).

Diagnosis of asymmetric LTV is relatively simple on the hip-extended radiographic view and it would be a simple matter to incorporate it into BVA/Kennel Club hip dysplasia schemes. However, representations made to both bodies has produced no results and it is perhaps time for them to reconsider their decision.

References

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