

Basis for LTV grading (lumbosacral transitional vertebra)

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Normally dogs have 7 lumbar vertebrae (L1-L7) and a sacrum consisting of three fused vertebrae (S1-S3) (Fig 1A and B). The fused dorsal processes of the sacrum are called a median crest.

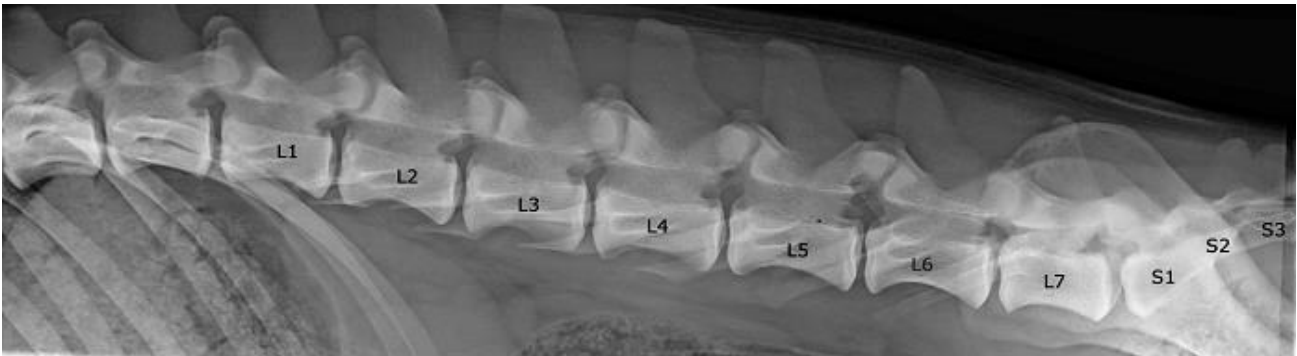


Figure 1A: Lateral image of the lumbar spine (L1-L7) and sacrum (S1-S3).



Figure 1B: Ventral image of the sacrum. The median crest is seen as a continuous line (arrows).

LTV1 (divided median crest) (Figure 2A) is the mildest form of LTV, where a depression is seen in the median crest between the first and second vertebrae (Figure 2 B). The body of the sacrum is always normally fused.

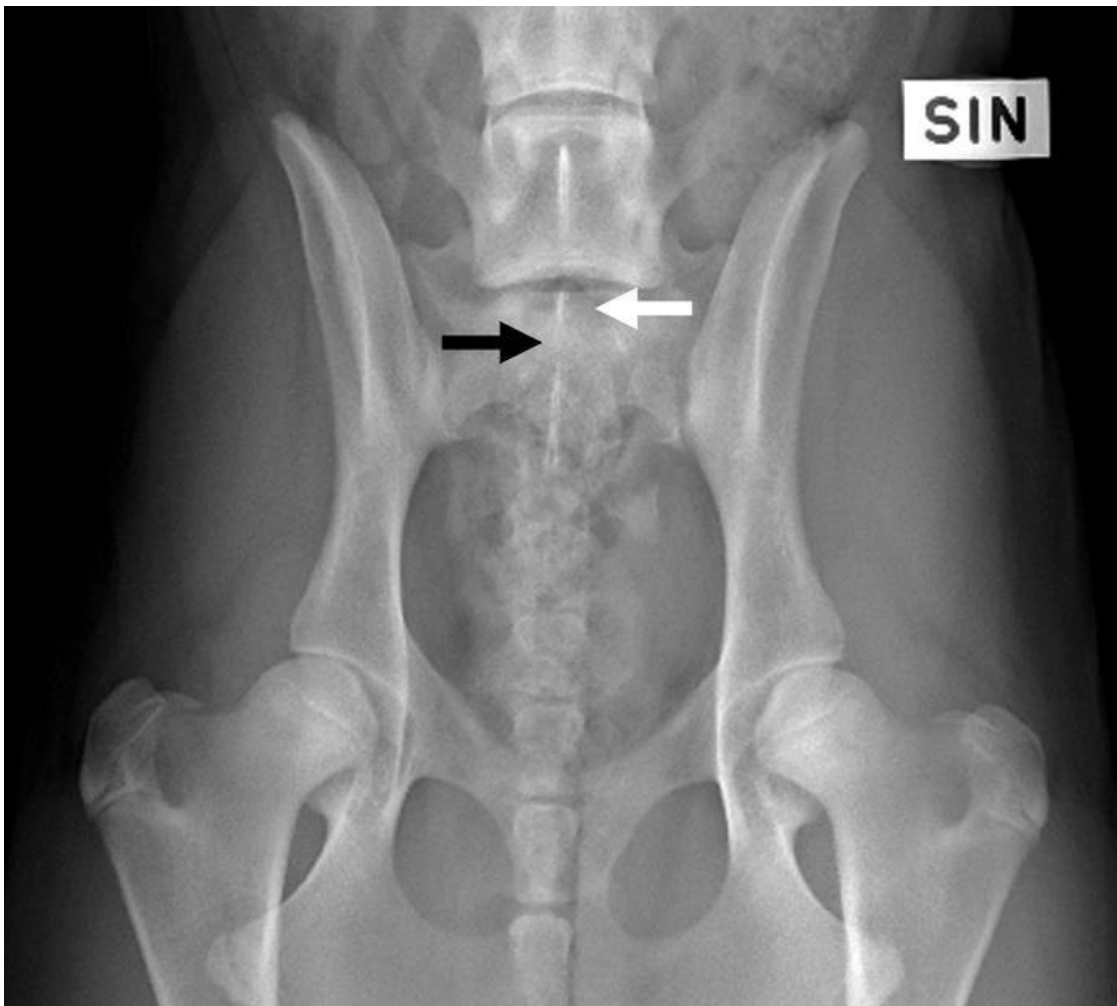


Figure 2A: A depression in the median crest between S1 and S2 (LTV1) is seen in radiographs as a separation (black arrow) of the spinous processes of S1 and S2. The spinous process of the S1 is marked with a white arrow.



Figure 2 B: CT image of the sacrum. A depression between spinous processes between S1 and S2 (arrow) is seen.

LTV2 is a symmetrical type of LTV, as changes are similar on the right and left side. The vertebra can resemble more a lumbar vertebra (Figure 3A) or a sacral vertebra. In the body of a vertebral space is usually visible (Figure 3B).

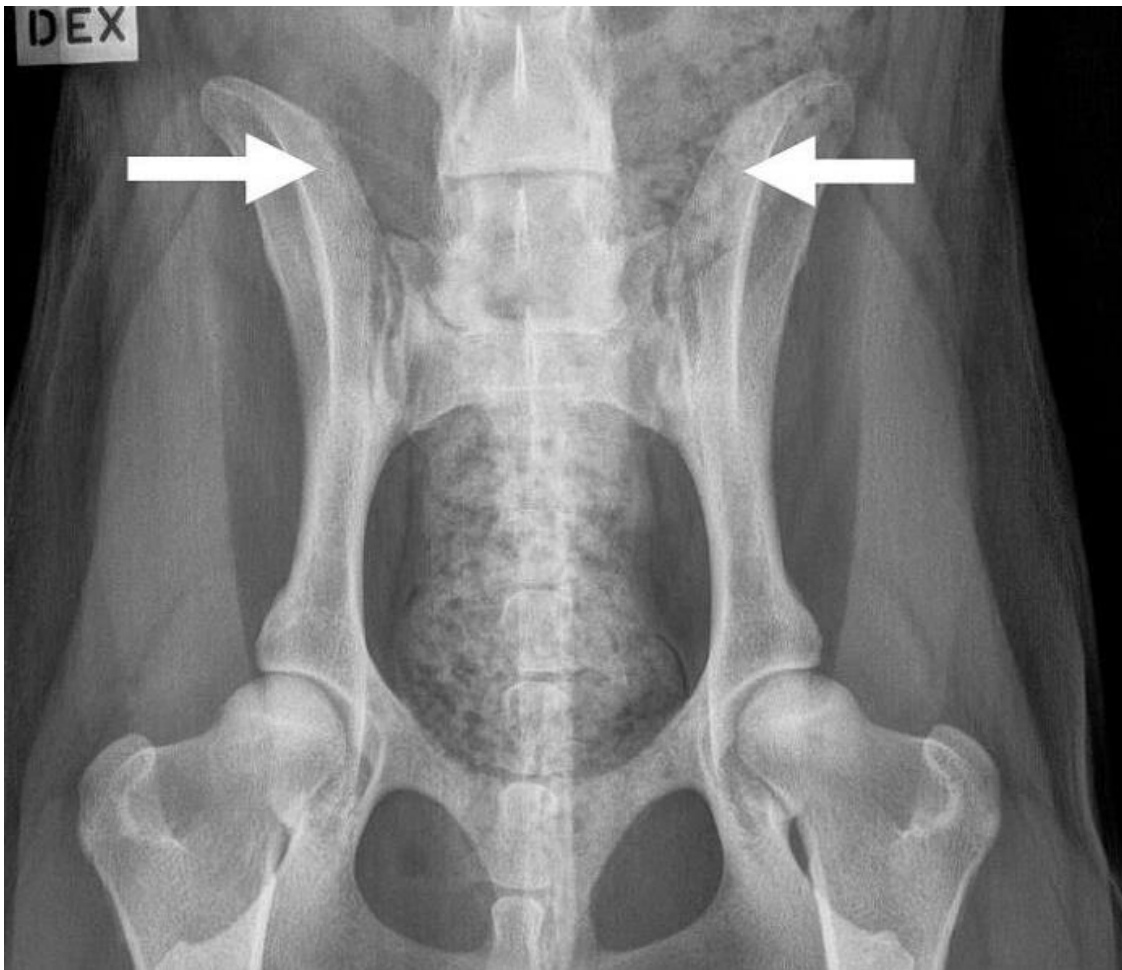


Figure 3A: A symmetrical LTV. In this example the last lumbar vertebra (L7) (arrows) is short and located more caudally than normally, the transverse processes are pointing more laterally than in a normal vertebra .



Figure 3B: A lateral image of a LTV. There is a narrow space between first two sacral vertebrae. From the lateral image, it is not possible to know if this is symmetrical or non-symmetrical LTV.

LTV3 is a non-symmetrical type, where right and left side differ in shape. One side resembles lumbar vertebra and the other sacral vertebra (Figure 4). The body of the sacrum is usually abnormally fused, and a space between sacral vertebrae is visible (Figure 3B).

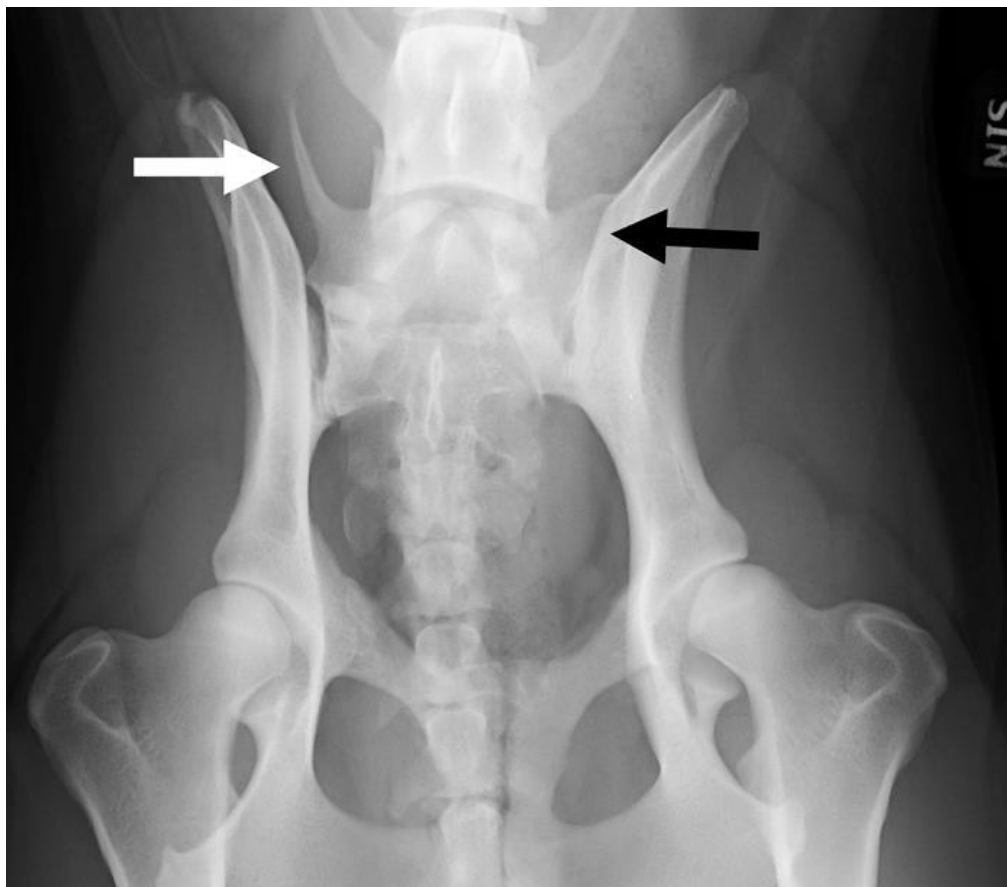


Figure 4: Non-symmetrical LTV (LTV3). The right side of the last lumbar vertebra resembles lumbar vertebra (right arrow) and the left side resembles sacral vertebra (black arrow).

LTV4 is conformationally the most severe type of LTV, where the shape of the of the S1 is similar to normal lumbar vertebra (lumbarization, L8) (Figure 5A) or L7 is totally fused to the sacrum (sacralization, L6) (Figure 5B).



Figure 5 A: LTV4, where S1 resembles lumbar vertebra (L8). A ventrodorsal image is needed to confirm the diagnosis.



Figure 5 B: LTV4, where the last lumbar vertebra (L7) resembles sacrum. The last normal vertebra is L6 (arrow). A ventrodorsal image is needed to confirm the diagnosis.

The clinical significance of LTV

LTV1: No clinical significance according to the present knowledge,

LTV2–LTV4: Changes can predispose the area to degeneration and cauda equina syndrome. Breed specific differences exist, and dogs are often asymptomatic. LTV3 can be associated with congenital asymmetry of the pelvis and unilateral hip dysplasia.