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Radiological Interpretation of Bones

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Radiological interpretation of the bones of the young, growing small animal can pose a problem to the veterinarian. Epiphyseal lines and subsidiary centers of ossification may confuse the veterinarian into misdiagnosing a fracture or joint abnormality in a normal animal.

The epiphyses of long bones are normally cartilaginous at birth and cannot be visualized radiographically. Progressive ossification occurs during the first few months of life, making the epiphyses visible on the radiograph usually by three months of age. The epiphyseal line appears as a narrow radiolucent line which extends completely across the bone in the young, growing animal, and may be mistaken for a fracture line. Cancellous bone is formed at the epiphyseal line during the growth period, therefore, the epiphyseal edge of the metaphysis will appear wider in the young animal than in the adult. The extreme edge of the metaphysis will be poorly visible radiographically since remodelling and reshaping of bone also occurs during the growth period.

The carpal bones, tarsal bones, and the epiphyses of long bones are cartilaginous at birth in the dog and cat, and therefore, are not radiographically visible. As ossification centers develop they will usually become visible on the radiograph by the time the animal is three months old.6

Many studies have been performed to determine the age and sequence in which epiphyseal closure occurs in the dog.1,6 The age at which closure occurs can vary by several months between breeds or even littermates. However, there is a definite sequence in the order in which specific epiphyses fuse.

Sequence of epiphyseal closure in the dog6 is:

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The ileum, pubis, and ischium of the pelvis are visible radiographically at birth, but fusion of these bones may not occur until 13 months of age or older.  

The important things to remember are that all epiphyses are usually closed between 10 to 14 months of age, and that the epiphysis of the proximal humerus is the last of the long bone epiphyses to close. The veterinarian should be aware of subsidiary centers of ossification, such as the greater and lesser trochanters of the femur, tibial tuberosity and medial malleolus, and the deltoid and lateral tuberosities and medial epicondyle of the humerus, as these may fuse at different times than the epiphyses and may also be mistaken for fracture lines.

A basic knowledge of the development and ossification of bone is important in the radiological diagnosis of fractures and congenital joint abnormalities in the young, growing small animal. During the first few weeks of life it is difficult to prove the existence of a pathological bone or joint condition. When such a condition is suspected in a dog or cat less than one year of age, a radiograph of the contralateral limb is always indicated for comparison.

**Bibliography**