Dyschondroplasia in a Dog

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Dyschondroplasia is a poorly defined disturbance in skeletal growth and development [2]. It is also known as skeletal enchondromatosis or Ollier's disease in man [2, 3] and as multiple cartilaginous exostosis or enchondrosis in animals [4]. In chickens, on the other hand, tibial dyschondroplasia is well known [1]. The present authors encountered a dog affected with a disease which was regarded as the category of dyschondroplasia. This paper describes the pathology.

A male 8-month-old boxer was used for this report. He was born as one of a litter of 4 mates in July, 1972 in Kagoshima Prefecture. From February, 1973, the lower half of the chest of both sides began to become hollow, showing a wrinkled face. Since then, the dog has been emaciated. In March of the same year he exhibited slight degree of bowleg (genu varum) and slight disturbance in the gait, so that euthanasia was given. Furthermore, no abnormality was observed in the others of the same litter.

Gross lesion: A deformity of the chest due to the following abnormality of all the ribs was first noted. About one-third of each rib was rib bone and one-fourth of it costal cartilage. In addition, the angles of the ribs curved markedly and all the costochondral junctions became hollow into the thoracic cavity. In the distal rib bones there was slight enlargement rich in spongy bone-trabeculae, and not observed the cortical bone. These gross lesions were also supported by radiographic examination (Fig. 1). The sternum was small in size, the whole area of which consisted only of the same cartilage as in cartilago xiphoides. Furthermore, two abnormal cartilaginous masses, which were an azuki bean in size and irregular in shape, were observed in the metaphysis of the right proximal femur.

Histology: The following bones were examined after electric decalcification and celloidin embedding: cranium, mandibula, thoracic vertebra, rib, sternum, humerus, pubis, femur and tibia. An abnormal development of cartilage was present in the ribs of both sides, the sternum, right proximal femur and tibia, and thoracic vertebra. The lesion was severest in the costal cartilages and sternum as recognized grossly. Several cartilaginous masses which were well-defined from the surrounding tissue were scattered in the medullary cavities of the rib bones and thoracic vertebrae (Fig. 3). The same masses in the femur were connected with

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the epiphyseal plate which was irregular in shape and increased slightly in width. In the tibia the abnormal cartilage proliferated like a bridge between the epiphyseal plate and the articular cartilage.

The abnormal cartilage mentioned above consisted of hyaline cartilage and showed essentially almost the same histologic structure. There were some variations between the number of the chondrocytes and the quantity of the intercellular substance. The chondrocytes themselves varied considerably in size and shape; they were small and spindle-shaped (Fig. 4), medium-sized and round or oval (Figs. 2 and 3), and large hypertrophied spherical ones (Fig. 5). Most of these cells resided in lacunae, and sometimes several chondrocytes were present in a single lucuna constituting a cell nest (Fig. 3). In addition, in some areas of the costal cartilages there were calcification from the cartilage capsules of the hypertrophied large cells to their adjacent intercellular substance and ossification in perivascular tissues (Fig. 5). Almost the same picture as seen in normal epiphyseal plate was observed in the costochondral junctions, with slight enchondral ossification (Fig. 2). Sometimes the epiphyseal plate was irregular in shape, from which comparatively large cartilaginous masses were protruded into the shaft of the rib bones (Fig. 4), extending over the periosteum. There was proliferation of osteoblasts in the periosteum of the distal rib bones. Slight enchondral ossification was also proceeding in other epiphyseal plates and some boundary-lines of the abnormal cartilaginous masses. No significant lesions were present in the visceral organs including the parathyroid gland.

In brief, the abnormal development of hyaline cartilage was the main lesion in the present case. The abnormal cartilage developed principally by interstitial growth, frequently connected with the epiphyseal plates. In addition, the histologic findings of it were dysplastic. Therefore, it is thought that the condition of this dog had better be diagnosed as dyschondroplasia. Any disease quite identical with the present case could not be found in literature. Skeletal enchondromatosis (Ollier’s disease) in man [2, 3], and multiple cartilaginous enchondrosis in animals [4] within the category of dyschondroplasia may provide valuable references for diagnosis of the present case. However, there were some discrepancies between such disorders and the present case. Furthermore, the etiology of the condition described here was not clarified.

References

Explanation of Figures

Fig. 1. Roentgenograph of right sixth rib by soft X-ray. About one-third of it (leftward) is rib bone showing a marked curvature, and the other is costal cartilage (arrow indicates the sternum). In the latter radiolucent area is cartilage and relatively radiopaque mottled foci are due to calcification and/or ossification.

Fig. 2. Longitudinal section through left seventh costochondral junction. There is seen epiphyseal plate showing slight endochondral ossification. Hematoxylin and eosin (H-E) stain, ×47.

Fig. 3. Cross section of sixth thoracic vertebra. An abnormal cartilaginous mass is present in the medullary cavity. H-E stain, ×47.

Fig. 4. Longitudinal section through right ninth rib bone. An extensive abnormal cartilage develops in the medullary cavity. The cortical bone is not involved. H-E stain, ×47.

Fig. 5. Left sixth costal cartilage. There are perivascular ossification (arrow) and calcification in the cartilage. H-E stain, ×169.