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Distal ulnar retained cartilage (RC) and coexisting hypertrophic osteodystrophy (HOD) in the dog

Przetrwała chrząstka (PC) w przynasadach dalszych kości łokciowych
i współistniejąca przerostowa osteodystrofia (POD) u psów

K e y w o r d s: retained cartilage, hypertrophic osteodystrophy, dogs.
S ł o w a k l u c z o w e: przetrwała chrząstka, przerostowa osteodystrofia, psy.

INTRODUCTION

Osteochondrosis (OC), also known as dyschondroplasia is a form of disturbance of cellular differentiation in the growing cartilage (13) or, the failure of cartilage to convert into bone (5). These explanations of the OC entity are also described as disturbance of endochondral ossification (9, 11). A number of experiments performed in different breeds of animals have demonstrated that OC is a multifactorial disease with the genetic and nutritional influences (9). The deficiency of Cu and excess of Zn are also known as important factors in the etiology of experimental (1) and clinical forms of OC in the domestic animals (11). Based on the experimental study performed on young Great Dane, some essential information has been added to the knowledge concerning OC (3). The results and the conclusions of this experiment have eventually proved that rapid growth and excessive dense diet rich in Ca/P evoke in Great Dane the symptoms of hypertrophic osteodystrophy (HOD), and later on osteochondrosis – OC (retained cartilage – RC, and wobbler syndrome). According to H e d h a m m a r at al. (3), hypercalcitoninism is the pathogenetic track for the explanation of bone pathology. Similarly, in the clinical cases of HOD encountered in puppies of the large and giant breeds, bone changes are located in the metaphyses of the long bones in the areas of active endochondral osteogenesis (7). Their presence in growing bones give similar clinical consequences expressed by growth retardation and angular limb deformity.

MATERIAL AND METHODS

20 young lame dogs of both sexes, both large and giant breeds, suspected of HOD or RC were examined radiographically. Distal ends of the radius and ulna were of special interest. Craniolateromedial radiograph of both thoracic legs – on one X-ray film – was taken. In the radiographic procedure the fullwave X-ray unit and a cassette equipped with rare earth intensifying screens (Currix C_2 Agfa) were used. A few dogs were radiographed during treatment and after the relapses of the disease (radiographic monitoring). The radiographs were scanned (Agfa scanner) and underwent computer processing.

RESULTS

All the dogs examined radiographically belonged to the large breeds of dogs. The names of the breeds and the number of dogs were listed in Table 1. There were 16 males and 4 females. 5 breeds (Table 1:2, 4, 5, 6, 7) were represented only by male dogs.

Table 1. Breeds and no. of dogs affected (n = 20)

No.	Breed	Sex		♂ : ♀
		♂	♀	
1.	Great Dane	7	3	2,3 : 1
2.	German shepherd	4	-	
3.	Caucasian sheepdog	1	1	1: 1
4.	Saint bernard	1	-	
5.	Gordon setter	1	-	
6.	Doberman	1	-	
7.	Irish wolfhound	1	-	
	Total	16	4	4 : 1

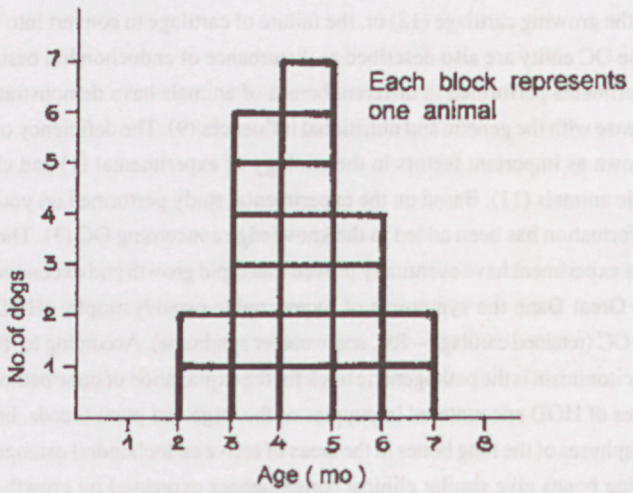

Fig. 1. HOG, RC incidence and dog's age (n = 20)

Fig. 2. 4-mo.-old male Great Dane presented with a history of lameness and swelling of both distal metaphyses (ulna and radius) of the front legs. The Radiograph revealed RC in the ulna (<) and cortical bone defects (←) in both antebrachial bones. RC and HOD was diagnosed

Fig. 3. 6-mo.-old male Irish wolfhound was admitted to the Radiology Dept. with bilateral swelling of the distal metaphyses, both radius and ulna. Radiographically RC (<) and the cortical bone defects were found. HOD and RC were diagnosed

Radiographic examination of the distal ulna and radius revealed in the ulnar metaphyses retained endochondral cartilage as a bilateral process, whose wedges-hape appearance reminds of similar ones described in literature (7, 2). Besides, numerous defects in the metaphyseal cortical bone were found in each dog (Figs. 2, 3, 4, 5, 6). Morever, irregular in shape defects of the trabecular bone, accompanied the above mentioned symptoms (Figs. 5, 6). The majority of dogs demonstrated clinical and radiographic growth retardation (angular limb deformity), bone remodelling and zonal bone atrophy in the shaft and the metaphysis of the radius (Figs. 5, 6). In some female Great Dane besides RC the abundant thickening of distal metaphyses has been found in both thoracic limbs (Fig. 6). Their follow-up radiograph taken after 45 days (Fig. 6) revealed periosteal reaction similar to the one described in dogs, which suffered from HOD (2, 7, 8). The incidence of RC and HOD relative to age in the breeds of dogs listed in Table 1 demonstrates that 4-, 5- and 6-month-old dogs are particularly prone to both diseases.

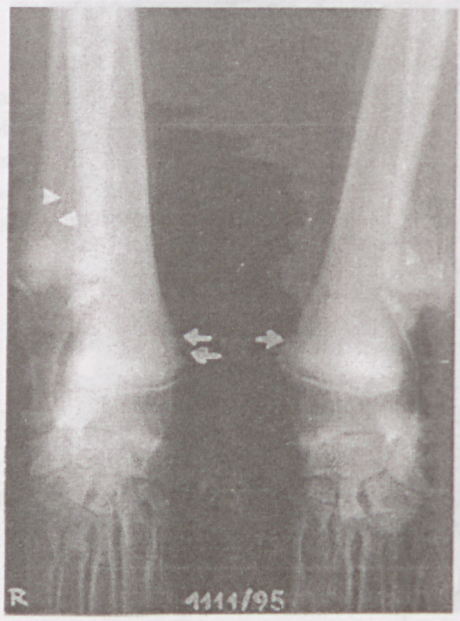

Fig. 4. 6-mo.-old male Great Dane. Clinical and radiographic characteristics were similar to the data presented in Figure 3.

Fig. 5. 6-mo.-old male Great Dane admitted to the Radiology Department with severe lameness and angular limb deformity (both thoracic limbs). Bilateral RC in the distal ulna (<) and metaphyseal cortical defects (←) in the antebrachial bones were revealed radiographically. Additionally growth retardation in both distal ulnae was visualized. Besides, zonal bone atrophy in the shaft of the radius and focal trabecular defects in its metaphyses (secondary spongiosa) were found

DISCUSSION

Retrospective study based on radiographic examinations have the exceptional value for collecting new data concerning clinical pathology (10). This statement refers especially to the skeletal diseases encountered in large and giant breed dogs during their skeletal maturition. Rapidly growing dogs are more susceptible to many types of skeletal diseases (8). Probably that was the reason why M o r g a n (9) has introduced to the terminology of clinical pathology a term: "developmental skeletal diseases". According to his opinion some of them may be genetic in nature or related to diet. HOD and RC are the examples of the diseases of this kind. Their

Fig. 6.1. 5-mo.-old female Great Dane was admitted with forleg lameness and reluctance to move. The radiograph revealed RC in the distal ulna (bilaterally) and irregular horizontal "band" located in the primary spongiosa (black arrowheads)

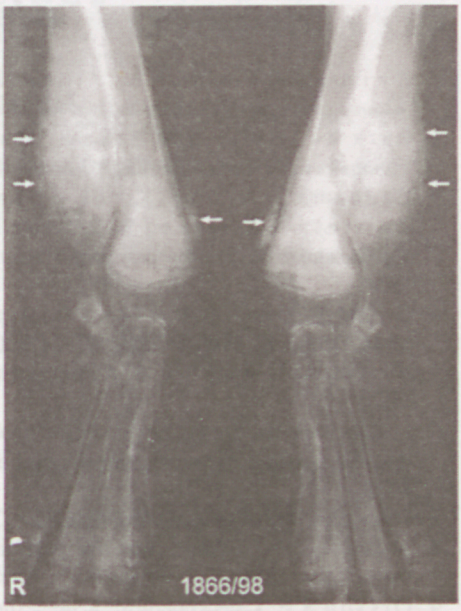

Fig. 6.2. The same dog (Fig. 6.1.) 45 days' follow-up radiograph revealed abundant periosteal reaction in the distal ulna and radius which confirmed earlier diagnosis of HOD (white arrows)

etiology was partly explained by H e d h a m m a r (3). High caloric dense diet with excess of Ca/P evoke in young weaning Great Danes first the symptoms of HOD, and later on OC. Our findings fully confirmed the concurrent occurrence of these diseases in large breed dogs, especially in males of Great Danes. The number of these dogs in our material amounts to 50% of dogs collected. The majority of patients were male dogs (4:1 – Table 1). Retained cartilage in Hedhammar's investigation has its expression located in secondary spongiosa as a "retention of chondroid core" (3). The correct interpretation of the cortical bone leasions and RC in dogs collected in our study is represented by all the Figures (2-6). Periosteal new bone formation in our material (Fig. 6.2) represents the fully developed radiographic symptoms of HOD. The additional confirmation for HOD presence was the incidence of HOD related to age (Fig. 1). The similar dependence was noticed in our earlier publication (4).

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STRESZCZENIE

Na podstawie badań klinicznych i radiograficznych u 20 psów ras dużych i olbrzymich obarczonych kulawizną stwierdzono w układzie szkieletowym przerostową osteodystrofię (POD), a w przynasadach dalszych kości łokciowych przetrwałą chrząstkę (PC).

Obydwie choroby występowały najczęściej u dogów i owczarków niemieckich. Wśród chorych psów było 16 samców i 4 suki (4:1). Wiekiem szczególnego ryzyka był okres między 4,5 a 6 miesiącem życia.

Przeprowadzone badania oparte na przypadkach klinicznych POD i PC występujących jednocześnie u psów opisanych ras przypominają podobne obserwacje poczynione u psów dogów w warunkach eksperymentalnych (3).