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Scientific Report

Radiographic findings of hypertrophic osteodystrophy in a mongrel puppy

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Summary

A three-month-old male native puppy with lameness, metaphyseal swelling, pain, depression, inappetence and variable pyrexia was diagnosed as having hypertrophic osteodystrophy (HOD) based on radiologic examination. The hemogram and biochemical profiles were within normal limits. Radiologic examination revealed a radiolucent zone in the metaphyses and a radiopaque band near the physes of the appendicular long bones. Periosteal new bone formation was seen around of the distal metaphyses of the radii, ulnae and tibiae. Currently, there is no specific treatment for HOD. The condition of puppy was improved following restriction of activity, confinement to small well-padded area, administration of high-quality diet and anti-inflammatory drug (aspirin, 10 mg/kg PO q12h for two weeks). To the best of our knowledge, it is the first report of HOD in mongrel puppies in Iran.

Key words: Hypertrophic osteodystrophy, Dog, Puppy, Bone

Introduction

Hypertrophic osteodystrophy (HOD) is a systemic illness that usually affects large and giant breed dogs that are aged between two and eight months (Konde, 2002). While the cause of HOD remains unclear, it appeared to be related to over-nutrition and perhaps, a concurrent deficiency of vitamin C (Muir *et al*., 1996; Johnson and Qarston, 2005). Attempts to identify a causative infectious agent or to transmit the disease had not been successful yet (Lenehan and Fetter, 1985; Malik *et al*., 1995; Johnson and Qarston, 2005). However, the canine distemper virus has been detected within osteocytes of dogs with HOD (Grondalen, 1976; Alexander, 1978; Lenehan and Fetter, 1985; Malik *et al*., 1995). To the best of our knowledge, it is the first report of HOD in mongrel puppies in Iran.

Case History

A three-month-old male mongrel puppy weighing nine kg was referred to the Small Animal Clinic of the Veterinary Faculty of Tehran University in spring of 1998. The owner believed that the pup was lame due to a bone fracture. The affected pup developed swelling and pain in the metaphyses of the long bones, accompanied by depression, inappetence and variable pyrexia (rectal temperature: 39.7°C). There was no history of vaccinations or medications. It was fed with cooked chicken's heads and legs and food leftovers. Palpation of the affected metaphyses of long bones showed pain and swelling. Vital signs were normal. There were no abnormalities in the hematologic and biochemical profiles. The pup was referred to radiology center for further evaluation of the limbs.

Results

At first, the distal parts of the right fore- and hind-limbs were radiographed in mediolateral and craniocaudal views. Upon recognition of radiologic signs of HOD

based on Burk and Feeney (2003) and Konde (2002), the rest of the long bones were radiographed in both common standard views, as well (Figs. 1-4). An increased radiopacity (sclerotic band) in the metaphyseal part of all long bones was observed parallel and adjacent to the physes. A thin irregular radiolucent line close to physes was the most important sign for the diagnosis of HOD (Figs. 1-4). Periosteal new bone formation was seen around the metaphyses of the radii, ulnae of the fore-limbs and tibiae of the hind-limbs (Figs. 1 and 2). The epiphyses and growth plates were normal in size and radiopacity. HOD was the tentative diagnosis based on signalment, clinical and radiological findings.

Fig. 1: Lateral radiographic view of distal radius and ulna. Osteolysis (black arrows) with periosteal new bone formation (white arrows) in the metaphyses are seen

Fig. 2: Lateral radiographic view of distal tibia and fibula. Radiopaque band (black arrows) near the physis and mild periosteal new bone formation (white arrows) can be observed

Fig. 3: Dorsopalmar radiographic view of metacarpus. Osteolysis (black arrows) and radiopaque band (white arrows) in the distal part of the metaphyses can be seen

Fig. 4: Dorsoplantar radiographic view of metatarsus. Osteolysis (black arrows) and radiopaque band (white arrows) in the distal part of the metaphyses can be seen

There is no specific treatment for this disease. Restriction of activity, confinement to a small well-padded area, and feeding with a high-quality diet were recommended. Treatment consisted of 10 mg/kg of aspirin PO q12h for two weeks (Tilley and Smith, 2003; Johnson and Qarston, 2005). In the next contacts, after three weeks of treatment, the owner stated signs of improvement in his dog.

Discussion

HOD is a systemic inflammatory disease of young rapidly-growing dogs of the large breeds, (Weisbrode and Doige, 1999; Johnson and Qartson, 2005). Male dogs affected more than females. The age and sex of the affected puppy in this report were in concordance with other reports. Because this case was among mongrel dogs, it seems that his breed is pertaining to the large and rapidly-growing dogs. Clinical signs in minimally-affected animals usually consist of a slight limp, with pain exhibited on deep digital palpation of the affected metaphyses. More severely affected animals, however, may exhibit anorexia, weight loss, fever and depression accompanied by extremely swollen, warm and painful long bone metaphyses, with refusal to bear weight on the affected limbs (Lenehan and Fetter, 1985). Based on the clinical signs, the pup presented here was so severely affected that the owner suspected the pup was lame due to a fracture. The exact etiology of HOD is still unknown, however, metabolic (hypo-vitaminosis C), nutritional and infectious hypotheses have been proposed (Shires, 2003; Tilley and Smith, 2003; Johnson and Qarston, 2005). Hypovitaminosis C was discounted, because many patients have normal ascorbic acid values, supplementation did not resolve the disease or prevent the relapse and dogs synthesize their own vitamin C (Muir *et al*., 1996; Tilley and Smith, 2003; Johnson and Qarston, 2005). Hypocuprosis that produces histologic changes in rats similar to those seen in affected puppies, did not cause similar changes in dogs (Konde, 2002; Tilley and Smith, 2003). Over-nutrition and over-supplementation is not likely, because only one or two affected puppies within a litter showed the disease, however, all receive the same diet and supplementation. Furthermore, HOD had occurred in puppies that had not been overfed or supplemented and correction of diet did not alter the course of the disease or eliminate the relapse (Tilley and Smith, 2003). The canine distemper virus had been detected in osteocytes of patients (Malik *et al*., 1995). Nevertheless, the presented puppy had not received massive dietary supplements or vaccines and did not show any signs of distemper disease. Therefore, the etiology of HOD in this puppy could not be accurately identified. Radiographic changes in the early stages of the disease occur in the metaphyses of the long bones and are usually bilaterally symmetric. Occasionally other bones such as the mandible, ribs, or scapula are affected (Lenehan and Fetter, 1985; Konde, 2002). Irregular radiolucent zone was presented in the metaphyses of the puppy, separated from the normal appearing growth plate by an opaque band (Figs. 1-4) (Lenehan and Fetter, 1985; Konde, 2002). Although the epiphyses and growth plates usually are normal, irregular widening of the growth plate may occur as the disease progresses. Subsequently, sub- or extra-periosteal new bone formation of the metaphyses occurs, which may progress to involve the entire diaphysis (Lenehan and Fetter, 1985; Burk and Feeney, 2003). In this case report, periosteal new bone formation was observed only in distal extremity of radius, ulna and tibia; so it could be concluded that different bones might not be at the same stage of the disease.

The puppy presented here, was in the early stage of the disease, based on the radiographic findings. HOD can be found in mongrel puppy from Iran. Like other large breed dogs in the world, HOD should be in the differential diagnosis list of a lame puppy under examination.

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