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Severe Polyostotic Hypertrophic Osteodystrophy with Concurrent Giardia Infection in a Juvenile Giant-Breed Dog: A Case Report

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Abstract: Hypertrophic osteodystrophy (HOD) is a debilitating developmental orthopedic disease primarily affecting rapidly growing large and giant-breed puppies. Characterized by painful swelling of the metaphyseal regions of long bones, HOD can lead to severe systemic signs and impaired mobility. Its precise etiology remains elusive, but infectious, nutritional, and immune-mediated causes are suspected. This case study report aims to provide a comprehensive summary of the clinical presentation of Hypertrophic Osteodystrophy (HOD), along with evidence-based guidelines for its diagnosis, treatment and prognosis, to support clinical decision-making in veterinary field practice. An approximatively 7-month-old intact male Bucovina Shepherd-type dog presented with severe systemic illness, anorexia, hyperthermia, marked limb swelling and pronounced difficulty ambulating. Initial clinical evaluation revealed diffuse, painful and firm metaphyseal enlargements affecting all four limbs. Comprehensive diagnostic evaluations- including radiographic imaging, hematological and biochemical analyses, stool antigen testing, coagulation profiling, completed by histopathological exam - confirmed severe polyostotic HOD complicated by concurrent Giardia spp. infection and secondary inflammatory anemia. Radiographs demonstrated classic metaphyseal "double physis" lesions, extensive periosteal proliferation and notable soft tissue edema. Histopathological examination of bone biopsies revealed disrupted endochondral ossification with suppurative inflammation, confirming the diagnosis. Intensive multimodal therapy involving antiparasitic, antibiotic, anti-inflammatory, gastroprotectant and analgesic treatments resulted in substantial clinical improvement and restored limb function. At one-year follow-up, the dog maintained satisfactory quality of life, requiring only intermittent analgesic management. This case emphasizes the importance of early diagnosis, comprehensive diagnostics and aggressive therapeutic intervention for severe HOD

(Fig 4).

Introduction

Hypertrophic osteodystrophy (HOD) is a developmental orthopedic disorder primarily affecting the metaphyseal regions of long bones in rapidly growing, large and giant-breed dogs. The condition is characterized by painful metaphyseal swelling particularly in the distal radius, ulna and tibia. Clinically, affected puppies typically present between 2 and 8 months of age with acute onset of pyrexia, anorexia, lethargy and lameness, accompanied by firm, painful metaphyseal enlargements.

Case description

A 7-month-old, 28.95 kg (Body Condition Score 2/5), intact male Bucovina Shepherd mix dog was presented to the Emergency Clinic of the Faculty of Veterinary Medicine, Cluj-Napoca, as a newly rescued stray. The patient showed acute non-weight-bearing lameness, bilaterally symmetrical and painful limb swellings, mild pyrexia (38.7 °C), and gastrointestinal signs. A comprehensive clinical evaluation was performed, including rapid fecal antigen testing, complete hematologic and serum biochemical profiling. Physical examination localized the pathology to the metaphyseal regions of all long bones, raising suspicion of a developmental osteopathy. Advanced imaging techniques were used to further characterize the metaphyseal lesions. A core bone biopsy of the distal radius was subsequently obtained under general anesthesia for definitive histopathological confirmation.

<u>Radiography</u> revealed classic HOD lesions with bilateral "double physis" lines, periosteal proliferation, and metaphyseal soft tissue swelling, especially in the distal limbs. (Fig.1)



Fig. 3 - 3D images of the forelimbs A. palmar view of the formation on the both forelimbs- bone proliferation is visible on both the radius and ulna; B. dorsal view of the both forelimbs- bone proliferation is visible on both the radius and ulna.

<u>Histopathological</u> findings - biopsy sample obtained from the distal radius





Fig. 1 Radiographic view: A - ML view of front limb; B - ML view of posterior limb

<u>CT imagine</u> findings - Siemens CT Somatom Scope machine with 16 channels

- CT imaging demonstrated bilateral metaphyseal remodeling with radiolucent "double physeal lines," sclerotic bands, and lamellar periosteal proliferation ("onion-skin" appearance), indicative of active hypertrophic osteodystrophy and disrupted endochondral ossification, with preserved elbow and carpal joint integrity. (Fig. 2)
- 3D reconstructions highlighted extensive, symmetrical periosteal new bone formation encasing the metaphyseal regions of the radius and ulna, accompanied by cortical thickening, physeal widening, and trabecular irregularities hallmarks of active-phase HOD. (Fig. 3)



Fig, 2 CT images of the forelimbs A. sagital section of the right forelimb at the radioulnar level; the proliferative

Figure 4 - Radius. Hypertrophic osteodistrophy. Multifocally, the bone exhibits extensive areas of necrosis (red arrow). The trabeculae (star) are devoid of osteoblastic lining, indicative of impaired bone remodeling. Throughout the affected regions, there is a severe and diffuse proliferation of fibrous connective tissue, replacing normal marrow architecture (black arrow). H&E stain. Ob.x 4 (Images A and B), ob.x 10 (Image C), and ob.x20 (Image D). Scale Bar 500 µm (Image A and B), 200 µm (Image C), 100 µm (Image D).

Results and discussion

A rapid fecal antigen test (VetExpert SNAP Giardia/Parvovirus/Coronavirus Ag Test) showed a positive Giardia antigen test with negative CPV/CCV results. The dog was hospitalized for intensive multimodal conservative management that targeted skeletal inflammation, Giardia spp. infection, pain management, gastrointestinal mucosal protection and prophylaxis against opportunistic bacteria. During hospitalization lameness, appetite and hematological parameters steadily normalized, diarrhea resolved after the antiparasitic course, and the patient was discharged ambulatory and clinically stable. At oneyear follow-up, the patient demonstrated sustained ambulatory function and quality of life, with only mild, manageable limb discomfort and no significant orthopedic or systemic complications, indicating a favorable long-term prognosis.

• Conclusions

This case demonstrates the clinical complexity of severe polyostotic hypertrophic osteodystrophy (HOD) in a juvenile giant-breed dog, further complicated by concurrent Giardia spp. infection and systemic inflammation. Early recognition, multidisciplinary diagnostics - including advanced imaging and histopathological confirmation - and timely initiation of targeted multimodal therapy, proved critical to clinical stabilization and favorable long







