GENERALIZED OSTEOPETROSIS IN A YOUNG CAT

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RESUMEN CORTO/RESUME

Osteopetrosis is a bone dysplasia characterized by presenting osteosclerosis, an abnormal increase in bone opacity of the bone marrow. A 19-month old domestic short hair spayed female was presented for thoracolumbar pain and hind limb rigidity. Blood tests showed severe anemia, leukopenia and trombocytopenia and SNAP test for feline leukaemia virus (FeLV) and feline immunodeficiency virus (FIV) was negative. On x-rays, there was an increase in bone marrow opacity focalized at the humerus compatible with osteosclerosis. The animal was euthanized and a post-mortem long bone CT was performed and found that osteosclerosis was present also in both femurs and tibias. The necropsy confirmed osteopetrosis of long bones and revealed extramedullary haematopoiesis in several organs. The pathogeny of osteopetrosis is poorly described in veterinary medicine, especially in cats. In this particular case, the pathogeny is difficult to describe but it is most likely to mirror the infantile or malignant in humans, rather than secondary to leukaemia virus or a neoplasia. In conclusion, this condition is not well understood in veterinary patients and further studies are needed to characterize its pathogeny.

INTRODUCCIÓN / INTRODUCTION

Osteopetrosis is a bone dysplasia characterized by presenting osteosclerosis, which is an abnormal hardening of the bone². This traduces in an increase of bone density without altering the normal shape of the bone. There is a defect in osteoclastic resorption of bone, which leads to a disorder in bone remodelling and as a consequence, this results in an accumulation of primary spongiosa in the bone marrow of the diaphysis⁵. Radiologically, there is a generalized increase in bone marrow opacity, a loss of trabecular bone and ill-defined cortical margins. Although the density of bone is increased, bones are more fragile and prone to fractures².

DESCRIPCION CASO CLINICO / CASE REPORT DESCRIPTION

A 19-month-old domestic short hair cat, spayed female, was presented to the neurology service of the Fundació Hospital Clínic Veterinari of the Universitat Autònoma de Barcelona because of kyphosis, generalized pain and hyporexy of 3 weeks of duration. There was no response to analgesia and there was no previous history of trauma.

On physical examination, pale mucous membranes were evident and rectal temperature was 39,5oC. There were no other significant abnormalities. On orthopaedic examination, no joint pain was found. Finally, the neurological exam revealed hind limb stiffness and thoracolumbar pain.

Blood tests were performed. Complete blood count revealed severe pancytopenia (normocytic and normochromic, non regenerative anemia of 12%, leukopenia with neutropenia, eosinopenia and severe thrombocytopenia). Biochemistry analysis showed hyperglogulinemia in which α2 globulins were increased. SNAP test for the detection of feline leukaemia virus (FeLV) and feline immunodeficiency virus (FIV) was negative.
Diagnostic imaging studies were performed as part of the diagnostic protocol. Thoracic X-rays showed mild lymphadenomegaly of the sternal lymph node. Outside the thoracic cavity, an increase in opacity was found in the medullary cavity of long bones such as humerus but also at the scapula. These findings were compatible with osteosclerosis. Abdominal ultrasound showed no abnormalities.

Due to the severely altered blood tests, a blood transfusion was suggested but the owner refused hospitalization and accepted medical therapy at home with methylprednisolone at a dose of 2.5mg/kg once a day, amoxicillin-clavulanic acid at 22mg/kg twice a day and adolonta at 3 mg/kg twice to three times a day. This treatment was established for a week but the animal died at home before arranging a visit for a re-check.

With owner’s consent, a total body computed tomography (CT) and a thoracolumbar magnetic resonance (MRI) were performed post-mortem. A bone and soft tissue algorithm CT was carried out and revealed a heterogeneous hyperattenuation of bone marrow focalized at humerus, femurs and tibias. The cortices where homogeneous in all the extension, presented soft margins and there was no alteration of its normal shape but the thickness was slightly increased. The MRI did not show relevant changes.

A necropsy of the animal was performed by the anatomic pathology service. The long bones previously described showed an increase in cortex thickness and a noticeable mineralization of the central part of the medullary cavity. Microscopic evaluation of these bones exposed an abnormally increased number of immature bone trabeculae (primary spongiosa) that diffusely replaced the medullary cavity of the diaphysis of the bones. Microscopic evaluation of abdominal organs showed extramedullary haematopoiesis of the spleen, liver and adrenal glands, which can be seen in cases of severe osteopetrosis. The remaining organs did not have evident macroscopic and microscopic alterations.

**DISCUSIÓN / DISCUSSION**

The pathogenesis of osteopetrosis is poorly described in veterinary medicine, especially in feline patients. It seems more commonly a defect in osteoclast functionality rather than a defect in its differentiation. In cats, it can be secondary to an infectious process such as feline leukaemia virus (FeLV), which is an in-utero infection in most cases, neoplasia (lymphoma, leukaemia or carcinoma), chronic kidney disease or hypervitaminosis D. Several cases of acquired osteopetrosis have been described in adult cats of idiopathic origin. In cats, as well as in dogs and humans, a congenital form is described and it is believed to be hereditary. In this form of the disease, osteopetrosis is present due to a mutation in erythrocytic pyruvate kinase enzyme.

The condition in young cats mirrors the precocious form of osteopetrosis in humans, also known as infantile or malign form, because it causes death due to severe anemia and secondary infections. These events are caused by a suppression of medullary activity due to its obliteration by newly formed bone. Therefore, the treatment of choice in humans is bone marrow transplant or corticoids. In addition, there are other three forms of the disease in humans, which are inherited too but are poorly investigated in veterinary medicine.

In the case described above, osteopetrosis secondary to feline leukaemia virus infection was unlikely because a negative SNAP test FIV/FeLV. However, a confirmation through a Polymerase Chain Reaction (PCR) would have been the technique of choice in this case. The probabilities of the idiopathic form are low due to the age of the patient, and as mentioned before, it is more likely to affect adult cats. Also, a mutation of erythrocytic pyruvate kinase is not discarded because of the age of the animal and its precocious presentation. Finally, in this particular case, the condition could have been similar to the infantile form in humans, described previously in this section.

Its diagnostic in some cases can be a finding on survey x-rays or it can be manifested in many different symptoms, such as generalized pain as happened in this case. Specifically, this cat had severe osteopetrosis that could be easily identified with an x-ray scan. However, advanced imaging techniques, like computed tomography, can help identify reduced areas of osteopetrosis in mild cases.
In conclusion, osteopetrosis is a complex disease poorly understood at the present moment due to the lack of studies to describe its veterinary patients, especially in cats. Therefore, further clinical and genetic studies need to be performed in order to characterize this condition in feline patients and adequate a possible treatment. However, advanced imaging techniques are sometimes expensive for the owner and this limits investigation in cases that the diagnosis is uncertain.

BIBLIOGRAFÍA /BIBLIOGRAPHY


