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Unilateral Forelimb Micromelia and Concurrent Aphalangia in a Kid: A Case Report

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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Case Study

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ABSTRACT

Congenital malformations and inherited disorders constitute a substantial proportion of the bone pathologies seen in sheep and goats. The macroscopic and radiographic features of a micromelia with aphalangia case are described here in a 2-month-old, 12 kg male kid. *In vivo* the animal showed a shortened right forelimb that ended, at the level of the digits, in soft hoof. Radiographs demonstrated an absence of phalanges. The cause of the condition in this case remains unclear. To the author's knowledge, the congenital forelimb deformity described here is the first documented case in the *Caprine* species.

Keywords: Abnormality; congenital defect; congenital deformity; limb defect; malformations.

1. INTRODUCTION

Birth defects arise from structural or functional congenital malformations stemming from errors during fetal development [1]. They can affect an isolated portion of a body system, the complete system or parts of different systems. Limb development is one of the most thoroughly studied aspects of vertebrate ontogeny. Malformations of the extremities or parts of them vary in their manifestations, ranging from absence of a single structure to partial or

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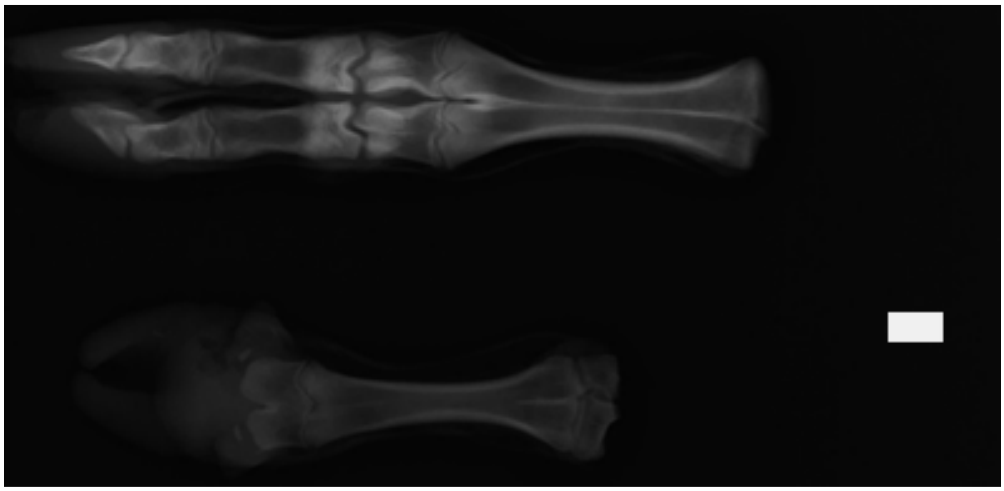
complete absence of the limbs. These include a variety of malformations and metabolic diseases that could occur in all breeds but tend to exhibit predisposition in some breeds. For domestic animals, although the Bell's classification [2], a complete description of congenital skeletal malformations is still lacking and a clear classification of the possible anomalies detectable does not exist, although their wide reported cases, comparing to human literature [3].

The aim of this report is to describe the macroscopic and radiographic findings of a unilateral forelimb defect observed in a kid. We try also to improve the knowledge about congenital limb anomalies in veterinary medicine.

2. CASE DESCRIPTION

A two-month-old male cross-breed meat-purpose kid was evaluated for an obvious deformity in its right forelimb during a routinary*post mortem* inspection in a commercial abattoir. Body weight was estimated at 12 kg. Method of husbandry of the herd was traditional (grazing in the pasture), but exact animal's prior history was unknown. At physical examination, a non-functional right fore limb, markedly reduced in size, both in length as in width (Fig. 1). No deformation of the hoof was seen but the solar surface was characterized by being markedly soft. The deformity had caused limited mobility, although the affected animal was declared ok for abattoir. No other macroscopicalanomaly was seen. Forelimb metapodes were obtained and studied radiographically and by dissection. Radiographs were done at 45 kVp and 10.0 mAs (100 mA, 1/10 sec.). A final dissection was performed.

Fig. 1. Comparison of both distal forelimbs. Right distal forelimb was markedly reduced in size (both length and width); No deformation of the hoof was seen. The solar surface (below) was characterized by being markedly soft. Squares are 10 x 10 mm



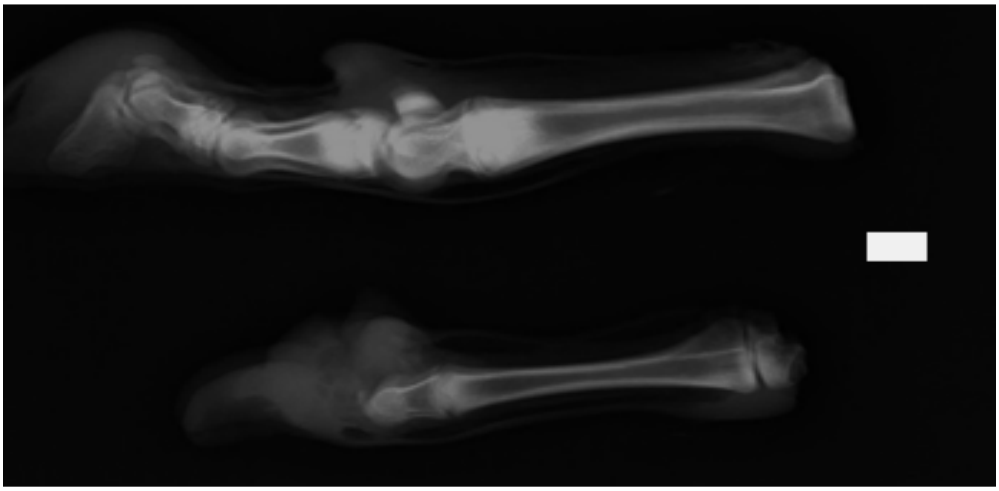


Fig. 2. Radiographs of both forelimbs. Above: Dorsopalmar radiograph; Below: Laterolateral radiograph. The survey radiographs revealed a clear shortening of metapodium and an absence of all phalangeal bones. Two proximal sesamoid bones were present, but not distal ones. Set at 45 kVp and 10.0 mAs (100 mA, 1/10 sec.). Bar is 40 mm

The survey radiographs revealed a clear shortening of metapodium and a complete absence of all phalangeal bones. Two proximal sesamoid bones were present, but not distal ones (Fig. 2). At dissection, superficial flexor digital tendon appeared inserted on proximal sesamoids, as well as lateral extensor digital tendon and lateral belly of common extensor tendon. Deep flexor digital and medial belly of common extensor tendon were inserted in a soft mass of connective tissue into de pad.

3. DISCUSSION AND CONCLUSION

Malformations of the extremities or parts of them vary in their manifestations, ranging from absence of a single structure to partial or complete absence of the limbs [4], but their description is often complicated by the lack of a uniform and precise nomenclature. The term dysostosis is used to define malformations of individual bones or groups of bones, caused by a failure of bone model formation or failure of the transformation of the bone model into cartilage or bone [1,3]. For limbs, micromelia is described as the abnormal smallness of one or morelimbs and aphalangiaas the absence of one or more phalanges from one to four digits [5]. So the dysosticcase here described can be named with the term unilateral micromelia with aphalangia.

Different forms of limb deformations have been identified by veterinarians, zoologists, physicians, and naturalists in individuals and populations in a range of species. For instance, in cats [5], sheep [6], horses [7], buffalos [8] and dogs [4,3]. Few congenital limb deformities in goats have previously been documented. To author's knowledge, there exist some published cases such as monobrachia, monopodia, perodactylia, tibial agenesis, radial agenesis, and arthrogryposis in goats [9,10], but no published case has been found for micromelia, so this is the first report of this type of forelimb malformation in a kid, and represents an important addition to the literature on this topic.

Genes responsible for dysostoses have still not been identified. Differently, several environmental factors have also been implicated in development of dysostoses in other species, such dog and cat, and may include: drugs, maternal diseases, faulty maternal diet, modified-live vaccines, radiations, and trauma to the mother, embryo, or placenta [3]. The etiology of congenital appendicular malformations may be genetic, environmental or their interactions [6]. An autosomal recessive mode of inheritance have been suggested for peromelia in goats [9] and congenital amputation(a developmental abnormality characterized by the lack of limb distal structures) [8] may be associated with early amniotic rupture [11]. But since we were unable to study the parents of the affected animal, nor the environmental circumstances of the goat, the cause of the condition in this clinical case remains unclear.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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