Global Veterinaria 10 (4): 424-426, 2013
ISSN 1992-6197

DOI: 10.5829/idosi.gv.2013.10.4.7271

A Case Report of Supernumerary Ectopic Limbs in a Lamb: Anatomical and Radiological Aspects

Ali Louei Monfared

Department of Basic Sciences, Faculty of Para-Veterinary Medicine, University of Ilam, Ilam, Iran

Abstract: Supernumerary ectopic limb(s) is a congenital anomaly defined as the presence of accessory limb(s) attached to various body regions. This paper describes some gross congenital abnormalities and clinical signs in a lamb with supernumerary ectopic hind limb based on anatomical and radiographic findings. A 55-day old lamb with the chief complaint of the presence of an extra limb in the caudal pelvic region was delivered to the local veterinary clinic. Clinical examination as well as radiographs revealed the presence of a supernumerary ectopic leg which its distal part was bifurcated at the tarsal joint area and had four hooves. The muscular apparatus around the supernumerary ectopic leg was exactly similar but not well developed. No gross or pathological lesions in different organs of the lamb as well as no hematologic disorder in peripheral blood smears were observed. In conclusion, it is not known if the supernumerary ectopic hind limb in this case is caused by genetic and or environmental factors.

Key words: Anatomy · Radiology · Lamb · Supernumerary Ectopic Limbs

INTRODUCTION

As a whole, a number of different congenital anomalies are known to occur in domestic animals [1]. Congenital defects are structural or functional abnormalities and can affect on isolated portion of a body system, entire system or parts of several systems and may cause obstetrical problems [2]. These abnormalities are induced by genetic or environmental factors (infectious diseases, viruses, drugs, poisonings, plants, mineral salts and vitamin (A, D, E) deficiency), hormonal factors and physical reasons or by their interactions [3-5].

It has been demonstrated that the majority of human and animal malformations are due to multifactorial etiology [6]. Furthermore, many congenital abnormalities affecting different species are widely described in the literature. For instance, Louei Monfared *et al.* [7] reported a case of congenital dicephalus in a lamb.

Supernumerary ectopic limb is a congenital malformation which is defined as the presence of accessory limb(s) attached to the various body regions [8, 9]. The incidence of supernumerary ectopic limb is reported to range from 2-3.5% of all births in calves, lambs and foals [1]. Although information on the exact etiology of supernumerary ectopic limb is scarce, but among the most frequent congenital anomalies, limb malformations are found in both humans and animals [10, 11]. The purpose of this case report was to describe some gross congenital abnormalities and clinical signs in a lamb with supernumerary ectopic hind limb.

Case Description: A 55-day old lamb belonging to a flock with 177 sheep and 135 goats was referred to the local veterinary clinic located in Sirvan city (Ilam, Iran) with a supernumerary ectopic limb in the pelvic region. Clinical examination revealed that the extra hind limb was attached to thecaudo-ventral region of the pelvis on the right side of the hip (Fig. 1). Normal mass of muscles and connective tissues were palpated at the limb area. No movement and pain response was observed during clinical examination. The animal was in an apparently good state and no other anomaly was observed physically.

Radiographic examination was used to determine the degree of malformation in the limbs as well as the type of articulation in both long bones and digits. Radiographs were taken in latero-medial and dorso-ventral position.

Corresponding Author: Ali Louei Monfared, Department of Basic Sciences, Division of Anatomy and Histology, Faculty of Para-Veterinary Medicine, University of Ilam, Ilam, Iran, Pajoohesh Street, Bangonjab, University of Ilam, Ilam, Iran. Tel: +98-8412222015 & +989183419098, Fax: +98-8412222015.

Fig. 1: View of the supernumerary ectopic hind limb (arrow) in the lamb

Fig. 2: Radiographic features of the hind limb with duplicated supernumerary ectopic leg of the lamb. The c part indicates that supernumerary ectopic hind limb is bifurcated at the tarsus joint and had four hooves. a, c: Dorso-ventral position and b:Latero-medial position

The radiographs revealed the presence of a supernumerary ectopic leg which its distal part was bifurcated at the tarsal joint area and had four hooves (Fig. 2). The first femoral bone was normal with a normal tibia attached to it. The second femur had the same pelvic articulation as the first. The third femoral bone had a common point of articulation caudal to the right acetabulum.

Based on the gross dissection of the normal limb, muscles groups of the hip and thigh regions appeared normal. The muscular apparatus around the supernumerary ectopic leg was exactly similar but not well developed. No gross or pathological lesions in different organs of the lamb as well as no hematologic disorder in peripheral blood smears were observed.

DISCUSSION

During the embryonic stage of development, limbs arise as a condensation of cells from the lateral plate mesoderm and its ectodermal covering [12]. The limb origin in amniotes develops from the wolffian ridges, which run along the lateral surface of the body [12].

In the current work, anatomical and radiological examinations revealed the presence of a supernumerary ectopic limb which was attached to the caudo-ventral region of the pelvis on the right side of the hip. Similar observations reported by previous researchers on the various species [1, 13, 14, 15], although the precise mechanism that regulates development of supernumerary limbs is not yet understood. Heterotypic polymelia has been reported in humans, mice, chickens, calves and lambs [16], although its etiology is not definitively known. This defect can result from defective genetics (transgenes, chromosomes), a genetic agent in the fetal environment, environmental agents or from an interaction of such factors [17].

Polydactyl is a congenital malformation which is defined as the presence of extra digits or toes, is the most common limb deformity in humans and is the consequence of disturbances in normal limb development. It can appear as an isolated condition or may be a part of a systemic syndrome [18]. Furthermore, at least two sets of genes are involved in the inheritance of polydactyl [19]. In this case, the lamb's supernumerary ectopic hind limb was bifurcated at the tarsus joint and had four hooves, a polydactyl. Similar cases have been described in previous studies [1, 13, 19].

Many conditions that are related to most of the congenital defects in human and animals have been reported. Teratogens including toxic plants, infectious agents, drugs, trace elements deficiencies and physical agents such as radiation, hyperthermia and embryo manipulations, are in the scope of possible other factors that may cause this congenital defect [3]. They induce alterations in oocyte structure, maturation and organogenesis probably as a result of some metabolic or circulatory disturbances, on the basis of a not well-known mechanism.

Genetic defects are conditions caused by abnormalities in genes or chromosomes. These structural defects result from mutant genes or chromosomal aberrations. The best known genetic defect in sheep results from autosomal recessive genes [3, 6].

In the present study with the limited information available, causes of this sporadic case cannot be determined. However, although it is not known if the supernumerary ectopic hind limbs in this case are caused by genetic or environmental factors, genetic factors are more suspected.

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