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## Hemimelia with Calcaneal Subluxation in a Buffalo Calf: A Case Report and Review of Literature

<sup>1</sup>A.M. Abu-Seida, <sup>1</sup>M.B. Mostafa and <sup>2</sup>O.S. Al-Abbadi

<sup>1</sup>Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Cairo University, Giza, Egypt

<sup>2</sup>Mistry of Agriculture, Iraq

*Corresponding Author: A.M. Abu-Seida, Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Cairo University, P.O. Box 12211 Giza, Egypt*

### ABSTRACT

This report presents a rare case of hemimelia with anterolateral calcaneal subluxation in a buffalo calf. The malformed calf was born from underfed dam which was naturally inseminated by unrelated bull. Neither the parents nor offsprings of the dam had hemimelia. The right malformed limb ended at hock joint and had two fused rudimentary claws and declaws. The malformed hock joint was immovable in both active and passive movements and had nearly straight angle. Achilles tendon deviated laterally. Radiographic findings included complete absence of all structures distal to the right hock joint, small tibia and tarsal bones and anterolateral subluxated calcaneus.

**Key words:** Buffalo, calcaneus, calf, hemimelia, subluxation

### INTRODUCTION

For several years, a genetic disease called Transversal Hemimelia (TH), also known as congenital amputation, has been recorded. It is characterized by the lack of limb distal structures, normally developing proximally to the malformed limb and being amputated at different points distally (Vegad and Swamy, 2010).

Hemimelia is a lethal congenital disorder in cattle characterized by severe and lethal deformities in newborn calves. Often, such a calf is born dead, or if it survives birth cannot stand to nurse and must be destroyed (Pollock *et al.*, 1979). Hemimelia was first described in Galloway cattle in the 1960's and in Shorthorn cattle in 2000 (Ojo *et al.*, 1974; Lapointe *et al.*, 2000). It was recorded in six genetically related Shorthorn calves. The lesions included bilaterally malformed or absent tibia and abdominal hernia in all animals, a long shaggy hair coat, retained testicles in males and meningocele in three animals. Pedigree analysis demonstrated a mechanism by which a recessive allele in a homozygous state could be responsible for the disorder. The condition in these calves was considered the result of a recurrence of a genetic mutation affecting a putative hemimelia locus (Lapointe *et al.*, 2000). Although, unilateral hemimelia without apparent genetic basis has been previously reported in cattle (Doige *et al.*, 1978; Baird *et al.*, 1994), this combination of congenital anomalies was inherited as a simple autosomal recessive traits in Galloway cattle and non toxic or infectious agents is known to cause this anomaly in cattle (Ojo *et al.*, 1974).

Additional anomalies associated hemimelia as meningocele, abdominal hernia, reproductive anomalies, internal hydrocephalus, sometimes non fusion of the pelvic symphysis, arthrogryposis and extra set of incisors teeth (Lapointe *et al.*, 2000; Ko *et al.*, 1990).

It is possible to detect the hemimelia syndrome characteristics in 90-day-old fetus and pregnancy termination using prostaglandin F<sub>2</sub> alpha was recommended  $\alpha$  (Ojo *et al.*, 1974).

Radiographic examination is a simple but important tool in diagnosing various congenital orthopedic defects in animals (Guffy and Leipold, 1977).

Later tibial hemimelia was recorded in ten Italian buffalo calves amputated off the tibia, the second tarsus bones, the third tarsus bones, the proximal epiphysis metatarsus, the distal epiphysis metatarsus and the first phalanx (Peretti *et al.*, 2008). Chromosome instability in Mediterranean Italian buffaloes affected by transversal hemimelia was suggested (Albarella *et al.*, 2009). This case report presents the clinical and radiographic findings of a rare case of hemimelia with anterolateral calcaneal subluxation in a survived buffalo calf.

## **MATERIALS AND METHODS**

A three-day-old male buffalo calf with an orthopaedic abnormality was presented to the surgery clinic during August 2014. The calf was recumbent after birth and had shortened right rear limb. Complete case history and full clinical examination were carried out.

Plain radiographic examination was carried out with an X-ray machine (Fischer, Stuttgart, Germany). The radiographic setting factors were 55 kVp and 10 mA. Dorsoplantar (DP), Lateromedial (LM) and mediolateral views were performed on both hock joints. One month later, the calf was readmitted to the clinic for the presence of an ulcer at the affected limb. The ulcer was curetted, dressed with Povidone iodine solution and Zinc oxide ointment and bandaged.

## **RESULTS**

The malformed calf was born from underfed dam. The dam was naturally inseminated by unrelated bull. Neither the parents nor offsprings of the dam had hemimelia.

Although, the calf was unable to stand or suck, it had normal appetite. Therefore the owner assisted the calf to stand and nurse (Fig. 1). The calf could be stand and nurse without assistance after one week of birth (Fig. 2a). The affected calf was in a good health condition and no other obvious defects were observed.

The affected buffalo calf had normal body temperature, heart and respiratory rates, mucous membrane and lymph nodes.



Fig. 1: Unable to stand 3-day-old buffalo calf with hemimelia

All limbs were normal except the right hind limb. The malformed limb shortened and amputated off the hock joint (Fig. 1). Achilles tendon deviated laterally. The malformed hock joint was immovable in both active and passive movements and had nearly straight angle.

At birth, the malformed limb had normal skin at the amputated site then alopecia and ulcer formation were seen one month later (Fig. 2b). Trials of the calf to use the malformed limb resulted in an ulcer one month later. Additionally, the calf also had a smaller right hind quarter than the left one.

Interestingly, the malformed limb had two fused rudimentary claws (1 cm length) and two separated rudimentary declaws (0.5 cm length) at the planter aspect of the hock joint (Fig. 2b).

The ulcer cured well within 10 days and the owner was advised to use soft bedding for the calf.

Radiographic examination revealed complete absence of metatarsus bones and all phalanges (Fig. 3a). The right tibia and tarsal bones were smaller and less radio-opaque than those of the left normal hind limb and the right calcaneus subluxated anterolaterally (Fig. 3b).

## DISCUSSION

In the last decade, congenital anomalies have been increased in the Egyptian animals and birds (Abu-Seida, 2014a, b, c; Abu-Seida and Torad, 2014; Abu-Seida, 2015) and high pollution is incriminated in this increase.

Hemimelia is a congenital absence of a longitudinal segment of one or more limbs (Vegad and Swamy, 2010). Few cases of hemimelia have been reported in the veterinary literature. This report records for the first time the clinical and radiographical findings of a rare case of hemimelia with anterolateral calcaneal subluxation in a survived buffalo calf.



Fig. 2(a-b): (a) The same calf standing at one-month old and (b) Amputated site showing alopecia, ulcer formation (Blue arrow), anterolateral calcaneal subluxation (Black arrow), fused rudimentary claws and declaws (White arrow)



Fig. 3(a-b): (a) Mediolateral radiograph of the malformed limb showing complete absence of structures below the hock joint, anterolateral calcaneal subluxation, small tibia and tarsal bones and (b) Lateromedial radiograph of the normal left hock joint. Notice that the tibia and tarsal bones of the malformed limb are smaller and less radio-opaque than the normal ones

Although severe lameness was noticed, the malformed calf could be stand and nurse without assistance after one week of birth. This disagrees with the previous results which concluded that if the affected calf survives birth, it cannot stand to nurse and must be destroyed (Pollock *et al.*, 1979).

The affected calf had no other congenital defects. This is in contrast with previous studies which recorded other concurrent congenital anomalies in cattle calves as meningocele, abdominal hernia, reproductive anomalies and internal hydrocephalus (Lapointe *et al.*, 2000; Ko *et al.*, 1990).

The deformed calf had normal physiologic parameters. Similar findings were reported in cattle calves (Ojo *et al.*, 1974; Lapointe *et al.*, 2000).

The malformed calf had fixed hock joint. This could be attributed to the malformed tarsal bones, deviated Achilles tendon and anterolateral calcaneal subluxation. To our knowledge, these findings were not recorded before in calves.

Alopecia and ulcer formation at the amputated site could be attributed to the continuous rubbing of the malformed limb against the ground. In addition, the calf had a smaller right hind quarter than the left one due to the disuse atrophy of the affected limb.

In this report, radiographic examination was necessary to describe the malformed limb. In this respect, Pollock *et al.* (1979) recommended radiographic examination as an easy and accurate tool for complete description of hemimelia.

## CONCLUSION

Hemimelia with anterolateral calcaneal subluxation should be listed as congenital orthopedic anomalies in buffalo calves.

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