Clinical Report

Notomelia and Ulnar Dimelia in a Calf: Radiographical Anatomic Aspects

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Abstract

Case Description- A three month Holstein female calf with a supernumerary limb in the caudal cervical region was delivered to a private veterinary clinic in Kashmar.
Clinical Findings- Clinical and radiographical examinations revealed a vestigial scapula, distally bifurcated humerus, two underdeveloped ulnae, two ossification centers for radius and more or less complete duplication of manus in the extra fore limb.
Treatment and Outcome- The supernumerary limb was removed surgically.
Clinical Relevance- Notomelia is a rare anomaly which according to absence of any other defects, can usually be treated surgically.
Key words- Notomelia, Calf, Dimelia, Polymelia, Radiography

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Introduction

In the embryo, the limb arises as a condensation of cells from the lateral plate mesoderm and its ectodermal covering. The limb primordia in amniotes appear from the wolffian ridges, which run along the lateral surface of the body. Heterotopic polymelia is an anomaly which affected animal has one or two supernumerary limbs attached to the various body regions and is classified as cephalomelia, notomelia, thoracomelia and pygomelia. This anomaly has been reported in human, mouse, chicken, calf and lamb. Congenital malformations sometimes lead to prenatal mortality, and may also decrease maternal productivity and reduce the value of the defective neonates. Severe defects result in abortion of the calf or a return to service of the calf and cow. In two different surveys, the percentage of the occurrence of congenital defects were reported 24% in the cattle musculoskeletal system, but there is no scientific report on congenital anomalies frequency of cattle in Iran. The aim of this article is radiographic description of notomelia in a calf as the first report in Iran.

Case Description

A three months Holstein female calf was delivered to a private veterinary clinic in Kashmar- Iran due to a supernumerary limb in the caudal cervical region. Clinical examination revealed that the extra limb was attached to the craniodorsal region of the scapula in the right side of the neck (Fig. 1). Its cranio-caudal axis of development was rotated in an angle of about 90 degrees in relation to the normal limb, somehow the cranial part of it was faced to the medial. The distal part of the limb had four digits which were placed in the four separate hoofs. Small amounts of soft tissue were palpated around the bones of the limb, but no movement and response was found in examinations. The animal was in a good state and no other anomaly was found. Radiographic examination of the extra limb in lateral and cranio-caudal views revealed that the proximal part of the humerus was attached to a rudimentary scapula (Fig 2). The distal part was going to bifurcate and two separate epicondyles accompanying the two capitula were seen in both sides (Figs 2, 3). Two short ulnae were developed in two abaxial sides and were articulated distally with carpal bones (Fig 3). They had a curved appearance in lateral view. Rudimentary radius with two ossification centers was formed centrally. In the first row of the carpal bones, an accessory bone was distinguishable on each side. Two main metacarpal bones were identified which were fused proximally but duplicated distally. Each distal extremity of them was joined to a complete set of digits. To relief the animal from the extra limb discomfort, it was then removed surgically.
Discussion

The precise mechanism that regulates development of supernumerary limbs is not yet clearly understood. Mahapatra et al (2001) have reported vitamin A-induced multiplication of fore and hind limbs in the tadpoles. This effect of vitamin A has been assumed due to break down of the lysosomes and disturbance of limb mesenchymal cells. The damaged primitive cartilage would break up into fragments, giving rise to the duplicated limbs. As the limb primordium is a self-differentiating system, once established it contains all the information required to attain its normal form even if it is removed from the body of embryo.

Definitive etiologic knowledge of polymelia is scarce. Whether it is caused by genetic or environmental factors, or both, is not known. But it is confirmed that the susceptibility to an injurious environmental or to the genetic agents varies with the stage of development and between species.

Limbs do not begin to form until the primordia of most other organs are laid down, and as discussed previously it is a self-differentiation system, so, like this case, we usually can not find any other associated defects in polymeric cases. However, these cases should be differentiated from the symmetric or asymmetric conjoined twins in which extra fore or hind limbs are resulted from the presence of another animal.
Kim et al (2001) reported the first male notomelic calf. In that case, the supernumerary limb was located in the caudal region of the scapula and was attached to its spine. Hiraga et al (1987) reported five cases of notomelia in the heifer. Similarly, it has also been reported that the occurrence of notomelia linked with sex, and found mostly in females. In the current case report, the belief of relationship of this abnormality with sex was confirmed.

Ulnar dimelia has been reported as a very rare anomaly in the cattle. In this case, the position of the both ulnae were similar to the calves in Kim et al (2001) and Hiraga et al (1989) reports, but its associated radial hemimelia was not seen in mentioned studies. Moreover, Kim et al (2001) have reported a fully developed radius which was duplicated and Hiraga et al (1989) could not find any vestiges of radius. In our case two (proximal and probably middle) ossification centers of radius were caught between two ulnae and from this point of view is similar to Ueshima and Uehara (1981) report. In other word, it seems that in the duplication process of the antebrachial region of the fore limb, there is a priority of ulnar development in comparison to radius.

The present case is the first report of notmelia in an Iranian calf accompanying antebrachial hemimelia and ulnar dimelia with duplication of distal extremity of extra limb.
References

چکیده

گزارش اندام حرکتی اضافه گردنی (نوتوملیا) و دوتایی شدن زند زیرین در یک راس گوساله: جنبه‌های آناتومی رادیوگرافی

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۳ دامپزشک بخش خصوصی

توصیف بیماری و پایه‌های بالینی - یک گوساله سه ماهه ماده با یک اندام حرکتی اضافه در ناحیه گردن که به یک اندام خصوصی دامپزشکی در کاشمر ارجاع داده شد. در معاونت بالینی و رادیوگرافی اندام حرکتی اضافه، یک استخوان کتف اولیه، یک بازو که در قسمت یاپینی دونا شده بود، و یک زند زیری زند زیرین دو برگ ازیده شدن زنده زیرین و دوتایی شدن کم و بیش کامل دست دیده شد.

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کاربرد بالینی - اندام حرکتی اضافی، یک ناهنجاری نادر است که معمولاً به دلیل وجود ناهنجاری جدی دیگر همراه با آن، می‌توان حیوان را به کمک عمل جراحی بهبود بخشید.

کلید واژگان - اندام حرکتی گردنی، گوساله، دامپزشکی، پلی‌ملیا، رادیوگرافی