

## A case of asymmetrical monocephalus dipygus (*tetrapus dibrachius*) in a male Holstein calf in Iran

Behrokh Marzban Abbasabadi<sup>1\*</sup>, Aliakbar Ahmadzadeh<sup>2</sup>, Shahab Ramezanpour<sup>3</sup>, Amir Reza Hajati Ziabari<sup>4</sup>

<sup>1</sup>Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine, Amol University of Special Modern Technologies, Amol, Iran; <sup>2</sup>DVM Student, Faculty of Veterinary Medicine, Islamic Azad University, Babol Branch, Babol, Iran; <sup>3</sup>Department of Pathobiology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran; <sup>4</sup>Young Researchers and Elite Club, Faculty of Veterinary Medicine, Islamic Azad University, Babol branch, Babol, Iran.

### Article Info

#### Article history:

Received: 24 November 2015

Accepted: 06 February 2016

Available online: 15 June 2016

#### Key words:

Conjoined twins

Holstein calf

Monocephalus dipygus

*Tetrapus dibrachius*

### Abstract

Dipygus is a teratological fetus with a double pelvis, genitals, and extremities. Congenital duplications in cattle are rare. Caudal duplication is more common in sheep and pigs while cranial duplications seem to be predominant in cattle. Asymmetric or parasitic conjoined twins consisting of an incomplete twin (parasite) attached to the body of a fully-developed twin (autosome). This report deals with a male Holstein calf with two extra limbs, in the pelvic region which were directed ventrally between the two normal hind limbs. The extra limbs were completely developed in one side and in other side just a bony mass were observed. So classification has been made as asymmetrical attached twins. The genital system was not affected and just one extra kidney-like structure was found. To the authors' best knowledge, this is the first report of asymmetrical monocephalus dipygus (*tetrapus dibrachius*) in a male Holstein calf in Iran.

© 2016 Urmia University. All rights reserved.

## گزارش یک مورد دایپیگوس نامتقارن یک سر (ترابوس/دایبر/کیوس) در یک رأس گوساله هشتتاین نو در ایران

### چکیده

دایپیگوس نوعی ناهنجاری مادرزادی همراه با دوتایی شدن لگن، اندام تناسلی و اندامهای انتهایی جنین می باشد. این پدیده در گاو ها به ندرت رخ می دهد. دو قسمتی شدن ناکامل بدن در گوسفندان و خوک بیشتر در نواحی خلفی و در گاوها در نواحی قدامی اتفاق می افتد. دوقلوهای بهم چسبیده در دو گروه دوقلوهای متقارن جدا یا متصل و یا دوقلوهای نا متقارن جدا یا متصل قرار می گیرند. دوقلوهای بهم چسبیده نا متقارن یا پارازیتیک شامل یک نوزاد ناکامل (پارازیت) است که به یک نوزاد کامل (اتو سایت) اتصال یافته است. این گزارش در ارتباط با یک گوساله نر هشتتاین با دو اندام اضافی در ناحیه لگنی می باشد. این دو اندام در بین دو اندام اصلی حیوان و بصورت شکمی قرار داشتند. از این دو اندام تنها یکی بصورت کامل رشد کرده بود و اندام دیگر تنها بصورت یک توده استخوانی مشاهده شد، از این رو این مورد در دسته دوقلوهای بهم چسبیده نا متقارن طبقه بنده می شود. سیستم ادراری - تناسلی تحت تأثیر قرار نگرفته بود و تنها یک ساختار پارانشیمی کلیه مانند مشاهده شد. با توجه به اطلاعات نویسنده این مورد اولین گزارش منوفالوس دایپیگوس (ترابوس/دایبر/کیوس) نامتقارن در یک رأس گوساله نر، در ایران می باشد.

واژه های کلیدی: ترابوس/دایبر/کیوس، دایپیگوس منوفالوس، دوقلوهای بهم چسبیده، گوساله هشتتاین

### \*Correspondence:

Behrokh Marzban Abbasabadi, DVM, PhD

Department of Basic Veterinary Sciences, Faculty of Veterinary Medicine, Amol University of Special Modern Technologies, Amol, Iran.

E-mail: behrokh\_ma@yahoo.com

## Introduction

Dipygus or caudal duplication is a rare anomaly in the calf that is structurally related to monozygotic twins.<sup>1</sup> According to the extension of the anomaly, duplicated cases are classified as monocephalus tripus dibrachius, monocephalus tetrapus dibrachius and cephalothracopagus.<sup>2</sup> Definitive etiological information and data about embryo duplications are limited.<sup>3</sup> It is assumed to be caused by genetic or environmental factors, or by their interaction or by ageing ova.<sup>4-6</sup>

To the author's best knowledge just one case of symmetrical monocephalus dipygus (*tetrapus dibrachius*) with urogenital defects in a female Holstein calf has been reported in Kerman, south of Iran<sup>1</sup>. So this is the first report of asymmetrical monocephalus dipygus (*tetrapus dibrachius*) in a male Holstein calf in Iran.

## Case Description

A dead male Holstein calf with two extra pelvic limbs was brought to a private clinic in August 2015 in Babol, northern Iran, and was later sent to the veterinary teaching hospital of Islamic Azad University of Babol, Iran.

The gross external features from the head down to the perineum and pelvis were essentially normal. Within the region of the pelvic and perineum, there were two extra limbs, which were directed ventrally between the two normal hind limbs (Fig. 1).



**Fig. 1.** Extra limbs in the affected Holstein calf.

The internal examination started from the pelvic region. The pelvic symphysis was not formed, and the two hip bones were separated. The hip bones were smaller than the normal size. On the left side, and at the medial border of the pubis and ischium, an articular surface was made, and the head of the extra femur was attached there by a ligament like the round ligament. The length of the extra femur was normal but because of the insufficient growth of muscular mass the diameter of femoral region was not that much. The head and the greater trochanter of

the extra femur were abnormal, and the lesser trochanter was absent. The patella was not seen as a separate bone and was just like a prominence proximal to the abnormal distal end of femur (Fig. 2). Among the patellar ligaments, just the middle patellar ligament was developed. Among the ligaments between femur and tibia, only the cranial and caudal cruciate ligaments were seen, and the two bones were connected by a broad connective tissue. The knee joint was flexed, and the extra limb was thus above the ground. The ankylosis was also observed in other joints of extra limbs. Fibula was absent but tibia and the other bones of hind paw had the same length as the normal limbs. Musculature of extra limb was significantly reduced or absent, which could be a reason for arthrogryposis. The knee and tarsal joints were fixed in flexed position, and the fetlock, pastern, and coffin joints were fixed in extended position. The flexion angles of the knee and digits were cranially, and the flexion angle of the tarsal joint was caudally.



**Fig. 2.** Patella (arrow) was just like a prominence proximal to the abnormal distal end of femur (star).

An articular surface like the one at the left side was observed on the right hip bone; however, it was smaller, and just an approximately 20 cm long bony structure was attached to it.

At necropsy, a parenchymal mass similar to an abnormal kidney was observed in sublumbar region but it did not contain cortex, medulla, renal pelvis, or any other related structures. The other internal organs were grossly normal, and no evidence of duplication was observed.

## Discussion

As previous studies showed monocephalus dipygus has been reported in domestic animals such as sheep<sup>7-9</sup> goats<sup>2,5,10</sup> and very rarely in horses<sup>11</sup> dogs and cats.<sup>12-15</sup> It is believed that the anomaly is more common in cattle and usually affects the anterior part of body.<sup>1,6,9,16-18</sup> The basic causes and mechanisms of caudal duplication and congenital limb deformities are still not well understood.

Beside genetic alterations, environmental factors such as intake of lupinus species, viral infections or exogenous hormone treatments are suspected to cause congenital duplications. Another hypothesis considers the ovulation of over-aged oocytes as a possible trigger.<sup>6</sup>

Conjoined twins classified as free or attached symmetrical or free or attached asymmetrical.<sup>5</sup> Shojaei *et al.* reported a monocephalus dipygus female Holstein calf in Kerman, south of Iran but there was some difference between that case and the present report; in that case two small supernumerary medial limbs were observed, so the case was classified as conjoined symmetrical twin, also the urogenital system was affected and two uterine and urinary bladder were observed.<sup>1</sup> The present case showed a monocephalus dipygus male Holstein calf with an extra pelvic limb attached to the uncompleted pelvic in one side and just a short bony structure in other side. Therefore, classification has been made as asymmetrical attached twins; the genital system was not affected and just one extra kidney-like structure was found.

### Acknowledgments

We would like to thank Dr. Saood Rouhani and Dr. Mohammad Reza Youssefi for their kindness in referring the case.

### References

- Shojaei B, Kheirandish R, Hasanzadeh M. Monocephalus *tetrapus dibrachius* in a calf. Comp Clin Pathol 2010; 19:511-513.
- Shojaei B, Mohebbi E, Hashemnia SH. Caudal duplication (monocephalus *tripus dibrachius*) in a kid goat. Eur J Anat 2012; 16 (3): 206-211.
- Mazaheri Y, Nourinezhad J, Ranjbar R, et al. A case of conjoined twins (*thoraco-omphalopygopagus tribrachius tetrapus*) in lamb. Vet Res Forum 2014; 5(1): 73-74.
- Kaufman MH. The embryology of conjoined twins. Childs Nerv Syst 2004; 20:508-525.
- Buhari S, Yakubu AS, Jibril A, et al. Monocephalus, thoracopagus and dipygus twins in Sokoto Red goat. Sokoto J Vet Sci 2008; 7:23-24.
- Ferick M, Behn H, Hardt M, et al. Monozygotic incomplete caudal duplication in a German Holstein calf. Vet Rec Case Rep 2014; 2:e000048. doi:10.1136/vetreccr-2014-000048
- Dennis SM. Embryonic duplications in sheep. Aust Vet J 1975; 51: 83-87.
- Doijode SV, Thorat NH, Markandeya NM, et al. Monocephalus dipygus conjoined twin lamb. Ind J Anim Reprod 1992; 13: 206.
- Hiraga T, Dennis SM. Congenital duplication. Vet Clin North Am Food Anim Pract 1993; 9(1):145-161.
- Otiang'A-Owiti G, Oduor-Okelo D, Kamau GK, et al. Morphology of a six-legged goat with duplication of the intestinal, lower urinary, and genital tracts. Anat Record 1997; 247: 432-438.
- Asquith RL, Sharp DC. An equine fetal monster *dicephalus tetrapus dibrachius*. Theriogenology 1979; 12: 39-44.
- Mazzullo G, Monteverde V, Macrif P, et al. Incomplete caudal duplication in a puppy: Gross and radiological observations. J Small Anim Pract 2007; 48: 410-413.
- Nottidge HO, Omobowale TO, Olopade JO, et al. A case of craniothoracopagus (monocephalus thoracopagus *tetrabrachius*) in a dog. Anat Histol Embryol 2007; 36: 179-181.
- Severse AM. Monocephalus dipygus parapagus: A suspected case of complete caudal duplication in a British blue kitten. J Feline Med Surg 2009; 11: 330-331.
- House J, Barrand KR, Cornillie P. A case of epigastric heteropagus twinning with other congenital abnormalities in a Chihuahua puppy. Flemish Vet J 2012; 81: 168-173.
- Abt DA, Croshaw JE, Hare WC. Monocephalus dipygus parasiticus and other anomalies in a calf. J Am Vet Med Assoc 1962; 141:1068-1072.
- Hiraga T, Abe M, Iwasa K, et al. Seven-legged calf-dipygus with an extra foreleg at the pelvic region. Jpn J Vet Sci 1989; 51: 1011-1015.
- Leipold HW, Dennis SM, Huston K. Embryonic duplications in cattle. Cornell Vet 1972; 62: 572-580.