

## Diprosopus, spina bifida and kyphoscoliosis in a lamb - a case report

Bahador Shojaei<sup>1\*</sup>, Amin Derakhshanfar<sup>2</sup>, Mohammad Mehdi Oloumi<sup>3</sup>,  
and Shadi Hashemnia<sup>4</sup>

<sup>1</sup>Department of Basic science, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman,  
Kerman, Iran

<sup>2</sup>Department of Pathobiology, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman,  
Kerman, Iran

<sup>3</sup>Department of Clinical science, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman,  
Kerman, Iran

<sup>4</sup>Student of Veterinary Medicine, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman,  
Kerman, Iran

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### ABSTRACT

Conjoined twinning has been reported in most domestic animal species. It occurs extremely rarely in horses, occasionally in dogs and cats and more commonly in cattle than in the other ruminants. A pregnant ewe was referred to the Veterinary Clinic of Shahid Bahonar University of Kerman for dystocia, and a male dicephalic lamb was delivered, which survived for 8 hours. It was a co-twin to another male lamb which was clinically normal. After macroscopic and C.T. examination the lamb was carefully dissected and histopathologic slices from the testis, lymph nodes, spleen, liver, kidneys, lung, fore stomachs and abomasum were taken, prepared routinely and stained with hematoxylin and eosin. In this study the anomalies which were seen can be categorized to complete and incomplete duplication, lack of fusion and axial deviation.

**Key words:** lamb, diprosopus, spina bifida, kyphoscoliosis

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### Introduction

Conjoined twins, considered to be monozygotic twins imperfectly separated, from a graded series of slight duplication to almost separated individuals (LEIPOLD and DENNIS, 1972). There are some suggestions for mechanism of this duplication (HERRING and ROWLATT, 1981; McGIRR et al., 1987) but the degree of duplication reportedly varies

\* Contact address:

Assist. Prof. Dr. Bahador Shojaei, Department of Basic Science, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, P.O. Box 761 691 4111, Kerman, Iran, Phone: +98 341 322 2047; Fax: +98 341 322 2047; E-mail: bshojaei@mail.uk.ac.ir

from case to case (HISHINUMA et al., 1987). Conjoined twinning has been reported in most domestic animal species. It occurs extremely rarely in horses, occasionally in dogs and cats (FISHER et al., 1986; SAPERSTEIN, 1981), and more commonly in cattle than in other ruminants (LEIPOLD et al., 1972; PAL and VERMA, 1981; RAMADAN, 1996). Diprosopus is a conjoined twin having a single trunk but with complete or partial duplication of the head (RAMADAN, 1996). In all species the most common defect associated with diprosopus is cleft palate (SAPERSTEIN, 1981) but other anomalies such as unilateral agnathia, pseudohermaphrodisim (DENNIS, 1975), kyphoscoliosis, spina bifida, arthrogryposis (LEIPOLD and DENNIS, 1972; McGIRR et al., 1987), patent urachus (RAMADAN, 1996) and mandibular deviation (FISHER et al., 1986) have been reported. This study is a report of a diprosopic sheep with some other defects.

### Materials and methods

A pregnant ewe was referred to the Veterinary Clinic of Shahid Bahonar University of Kerman for dystocia. A left paramedian Caesarean section was performed and a male dicephalic lamb was delivered, which survived for 8 hours. It was a co-twin to another male lamb which was clinically normal. There was no record of previous defects within the flock and the ewe had delivered two normal lambs. The dicephalic lamb was conducted to C.T. examination and transverse images were prepared from the whole body by 8 mm. intervals. Also, some 3-dimensional images of skull were prepared for detailed studies of bones situation. The lamb was carefully dissected after macroscopic and C.T. examinations and a photographic record was made of all recognizable anomalies. For histopathologic evaluation, samples from the testis, lymph nodes, spleen, liver, kidneys, lung, fore stomachs and abomasum were taken, prepared routinely and stained with hematoxylin and eosin.

### Results and discussion

The lamb had two symmetrical heads, fused at the masseteric region. The anterior portions of the heads were double and fused at the level of rhami of mandibles. It had two lateral and two medial eyes that the latter were in common orbit (Fig. 1). Two pinea were normal. A moderate inferior brachygnathia and mandibular deviation was also seen (Fig. 2). The skin of the parietal region of the head had not formed and only a pinkish membranous part was observed. The vertebral column was involved in extreme kyphoscoliosis at the thoracic region (Fig. 3). The heart had no defect but left subclavian artery was branched separately from the aortic arch (Fig. 4). The palates were grossly complete.

In the C.T. images, the bony roof of the skull was not formed between the common orbit of medial eyes to the foramen magnum, which was larger than normal (Fig. 5). Bone formation was not perfect. Therefore, mandible and hard palate were seen with some defects (Fig. 6). Spina bifida was seen in cervical and thoracic vertebrae (Figs. 7 and 8).



Fig. 1. Diprosopoic lamb with two medial eyes in a common orbit

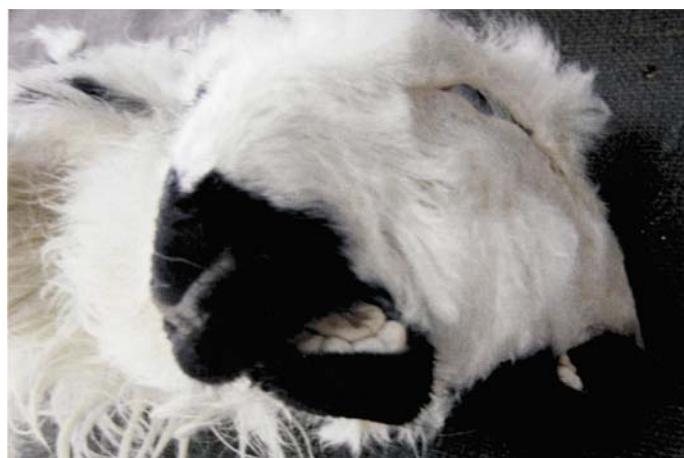


Fig. 2. Brachyglossia and deviation of mandible



Fig. 3. Kyphoscoliosis at the thoracic region

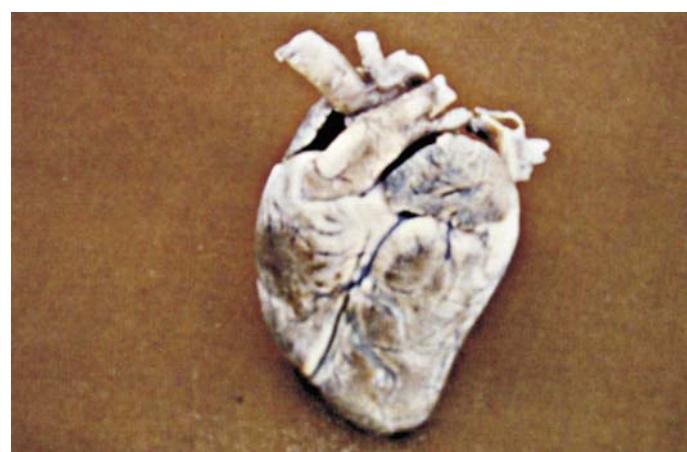


Fig. 4. Separate branching of left subclavian artery from the aortic arch

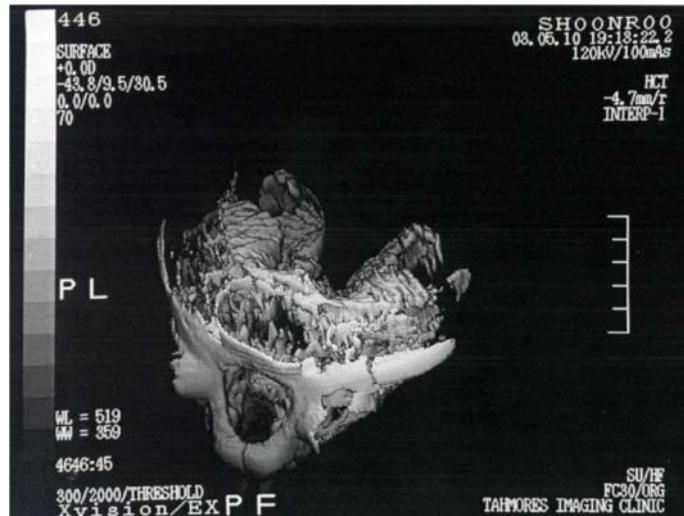


Fig. 5. Malformation of the skull roof. Note the large foramen magnum

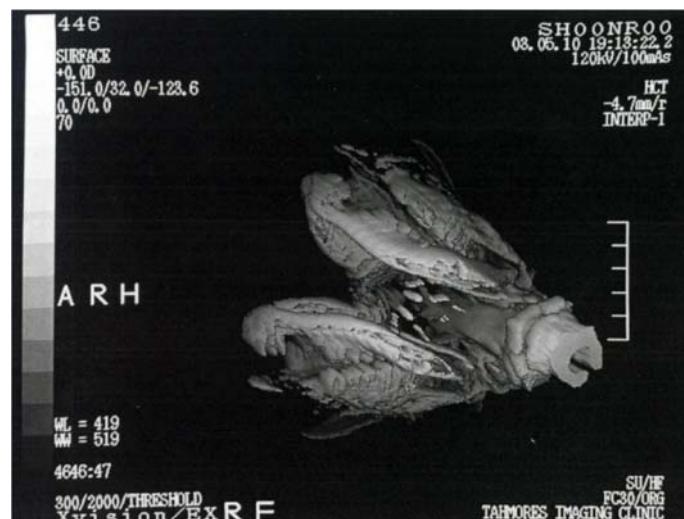


Fig. 6. Defects in bone formation in the mandible and hard palate

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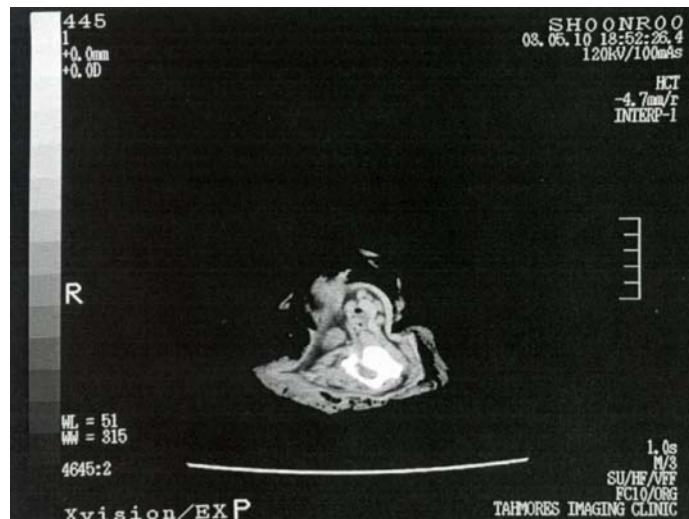


Fig. 7. Spina bifida in the cervical region



Fig. 8. Spina bifida in the thoracic region

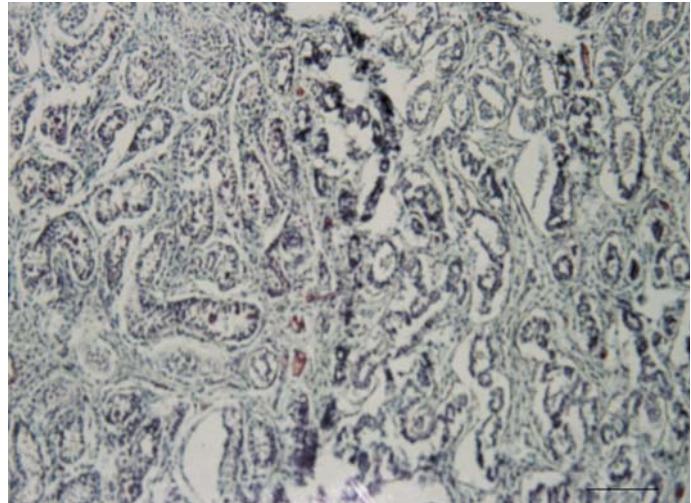


Fig. 9. Degeneration of seminiferous tubules of the testis. H&E; scale bar = 100 µm.

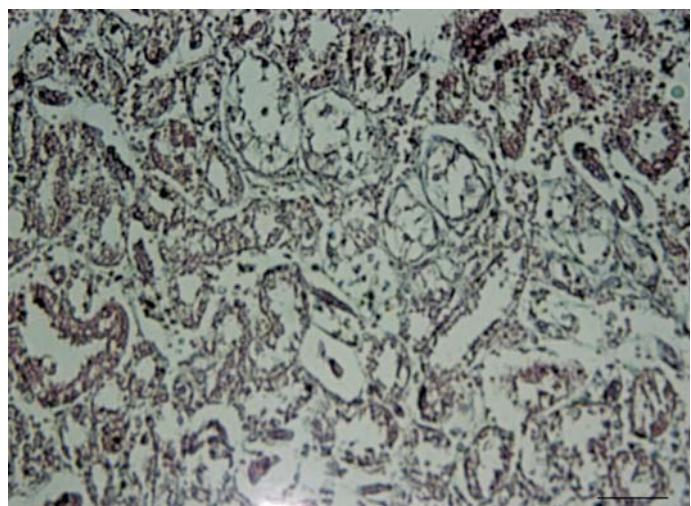


Fig. 10. Acute tubular necrosis in kidney. H&E; scale bar = 50 µm.

Microscopic examination showed hemorrhagic splenitis, degeneration of seminiferous tubules of the testis (Fig. 9) hepatocellular degeneration and severe fatty change of the liver and acute tubular necrosis (Fig. 10) with intratubular hemorrhage and granular casts in the kidneys. Lungs, fore stomachs, abomasum, lymph nodes and epididymis were normal histologically.

Malformation of the head and face is a common phenomenon among sheep abnormalities (DENNIS and LEIPOLD, 1979). However, among the ovine conjoined twin anomalies duplication of the caudal parts of the body is most frequent (DENNIS 1975). In other species, duplication of the cranial end of the body is most common (ARTHUR et al., 1982). This type of anomaly is characterized not only in sheep. Grossly similar abnormalities have been reported in a wide variety of other species (EASTON, 1985; PAL and VERMA, 1981; PARTLOW, 1981; RAMADAN, 1996; SAMIR and MAHMOUD, 1995) but the birth of a normal co-twin along with a duplicated lamb appears to be unusual. We could only find 3 other similar reports in this regard (PAL and VERMA, 1981; PARTLOW, 1981; SAPERSTEIN, 1981). In this case the teratogen affected the embryo in a craniocaudal gradient, so more duplication and malformation were seen cranially than caudally. By this gradient the strength of the teratogen has been reduced toward the caudal portions of the body. As a result of this reduction, spina bifida (incomplete duplication), kyphoscoliosis (axial deviation), and separate branching of left subclavian artery from the aorta (lack of fusion of aortic arch III) can be seen. Such similar results are seen in LEIPOLD and DENNIS (1972), McGIRR et al. (1987) and GRUYS (1973) reports as spina bifida, kyphoscoliosis and two separate pulmonary trunks. In this study the anomalies which were seen can be categorized to complete and incomplete duplication, lack of fusion and axial deviation. We could not find any other similar microscopic results.

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**SAŽETAK**

Pojava sjedinjenih blizanaca opisana je u većine vrsta domaćih životinja. Javljuju se iznimno rijetko u konja, povremeno u pasa i mačaka te češće u goveda u odnosu na druge preživače. Gravidna ovca bila je upućena na Veterinarsku kliniku Shahid Bahonar, Sveučilišta Kerman, zbog distokije. Ojanjeno muško janje s dicefalusom preživjelo je 8 sati. Janje je bilo sjedinjeno s blizancem, drugim muškim klinički normalnim janjetom. Nakon makroskopskog pregleda i obavljene kompjuterizirane tomografije, janje je pažljivo odvojeno, pri čemu su uzeti uzorci testisa, limfnih čvorova, slezene, jetre, bubrega, pluća, predželudaca i abomasusa. Uzorci su pripremljeni uobičajnim postupcima te obojeni hematoksilinom i eozinom za histopatološku pretragu. U ovom slučaju opažene anomalije mogu se razvrstati u potpunu i nepotpunu duplikaciju, nepotpuno sjedinjenje i aksijalnu devijaciju.

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**Ključne riječi:** janje, diprosopus, spina bifida, kifoskolioza

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