Indian Vet. J., October, 2005 ; 82 : 1087 - 1089

ANATOMIC FEATURES OF TWO DICEPHALIC CALVES

I.Turkmenoglu[1*], E.Karadas[2], I. Kurtul[3] and Z.K. Saritas[4]

[1]Department of Anatomy, [2]Department of Pathology, [4]Department of Surgery, Faculty of Veterinary Medicine, Kocatepe University, Afyon/Turkey, [3]Department of Anatomy, Faculty of Veterinary Medicine, Kafkas University, Kars, Turkey.

(Received : 23-10-2003; Accepted : 13-01-2004)

The cause of the conjoined twinning is not well established even though there are two main theories, fission and fusion (Siebert *et al.,* 1989; Spencer, 1992; Vanderzon *et al.,* 1998). Degree of the twinning varies from dicephalic, iniodymic, monosomic to a simple adherence.

This anomaly has been documented in both human (Groner *et al.,* 1996) and domestic animals (Camon *et al.,* 1992; McManus *et al.,* 1994). Levels of the fission have been considered to be of valuable and interesting to be reported. This report presents the gross anatomic features of the two conjoined twins.

Materials and Methods

Both calves were born to artificially inseminated recipients. They were still-born female calves delivered by the veterinary assistance of a local veterinary clinic (Afyon,Turkey). The cadavers were examined grossly for their external appearance, then were dissected with care. Nomenclature recommended by Nomina Anatomica Veterinaria (1992) was adapted.

Results and Discussion

The calves had two heads, one trunk, two thoracic limbs, and two pelvic limbs. Calf 1 possessed two well dev eloped heads joined at the level of an anomalous occipital bone while calf 2 comprised two heads, one fully developed and dominating the other, fused at the level of 3rd cervical vertebra. Structures caudal to the unification levels were single.

Osseous structures of the both heads in both calves were developed other than the anomalous and fused occipital bones in the first calf and deterioration in the smaller head of the second calf. Two separate foramen magnum were joined at the level of the first cervical vertebra in the first calf while the osseous components of the both necks up to the 3rd cervical vertebra were separate in the second calf. This vertebra was partly divided in such a way that it was in "V" shape. The musculature of the both heads and necks in the two calves were complete but an abnormal orientation of the neck of the smaller and less developed head was obvious in second calf. The nasopharyngeal and oropharyngeal cavities in the first calf were fully intact but converged caudally into a single laryngopharyngeal cavity. They were present in the second calf also but the hypoplasia of these on the second head was clearly observed. They were followed by separate laryngopharyngeal cavities. Hence separate larynges, tracheae, and esophagi were

observed. They descended caudally and united just before entering the single thoracic cavity.

Even though pattern of the related vasculature of the heads in the two calves were in normal fashion, the medial ones appeared to fail to develop. The laterally located common carotid arteries followed their usual pattern caudally, joining the single brachiocephalic trunk. However, the medially located ones united and continued caudally as one vessel and ended in joining the brachiocephalic trunk.

All orbital cavities and their contents appeared to be fully developed in both the calves, though they were smaller in the smaller head. The medial ears were lacking pinnae while the lateral ones appeared to be grossly normal in the first calf. They were all present and appeared to be grossly normal but those of the second head were smaller in the second calf.

The brain of the all heads were normal. The separate spinal cords completely united at the level of the first cervical vertebra and descended caudally as a single grossly normal spinal cord in the first calf while they united at the level of the 3rd cervical vertebra, descended caudally as a single spinal cord in the second calf.

The conjoined twinning documented by the studies (Groner *et al.*, 1996; Logrono *et al.*, 1997) might be due to atypical "hatching" which occurs either by fission (McGirr *et al.*, 1987) or by fusion (Spencer, 1992). A combination of the both was also suggested (Vanderzon *et al.*,1998). In the two cases studied, both the calves had two heads, one trunk, two throracic limbs, and two pelvic limbs. The anatomic structures of the unification regions of the both cases, especially those of the vascular system, were anomalous, in acceptance with the literature (Alo *et al.*, 1997; Marin-Padilla *et al.*, 1981; Sabherwal *et al.*, 1979). On the other hand, all the anatomic features of the both calves caudal to the unification level resembled those of a single one. These findings on the dissected calves suggest that dicephalic condition in both cases occurred because of the fission process. In conclusion, the observations in these twins suggested fission events occurred on the cranial parts of the embryonic discs. Doubling of cranial axial structures with a single caudal body suggests that there were Y-shaped development on the notochord and neural plate at early stage.

Summary

Two cases of twin calves of Holstein cow are presented in this paper. Both the calves had two heads, one trunk, two thoracic and two pelvic limbs. The calf 1 comprised two highly equally developed heads joined at the level of an anomalous occipital bone while the calf 2 had two heads, one fully developed and dominating the other less developed one. Structures caudal to the unification levels were single. The findings in these twins suggest that fission events occurred on the cranial part of the embryonic discs.

REFERENCES

Alo, P.L., Trombetta, G., Marcone, P., De Quartro, A., Memeo, L. and Di Tondo, U. (1997)... *Pathologica,* **89**:523.

Camon, J., Sabate, D., Verdu, P., Rutllant, J., Lopez-Plana, D., Anat. Embryol (Berl) **185**:45.

Groner, J.I., D.W. Teske and S. Teich, (1996)... *J Pediatr Surg.,* **31**:1698.

Logrono, R.,C. Garcia-Lithgow, C. Harris, Kent, M. and Meisner, L. (1997)... *Am J. Med. Genet.*, **73**:239.

Marin-Padilla, M., Chin, A.J. and Marin-Padilla, T.M. (1981)... *Teratology,* **23**:101.

McGirr, W.J., Partlow, G.D. and Fisher, K.R. (1987)... *Anat Rec.,* **217**:196.

McManus, C.A., Parlow, G.D. and Fisher, K.R. (1994)... *ibid.,* **239**:224.

Nomina Anatomica Veterinaria, (1992)... International Committee on Veterinary Gross Anatomical Nomenclature. 4th Ed., Gent (Belgium).

Sabherwal, U., Tandon, R. and Chopra, P. (1979)... *Jpn heart J.,* **20**:897.

Siebert, J.R., Machin, G.A. and Sperber, G.H. (1989)... *Teratology,* **10**:305.

Spencer, R. (1992)... *Teratology,* **45**:591.

Vanderzon, D.M., Partlow, G.D., Fisher, K.R. and Halina, W.G. (1998)... *Anat. Rec.,* **251**:60.

intervet

Intervet India Pvt. Ltd., is looking for a

SENIOR SCIENTIST (R&D)

for their site at Wagholi, Pune with the following specifications.

Position : Bacteriologist R&D (Bacterial vaccines).

The ideal candidate would be at least a post-graduate in Veterinary Microbiology with experience of around 3- 5 years in development / production of bacterial cultures. Additionally, exposure to GMP/GLP standards would be preferred.

Please send your application in strict confidence with in 10 days to:

The General Manager-HRD, Intervet India Pvt. Ltd.,
Briahnagar, Off Pune-Nagar Road, Wagholi- 412 207,
Pune, Fax No: (020) 27050859,
email: trideep@intervetindia.com, info@intervetindia.com