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Case Report

Ectopia Cordis Sternalis with Cantrell Syndrome in a Goat Kid (*Capra hircus*) – A Case Report

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Abstract

Ectopia cordis is a congenital condition characterised by complete or partial protrusion of heart through ventral-thoraco abdominal wall defects. Ectopia cordis is usually associated with other multiple anomalies and intra-cardiac defects. This when accompanied by protrusion of other visceral organs and diaphragmatic defects are described as pentalogy of Cantrell. This short communication documents a case report of ectopia cordis sternalis with Cantrell syndrome in a day-old female goat kid presented to University Veterinary Hospital, Mannuthy. The animal had a sternal defect with a sternal cleft which exposed the heart outside the thoracic cavity lacking a functional pericardium. There was also an improper closure of umbilical opening and suspected congenital diaphragmatic hernia. The animal was presented with severe tachypnoea and apnoea and collapsed despite attempts to stabilise.

Keywords: Cantrell Syndrome, *Ectopia cordis*, Goat

Introduction

Ectopia cordis is a congenital condition in which the heart is located outside the thorax. Among the domestic animals, ectopia cordis is reported mostly in dairy cattle. There are reports of sternal /pectoral forms of ectopia cordis in ruminants (Adrian, 1962). Ramadan and Abdin-Bey (1993) documented first case reports of ectopia cordis in goats in Saudia Arabia and Gulf region. The condition was again reported in Mehsana kids (Sutaria *et al.*, 2014) and in Toggenburg goats (Lai *et al.*, 2016). The condition could be manifested as a benign sternal cleft as a sequel to midline thoracic fusion disorders to a potentially lethal ectopia cordis. Complete cardiac displacement through sternal defects results in neonatal death (Kurt *et al*., 2016).

Materials and Methods

A day-old female goat kid weighing 2 kg was presented to Veterinary hospital, Mannuthy, with a fully functional heart located outside the thoracic cavity and improper closure of mid line from thorax to umbilicus. On examination, a midline anterior abdominal wall defect, a distal sternal cleft and a suspected defect of the anterior diaphragm were identified. A fully developed heart was located ventral part of caudal sternal region without a pericardium and skin cover. There was incomplete closure of ventral abdomen in the umbilical region with omphalocele (Fig. 1).

Figure 1: Ectopia cordis sternalis with omphalocele in goat kid

On clinical examination, the cardiac movements were well appreciated externally. The animal was tachypnoeic with subnormal temperature and feeble pulse of less than 30 per minute. Pulmonary auscultation revealed pleuritic friction rub close to costo- phrenic angle and absence of lung sound in cranial lung region. The kid was showing severe respiratory distress and collapsed before providing any treatment. (Video attached as supplementary file). On post-mortem examination, rudimentary xiphoid cartilage of sternum and incompletely developed left crura diaphragm was identified. The incomplete closure of the mid ventral line with omphalocele with intestinal loops was also evident.

The ethical issue to this particular case regards the clinical observations on first day of a goat kid's life with congenital malformation of ectopic cordis with Cantrell syndrome. The case is reported after taking a written consent from the owner.

Results and Discussion

Congenital cardiac abnormalities occur in all species including humans (Kabbani *et al.*, 2002). The occurrence of this condition in human was estimated between 5.5 and 7.9 per one million, in live birth (Khoury *et al.*, 1988). The prevalence of congenital cardiac abnormalities are more in cattle and least in horses (Rooney and Franks, 1964). Ectopic cordis is the partial or complete displacement of the heart in an abnormal position outside the thoracic cavity (Hamali and Ashrafihelan, 2010). Among ruminants, Ectopic cordis cervicalis is more common in cattle (Gopal *et al*., 1986). Cantrell syndrome or pentalogy of Cantrell is a congenital condition manifested as exposed cardiac musculature, tachypnoea and arrhythmia due to functional derangements of diaphragm characterized by midline

birth defects involving anatomical defects in sternum (Cantrell *et al.*, 1958). The exact cause of the condition is not known and symptomatic treatment is recommended with very less chances of long-term survivability. The condition is characterised by five identified deformities such as abnormal pericardium, abnormal sternum morphology, congenital diaphragmatic hernia, omphalocele and ventricular septal defect. (Williams *et al.*, 2019). Smigiel *et al.* (2011) identified genetic predisposition in human babies suggesting X-linked recessive inheritance. The survival rate for ectopia cordis is reported to be 10 percent with most instances terminating in stillbirth. Most human infants that survive birth are reported to die within hours or days and Pentalogy of Cantrell remains as a disease associated ectopia cordis with high mortality (Williams *et al.*, 2019). Similar case of ectopic cordis sternalis was also reported by Ramadan and Abdin-Bey (1993) who followed a surgical attempt to correction but animal died during the surgical procedure.

Conclusion

A case report of congenital ectopic cordis sternalis along with Cantrell syndrome in a goat kid is reported.

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Conflict of Interests

There is no conflict of interest.

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