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Research Article

Post-mortem Radiographic and Clinical Evaluation of Cleft Palate in a Day Old Balami Lamb: A Case Report

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ABSTRACT

Cleft palate is a defect of longitudinal fusion that affects the bone and the mucosa in the midline of the hard palate. This defect in the fusion of the palatal lateral shelves from the maxillary processes results in an open cleft between the oral and nasal cavities. The objective of this work is to report the morphological characteristics of palatine clefts observed in a neonatal lamb delivered following a dystocia case presented at the Large Animal Clinic Unit of the Veterinary Teaching Hospital, University of Jos, Nigeria. Following delivery of the ram lamb, upon clinical examination, it was discovered to have a suspected cleft palate. Radiography was then carried out for confirmation. In cleft palate, clinical signs vary with the degree of defect and may include unsatisfactory growth of the neonate, drainage of milk through the nostrils during and after breastfeeding, coughing, vomiting, sneezing during feeding, relapsing respiratory tract infections, respiratory infection, and pneumonia because of food aspiration. Due to possible hereditary predisposition, breeding in some affected animals such as dogs is not normally recommended, although surgical treatment could be done, but such option should be postponed if possible up to 45 days or preferably at three months of age to reduce possible anesthetic risk. This study is beneficial in expanding the horizon of knowledge on the morphology of the cleft palate, which will ultimately aid in the ease of diagnosis of this case for prompt medical attention.

Keywords: Cleft Palate; Evaluation; Gross; Lamb; Radiographic

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INTRODUCTION

A cleft lip or palate happens when the structures that form the upper lip or palate fail to join together when a fetus is developing in the womb. The exact reason why this happens to some fetus is often unclear. Cleft palate (palatoschisis) is a severe congenital defect found in neonates (Nathan *et al.,* 2014).

Cleft palate is most commonly recognized when milk or other ingested feed is seen exiting the nares during or shortly after ingestion. Cleft palate is diagnosed in some affected animals during evaluation of aspiration pneumonia. Cleft palate may be seen alone or as part of other facial defects. Cleft palate in sheep and goats is commonly associated with ingestion of piperidine alkaloids (e.g. ingestion of hemlock, *Conium maculatum; Opium poppy, etc*) during pregnancy. Although genetics is considered the main cause of this problem, nutritional deficiencies, viruses, and poisons that affect the dam during pregnancy may also increase the risk of cleft palates. Cleft lip or cleft palates are among the most common birth

defects. They most commonly occur as isolated birth defects but are also associated with many inherited genetic conditions or syndromes (Fossum, 2008).

Abnormal respiratory sounds are identified on auscultation when aspiration pneumonia is present in cases of animals with cleft palate condition. The diagnosis of both the cleft lip and the cleft palate is clinical, and the incomplete lip closure is easily recognized visually. However, the incomplete closure of the pre-maxilla, hard palate, or soft palate requires thorough oral inspection (Sousa *et al*., 2018). This case report aims to evaluate and present insight and diagnostic features observed in the diagnosis of this condition.

MATERIALS AND METHODS

Clinical Case Presented

Signalment and History

A 4-year-old ewe weighing 30.4kg was presented at the Large Animal Clinic Unit of the Veterinary Teaching Hospital, University of Jos, on the 23rd of August 2024, with the chief complaint of prolonged labour as observed by intermittent straining by the ewe. History revealed that the condition started 6 hours before presentation. Physical and clinical investigations were carried out on the patient. The ewe was observed to have an oedematous vulva with persistent moderate dark brown watery vulva discharge, enlarged abdomen, straining and being restlessness and on close examination foetal membrane was seen hanging from the vulva. The body temperature was obtained as 38.0˚C, Pulse rate (80 beat/minutes) and respiratory rate (23 cycles/minutes). The vital parameters of the ewe upon presentation are as shown in Table 1.

Table 1: Dam's vital parameters on the day of presentation

Parameters	Patient's Values	Reference Values
Temperature (^{0}C)	38.1	37.5-39.4
Heart rate (beats/min)	80	60-90
Respiratory rate (cycles/min)	21	12-20

Outcome of Medical Intervention on the Ewe

The pregnant animal was restrained, and the perineal region was thoroughly cleansed. The Clinician then wore a sterile rubber hand glove on each hand. K-Y Jelly was then applied to lubricate the hand before insertion into the birth canal to determine its patency through the ease of passage of at least three fingers. The dam was then able to deliver following a medical intervention (oxytocin injection at the dose rate of 20 I.U. corresponding to 2 ml intravenously) followed by manual traction after 1 hr of the administration of the drug. The dam was then injected with oxytetracycline at the dose rate of 20mg/kg corresponding to the volume of 3ml intramuscularly. This was done to prevent possible secondary bacterial infection. The delivered lamb was cleaned and examined and discovered to have an opening on the upper lip. However, the lamb died after an hour postpartum, although there was no verified connection between the cleft palate and the possible cause of the lamb's death. Still, the lamb did not attempt to suckle after being delivered till its death.

Diagnostic/Evaluation Plan on the Lamb

To conduct a postmortem examination on the dead lamb.

Postmortem findings

At post-mortem examination an open hole was observed linking the mouth and the nose (see plates attached). Following the post-mortem finding, the plan was made to take radiographs/photographs so as to further study the condition and establish the morphological features used for the diagnosis of the condition.

Differential Diagnoses

Cleft palate

Traumatic wound.

RESULTS/CONFIRMATORY DIAGNOSIS

Gross Findings

As shown in Plates I-III presented below, cleft lip or palate was immediately identifiable at birth. Cleft palate in this study appeared as a split in the lip and roof of the mouth (palate) that affected both sides of the face, appearing as a big notch in the lip and extended from the lip through the upper gum and palate into the bottom of the nose.

Radiographic Findings

The radiological evaluation revealed a radiolucent appearance in the area of the palato-incisive bone indicating the cleft palate. This is shown on Plates IV and V.

Plate I: A lamb with cleft palate (forceps pointing)

Plate II: A lamb with cleft palate (red arrow head); exposed incisive bone (black arrow) which surrounded the cleft palate.

Plate III: Photograph of the lamb's head showing clearly the cleft palate (red arrow)

Plate IV: Radiograph of the lamb: right lateral view (Arrow indicating a radiolucent area of the palato-incisive bone indicating the cleft palate).

Plate V: Left lateral view of the lamb's radiograph (Arrow indicating a radiolucent area of the palato-incisive bone indicating the cleft palate)

DISCUSSION

The cleft palate, or palatosis, is a longitudinal fusion defect of varying lengths that affects the bone and mucosa in the midline of the hard palate. This defect in the fusion of the palatal lateral shelves from the maxillary processes results in an open slit between the oral and nasal cavities, which allows the cavity to intersect (Nunes, & Ferreira, 2015). This report is consistent with the findings in this present case report.

Cleft palate can result when the palatine shelves fail to fuse during gestation and this fusion typically occurs at 25–28 days of gestation in dogs, and 47 days of gestation in horses and could be generally between 1 month to 2 months during prenatal development in animals. However, in this present study the gestational age at which the fusion failed was not determined because this is a case report observed after delivery of a lamb which was not monitored prenatally.

Radiographic observations made in this case revealed that the recognizable feature of cleft palate appeared as a radiolucent area (which appeared as dark zone). This is because this area (hole) cannot attenuate x-ray energy because of their low calcified tissue (Arntsen *et al,* 2008). Bones are generally radio-opaque, thus they attenuate x-ray energy more than other tissues and appeared white on radiographs, however in this case cleft palate being radiolucent in nature thus could not absorb the radiation.

A radiographic picture of the head is a valuable aid for diagnostic purposes and for research concerning the growth of the head in animals. In many instances, a radiograph of the head according to Shojaei *et al., (*2008), is used as a representation of the bony and soft tissues of the head; however, the soft tissues as well as the complex arrangements of numerous structures of the head may influence the measurements of the bony parts, thus making a radiographic anatomy of the head region most times difficult to understand. The radiolucency of this area may also support the concept of poor mineralization of the cleft palate in contrast to the other parts of bones of the head (Peterson & Dechow 2002; Arntsen *et al,* 2008).

The present case presented with a cleft palate which was also associated with a cleft lip which is a primary palatine cleft, at the opening of the upper lip that occurs due to involvement of the primary palate (lips, premaxilla and incisive bone) and is a congenital malformation of the face, causing the deforming opening in the upper lip of the animal (Hoskins, 2001; Ribeiroo, & Moreira, 2005; San-Román, 1999).

Clefts can be either of the primary palate (involving the lip and incisive bone), cleft lip (harelip); or of the secondary palate (involving the hard and soft palate). The conditions can occur singly or together. In dogs, Computed Tomography (CT) studies have shown an association of cleft palate with other craniofacial abnormalities, including hypoplastic

tympanic bullae, hypoplastic nasal turbinates, and maxillary malocclusions, mostly of the incisors. This multiple occurrence however is yet to be confirmed in ovine species probably because the case of cleft palate is not well studied or documented in this animal species as compared to dogs, or possibly still dog owners being more inclined to getting a reason for puppy losses and willing to spend money even after death to obtain a diagnosis than sheep owners hence lower diagnosis.

Among the possible causes involved in the pathogenesis of congenital palatine clefts in sheep are those resulting from fetal injuries at specific stages of development: ingestion of teratogenic or chemical agents, nutritional deficiencies such as riboflavin, folic acid and vitamin A deficiency, therapies with corticosteroids, or possible hereditary factors (Davies, 2011). The findings in our present work however, was unable to determine the exact cause because this was not done under a controlled environment with appropriate monitoring.

Cleft palate and cleft lip have been described in most domesticated animal species, including dogs, cats, ruminants, horses, and camels. The palatal cleft lesion presents high lethality rates (Santos, 2010). Many affected neonates are euthanized or die early in life. Animals with both primary and secondary defects of the palate mostly die or are submitted to euthanasia (Sousa, *et al*., 2018).

Due to possible hereditary predisposition, reproduction of the affected animals is not normally recommended (Peterson and Kutzler, 2011). However, in some cases of the cleft palate, surgical treatment could be done but such option should be postponed if possible up to 45 days or preferably at three months of age to reduce possible anesthetic risk (Sousa *et al*., 2018).

Although surgical repair has been undertaken in many species, success has varied, and complications such as surgical site dehiscence, continued nasal discharge, and chronic pneumonia have been reported. In the cleft palate, clinical signs vary with degree of defect and may include unsatisfactory growth of the neonate, drainage of milk through the nostrils during and after breastfeeding; as well as coughing, vomiting, sneezing during feeding and relapsing respiratory tract infections; respiratory infection and pneumonia because of food aspiration (Hoskins, & Dimski,1997).

This study is beneficial in expanding the horizon of knowledge on the morphology of the cleft palate which will ultimately aid in ease of diagnosis of this case for prompt medical attention.

CONCLUSION

Cleft palate pose threat to the life of an animal (compromised breathing and feeding). Without surgical correction survival rate in sheep is not certain but other animals like cats and dogs can survive with good management system (feeding with liquid foods). Surgery can be performed with some level of success; however this is sometimes discouraged in animals with possible hereditary disposition. Pregnant animals should be prevented from possible of ingestion of poisonous plants and certain medicinal properties to avoid possible predisposition to giving birth to neonates with cleft palate. This study is beneficial in expanding the horizon of knowledge on the morphology and radiography of cleft palate which will ultimately aid in ease of rapid diagnosis of this case for prompt medical attention.

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