Dystocia in Cow due to Anasarca Syndrome along with Pulmonary Hypoplasia and Renal Hypertrophy in Aborted Calf: A Case Report

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ABSTRACT

Background: A case of dystocia due to fetal anasarca (hydrops foetalis) in a cow and the fetus was in posterior presentation and relieved by cesarean section by forced traction and giving incision on the fetal body. On clinical examination of the fetus, it was found to be fetal anasarca (hydrops fetus). For future investigation of the fetus post mortem examination was conducted, which revealed the typical finding of pulmonary hypoplasia and hypertrophy of kidneys with anasarca diagnosed as a developmental anomaly; pulmonary hypoplasia and anasarca syndrome.

Methods: Post mortem of the aborted fetus was performed on 20/12/2024, 11:AM and tissues from viscera (lungs, liver, spleen, kidney) were collected in 10% NBF for histopathological examination. Routine H and E staining was performed and microscopical lesions were examined.

Result: Macroscopic findings were significant such as pulmonary hypoplasia, hydrothorax. anasarca and marked enlargement of both kidneys to about 18 cm in length. putrefactive and autolytic changes were observed in visceral organs like heart, liver, spleen, intenstine and ballooning appearance of kidneys. Microscopic examination of liver revealed focal area of necrosis infiltrated with numerous polymorphonuclear lymphocytes (PMNL's) in liver tissue and also dilated sinusoids infiltrated with neutrophils and hydropic degeneration of hepatocytes. Microscopic section of lungs revealed bronchointersititial pneumonia and intralveolar oedema. Microscopic section of kidney tissues revealed autolytic changes. The cow recovered uneventfully after twelve days of post-operative management.

Key words: Broncho-interstitial pneumonia, Foetal anasarca, Hydropic degeneration, Hydrothorax, Hypertrophy, Pulmonary hypoplasia.

INTRODUCTION

Hydrops fetalis also referred as fetal hydrops is defined as the condition in which there is severe accumulation of fluid inside the thoracic and abdominal cavities of the fetus along with its extravascular compartments and generalized skin thickness of more than 0.5 cm (Bellini *et al.*, 2009). This condition results into a rare congenital abnormality in bovines referred as Pulmonary hypoplasia and Anasarca syndrome (PHA) particularly evident in *Dexter* and *Simmental* calves (Yuksel *et al.*, 2019). Developmental anomalies can occur due to defects in bone or cartilagenous tissue development, or due to primitive mesenchymal tissue. Extreme subcutaneous edema (anasarca) and underdeveloped lungs (pulmonary hypoplasia) are the characteristic lesions of PHA syndrome. This syndrome is often associated with placental enlargement, pericardial and pleural effusion and ascites (Svara *et al.*, 2015) and many genetic diseases and is associated with alpha thalassemia (Bellini *et al.*, 2015). Anasarca is an anomaly which is characterized by excessive fluid accumulation between all the soft tissues of the calf (Dogan *et al.*, 2022). PHA results in peculiar abnormalities as hereditary "Bulldog" like appearance of calves (Windsor *et al.*, 2006). Certain significant histopathological changes were also reported in PHA such as perivascular and intralveolar edema, endocardial fibrosis, hydropic degeneration of liver cells (Dogan *et al.*, 2022; Yuksel *et al.*, 2019). In this article, a rare case of fetal anasarca in a calf fetus delivered by caesarean section from a cow are defined and the clinical, macroscopic and microscopic findings are presented.

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Case history

A case of dystocia in a crossbred cow in third parity, full term pregnant was presented to Teaching Veterinary Clinical

Complex, DSVCKV, Durg with a history of severe labour pain for more than 24 hour. The water bag had ruptured 14 h before. One foetal hindlimb was protruding out of the vulva without any progress and the animal was straining severely. The animal appeared to be exhausted due to severe straining. Physical examination revealed edematous valval lips, congested mucus membrane and subnormal body temperature and severe dehydration. Per vaginal examination after proper lubrication revealed edematous vaginal tract, tin posterior longitudinal presentation of the fetus, dorso-sacral position with one hind-limb protruding from vulvas and another hind limb was unable to be palpated. The fetus was felt as deformed, fetal movements and other reflexes were found to be absent and limbs were short and were without hairs and appeared edematous and swollen with fatty deposition under the skin and suspected to be case of dystocia due to anasarca fetus (Fig 1). The animal was subjected to caesarean section through left ventro-lateral oblique approach and the dead fetus along with the fetal membranes was delivered successfully. The calf was abnormally enlarged and swollen (Fig 1 and 2) resembling a bull-dog like appearance due to swollen face (Fig 3), belly and extremities. Diffused subcutaneous edematous swelling was observed throughout. During the caesarean section, the right horn of the uterus was severely enlarged, filled with plenty of fluid leading to excessive accumulation between the subcutaneous tissues. The present study recorded a case of fetal hydrops in calf delivered by cesarean section and its clinical, gross and histopathological findings are presented.

MATERIALS AND METHODS

Tissue samples, including the lungs, heart, liver and kidneys were collected and stored in 10% NBF for 72 hours at room temperature to ensure proper fixation. Subsequently, 0.5 cm thick tissue sections were cut from the fixed tissues and processed for routine histopathological examination. The cut tissue sections underwent dehydration using ascending grades of alcohol and were then cleared through two changes of xylene. Further, paraffin-embedded tissue sections were processed and 4 to 5-micron thick sections were cut using a semiautomatic microtome, placed on glass slides. For routine histopathological examination, the sections were stained with Haematoxylin and Eosin (H and E) as per standard protocol (Luna, 1968).

RESULTS AND DISCUSSION

External examination

External examination further highlighted several notable observations: the carcass exhibited a emphysematous condition, protrusion of edematous tongue from mouth although the mucous membranes appeared pale, indicative of potential underlying tissues. Rigor mortis was



Fig 1: Aborted bovine fetus was severely deformed due to marked diffuse subcutaneous oedema.



Fig 2: Prominent facial oedema.



Fig 3: Hydrothorax; Inflammatory fluid in the thoracic cavity.



Fig 4: Accumulation of fluid (fetal urine) in the abdominal cavity.

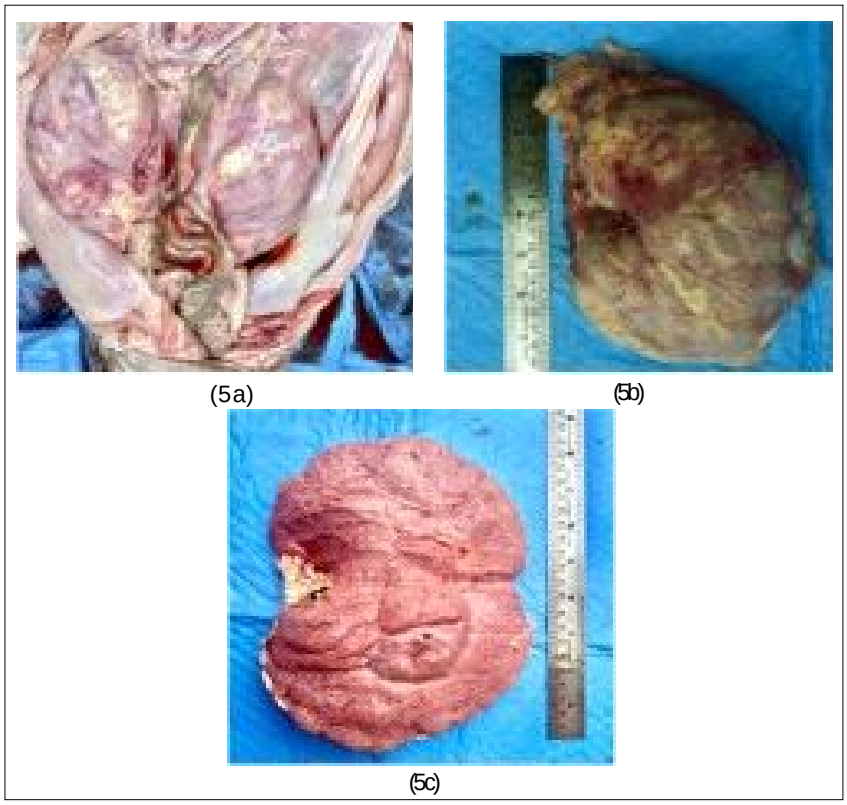


Fig 5 (a-c): Marked hypertrophy of both right and left kidney.

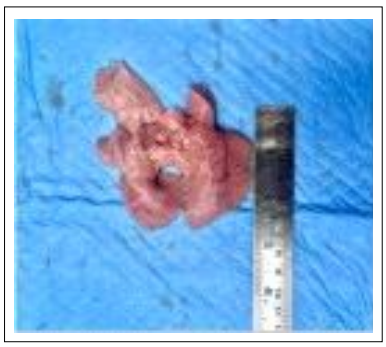


Fig 6: Prominent pulmonary hypoplasia.



Fig 7: Rounded appearance heart due to marked dilatation of the heart chambers.

not evident in the hind limbs, indicating the postmortem interval. Additionally, various signs were observed, including severe generalized subcutaneous edema, accumulation of fluid in thoracic and abdominal cavities, marked increase in the size of extremities and head. These findings collectively suggested a complex and potentially severe pathological process affecting the animal.

Gross examination

Aborted bovine fetus was severely malformed due to marked diffuse subcutaneous oedema and amber colored fetal fluid accumulation, mixture of allantoic and amniotic fluid (Fig 1), facial oedema (Fig 2). Subcutaneous tissue exhibited severe accumulation of yellowish tinged serous fluid. There was marked hypoplasia of skeletal tissues (shortened rib cage) due to excessive accumulation of fluid inside thoracic cavity (hydrothorax; Fig 3) and pressure exerted by it. Accumulation of excessive fluid of fetal fetal urine) inside abdomen leading to ascitis (Fig 4) and severe disproportionatory enlargement of kidney (Fig 5a-c). Marked hypoplasia of lungs was observed (Fig 6). Uncommon bilateral dilatation resulting in rounded appearance of heart (Fig 7). Spleen was normal without any distortion in shape and size (Fig 8).

Histopathological examination

Tissue sections from lungs were evident of severe perivascular and interstitial edema (Fig 9a) with intralveolar

oedema (Fig 9b), desquamation of bronchiolar epithelium (Fig 9c,d) along with collapse of alveoli (atelectasis; Fig 10a), peripheral extravasation of mononuclear cells (Fig 10b). Other prominent microscopic findings were Interstitial pneumonia with thickening of the alveolar wall is observed and desquamation of bronchiolar epithelium with peripheral extravasation of leucocytes and mononuclear cells. Liver tissue sections revealed mild hydropic and vacuolar degeneration of hepatocytes (Fig 11a-d). Heart tissue sections were evident of myocardial necrosis (Fig 12a) and endocardial fibrosis characterised by extensive prolifration of fibrous connective tissue was observed (Fig 12b). Tissue sections from kidney were severely autolysed imparting non-significant pathological changes. Tissue section of liver was observed with mild hydropic and vacuolar degeneration of hepatocytes however autolytic changes were in abundance inside liver tissues so any substantial pathological change was not evident.

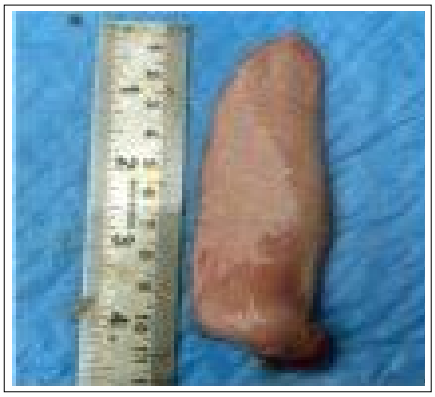


Fig 8: Normally developed spleen.

Gross and histopathological findings such as pulmonary hypoplasia, atelectasis in lungs, amber colored fetal fluid accumulation, anasarca, rounded misshapen appearance of heart, interstital, perivascular and intralveolar edema, endocardial fibrosis in the aborted fetus were in accordance with the findings of Dogan *et al.* (2022); Sengodan *et al.* (2022); Švara *et al.* (2015); Yuksel *et al.* (2019) and Monteagudo *et al.* (2002). Edematous vaginal tract observed after per vaginal examination of cow was also reported by Rajput *et al.* (2024). Microscopic examination of tissue sections from liver showing hydropic degeneration in hepatocytes was also reported by Dogan *et al.* (2022). “Bull dog” like appearance of calf was observed as reported by Windsor *et al.* (2006). The occurrence of such lesions causing dystocia in bovines are extremely rare. The caesarean section was performed in the routine matter as outlaid by Kumar (2002). The cow recovered uneventfully in a period of twelve days post operation. Anomalies observed in the aborted fetus may be associated with the dystocia and abnormal posterior presentation of fetus leading to caesarian section. The cause of abortion in cow may be associated with BVDV

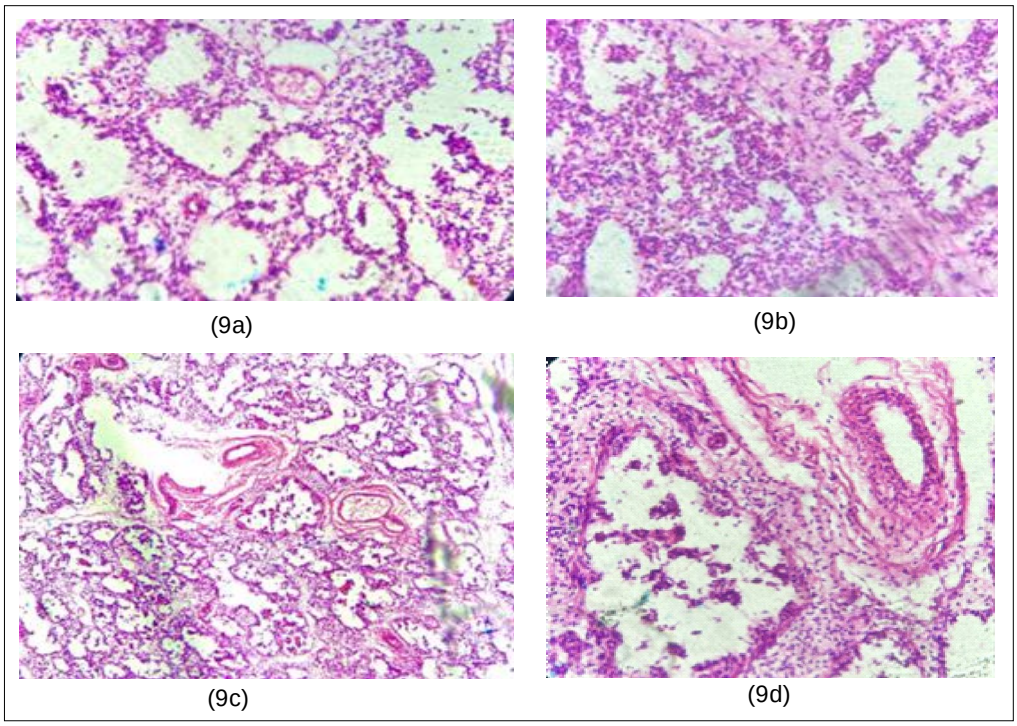
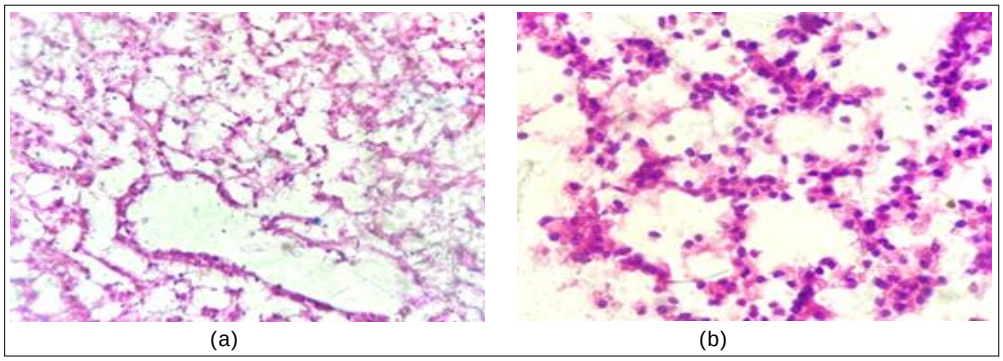
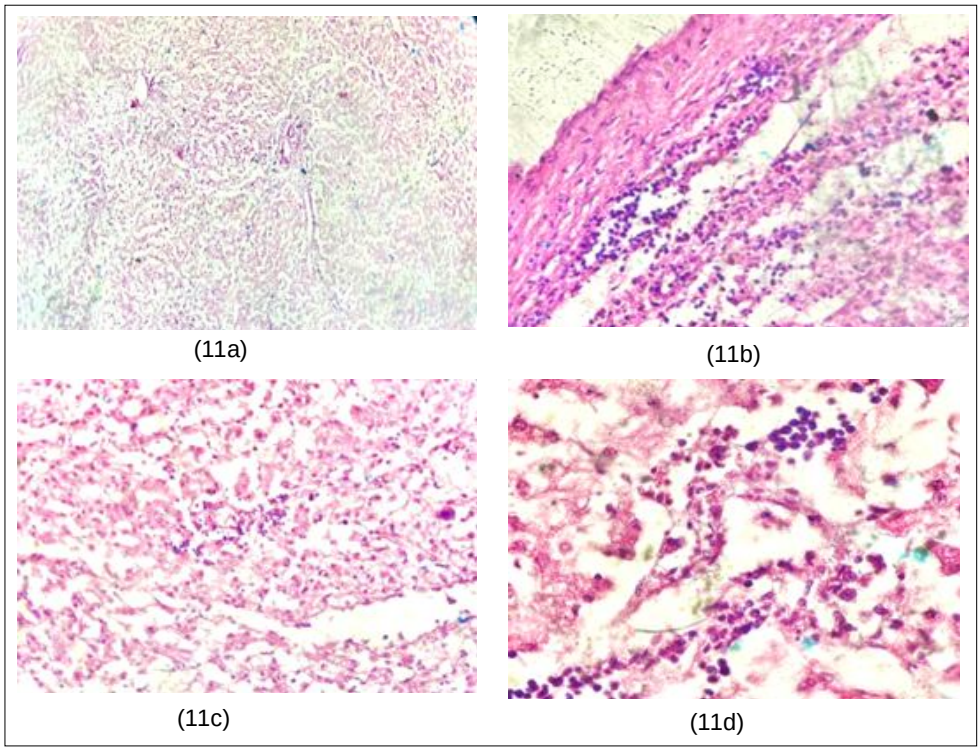


Fig 9(a-d): Lungs, hypoplasia of pulmonary parenchyma (9a,c) and interstitial pneumonia with thickening of the alveolar wall is observed and desquamation of bronchiolar epithelium with peripheral extravasation of leucocytes and mononuclear cells 9c; H and E × 100), d; 40× H and E areas with intra-alveolar oedema and congested blood vessels (9b; H and E × 400).



(a) (b)

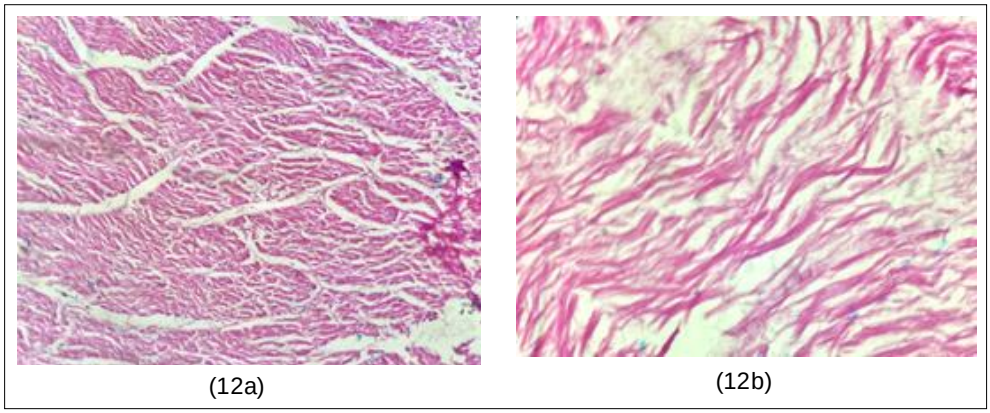
Fig 10: (a) Atelectasis; collapse of alveoli with hyperemia (H and E × 400), b) peripheral extravasation of leucocytes and mononuclear cells (H and E × 1000).



(11a) (11b)

(11c) (11d)

Fig 11(a-d): Section of liver with mild hydropic and vacuolar degeneration of hepatocytes (H and E × 100 ; H and E × 400).



(12a) (12b)

Fig 12: (a,b) Heart; myocardial necrosis (a H and E × 100) with extensive prolifration of fibrous connective tissue in the endocardium (b H and E × 400).

(Bovine Viral Diarrhoea Virus) infection as reported by Yilmaz *et al.* (2016) corelated with the microscopic lesions like broncho-interstitial pneumonia, alveolar oedema *etc*. but confirmation of BVDV virus can be done through RT-PCR (Yilmaz *et al.*, 2016).

CONCLUSION

In summary, the necropsy of the calf revealed anasarca and pulmonary hypoplasia syndrome along with marked renal hypertrophy resulting in severe fluid accumulation in the thoracic and peritoneal cavity, bilateral abdominal distension leading to death due to excessive pressure exerted by the fluid on viscera, hydrothorax, hydroperitoneum and bilateral hypertrophy of kidneys highlighted the severity of the condition. Microscopic examination further elucidated pulmonary, hepatic and cardiac involvement with atelactasis, pulmonary oedema and hydropic degeneration of hepatocytes in liver tissues. These findings underscore the importance of comprehensive postmortem evaluation in understanding the developmental anomalies in calf.

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Consent for publication

All the authors consent to the publication of this manuscript.

Ethics approval consent to participate

This research followed the instructions specified by Institutional Animal Ethics Committee (IAEC). All the experimental procedures were carried out as per the guidelines of the IAEC.

Conflict of interest

All authors declare that they have no competing interests.

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