

RUMINOSCOPIC VISUALISATION OF AN UNUSUAL RUMENITIS IN A SIX-MONTH CAMEL CALF: A CLINICAL CASE REPORT

Abdulaziz H. Almuhananna

Department of Clinical Sciences, College of Veterinary Medicine, King Faisal University,
PO BOX 400 Al-Ahsa 31982, Saudi Arabia

ABSTRACT

The present clinical case report aimed to describe a novel ruminal finding in a 6 months camel calf. The case was suffering from chronically progressive weight loss, unthriftiness and stunted growth. Upon clinical examination, the calf appeared with generalised weakness, the origin of which couldn't be clinically detected. A comprehensive clinical and laboratory examination was performed but it did not yield a diagnostic significance. Examination of the rumen *via* endoscopy revealed presence of massive lesions occupying the caudo-dorsal parts of the rumen. The nature of the reported lesions was extensive scare tissue formation, ulceration, ruminal wall hypremia, thickening of ruminal wall and nodules formation.

Key words: Camel, rumen, ruminoscopy, endoscopy, rumenitis

Digestive disorders in camels are highly prevalent and represent a major concern in camel medicine (Cebra, 2014). These include those occupying the oral cavity, oesophagus, rumen and intestine. Each of these organs can sometimes have slightly varying clinical presentation and should be approached using specific diagnostic tools. The diseases affecting the oral cavity can be approached simply by direct inspection of the oral mucosa (Eze *et al*, 2012), whereas the vast majority of oesophageal disorders in camels manifest clinically with vomiting following swallowing and are approached via oesophagoscopy (Shawaf *et al*, 2017; Zabady and Shawaf, 2022). On the other hand, enteric diseases may sometimes appear clinically with diarrhoea, constipation or eventually progressive unthriftiness in neglected chronic cases. Intestinal abnormalities are best assessed by abdominal ultrasound (Tharwat, 2020).

Although, abdominal disorders may appear with variable forms of abdominal distention (left or right sided or even symmetrical) (Tharwat *et al*, 2012), there are some disorders (such as those affecting the dynamics of ruminal wall) that do not always have obvious clinical presentation especially in the early course of the disease, rendering clinicians from reaching accurate diagnosis and making disease identification a challenging task. Such cases

requires collaborative efforts made among specialised clinicians and could be best approached through the application of comprehensive diagnostic tests and sophisticated veterinary imaging.

An example of ruminal disorder that primarily affects the ruminal wall integrity is gastric ulceration. Ulcerative lesions of the ruminal mucosa could be classified as either perforating or non-perforating ulcers (Neubert *et al*, 2024). Additionally, the vast majority of perforating gastric ulcers appear with severe clinical presentation when compared to the non-perforating type, with the former group carrying the possibility of invading other organs within the abdomen such as the kidneys or peritoneum, or within the thorax and leading to pneumonia, eventually resulting in potential multi-organs dysfunction (Neubert *et al*, 2024). In some cases of perforating gastric ulcers, the ongoing blood loss resulting from damaged gastric vasculatures might also lead to chronic, progressive and unresponsive anaemia, which could be severe enough to cause death (Wagener *et al*, 2023).

The purpose of this work was to report an unusual necrotic lesions in the ruminal wall of a young dromedary camel calf. The novelty in this work is related to the successful ante mortem ruminoscopic detection of such rare finding as well as to report the associated clinical signs. In addition, the possible

SEND REPRINT REQUEST TO ABDULAZIZ H. ALMUHANANNA [email: aalmohana@kfu.edu.sa](mailto:aalmohana@kfu.edu.sa)

theories behind the aetiology for such lesions are also thoroughly proposed and critically discussed.

Materials and Methods

The present case report was approved by the Research Ethics Committee at King Faisal University (KFU-REC-2024-DEC-ETHICS2917). A six-months she-camel calf of Waddah breed weighing 110 Kg was admitted to the Veterinary Teaching Hospital at King Faisal University with a complaint of stunted growth, lack of vitality among other camels, isolation from the herd and unthriftiness. The case had been examined by some local veterinarians who, at that time, provided a panel of commercially available medications (broad spectrum antibiotic, anti-inflammatory, multivitamins, rumenatorics and nerve tonic), which was used with little transitory effect or no satisfactory response to therapy. Upon arrival to the camel clinic, the case was clinically examined and vital signs were thoroughly assessed. All vital signs were within the normal range except for apparent weakness and slight dullness. Examination of the skin and wool revealed presence of circular-shaped alopecia suggestive of possible fungal lesions (Fig 1). Therefore, we then voted for ruminoscopy for examination of possible ruminal foreign body because the case did not have a specific clinical presentation indicating specific organ involvement. The details of ruminoscopy procedure application in camel is described entirely elsewhere (submitted for publication) and a brief summary is recapitulated in this paper. The ruminoscopic procedure was performed while the animal placed on sternal recumbency. Then an intravenous dose of sedation was used to control the animal and to minimise any potential physical damage to the endoscope. Once sedated, a wooden mouth gag was then placed inside the oral cavity and was securely handled by two expert clinicians. After ensuring the patency of the oral cavity, the endoscope was then inserted *via* the oral route and passed the pharynx and eventually reached the oesophagus. At this point, the head and neck of the animal were lowered to a position below the trunk to facilitate drainage of any lodged food or accumulated saliva. Adopting and maintaining the animal in this position enabled easy and clear visualisation of the oesophagus as the endoscopy was passing toward the cardia opening. Finally, the insertion tube of the endoscopy was pointed toward the cardia opening and advanced through it and the rumen was then accessed. The rumen was endoscopically visualised thoroughly and the ruminal

lesions were also detected and described. In addition, the strength of ruminal wall motility and the nature of ruminal contents were also assessed. Haematological finding included neutrophilia, lymphocytopaenia and reduction in RBCs count and haemoglobin level.

Results and Discussion

The endoscopic examination of the rumen enabled visualisation of an unusual ulcerative and necrotic lesions that were mainly visible in the caudal border of the ruminal wall (Fig 2A), with the possibility that the lesions were initially started in the ventral floor of the rumen and then developed and spread caudo-dorsally. A small part of the dorsal roof of the ruminal wall was found abnormally pedunculated (Fig 2B), although this region did not show similar necrotic lesions, but it was evidently having abnormal morphology suggestive of underlying disease process. Interspersed within the necrotic tissues were some regions showing round-shaped nodules like structures arising from the ruminal wall with no visible discolouration or tissue degeneration (Fig 2C). The regions of junctions between healthy and necrotic tissue appeared having red (ulcerative) line demarcating damaged from non-damaged tissues (Fig 2D). Evidence of ruminal wall blood vessels congestion was also found in regions in close vicinity to the necrotic lesions (Fig 2E). The visible part of the necrotic lesions appeared black and greyish in colour with some patchy foci having whitish and yellowish discolourations (Fig 2F). According to previous clinical experience, the motility of the ruminal wall in this case was not as strong as we had usually observed in otherwise apparently healthy camel calves. The content of the rumen was



Fig 1. The camel calf appearing with some patches of circular-shaped alopecia (indicated by arrow) in the head region.

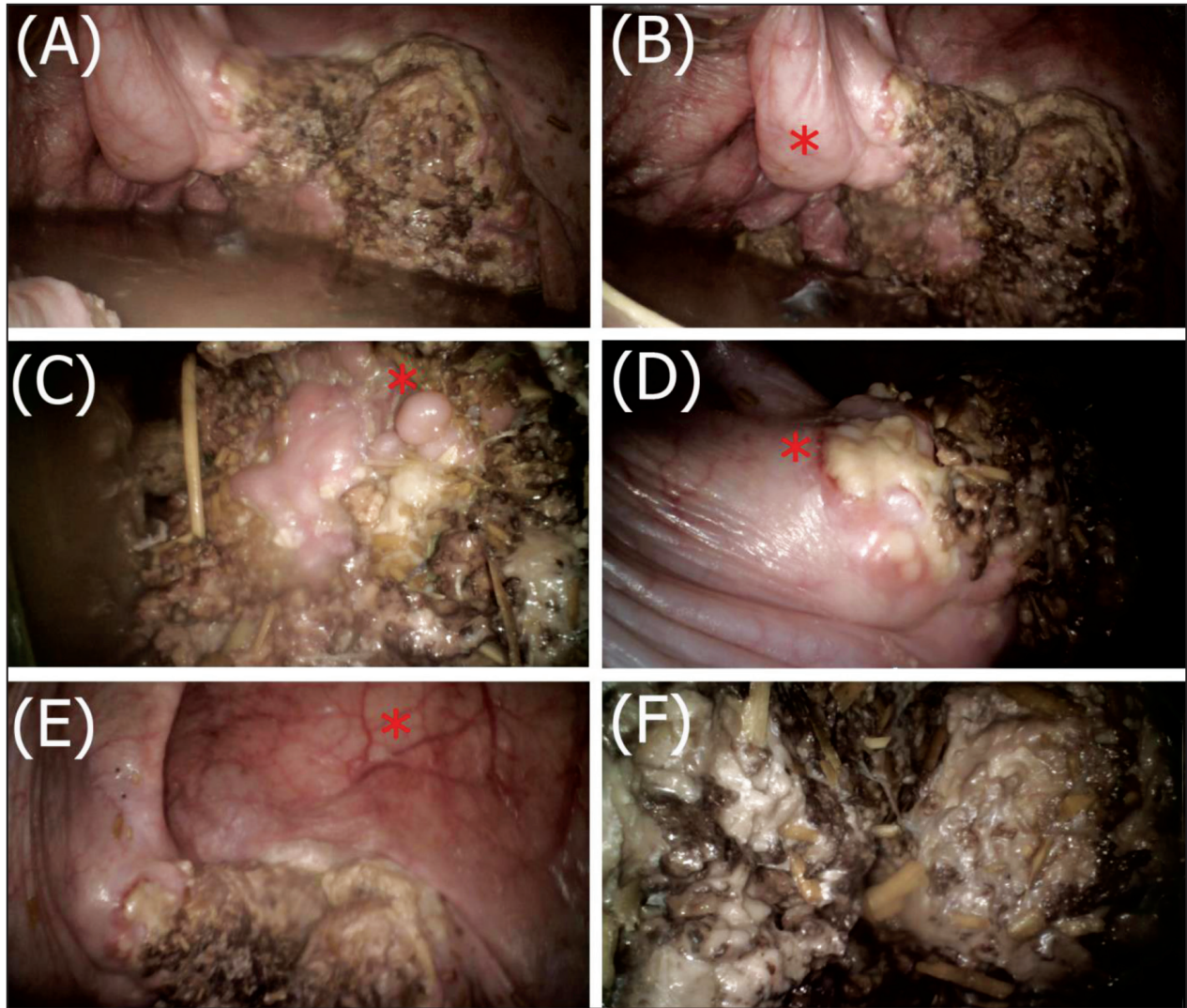


Fig 2. Ruminoscopic appearance of the ruminal wall in a six-months camel calf showing the associated lesions of necrosis. Fig A shows the overall appearance of the lesions in the caudal part of the rumen (red star). Fig B reveals a pedunculated ruminal wall (red star). Fig C shows some vacuoles (red star) adjacent to necrotic tissues. Fig D reveals a red line separating healthy and non-healthy tissues (red star). Fig E reveals visible congested blood vessels (red star). Fig F is a close view to the necrotic tissues.

found entirely fluidly and looked stagnant in nature and appeared greyish in colour. No obvious change in ruminal wall colouration was noted in the rest of the rumen.

Improving the diagnostic accuracy and disease detection capability, especially in camel medicine, has now become a necessity for advancing the welfare of camels. Camels have the capability of carrying some diseases without exhibiting a clear and specific clinical picture. Nevertheless, this characteristic might pose a challenge to clinicians because the clinical signs that could have been suggestive of disease involvement or organ dysfunction are hidden by the diseased camel. In 2018, another report was published on a Bactrian camel that had been presented clinically with lethargy

and progressive loss of body conditions over a month (Heck *et al*, 2018).

The most commonly encountered ruminal disorder in farm animals is rumen acidosis, which is routinely diagnosed through the measurement of ruminal juice pH (a pH of less than 5 is indicative of rumen acidosis) (Golder and Lean, 2024). The corrosive action of the lactic acid on the ruminal wall in such cases usually results in necrosis and death of rumen papillae and eventually leads to black discolouration of rumen interior (Voulgarakis *et al*, 2023). However, this feature is used diagnostically in post-mortem examination (Kumar *et al*, 2019). In a previous study, the black discolouration of the ruminal mucosa had been visualised during

ante-mortem examination through the application of ruminoscopy in 110 cattle suffering acute lactic acidosis (Sasikala *et al*, 2018). In the present case, on the contrary, these lesions were not seen in the examined camel calf and therefore it is unlikely that one camel that was affected by ruminal acidosis. Additionally, it is not expected in camels with ruminal acidosis to observe ulcerative lesions and scar tissue formation occupying only the caudo-dorsal part of the rumen.

Our results indicated that the nature of the lesions are hypremic in junctional regions between healthy and not healthy tissue, this feature might indicate ongoing inflammation in process of spreading. On the other hand, the scar tissue formation that represents the majority of the detected lesions may reflect the chronicity of disease course. The fact that the case was a 6-months old, when was presented to the clinic with such chronic condition, might suggest that the lesions could have started when the calf was in neonatal period and developed over time.

Since clinical ruminoscopy has not been extensively employed in dromedary camel, therefore our findings were assessed on the light of available pathological literature in llama and alpaca or in other animal species. A comparable lesions of gastritis was found on post-mortem examination of a camel that had been initially suffering from non-digestive abnormalities (Wellehan *et al*, 2004). In this report, Gross pathological examination of the rumen revealed presence of granular, irregular and thickened mucosal surface. In this paper, the camel died and was subjected to post-mortem examination which similarly revealed presence of swollen ruminal wall having multifocal yellowish and irregular masses with some intermixed whitish tissues. Such an infection is frequently caused by an aquatic oomycete in the horse and dog (Martins *et al*, 2012). The clinical appearance of fungal alopecia in the head might indicate that the calf was raised in an environment promoting fungal growth. Nonetheless, the current case is reported as idiopathic ruminitis and further research is required in the future when similar lesions are identified via ruminoscopy.

In conclusion, the ruminoscopic detection of such lesion is still clinically useful and should be taken into account for future clinical settings guiding clinicians for better differential diagnosis of diseases affecting the digestive system of camel. However the correct causative agent or infection need to be established.

Acknowledgement

The author would like to thank Dr. Ayman Elnahas, Dr. Mohammad Karam Zabady and Dr. Sayed Fathi for their clinical assistance in examining this case.

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