
ONE-STAGE RUMEN FISTULATION WITH PERMANENT SILICONE CANNULA IN SHEEP

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RESUMO: This study describes a one-stage rumenostomy technique with placement of permanent flexible silicone cannula, performed in seven Santa Inês ewes used in a research on ruminal acidosis for six months. The surgical procedure proved to be easy to perform, with few postoperative complications and effective to carry out the ruminal fluid sampling during the period of study.

Keywords: Cannulation. Fistula. *Ovis aries*. Veterinary surgery

FISTULAÇÃO RUMINAL EM UM ESTÁGIO COM CÂNULA PERMANENTE DE SILICONE EM OVINOS

RESUMO: Este estudo descreve uma técnica de rumenostomia em um estágio, com colocação de cânula permanente flexível de silicone, realizada em sete ovelhas Santa Inês usadas em uma pesquisa sobre acidose ruminal por seis meses. O procedimento cirúrgico provou ser de fácil realização, com poucas complicações pós-operatórias e eficaz para realização de colheitas de amostras durante o período de estudo.

Palavras-chave: Canulação. Cirurgia veterinária. Fístula. *Ovis aries*

INTRODUCTION

Ruminal cannulation is a fistulation procedure between the dorsal sac of the rumen and the body surface on the left paralumbar fossa, with experimental purposes or to relieve of chronic bloat (SAEED et al., 2007). The placement of cannulas in the digestive system is often required for experimental studies of digestibility, especially in farm animals (STEDILE et al., 2008) and knowledge of the rumen function has evolved through these fistulas (KOMAREK, 1981).

Cannulation is necessary to maintain the fistula open and minimize its interference on the normal digestive function (KOMAREK, 1981). Cannulas prevent gas and rumen contents

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leakage during sampling intervals and are used in several species and portions of the digestive tract (STEDILE et al., 2008).

The ideal fistula is one that seals around the cannula, preventing rumen fluid leakage in the experimental period (MUZZI et al., 2009). Ideally, in addition, the cannulation should not protrude from the side of the animal, or be vulnerable to mechanical disturbances, as well as being easy to open and close without twisting (KOMAREK, 1981).

Some complications may occur after permanent cannula implantation, such as peritonitis and leakage of rumen contents. The leakage of large amounts of rumen content can take the animal to dehydration and malnutrition, cause skin lesions, produce unpleasant odor and promote the emergence of myiasis (MUZZI et al., 2009).

Thus, this study describes a rumenostomy technique with placement of permanent flexible silicone cannula in a single surgical stage, performed in seven Santa Inês ewes used in a research on experimentally induced subacute ruminal acidosis for 19 weeks.

MATERIAL AND METHOD

This study was approved by the Ethics Commission in Use of Animals of the School of Agrarian and Veterinary Sciences (Protocol no. 008891/12).

For sampling of ruminal fluid for six months, during a study on rumen acidosis, it was performed the rumenostomy with placement of permanent cannula, in accordance with the procedures described below, in seven Santa Inês ewes.

The animals were subjected to water and food fasting 24 hours prior the intervention in order to reduce the rumen volume and facilitate the surgical procedure (GOMES et al., 2009).

Under xylazine (Anasedan Injetável, Ceva Saúde Animal Ltda, Paulínia, Sao Paulo, Brazil) tranquilization at a dose of 0.1 mg/kg by intramuscular injection, the animals were placed in right lateral decubitus on padded operating table. Hair removal was performed on the left flank, followed by 10% povidone-iodine antiseptis (Figure 1-A). The paravertebral block and the subcutaneous and muscular inverted L block were made with lidocaine hydrochloride without vasoconstrictor (Xylestesin® 2%, Cristália Produtos Químicos Farmacêuticos Ltda, Itapira, São Paulo, Brasil), in a 1:1 dilution in sterile saline solution 0.9%, in the incision area. When there was manifestation of pain, this lidocaine solution was also instilled on the surgical wound (Figure 1-B).

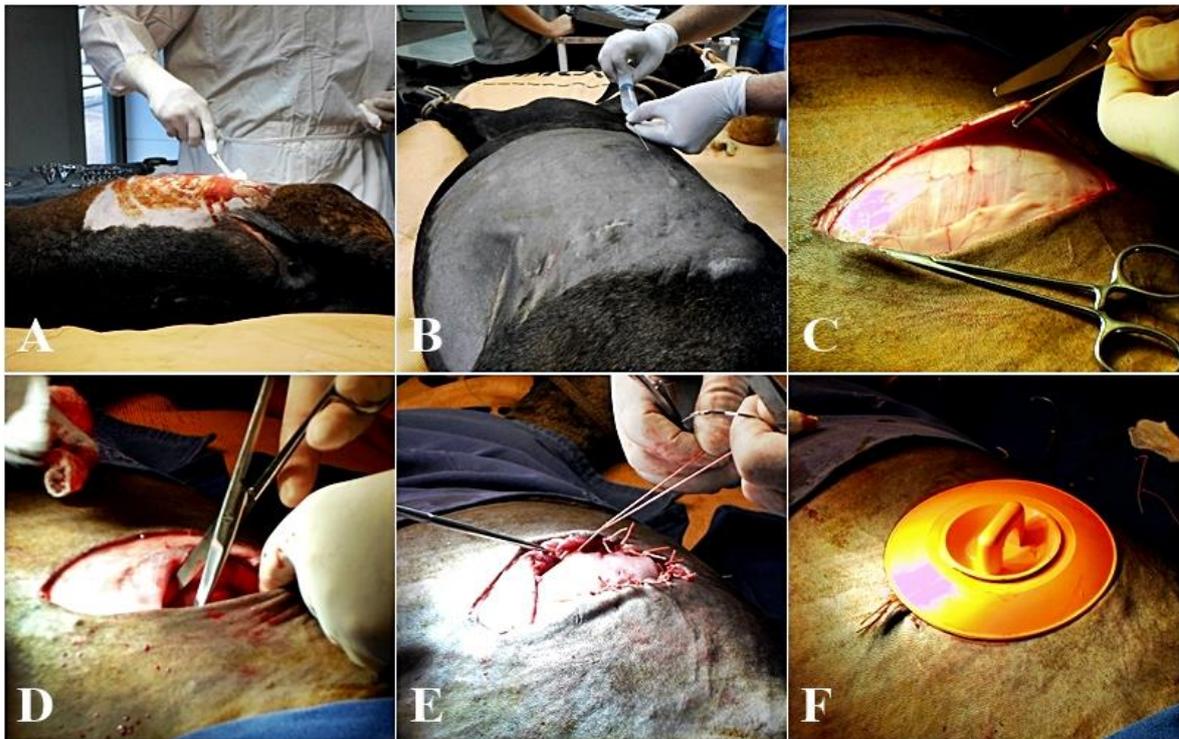
An eight-centimeter incision was made in the skin of the left flank, in the dorsoventral direction, approximately five centimeters ventral to the transverse process of the lumbar vertebrae

and eight centimeters caudal to the 13th rib. This was followed by blunt undermining in the subcutaneous tissue and large vessels hemostasis with #0 chromic catgut wire (Figure 1-C).

Muscle layers (external oblique, internal oblique and transverse abdominal muscles) were incised using scissors in the direction of their fibers (Figure 1-D). Rumen wall was exposed, and ruminal serosa, peritoneum, muscles and skin were sutured together using single interrupted pattern with #0 surgical cotton wire around the entire surgical wound (Figure 1-E).

A dorsoventral incision was made in the center of the exposed rumen wall, in which was inserted a silicone rumen cannula of two inches in diameter (Kehl Industria e Comercio Ltda ME, São Carlos, São Paulo, Brazil) that was submerged in 10% povidone-iodine for a few minutes before placement (Figure 1-F). The flexible silicone cannula, with cap inserted under pressure, presented the following measures: external disk - 12.5 cm diameter, internal disk - 10.5 cm diameter, opening - 5.8 cm inner diameter and 8.2 cm outer diameter, distance between outer and inner rings - 3.5 cm. Its inner ring was partially folded into the cannula opening for insertion of the cannula into the fistula, being subsequently unfolded into the rumen, and the cannula was capped immediately. The inner ring stood by the inner rumen wall, the outer ring remained juxtaposed to the skin and the core tube occupied the fistula space (MUZZI et al., 2009).

Figure 1. Rumenostomy with placement of permanent flexible silicone cannula in sheep



A: antiseptics of the left flank of sheep under xylazine tranquilization, on padded operating table, restrained by ropes. B: inverted L block made with lidocaine hydrochloride without vasoconstrictor. C: skin incision of the left flank, in the dorsoventral direction, followed by blunt undermining in the subcutaneous tissue and large vessels hemostasis. D: incision of the muscle layers (external oblique, internal oblique and transverse abdominal muscles), using scissors, in the direction of their fibers. E: suture of ruminal serosa, peritoneum, muscles and skin using single interrupted pattern. F: rumen cannula inserted into the left flank.

Ten percent povidone-iodine was applied to the wound and repellent ointment (Vansil Indústria Veterinária, Descalvado, São Paulo, Brasil) was used around the rumen cannula until complete wound healing (Figure 2).

Figure 2. Ruminally cannulated sheep on the day after the surgery, following the application of repellent ointment around the cannula.



Immediately after surgery, antibiotic therapy was initiated using penicillin (Pentabiótico® Veterinário Reforçado, Fort Dodge Saúde Animal Ltda, Campinas, São Paulo, Brasil), at a dose of 30,000 IU/kg intramuscularly every 48 hours, a total of five applications. Furthermore, Flunixin meglumine (Flunixin Injetável, Uzinias Químicas Brasileiras S. A., Jaboticabal, São Paulo, Brasil) was intramuscularly administered at a dose of 2 mg/kg, every 24 hours, for three days.

Surgical stitches were removed 10 days after the surgical procedure. At least once a week for the six-month study, the animals were washed and the region around the cannula was hygienized to avoid the emergence of myiasis (GOMES et al., 2009).

The animals were euthanized (MAPA, 2000) and necropsied at the end of the study.

RESULTS AND DISCUSSION

The surgical procedure lasted approximately two hours for each animal. The tranquilization and anesthesia protocol was adequate for the procedure, with rapid recovery in the

immediate postoperative period, with animals getting in standing position in a few minutes. They were taken walking from the operating room to the stalls where, immediately, they ingested water and food, similar to that described by Komarek (1981) and Elices Mínguez et al. (2010), who found quick recovery and ingestion of food and water until 12 hours after rumenostomy in sheep (Figure 2). As described previously, the surgical wound healing took place satisfactorily, without bleeding or tissue necrosis (STEDILE et al., 2008; ELICES MÍNGUEZ et al., 2010).

Rumen fluid sampling using disposable 10 mL plastic pipette, needed for the study on ruminal acidosis, was easily performed through the cannula, similar to that reported by Miller and Maltby (1966), Stedile et al. (2008) and Muzzi et al. (2009).

The animals were kept cannulated for six months. All sheep had small leak of ruminal fluid around the fistula, without major consequences, as described by Komarek (1981) and Stedile et al. (2008), unless the hair loss in the area where ruminal fluid oozed, and the occasional need for cleaning and applying repellents. The cannulas of four animals fell at times, mainly in the last weeks of the study period, and were promptly replaced. The falls were observed in the morning, after sheep have spent the night lying with the rumen full, which increased the pressure on the cannulas. In sheep, due to the weakness of their abdominal wall muscles, the cannula attachment and maintenance of its stability can be considered as a challenge for veterinary surgeons (SAEED et al., 2007). The silicone cannulas are recognized by maintaining their flexibility for long periods, having ease replacement, and by not irritate the tissues (HARMON; RICHARDS, 1997). In this study, the cannula material caused no apparent tissue reaction and allowed their easy replacement, but there was some loss of its original format after six months of use.

At necropsy, there were no infection signs in the abdominal cavity as a result of rumenostomy, as observed by Komarek (1981), Saeed et al. (2007), Stedile et al. (2008) and Elices Mínguez et al. (2010).

The one-stage rumen cannulation technique in sheep is less laborious, faster and easier to be performed (ELICES MÍNGUEZ et al., 2010), is cheaper and less stressful for the animals than the two-stage technique, without changing the effectiveness of the procedure (MUZZI et al., 2009).

The surgical technique used for permanent rumen fistulation of sheep proved to be easy to perform, with few postoperative complications and effective to carry out the ruminal fluid sampling.

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