GLOBAL JOURNAL OF AGRICULTURAL SCIENCES VOL 10, NO.2, 2011: 83-88

 ISSN 1596-2903
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FISTULATION AND CANNULATION OF GOAT SINGLE STAGE TECHNIQUE USING LOCALLY IMPROVISED CANNULA

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(Received 11, January 2010; Revision Accepted 7, April 2010)

ABSTRACT

There is a great need presently for cannulation in small ruminants either for investigation of digestion as in evaluation of feed or collection of ruminal fluids, and this could be performed by many types of cannulae and techniques. The materials used here were fabricated (improvision) of cannula for goat and an adopted technique for its implantation. The device was adapted to allow sampling of entire ruminal contents via cannulae with similar diameters, which tightly sealed within ruminal fistula to ensure cleaner, achieve easier nursing of operated animals, and maintain normal ruminal environment. The device was applied into the goat by one-stage operation. It was successfully used in bucks for 10 months without complications in this experiment. Accordingly, this will encourage researchers to perform long-term studies of ruminal environment in small ruminants.

Four indigenous breeds (Maradi) of goats were cannulated using an improvised cannula from local materials. One among these breeds was not fasted and water not withdrawn, but the other three were fasted for 24 hours and water withdrawn for 12 hours to minimize contamination by the ruminal content. The cannula was of 3cm in diameter weighing 78gms implanted to all the four. Aseptic measures were observed to prevent contamination and complication. Xylazine, diazepam and local aneasthetic (xylocaine) were used to sedate and desensitize the surgical site using inverted L block infiltration of the left flank. The one that was not fasted did not survive because of the high level of contamination from the ruminal content, but the three survived the surgery with one casualty of death due to poor management 48 hours post surgery. The remaining two survived without complication, thus, healing was by first intention, no leaking of ruminal content and suture was removed within 10 days post surgery. After four months post surgery one of the goats' ruminal content started leaking at close observation. It was discovered to be due to insertion of the left horn around the cannula which succeeded in widening the area leading to the leakage even though it was not copious.

KEY WORDS: Cannulation, Fistula, Indigenous Breeds, Rumen & Aneasthetic

INTRODUCTION

Ruminal fistulation and cannulation are surgical procedures created between the dorsal sac of the rumen and the body surface in the left paralumbar fossa (Azizi *et al*., 2007)

Fistulation and cannulation of the rumen are integral part of the bovine and small ruminants (caprine and ovine) nutritional studies recommended as conservative treatment in cases of chronic bloat (Anderson *et al*., 1976; Abdel-Fatah, 1999 and Abdel-fattah *et al.,* 2007; Azizi *et al*., 2007). Thus, it is a useful biological tool for in-sacco studies (Osuji *et al*., 1993). Thus, the need for a successful durable ruminal fistulation and cannulation technique is required for the research field as well as in the day to day practice (Schnautz, 1957; Wakanker *et al*., 1980). Many factors complicate ruminal fistulation and cannulation by conventional methods; accordingly various modifications in the processing of ruminal cannulas as well as fistulation techniques had been recorded to minimize complications (Schnautz, 1957, Wayne *et al*., 1959, Komarek *et al*., 1961, El-Monzaly, 1975, Corley *et al*., 1999, Nocek *et al*., 2002 and Abdel-Fattah *et al*., 2007).

A single-stage ruminal fistula technique was quite successful in sheep while two-stage technique was recommended in cattle (Dougherty, 1981; Hassanein *et al*., 1988; Azizi *et al*., 2007). However, several types of ruminal cannula and respective surgical techniques have been reported (Brown *et al.,* 1968; Santra *et al.,* 2002). Ruminal cannulas were made of plastic, rubber, or even metal materials that should be placed and fixed properly to prevent leakage (Hecker, 1974; Thyfault *et al*., 1975; Dougherty, 1981). Ruminal fistulation and cannulation was adopted practically for obtaining samples of ruminal ingesta, fluid or gases (Schnautz, 1957, Komarek *et al*., 1961; Corley *et al*., 1999) and also in-sacco degradation studies (Osuji *et al*., 1993; Azizi *et al*., 2007). The fistulated animals maintained functioning

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satisfactorily for about 10 months. It is very good and practical means of in-sacco degradation studies for feed evaluation research and or ranking of feeds.

MATERIALS AND METHODS

The surgical procedure was done on 4 healthy bucks of native breed(Maradi i.e Red Sokoto) from the Federal University of Technology, Yola Livestock Farm ranging in weight between 13 - 15kg of 1 – 2 years-old.

Preoperative Preparation

The animals were stabilized for adaptation for one week prior to surgery. Food was withheld for 24 hours and water for 12 hours. In one buck, however, food and water was not with-held prior to surgery and the left para-lumber region was prepared for aseptic surgery. The operation was carried out in recumbent position and the operated animals were positioned on the right side.

Anesthesia:

Operated animals were injected intramuscularly with Diazepam 0.5% in a dose of 2 mg/kg Bwt. and 10 minutes later the animals were injected with Xylazine at 0.22mg/kg intramuscularly was administered and local aneasthetic (xylocaine) was used to infiltrate the surgical site (inverted L block) thereby blocking the nerves supplying that region (Abdel-fattah, *et al*., 2007 and Azizi *et al*., 2007).

Improvised Cannula:

The cannula used in this technique was made of a plastic bottle with its screwed cap, four pairs of small button-like plastic pieces and strong non absorbable-suture material (silk/nylon). A small cannula whose diameters of external opening of 3 cm, internal opening of 7.5 cm and weight of 78 gm was used (Fig. 1). The cannula was an improvised material from a local market.

Fig 1. The Local cannula material

The cannula cut and shaped as it is shown in Fig 2 below. The screw-cap was tightened on the cannula before implantation which prevented ruminal content from spillage during and after the surgical procedure. Thus, providing an opening and close for the experiment.

Fig 3. The cannula with its perforated screw-cap fitted with rubber tube

For good fixation, 2-4 button-like plastic pieces (according to the size of operated animal) were placed two plastic pieces out side the body (Fig 6). Figure (2) shows the final shape of the cannula.

Surgical Technique:

The surgical site of the animal was aseptically shaved and washed with soap and water and scrubbed with antiseptic solution severally before the initial skin incision commenced.

An initial skin incision was made few centimeters inferior to the tuber coxae and extended ventrally. The length of incisions of the skin, underlying layers and the rumen, were made large enough for insertion of the cannula.

Another ruminal incision was made 7-10 cm cranial to the original one and created parley wide for the neck of the cannula to be exteriorized through it. The cannula was positioned into the rumen through the initial incision and pushed from inside the rumen through the second ruminal incision, and 4-6 interrupted sutures were stitched through the rumen and cannula by silk, then a purse string suture was sewed around the edge of the second ruminal incision and drawn tight and tied around the neck of the cannula (Fig 4).

Fig 4: stay and pulse string suture fixed

The initial ruminal incision was closed and the rumen repositioned into the peritoneal cavity. The skin and subcutaneous tissue (7-10 cm cranial to the initial incision) were bluntly dissected from the abdominal muscles and a circular excision made through the muscles and peritoneum. The excision in the muscles and peritoneum created a hernial ring wide enough to force the cannulated part of the rumen through it. The hernial-like ring and then continuously sutured around the contour of the cannula with the muscles and peritoneum. A second skin incision was made corresponding to the outer opening of the cannula. This skin incision was created parley enough for the neck of the cannula to be forced through it (Fig 5). 4-6 staying stitches were made around the neck of the cannula between the skin and the underlying herniated rumen

Fig 5 Exteriorized cannula.

Fig 6 Buttons with cannula screwed cap

A purse string suture was sewed around the edge of skin incision via the subcutaneous layer and drawn tight and tied around the neck of the cannula (Fig 5).

The initial incision through the skin, muscle and peritoneum was sutured. 2-4 pairs of fixation buttons were implanted inside the cannulated rumen. Also another 2-4 pairs of buttons were placed outside the body through the outer opening of the cannula, around the contour of the cannula, by using silk/nylon, and then they were perfectly tighten and tied (Fig 6). Following operation the animals were isolated, fasted for another 12 hours, administered intravenous fluid therapy, intramuscular long acting oxytetracycline and the wounds were dressed with iodine. Food intake was restricted up to one week post-surgery to avoid complications. Finally, the skin sutures were removed 10 days post-surgery.

Thus, goats were fitted with rumen cannula for experimental screening and ranking of feeds materials: in-Sacco degradation characteristics of some browse plants in semi-arid zone of Nigeria. The stability of the cannula in the ruminal opening is a necessity throughout the experiment and that made it less detrimental on the animal's gastrointestinal function which is similar with the work of Azizi *et al*., (2007).

Fig 7 Live animal post-surgery

RESULTS

Fastening of the animals prior to surgery reduced ruminal contents and facilitated surgical minutes, followed by smooth uncomplicated recovery. Light improvised flexible cannulas (28-35 gm) facilitated its insertion, exteriorization and fixation and caused no

successfully implanted within the ruminal fistula of 4 bucks. The operated animals followed up for 5 weeks (Figs 7 & 8), thus corresponding with the report by Abdel-Fattah *et al*., (2007).

The initial surgical wound showed healing within 10 days without post surgical problems in any of the operated animals, except the presence of temporal slight edema. Also thickening around the cannula in one, and death of one animal due to causes unrelated to surgery were observed. The one that was not fasted, the ruminal content was found difficult to control thus making the level of contamination high and it died, while rest of the animals enjoyed good health through the period of the experiment (10 months). The cannula was kept in place without any problems, caused

Fig 8 Live animal eating post-surgery

No complications or leakage around it except the one that inserted the left horn around the implanted cannula. This caused minimal leakage, therefore dehorning is recommended in goats fistulation and cannulation; but the other one remained gas and liquid tight (without leakage) throughout the period of the experiment.

DISCUSSION

Fistulated ruminants are valuable biological tools for researches concerning ruminant animal nutrition and physiology especially in in-vivo studies of feed evaluation(Thyfauil, 1975, Osuji *et al*., 1993; Azizi *et al*., 2007). The results of the study were encouraging and showed that the improvised cannula from the local market was well fitted and less irritant to the tissues, thus, could be used as a permanent ruminal cannula in small ruminants (Goats) which was well fitted in single stage surgical technique.

However, observations and experience in this study indicated that fasting of the animals reduced the size of the rumen (ruminal content) which made manipulation easier and facilitated aseptic surgery. This is in line with Wakanker *et al*., (1980) and Abdel-fattah *et al*., (2007) who stated that fastening prior to surgery reduced the load of rumen that facilitated healing of the organ and reduced chance of soiling of the surgical field with ruminal contents during surgery. Intramucular injection of diazepam, atropine sulphate followed by xylazine ensured sedation, analgesia, complete

which fitted exactly to its diameter, favored healing of the initial incision by first intension and prevented leakage between the rumen and abdominal wall, similar to the one reported by El-Monzaly, (1975) and Abdel-Fattah *et al*., (2007). Exteriorization of the cannulated part of the rumen from peritoneal cavity via a second circular abdominal wound and suturing of the prolapsed part of the rumen, peritoneum, and abdominal muscles around the contour of the cannula to induce incarcerated hernia, ensured mechanical support to the cannula as reported by Venugopalan, (1986) and Abdel-Fattah *et al*., (2007). The purse string suture effectively sealed the peritoneal cavity around the level of the cannula as evidenced by the absence of peritonitis. On the other hand, Wakanker *et al.*, (1980) and Abdel-Fattah *et al*., (2007) mentioned that the through-and-through sutures increased the area of adhesion as expected and prolonged the operative procedure. Slightly smaller incisions of the rumen and skin than the size of the neck of the cannula are preferred. This made the rumuinal opening and exposed skin opening fit tightly around the neck of the cannula (Schnautz, 1957, El-Monzaly, 1975 and Abdel-Fattah *et al*., 2007). A purse string suture around the neck of the cannula tends to curl the edges of the rumen and the skin inward ensuring that the ruminal serosa will come in contact with the cut edges of the skin and subcutaneous layer to provide good adhesion and to strangulate the neck of the cannula to support it (Komarek *et al*, 1961 and Abdel-Fattah *et al*.,

and Abdel-Fattah *et al*., (2007). The cannula fitted was of light weight with short part of the neck that protrudes via the flank, which rarely exposed the animal to mechanical disturbances supporting the findings of Komarek *et al.*, (1961) and Abdel-Fattah *et al*., (2007). They also used improvised materials which makes it very relevant to the one used in this study (improvised cannula from local material in Nigeria).

CONCLUSION

This improvised cannula is cheap, applicable, durable and available from local material, since it is a plastic, it is not affected by the rumen microbes activities. It also causes less mechanical pain and maintains normal ruminal environment. This technique of ruminal fistulation and cannulation is simple, easy, with minimal time consuming (one-stage operation), suitable for collection of all ruminal contents and also in-sacco degradability studies and has no adverse effect on general health condition. This procedure was adopted from Abdel-Fattah *et al.,* (2007) done in sheep.

REFERENCES

Abdel-fattah, M. Sedeek, A. M. and Suliman, A. I. A., 2007. An effective device for rumen cannulation in sheep. Priory Lodge Education Limited 2007. Cairo, Egypt.

Abdel-fattah, M., 1999. The goat as a model for experimental surgery. Ph.D. thesis, surgery, anesthesiology, and radiology, Fac. Vet. Med., Cairo Univ., Beni-Suef brnch, Egypt.

Anderson, J. F., Frederikson, E. D., 1976. Surgical fistula as an aid in the treatment of chronic bloat in cattle. Vet. Med. Small Anim. Clin. 71, 1363-1367.

Azizi, S., Pir-Mohammadi and Pour-Hasani, F., 2007. A Two Stage Rumen Cannulation, Technique in Sheep. Journal of Animal and Veterinary Advances 6, 1: 29-32

Brown, G. F., Armstong, D. G., MacRac, J. C., 1968. The establishment in one operation of cannula into the rumen and re-entrant cannula into the duodenum and ileum of the sheep. British Vet. J. 124, 78-81.

Buckner, R., 1995. Surgical correction of left displaced abomasums in cattle. Vet. Record 136, 265-267.

Corley, R. N., Murphy, M. R., Lucena, J., Panno, S.V., 1999. Technical note: A device for obtaining Time integrated samples of ruminal fluids. J. Anim. Sci. 77, 2540-2544.

Dougherty, R. W., 1981. Experimental surgery in farm

El-Monzaly, M., 1975. Simplified surgery for rumen cannulation of goats under the influence of Rumpun. J. Egypt. Vet. Med. Assoc.35, 207-218.

Hassanein, A., Soliman, A. S., Eifat, J. F., 1988. Rumen cannulation in sheep. Alexanderia. J. Vet. Sci. 4, 429-435.

Hecker, J. F., 1974. Experimental surgery on small ruminants. Butterworths & Co, Ltd, London, England.

Komarek, R. J., Leffel, E. C., 1961. Gas-tight cannula for rumen fistula. J. Anim. Sci. 20, 982-984.

Misra, S. S., Angelo, S. J., 1981. Vaginopexy technique for the management of recurrent utero-vaginal prolapse in bovines. Ind. Vet. J. 58, 576-580.

Nocek, J. E., Allman, J. G., Kautzw, P., 2002. Evaluation of an indwelling ruminal probe methodology and effect of grain level on diurnal pH variation in dairy cattle. J. Dairy Sci. 85,422-428.

Osuji, P.O, Nsahlai, I.V and Khalili H., 1993. Feed evaluation. ILCA Manual 5. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia. 40.

Ragab, G. A., 1989. Some studies on the surgery of the urogenital system in small ruminants. Ph. D. thesis, Fac. Vet. Med., Cairo Univ., Egypt.

Santra, A., Karim, S. A., 2002. Rumen cannulation in sheep and goats: Fabrication of cannula and surgical procedure for its implantation. Ind. J. Anim. Sci. 72, 978-980.

Schnautz, J. O., 1957. A rumen fistula modification. Am. J. Vet. Res.18, 73-75.

Tantawy, M., 1978. Studies on the effect of some anesthetics in sheep and goats. Ph. D. thesis Vet. Surg., Assuit Univ., Egypt.

Thyfaultt, H. A., Leffel, E. C., Huang, M. D., 1975. Simplified method for producing permanent rumen fistula. J. Dairy Science 58, 1899-1901.

Venugopalan, A., 1986. Essentials of veterinary surgery. 5th ed., Oxford and IBH publishing Co. PVT. L.T.D.; New Delhi-Bombay.

Wakanker, C. C., Mantri, M. B., Deshpande, K. S., 1980. A study on evaluation of rumen fistulation techniques in bovines. Indian Vet. J. 57, 160-163.

Wayne, R., Lynn, F. J., 1959. A plastic rumen fistula