Journal of Camel Research and Production
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Fistulation technique and insertion of a permanent cannula into the fore stomach of the camel (Camelus dromedarius) (Case study in Sudan)

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ABSTRACT:

This study presents a comparatively easy and practical method for longterm fistulation and insertion of a proper rumen cannulae in the fore stomach of the dromedary camel *(Camelus dromedarius).*

As an advantage, it is important to point that this technique is simple, less laborious to do than traditional two-stage techniques in which ones had to do a second ruminotomy to implant the cannula (Ward et al., 1950). Overall, the rumen fistulation of dromedary camels were very difficult because of choosing the proper cannula, spleen of ventral position, smaller abdominal cavity compared to cattle leading to that the rumen is small and a pit cranially positioned and finally thick abdominal walls specially in she-camel.

Key words: dromedary camel, forestomach, cannulation.

Introduction

Camel population in Sudan accounted for 4 millions of heads (MAR, 2008) mainly reared by nomads in a belt configuration; it extends between latitudes 12-16 N. This belt is characterized by erratic rainfall, less than 350 mm. *Camelus dromedarius* camel plays a significant role in the livelihood of pastoral people, providing them with food, cash income, transport, packing, and sport. As well as a source of proud and honor in those remote societies.

Research in camel production is scarce in Sudan (Majid, 2000 and Majid, 2006) because it is expensive animal and requires special attention. It is still interesting animal as it efficiently using available feed resources in those harsh environments and store water in its tissues for long periods.

Though camels ruminate, they are not true ruminants (Lechner-Doll et al., 1992); as they lack the four well-defined stomachs of the ruminant; the rumen, reticulum, omasum and abomasum.They are classified as pseudo-ruminants with 2- compartments chamber (*Forestomach*). The true stomach is represented by the third compartment . The rest of digestive tract resembles that of ruminants. The forestomach in the camel is located in the lumbar region moving to the left side.

Forestomach cannulation of the camel enables scientists to study forestomach environment, motility and fluid volume and flow rates. It also, enables rumen liquor to be collected for in-vitro studies. Nylon Bags containing various feed samples can also be easily inserted into

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the forestomach to study their degradation characteristics.

This article describes a surgical technique for fitting four large rumen cannulae (Two Bar Diamond #4C3″ cannulae, and two home-made PVC cannulae) into the rumens of four camels.

Materials and methods:

Four healthy camels (2 males and 2 females) were used for surgery. They were weighting 250-300 kg, in body weight.

Operation sites:

The first surgical operation was done in one male camel at Tambol Camel Research Centre; central Sudan; of Animal Resources Research Corporation (ARRC), Sudan. The other three operations were done in one male and two she camels, at the Veterinary Research Institute- Soba, Khartoum, Sudan.

Materials:

- Gloves and laboratory coats.
- Animal clippers and hair shavers.
- Antiseptic soap.
- Scalpels.
- Needle holder.
- Artery forceps.
- Tissue forceps.
- A traumatic tissue forceps.
- Surgical scissors.
- Non-absorbable suture size 2.
- Hot water.
- Antibiotic Penivet forte (Penicillin G. procaine+ Penicillin G). sodium+ Dihydrostreptomycinsulphate) for deep I/M injection.
- Analgesia I/M injection (0.4 mg/ kg body weight xylazine).
- Antiseptic solution (400 mg of potassium permanganate diluted in 4 liters of water).
- Syringes (3 ml and 10 ml) and injection needles.
- Local antibiotics (wound powder).
- Elastic rumen cannula #4C3″ (Bar Diamond, Parma, ID 83660, USA) with the inner flange like outer flange and 3 inch centre diameter.
- Modified plastic cannula (homemade) was made from PVC, internal flanges, nut and lid. The internal diameter of the body and inerior flanges of cannula were 4.5 and 8 cm respectively.

Procedures:

Pre-operative care:

1. Day before surgery, animal was inspected and the surgical area (left paralumbar fossa) was clipped and shaved. On that day feed and water intake were *atlib*. That non fasting procedure facilitated surgery and rumen fistulation easier.
2. Instruments were inspected and sterilized.
3. Tampons and antiseptic solution were prepared.
4. Operation day started at 9:00 a.m. animal was restrained by labors using robes and kept on knees throughout the surgery.
5. A sedative was administered (at least 15 minutes before surgery) by I/M injection of xylazine.
6. Area where fistula should be located was identified using permanent marker on the skin as 10 cm line. The line was positional two finger behind the last rib and three fingers

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below the transversal processes of the lumbar vertebrae.

7. Surgical area was then washed with antiseptic soap then potassium permanganate solution (repeat procedure until surgical area is clean) and lastly tincture of iodine was applied. Usually surgical are is scrubbed starting at the incision site of work in spiral motion progressively towards the margin of shaved area.
8. Local aesthetic (2% Lidocaine) was applied S/C using the inverted L or distal paravertebral block.
9. At the start of surgical procedure, hands of surgeon and assistants were washed and sterile gloves and laboratory coats were put on.
10. The level of aensethia was confirmed adequate.
11. Sterile scalpel was used to make a 10 cm linear incision through the skin.
12. Dissection by scissor was used to penetrate internal abdominal muscle layers.
13. Peritoneum appeared under abdominal muscles as a glossy layer, then it was grasped using any forceps, tented and incised.
14. A traumatic tissue forceps were applied to rumen wall.
15. Part of the dorsal rumen wall was then exteriorized. Topography of the spleen was inspected and antibiotic wound powder was applied in the rumen wall and surrounding muscles.
16. The rumen wall was then sutured to the skin using 4 horizontal mattress sutures at quarter hour positions (12, 6, 3 and 9 O'Clock) using permanent suture.
17. Cleaning of the area surrounding surgery was done and finally tincture of iodine was used.
18. The rumen wall was incised using sterilized scalpel 0.5 cm from the wound margin opposing skin.
19. Step number 17 was repeated.
20. Proper rumen connula was forced to pass through the fistula and kept intact.
21. By securing the cannula in position the surgery was finished.
22. The whole surgical operation took ½ to 1 hour.
23. Animal then moved to isolated confinement. Flies repeller maybe applied on cannlua and surrounding areas.
24. Cleaning of wound using antiseptic and tincture of iodine was done for the following period looking for debris or pus formation. Cleaning start on daily bases for the first 2 weeks and as needed up to complete healing in 4-6 weeks after surgery.
25. Antibiotic injection continued for at least 5-7 days or longer as needed.

Results and conclusions

Results showed that all the four dromedary camels were fistulated with rumen cannula in a one-stage surgical technique. Each of those camels in short and long-term follow ups had normal behavior and appetite. The presumption complications were not encountered during the two weeks postoperative except for tissue around the wound necrosis, like infection, hemorrhages and suture abscess in the surgical site were seen during the follow up period. The four fistulated dromedary camels with this technique were controlled ten months period after surgery and they

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were done animal feeds degradation using Nylon bag technique and camel rumen environment in this period.

In the long term observation, the dromedary camels did not lose weight and the fistula remained fixed in position in two camels that equipped with the elastic cannula of Bar Diamond. It is worthy to mentioned that homemade cannula, although successfully fixed after surgical operation, it occasionally came out the fistula when the animal is well fed or due to straining or even due to mechanical disturbances (like been in contact wih walls or hard objects).

As an advantage, it is important to point that this technique is simple, less laborious to do than traditional two-stage techniques in which ones had to do a second ruminotomy to implant the cannula (Ward et al., 1950). Overall, the rumen fistulation of dromedary camels were very difficult because of choosing the proper cannula, spleen of ventral position, smaller abdominal cavity compared to cattle leading to that the rumen is small and a pit cranially positioned and finally thick abdominal walls specially in she-camel.

Acknowledgement

The author would like to acknowledge the staff of Tambol Camel Research Centre headed by the past Dr. Badr Eldin El Wasila Abd Elaziz for giving me the opportunity to conduct my first surgery in camel. Thanks also extend to, colleagues and assistants who helped me during the surgical operations, namely Dr. Soheir Rahmatalla Fadol and Hasna Amin Alseed.

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Appendices:

Appendix1.The surgical area (left para-lumbar fossa) was clipped and shaved

Appendix 2. A camel equipped with home made cannula.

Appendix 3. A camel equipped with elastic cannula.