

Histomorphological Studies on the One Humped Camel's Rectum (*Camelus dromedarius*)

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ABSTRACT: This histological study of camel rectum was done on 6 samples of dead camel which is obtained from recently died camel belongs to both male and female camel. Wall of rectum in camel was made up of four layers tunica mucosa, tunica submucosa, tunica muscularis and serosa. The lining epithelium, lamina propria and muscularis mucosae were three present in tunica mucosa. A loose connective tissue with various amount of blood vessels found in submucosa of rectal wall. A circular layer of muscles and longitudinal layer which was present in outer side in which outer longitudinal muscle layer was thin in compare to inner circular layer of tunica muscularis. Outer most layer of rectal wall was the tunica serosa or adventitia which was madeup of various types of fibers like collagen, reticular and reticular.

Keywords: Histomorphology, one humped camel, rectum, tunica.

INTRODUCTION

This study about the rectum tells us about the major part of camel rectum was situated in peritoneal cavity but a last small part of rectum was situated retroperitoneally where rectum attached with anus (Aronson, 2016).

The various muscles of pelvic region gave support to mesorectum and retroperitoneal part of rectum of camel. The outer surface of bowel was coated with mucous which was produced by goblet cells of rectum as we know that the rectum in animal was the temporary storage site for feces. Rectum was the site where feces was present for some time before defecation (Dyce *et al.*, 2009).

Wall of the rectum was thick and more extendable then fore portion of digestive tract. Rectal wall thicker and dilatible then other portion of intestine because it gives more area for peristalsis movement for defecation process in rectum. There were many numbers of payers patches are present in intestinal wall of cattle and in camel there was no payers patches in rectal wall (Zhaxi *et al.*, 2014).

This study on rectum was done to determine the importance of the rectum and structure of rectum. This histomorphological study of rectum demonstrated the structure of rectal wall.

Equipment and procedure. The histomorphological study on camel rectum was done on six sample of camel rectum which was obtained from recently died camel in clinical complex of veterinary college Bikaner. All the samples of rectum of camel collected immediately just after death of camel with concerned with owner of camel.

For microscopic study first of all the sample of camel rectum was fixed with formalin solution for normal routine staining procedure, in which concentration of formalin was 10%. This sample was fixed with bouin's solution for special staining procedure. The timing for fixing the tissue was 48 to 72 hours. After fixation was done, tissues were washed with tap water for a night. After washing the sample, dehydration was done with alcohol solution. After dehydration of sample, clear the sample with cedar wood oil and after clearing, it was impregnated with paraffin and blocks were prepared and stored at refrigerator. Various stain were used during different staining procedure.

| Sr. No. | Name of stain | Purpose | References |
|---------|---------------------------------|-----------------------------|----------------------------|
| 1. | Ehrlich's Hematoxylin and Eosin | For routine histomorphology | Singh and Sulochana (1997) |
| 2. | Van Gieson's method | For Collagen fibres | Singh and Sulochana (1997) |
| 3. | Verhoeff's stain | For elastic fibres | Singh and Sulochana (1997) |
| 4. | Masson's trichrome stain | For Collagen fibres | Luna (1968) |
| 5. | Weigert's method | For elastic fibres | Luna (1968) |
| 6. | Gomori's method | For reticular fibres | Luna (1968) |

RESULTS AND DISCUSSION

Results of histological study. This present study of histomorphology tells us about that the rectal wall of camel rectum was made up of four layers; tunica mucosa, tunica submucosa, tunica muscularis and serosa, which we see in Fig. 1. Results of this histomorphological study similar with findings of Raghavan (1964) in ox, Takahashi *et al.* (1956) in cat and horse, cattle, carnivores by Dellmann and Eurell (1998) and finding in sheep, goat and cattle by Kadam *et al.* (2009).

1. Tunica Mucosa of Rectal Wall. Tunica mucosa was the inner most layer of rectal wall in camel rectum according to present study on camel rectum. The lining epithelium, lamina propria and muscularis mucosae were three present in tunica mucosa, as we see in (Fig. 2). The results of this histomorphological study showed similarity with findings of Raghavan (1964) in ox, Takahashi *et al.* (1956) in cat, in horse by Dellmann and Eurell (1998), in double humped camel by Zhaxi *et al.* (2014); Plakhotnyi *et al.* (2020) in pig.

The mucosa of rectal wall contained folds of mucosa called as mucosal folds. The results of the present study were similar with findings with Takahashi *et al.* (1956) in cat, in double humped camel by Zhaxi *et al.* (2014). The types of epithelium that was present in mucosa was simple columnar epithelium (Fig. 2). A many number of goblet cells were present between simple columnar epithelium. These goblet cells secreted mucous that coated the feces or bowel that temporary stored in rectum. The results of the present study were similar with Dellmann and Eurell (1998) in horse, cattle and carnivores, and in camel by Jarrar and Faye (2019).

The nucleus of the simple columnar epithelial cells present at the base of epithelium cells and the shape of cells were oval to round. The results of the present study were similar results of Kadam *et al.* (2009) in sheep, goat and cattle.

The various amount of loose connective tissue and crypts of leiberkuhns were present in lamina propria (Fig. 4). The results of this histomorphological study were similar with findings of Jit (1974) in monkey and in horse, cattle and carnivores by Dellmann and Eurell (1998).

The shape of mucous secreting goblet cells of rectal wall was globular and it was a unicellular mucous secreting cells that was present at the tunica mucosa (Fig. 4). The results of present study were similar with that of results of Dellmann and Eurell (1998) in horse, cattle and canine and in camel by Jarrar and Faye (2019).

A various amount of smooth muscle fiber that was present in tunica mucosa which present between the tunica mucosa and submucosa as we can say that the these smooth muscle fiber separate the mucosa and submucosa layer of rectum. These layers known as muscularis mucosae (Fig. 3, 4, 6). The results of present study were similar with that of results of Dellmann and Eurell (1998) in equine, bovine and canine and in camel (Jarrar and Faye (2019).

2. Tunica Submucosa. A loose connective tissue with various amount of blood vessels found in submucosa of rectal wall. The results of the present study were similar results of Kadam *et al.* (2009) in sheep, goat and cattle. Histomorphological study of camel rectum revealed that the very few number of lymphoid tissue were found in tunica submucosa (Fig. 4). The findings of this study were similar with results of as Takahashi *et al.* (1956) in cat, Jit (1974) in monkey, Lieber *et al.* (1988) in cattle calf, Dellmann and Eurell (1998) in horse, goat, Sturgess *et al.* (2001) in cat and Plakhotnyi *et al.* (2020) in boar.

The results of present histological study were dissimilar that of the results of Sturgess *et al.* (2001) according to this there were large amount of lymphoid tissue founded in anal canal of digestive tract and these lymphoid aggregations called as rectal tonsils.

3. Tunica Muscularis. A inner circular layer of muscles and longitudinal layer which was present in outer side. Outer longitudinal muscle layer was thin than inner circular layer. The results of this histological study were similar with reports of Takahashi *et al.* (1956) in felines, in horse, cattle, sheep, goat and carnivores in Dellmann and Eurell (1998).

A large amount of collagen and reticular fibers were present in tunica muscularis. The findings of this histological study were similar with Jarrar and Faye (2019) in camel. This histological results were also similar with reports of Dellmann and Eurell (1998) in eqine, feline, ovine and caprine.

4. Tunica Serosa of Rectum Wall. Outer most layer of rectal wall was the tunica serosa or adventitia which was madeup of various types of fibers like collagen, reticular and reticular we can see in Fig. 3. This histological results were also similar with reports of Dellmann and Eurell (1998) in eqine, feline, ovine and caprine.

All types of fibers include elastic, reticular and collagen were found in tunica serosa of rectum wall. It was outer most rectal wall. In these many types of fibers there was elastic fibers were present around the blood vessels primarily.

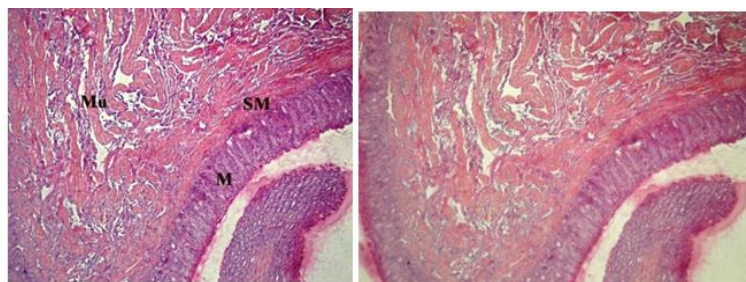


Fig. 1. Photo of camel's rectum showing M-mucosa, SM- submucosa and Mu- muscularis layers in H&E stain, 100x magnification.

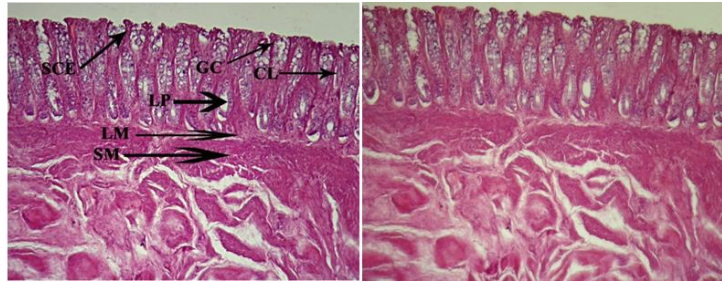


Fig. 2. Photo of camel's rectum showing CL- crypts of leiberkuhn, SCE- Epithelium and gc- Goblet cell, LP- Lamina propria, SM- Submucosa, LM- Lamina muscularis, in H&E stain, 100x magnification.

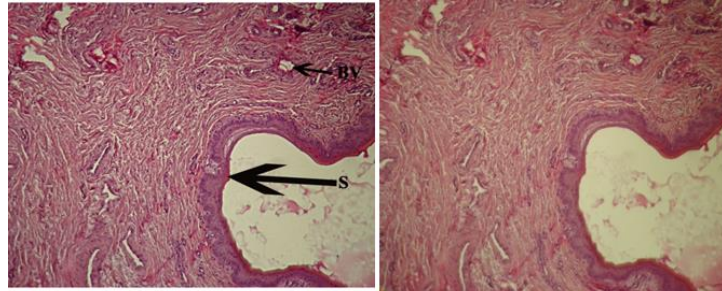


Fig. 3. Photomicrograph of camel rectum showing Tunica Serosa and Bloodvessels in H&E staining procedure, 100x magnification.

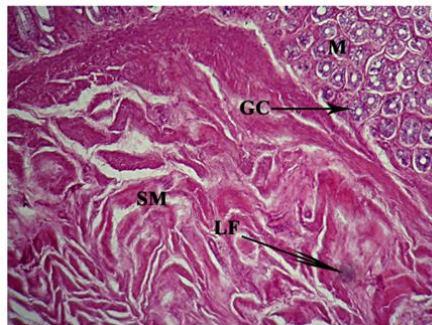


Fig. 4. Photomicrograph of camel rectum presenting GC-goblet cells, M-Mucosa, SM-Submucosa, and LF-lymphoid follicles in H&E staining procedure in 100x magnification.

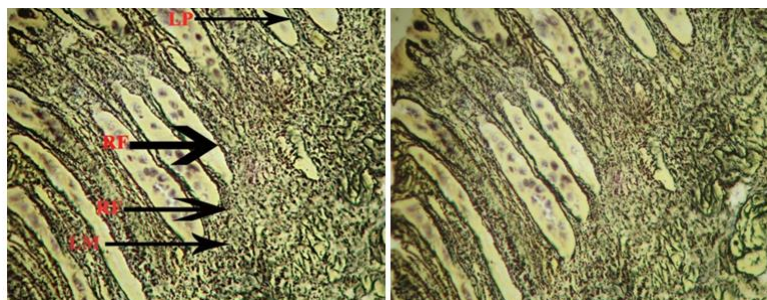


Fig. 5. Photomicrograph of the camel rectum showing lm- lamina propria, LM- Lamina muscularis and RF- Reticular fiber in gomori staining procedure at, 400x magnification.

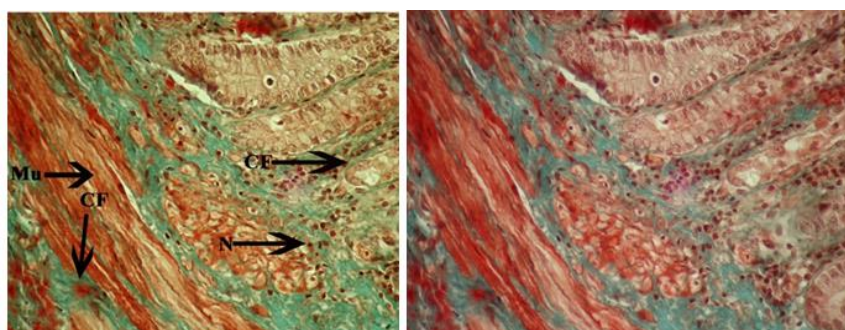


Fig. 6. Photomicrograph of camel rectum presenting rectum showing N- nucleus, CF- Collagen fiber and MU- Muscularis in MT staining at 400x magnification.

CONCLUSIONS

Rectal wall of camel rectum was made up of four layers; tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa. Tunica mucosa was the inner most and folded layer of rectal wall. Folds of rectal wall helped in absorption for different nutrients. A loose connective tissue with various amount of blood vessels found in submucosa of rectal wall. Tunica muscularis layer was composed by thick inner circular and thin outer longitudinal layer. Tunica serosa was outermost layer and contained reticular, collagen and elastic fibers.

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REFERENCES

- Aronson, L. R. (2016). Rectum, anus, perineum. *Veterian Key Fastest Veterinary Medicine Insight Engine*, Chapter 94.
- Dellmann, H. D. and Eurell, J. A. (1998). *Text book of Veterinary Histology*, wiley Blackwell, 5th edn., pp. 199-200.
- Dyce, K. M., Sack, W. O., & Wensing, C. J. G. (2009). *Textbook of veterinary anatomy-E-Book*. Elsevier Health Sciences.
- Jarrar, B. M. and Faye, B. (2019). Normal pattern of camel histology, FAO, pp. 62.
- Jit, I. (1974). Anatomy of the rectum and anal gland of the rhesus monkey (*Macaca mullata*). *Journal of Anatomy*, 117(2), 271-279.
- Kadam, S. D., Bhosale, N. S. and Kapadmis, P. J. (2009). Camparative histological study of rectum in cattle, sheep and goat. *Indian Journal of Animal Research*, 43, 120-123.
- Lieber, E. M., Pohlenz, J. F. and Woode, G. N. (1988). Gut-associated Lymphoid Tissue in the Large Intestine of Calves. I. *Distribution and Histology Veterinary Pathology*, 25, 503-508.
- Luna, L. G. (1968). *Manual of histology staining methods of Armed Force Institute of Pathology*. McGrew Hill Book co. New York, 3rd edn, 153-173.
- Plakhotnyi, R. O., Kerechanyin, I. V., Kovalchuk, N. V., Radomska, N. Y., & Shmargalov, A. O. (2020). Modern and traditional methods of comparative anatomy of the pigs rectum and humans rectum.
- Raghavan, D. (1964). *Anatomy of the Ox*. Indian Council of Agricultural Research, New Delhi. 1st edn., pp. 413-415.
- Sturgess, C. P., Canfield, P. J., Gruffydd-Jones, T. J., & Stokes, C. R. (2001). A gross and microscopical morphometric evaluation of feline large intestinal anatomy. *Journal of comparative pathology*, 124(4), 255-264.
- Takahashi, T., Numata, T., Sugamata, G., & Tokumistu, Y. (1956). On the Sensory Innervation of the Rectum in Cat. *Archivum histologicum japonicum*, 10(1), 165-171.
- Zhaxi, Y. I. N. G. P. A. I., Wang, W., Zhang, W., Gao, Q., Guo, M., & Jia, S. (2014). Morphologic Observation of Mucosa Associated Lymphoid Tissue in the Large Intestine of Bactrian Camels (*Camelus bactrianus*). *The Anatomical Record*, 297(7), 1292-1301.

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