

MICROANATOMICAL STUDY OF THE CAECUM IN PARTRIDGE

S. Rajathi¹, Geetha Ramesh and S. Muthukrishnan

¹Assistant Professor, Department of Veterinary Anatomy,
Veterinary College and Research Institute, Tirunelveli – 627 358
E-mail: srajathi9936@yahoo.in

Abstract

Aim: Microanatomical study was performed in the caecum of six adult male partridge.

Materials and Methods: Tissue pieces from different segments of caecum were fixed and processed in routine manner. 4 to 5 micron thick section was stained using Haematoxylin and Eosin staining technique.

Results: The histological study distinguished three region of the caecum. The proximal, middle and distal portions of caecum were distinguished. The caecal wall was composed of four layers viz. mucosa, submucosa, muscularis and serosa. The proximal portion of caecum were well developed with villi and numerous folds, middle portion with small villi and numerous folds while the distal with small villi and very less folds. The mucosal folds were well developed and lamina propria contained lymphatic nodules which were mostly found in the proximal part, but they were less prominent at the distal end and least in the middle portion of caecum. Muscularis mucosa ran along the inner surface of the villi of caecum. Submucosa contained loose connective tissue, blood vessels and adipose tissue. Muscularis layer was well developed with tunica serosa. The histometrical analysis of lymphatic nodules showed that the number of lymphatic nodules was significantly different among three parts of caecum.

Conclusion: The histological and histometrical analysis of caecum in partridge showed differences among other species of birds in relation with the shape and distribution of villi and mucosal folds and also in the distribution of lymphatic nodules.

Keywords: Microanatomy, Caecum, Partridge, Lymphoid, goblet cells.

I. INTRODUCTION

Birds' large intestine consists of paired caecum and a short colo-rectum joined to ileum and cloaca. Caecum, the largest part of partridge intestine has an important role in liquid absorption, cellulose digestion and defensive mechanism. Caecal wall is thinner than other parts of intestine containing lymphatic tissue mostly in the basal part forming caecal tonsil. The lymphatic nodules in the mucous membrane of caecum are considered important both for immune responses and medicinal therapies. Literature on the digestive organs of Partridge is scanty. Here this research work was undertaken to study the microanatomy of caecum in Partridge. This will form the basis for correlating the defensive functions of the caeca.

II. MATERIALS AND METHODS

The caecum was collected from six predator killed fresh nine weeks old adult male partridges in Abhisekapatti campus of Tirunelveli district and was studied for their histological details. The caecum was cut across into small pieces and was processed conventionally. Paraffin sections of 4 to 5 μm thickness were taken and stained using Haematoxylin and Eosin (Luna, 1968). Histometrical analysis for width, length and number of lymphatic nodules were measured using image size recording system in digiscope with imaging system. The data on these parameters were analysed statistically (Petrie and Watson, 2006).

III. RESULTS AND DISCUSSION

The paired caeca extended cranially from the ileocaecal junction. Each caecum showed three regions namely proximal, middle and distal portions. This agreed with the results of Rajathi (2017) in pigeon and quail. Vibek (2005) reported that there were variations in the mucosal surface in the three parts of caecum of white Plymouth Rock hens giving morphological evidence for different function between the three parts. Such variations were not observed in the present study. The caecum of ostrich contained folds that it gradually decreased and disappeared 14 cm from apex, suggesting that these folds play an important role in the absorption of volatile fatty acids and other metabolites produced by microbial fermentation of cellulose and hemicelluloses (Hodges, 1974).

The caecal wall consisted of four layers viz mucosa, submucosa, muscularis and serosa. The mucosa of proximal part had well developed tooth shaped villi. According to Hodges (1974) the villi of duck caecum were tooth shaped and smaller than in small intestine. The middle and distal part had small villi. The numerous folds protruded into the lumen of proximal and middle part but low in distal part (Fig.1).

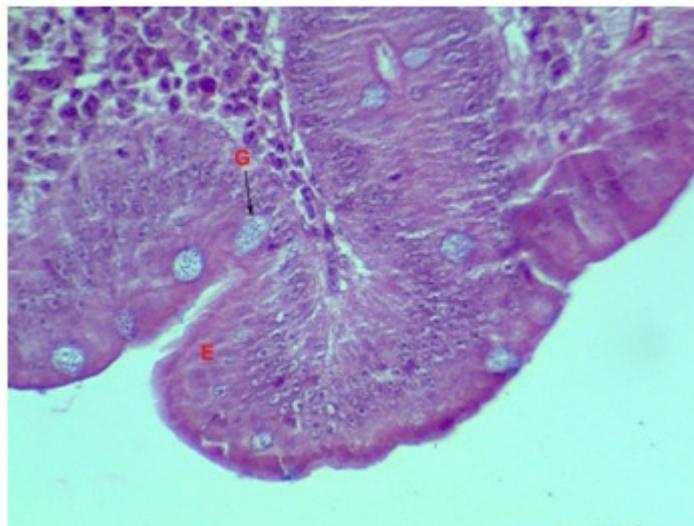


Fig. 1: Cross section of distal portion of caecum showing mucosal layer

G – Goblet cells

E – Columnar epithelium

H & E x 400

The lining epithelium of the caecum was simple columnar epithelium with goblet cells in the proximal part but in the middle and distal part with simple columnar epithelium (Fig. 2). The lymphoid tissues were distributed in the mucosa, lamina propria and submucosa and core of villi were agreed with the report of Ruhma *et al.* (2003) in caeca of chicken of Bangladesh. The lymphatic nodules were found in the proximal region of chicken caecum about 3 cm from the ileo-caecal junction (Imilia *et al.* 2004).

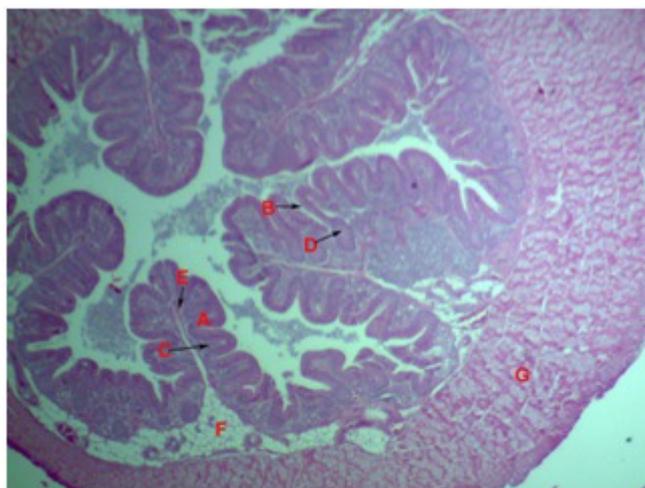


Fig. 2: Cross section of proximal portion of caecum showing four layers

A – Villi

B – Mucosal folds

C – Lamina Propria

D – Lymphatic nodules
muscularis

H & E x 400

F – Submucosa

G – Tunica

The muscularis mucosa had thin layer of muscle fibres entered into the core of villi. According the Hodges (1974) the muscularis mucosa of chicken caecum were poorly developed and consisted of only few bundles of circular muscle fibres. Submucosa also entered the core of the villi which is a thin layer with connective tissue, fat cells, blood vessels and nerve elements (Fig.3). The muscularis layer had muscle fibres arranged in same direction. Thin layer of serosa was present.

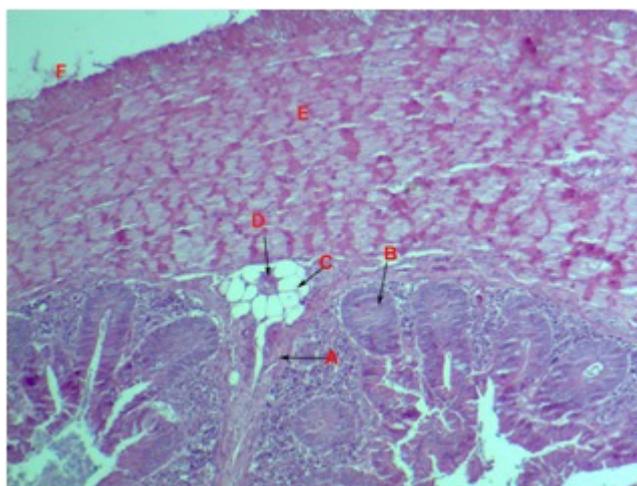


Fig. 3: Cross section of distal caecum showing submucosa

A – Muscularis mucosa B – Lymphatic nodule C – Fat cells D – Blood vessel
E – Tunica muscularis F – Serosa H & E x 400

The histometrical analysis of lymphatic nodules showed that the number of lymphatic nodules showed significant differences among three parts of caecum, they were $0.56 \pm 0.02 \mu\text{m}$, $0.53 \pm 0.01 \mu\text{m}$ and $0.17 \pm 0.01 \mu\text{m}$ in proximal, middle and distal parts respectively (Table 1). In duck caeca, the lymphatic nodules were distributed densely in the proximal part (Kitamura *et al.* 1976). This correlates that distal part is an important site for immunological surveillance against foreign microorganisms.

The width of the lymphatic nodules showed no significant difference between proximal and middle part but significant difference between distal and other parts which were $71.20 \pm 0.01 \mu\text{m}$, $72.03 \pm 0.33 \mu\text{m}$ and $82.44 \pm 0.17 \mu\text{m}$ in proximal, middle and distal parts (Table 1).

The length of the lymphatic nodules showed no significant difference between proximal and middle parts but there were significant difference between distal and other parts which were $44.55 \pm 0.22 \mu\text{m}$, $46.41 \pm 0.11 \mu\text{m}$ and $51.11 \pm 0.51 \mu\text{m}$ in the proximal, middle and distal parts respectively (Table 1).

IV. CONCLUSION

The histological and histometrical analysis of caecum in partridge showed differences among other species of birds in relation with the shape and distribution of villi and mucosal folds and also in the distribution of lymphatic nodules.

TABLE 1: HISTOMETRICAL ANALYSIS OF LYMPHATIC NODULES IN PARTRIDGE

| Histometrical parameter | Caecum (Mean±SD) | | |
|---|---------------------------|---------------------------|---------------------------|
| | Proximal part | Middle part | Distal part |
| Lymphatic nodules number in mm ² | 0.56 ± 0.02 ^a | 0.53 ± 0.01 ^a | 0.17 ± 0.01 ^b |
| Lymphatic nodules width in µm | 71.20 ± 0.01 ^a | 72.03 ± 0.33 ^a | 82.44 ± 0.17 ^b |
| Lymphatic nodules length in µm | 44.55 ± 0.22 ^a | 46.41 ± 0.11 ^a | 51.11 ± 0.51 ^b |
| Different superscript letters = significance differences (P<0.01) | | | |

References

- [1] Hodges, R.D. 1974. The histology of the fowl, Academic Press, London. 648
- [2] Imilio, D.C. Margarita, G. Albina, S. and Sugustin, Z. 2004. Characterization of distal lymphoid nodules in the chicken caecum. Anatomical Record. Vol 237: Issue 4. 512-517.
- [3] Kitamura, H., Sugimura, M., Hashmoto, Y. and Yamano, S.N. 1976. Distribution of lymphatic tissue in duck caeca. Japanese journal of Veterinary Research. 24: 37-42
- [4] Luna, L.G. 1968. Manual of histologic staining methods of armed forces institute of pathology. 3rd edition. Mc. Graw hill book company. New York 258.
- [5] Petrie, A and Watson, P. 2006. Statistics for Veterinary and Animal Science. Blackwell Publishing, USA.
- [6] Rajathi, S. 2017. Comparative morphology and morphometry of the Caecum in pigeon and quail. International Journal of Science, Environment and Technology, 6(1): 885 – 888
- [7] Ruhma, M.L., Islam, M.R., Asaduzzaman, M. and Khan, M.Z. 2003. Lymphoid tissue in the digestive tract of Deshi chicken in Bangladesh. Pakistan Journal of Biological science 6: 1145-1150
- [8] Vibek, D. 2005. Ultrastructure difference between the two major component of chicken ceca. Journal of Experimental zoology. 252(53) 21-31.