Gross Anatomical and Histomorphological Studies on Proventriculus of Japanese Quail

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SUMMARY

For the present study, 36 day old apparently healthy Japanese quail birds were selected. Birds were sacrificed and processed for dissection and gross parameters like weight, volume, length, diameter and thickness of proventriculus. Small tissue pieces of 3 to 5 mm length from proventriculus were processed for histomorphological studies. The mucosal surface of proventriculus revealed presence of papillae. The wall of the proventriculus presented tunica mucosa, tunica sub-mucosa, tunica muscularis and tunica serosa. The bulk of the wall of proventriculus was made up of proventriculus glands in sub-mucosa. Proventriculus or glandular stomach of Japanese quail is an elliptical shaped organ. The main function of proventriculus is production of gastric juice and propulsion of juice and food into the gizzard which is the main site of gastric proteolysis, mucins and lipids.

Key words: Japanese, Proventriculus, Quail

For the present study 36 day old apparently healthy quail birds were selected and divided into three groups according to their age. Birds from each age group were sacrificed and processed for dissection and gross parameters like weight, volume, length, diameter and thickness of proventriculus. Small tissue pieces of 3 to 5 mm length from proventriculus were collected, washed and fixed in 10 per cent neutral buffered formalin.

The tissue pieces collected were dehydrated in ascending grades of alcohol, cleared in xylene and embedded in paraffin. Transverse sections of 3-5 µ were stained with Harris heamotoxylin and eosin stain, Verhoeff's stain for observation of elastic fibres, Van Gieson's stain for collagen fibres, Masson's trichrome for connective tissue and Gomori's silver impregnation technique for reticular fiber (Luna,1968). The statistical analysis of observations recorded in the study for the above parameters were carried out using 'T' test.

The proventriculus formed the first part of stomach and was separated from gizzard by a small constriction known as isthmus or intermediate zone (Fig. 1). The proventriculus completely covered ventrally, medially and laterally by left lobe of liver was located to the left of the median line. Dorsally it was related with left lung. Hassan and Moussa (2012) however reported absence of isthmus in duck. The light brown proventriculus was small, elongated, spindle shaped thick walled tube and could be differentiated from esophagus with white coloured mucosa. The mucosal surface of proventriculus revealed presence of papillae. The average weight of empty proventriculus at 2nd, 4th and 6th week of age was 0.53±0.020 gm, 0.96±0.027 and 0.90±0.017 gm, respectively. The average value of the weight of empty proventriculus was higher at 4th week, while lower in 2nd week of age group. There was a significant increase (p < 0.05) in the weight of the empty proventriculus of quail at 4th week of age group. The average weight of filled proventriculus at 2nd, 4th and 6th week of age in Japanese quail was 0.54±0.021 gm, 0.98±0.027 gm and 0.96±0.025 gm, respectively.

The average diameter of the proventriculus at 2nd, 4th and 6th week of age was found to be as 2.43±0.045 mm, 3.46±0.063 mm and 3.60±0.57 mm, respectively at the esophageal end, 7.54±0.089 mm, 8.45±0.115 mm and 8.87±0.088 mm, respectively at the middle and 3.59±0.085 mm, 4.22±0.035 mm, and 4.69±0.114 mm, respectively at the gizzard end. The average value of the diameter of the proventriculus at esophageal end, middle and gizzard end was higher during 6th week, while lower in 2nd week of

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age group. The average length of proventriculus at 2nd, 4th and 6th week of age of Japanese quail was recorded as 1.92±0.030 cm, 2.07±0.039 cm and 2.11±0.031 cm, respectively (Nasrin et al., 2012).

The wall of the proventriculus presented tunica mucosa, tunica sub-mucosa, tunica muscularis and tunica serosa. The bulk of the wall of proventriculus was made up of proventricular glands in sub-mucosa as reported earlier (Ahmed et al., 2011), and in guinea fowl (Selvan et al., 2008), duck (Hassan and Moussa, 2012) chicken (Nasrin et al., 2012). The mucosal layer of proventriculus was thrown into various folds of different heights known as plicae. The depressions present between them were sulci and from the bases of sulci short simple tubular glands were extended into lamina propria. The lining epithelium of mucosa was consisted of simple columnar epithelium with no evidence of goblet cells in between them. The height of columnar cells decreased towards the base of plicae. The nuclei of the cells were vesicular types and located towards basal part of cell. The supra nuclear parts of cell presented mucin granules. The mucin granules were more in cells of basal part of plicae than in apical part. Lamina propria was predominated by large amount of bundles of collagen fibres (Fig. 2) with few reticular fibres. These connective tissue fibres formed the core of the mucosal folds. The lymphoid follicles (Fig. 2) were also observed in lamina propria mucosa. The lamina propria of proventriculus showed short simple tubular mucosal glands. These glands were located near to the base of the sulci. Lamina muscularis was consisted of longitudinally oriented smooth muscle fibres bundle in an interrupted fashion. These muscle fibres bundles separated tunica mucosa from tunica sub mucosa.

The tunica sub-mucosa was consisted mainly of proventricular glands. The bulk of the wall of the proventriculus was formed by these glands which presented lobules having circular, oval, elongated, triangular or irregular shape (Fig. 3). The lobules were separated from the adjacent lobules by means of connective tissue septae. The connective tissue septae were consisted mainly of collagen fibres with few elastic and reticular fibres. The blood vessels were numerous and prominently visible between the lobules. Each lobule was composed of primary, secondary and tertiary ducts. The several irregular tertiary ducts joined together to form secondary duct, the secondary ducts united and formed primary duct which passed between lobules through the connective tissue septa and reaches towards the bases of mucosal plicae. Each lobule consisted of numerous alveoli, the alveolar cells were cuboidal to columnar in shape. The alveoli showed secretory material with in the lumen of alveoli. The two principle cell types found in the alveoli were chief cells and parietal cells. The proventricular glands were lined with stratified columnar epithelium with wide lumen but some glands were still undifferentiated and appeared as mass of stratified cells. The diameter of proventriculus glands increased with advancement of age.

Tunica muscularis was consisted of an inner longitudinal and a thicker outer circular smooth muscle layers. However, Ahmed et al. (2011) reported thick inner and thin outer muscle layers in quail. Tunica serosa was typical and composed of thin layer of loose connective tissue. Peritoneal membrane which covers proventriculus externally consisted of single layer of fattened mesothelium cells.

REFERENCES


