Histomorphological Observations on the Parathyroid Glands in White Leghorn Birds

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Although considerable work had been done on the parathyroid glands of mammalian species, detailed investigation on the sub-mammalian class like aves is not much at microanatomical aspects. Therefore, an attempt is being made to study the comparative histomorphology of parathyroid glands in both sexes in the domestic fowl.

Materials and Methods

The parathyroid glands were collected from day-old, 4 week-old, 8 week-old and 12 week-old chicks along with the thyroid glands taking into consideration of their topographical relation with jugular veins and common carotid arteries of the respective sides.

Thirty birds were procured from the Poultry Research Station, Madras under the following categories; pullets/cockerels (16-20 weeks), layers and cocks ranging from 24 weeks to 52 weeks and non layers between 75 to 100 weeks as and when needed. Twelve adult birds aged about 52 weeks were also procured for a detailed study on the topography of the organ.

Parathyroid glands from laying hens were also fixed in 3 percent glutaraldehyde in phosphate buffer (0.1 M, 7.3 pH) for araldite embedding and used for electron microscopy. For routine histological observations, sections of 5 to 6 um thickness were cut and stained by, Mayer’s haemalum and eosin-phloxine, Masson’s trichrome, Crossman’s modification of Mallory’s triple stain, van Gieson’s method for collagen fibre, Silver, Orein and Aniline blue method for selective demonstration of elastin, reticulum and collagen, Toluidine blue method for semi-thin sections, Periodic acid Schiff (PAS) reaction for carbohydrates, PAS with alcian blue for the differentiation of acid mucopolysaccharides. The frozen sections were used for staining in Oil-red ‘0’ in propylene glycol for localizing the lipids and Gomori’s method for localizing acid phosphatase activity (Bancroft and Gamble, 2003).

Measurements of the sizes of the lobes, thickness of the capsules and variation in the size of the chief cells in White leghorn birds of different age groups of both the sexes were recorded by using the calibrated ocular micrometer. The arithmetic mean, standard error and coefficient of variations were carried out by following usual procedures (Snedecor and Cochran, 1994).

Results and Discussion

The parathyroid glands in White leghorn birds were paired structures, on either side of the midline at the thoracic inlet. Each pair on either side appeared to be a single gland in the form of an ovoid structure. The presence of two pairs of gland viz anterior and posterior pairs was typical of the avian species as reported by Abdel

Fig 1. Photomicrograph of an accessory parathyroid tissue in the parenchyma of a thyroid in a 6 week old broiler chicken. T - Thyroid, AP - Accessory parathyroid tissue. Haematoxylin and Eosin x 125.

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In general the number of parathyroid glands does not exceed four in any of the avian species except the Japanese Quail where it is only two (Clark and Sasayama, 1981).

The glands on the same side designated as parathyroid III (Cranial or anterior parathyroid) and parathyroid IV (Caudal or posterior parathyroid) were enclosed by a common capsule. The anterior and posterior lobes of the respective sides were separated by a well defined connective tissue layer in spite of their being enclosed by a common capsule. Though they were closely related to the thyroid glands of the respective side, the parathyroid gland on the right side was in actual contact with the caudal pole of the thyroid gland, where the left one was only nearer to the thyroid.

Among the pairs of the same side, the anterior lobes were larger in size than the posterior ones, similar to the report of Yashwant Singh and Bharadwaj (1982) in White leghorn birds. With regard to the weight, the glands of the hens weighed more than that of the cocks of the corresponding age groups which is in conformity with the findings of Hodges (1981) in Gallus domesticus.

The anterior lobe was oval or spherical and the posterior one was elongated. The diameter ranged from 1020 to 1530 microns for anterior lobes and 629 to 884 microns for posterior lobes. The parenchyma of the parathyroid gland in White leghorn birds consisted of irregular anastomosing cords of cells in their laminar form in chicks and in an organized form of acini in the rest of the groups within a thick dense connective tissue capsule. Numerous sinusoids were found in the parenchyma which were lined by a distinct endothelium. The presence of parenchymal cells in the connective tissue capsule was common in the parathyroid gland of White Leghorn birds (Fig 1).

The parenchyma had single cell type, the chief cell. Three types of chief cells were identified in White leghorn birds of sexes and all age groups, viz., dark chief cells with darker cytoplasm; light chief cells with very pale cytoplasm and clear chief cells with little stainable material. The presence of fine basophilic granules with few vacuoles in the cytoplasm of dark chief cells and lesser content of basophilic granules with more vacuoles in the cytoplasm of light chief cells of the parathyroid gland of White Leghorn birds of all the age groups of both the sexes are in support of the findings of Yashwant Singh and Bharadwaj (1982). The shape of the chief cells was columnar in male and cuboidal in female chickens. The dark chief cells with darker stained nuclei and the light chief cells with lightly stained nuclei noticed in the present study were suggestive of the active state of secretion of the dark chief cells and the inactive state of the light chief cells. The oxyphil cells with an characteristic acidophilic cytoplasm was not seen in parathyroids as also reported by Parchami and Dehkordi (2011).

Colloid vesicles lined by cuboidal epithelium were noticed in the parathyroid of all age groups of both the sexes in the White Leghorn birds. The tendency towards the vesicular formation was more and the colloid material was PAS positive in the broiler chickens of 6 to 8 weeks of age. This is agreeable with the findings of Yashwant Singh and Bharadwaj (1982) who have reported the existence of a large follicle filled with PAS positive colloidal mass in the cranial parathyroid of 32 weeks old female White Leghorn bird.

Occasional presence of accessory parathyroid tissue was noticed in the thyroids (Fig) and ultimobronchial bodies of White leghorn birds of post hatch groups, which is in correspondence to the findings of Mohammad and Al-Badri (2010) in ultimobronchial glands of geese. The presence of parathyroid tissue in the extraneous locations like thyroids and ultimobronchial bodies may be warranted at times of growth and egg laying in birds, as standing reserve to cope up with the demand for the hormone in calcium metabolism.

The variation in the number of the vacuoles in the chief cells immaterial of their types, suggests various phases of the activity of the cells as the vacuoles are containing the precursors of the secretion. Abundance of lipids in the interstitial connective tissue and lipid droplets in some of the parenchymal cells observed in White Leghorn birds of adult age groups are in confirmation with the findings of
Intestinal Volvulus Due to Obstructive Enteroliths in a Pony

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This is a report on the occurrence of an intestinal volvulus in a pony caused by enteroliths in the caecum and colon.

Material and Methods

A female pony of 8 years old reported to be suffering from colic, anorexia, distension of abdomen, absence of peristalsis and defecation was brought to the Large Animal Clinic, Madras Veterinary College for treatment. The animal was treated with magnesium sulphate to increase the peristalsis but the animal died suddenly.

Results and Discussion

A thorough necropsy was conducted which revealed fibrinous adhesions of the abdominal organs with the walls of the abdominal cavity along with accumulation of fluid mixed with shreds of fibrin. Serosal surface of the distal portion of the ileum, caecum and colon was severely congested and haemorrhagic. Portion of the distal end of the ileum of about two metres length had twisted clockwise upon itself and appeared dark red in color and distended with gas and fluid (Fig.1). The wall of the affected segment was oedematous and congested. The mesentry was thickened and congested. Mesenteric lymphnodes were congested and enlarged. The mucosal surface of the ileum was highly congested and the lumen contained blood mixed ingesta. The caecum was impacted with solid partially digested ingesta along with two firm irregular shaped enteroliths of 13 cms height 5 cms diameter and 9 cms height 4 cms diameter size and weighing 800g and 300g respectively. The surface of the enteroliths were rough. The enterolith was divided to identify the nidus. Thenidus consisted of plant fibres and shreds of Volvulus due to enteroliths in apony plastic wires around which the mineral was deposited.