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Gross and Histological studies on the Parathyroid gland in Native chicken

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I INTRODUCTION

The parathyroid glands were first recognized by Sandstrom (1880) as an independent structures in man and animals, with regard to their relationship to the thyroid and the thymus. The parathyroid glands in birds control the concentration of calcium ion in the plasma by mobilizing calcium from the skeleton, increasing renal excretion of phosphates and augmenting the rate of absorption of excretion of calcium from the intestine. The number of pairs of parathyroid glands in domestic animals varies from one to two pairs. Cat, dog, sheep and cattle possesses two pairs (Mc Donald, 1989) while the pig and horse has only one pair (Lombard *et al*, 1943 and Sisson and Grossman, 1962).

Yashwant Singh and Bharadwaj (1982) have reported that in chickens, the parathyroid glands are paired structures lying on the either side of the midline at the thoracic inlet. Generally in birds the parathyroid glands are normally found in contact with the caudal aspect of the thyroid or close to it (Forsyth, 1908 and Pischinger, 1937). In Gallus, however, there is considerable variation in the positions of the glands relative to the thyroid gland.

Though lot of 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 level. Therefore an attempt is being made to study in detail on the topographical aspect, for better understanding in the domestic fowl.

II MATERIALS AND METHODS

To study the effect of age and sex on the earliest post hatch age groups, twelve, day-old chicks were procured from M/s Jayadev Hatcheries, Namakkal and reared under personal supervision at the Department of Poultry Science, Veterinary College and Research Institute, Namakkal following regular vaccination schedule. The parathyroid glands were collected from day-old, 4 week-old, 8 week-old and 12 week-old chicks in different fixatives for paraffin embedding.

III RESULTS AND DISCUSSION

The parathyroid glands in native chicken were paired structures on either side of the midline at the thoracic inlet revealing an appearance as though, there is only a single pair in total in the species studied as the pairs of the same side were enclosed by a common capsule. The presence of two pairs of gland viz anterior and posterior pairs was typical of the avian species as reported by early workers (Hodges, 1974).

The recorded findings of the present study with regard to the number and the position are in total agreement with the findings in domestic birds (Nonidez and Goodale, 1927), in Gallus (Hodges, 1974), In Columba, Ans, Anser (Raether, 1964). These workers have reported that the topographical relationships between the anterior and the posterior parathyroids and between the parathyroid glands and the thyroid glands are variable between species and between individuals of the same species.

In the present study, it has been recorded that the anterior and the posterior lobes of the respective sides are separated by a well-defined connective tissue layer in spite of their being enclosed by a common connective tissue capsule (Fig. 1). This is in accordance with the earlier report of Hodges (1974) in birds.

Though in general the descriptions of the above workers holds good with the present findings, it could be observed clearly that both glands were close to the thyroids of the respective sides, more so in the case of the right side where it was quite opposition to the thyroid invariably in all the age groups of the birds studied.

The colour of parathyroid gland varies from species to species. Even within the species a wide variation of colour has been reported, probably based on the functional status of the gland at the time of observation. The present findings of yellowish brown colour of the parathyroid, totally agrees with that of Abdel-Magied and King (1978).

The present recorded finding of oval shape is in total agreement with that of Hodges (1974) and Sturkie (1975) in domestic birds.

The amount of connective tissue in the capsule, trabaculae and the interlobar spaces increased proportionately from day-old to advanced age groups. These present findings are in agreement with the report of Maximow and Bloom (1957) in human, Biswal and Das (1966) in white cattle and Mookkappan and Mariappa (1968) in buffaloes.

The parenchyma of the parathyroid gland 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 (Fig.2). Numerous sinusoids were found in the parenchyma which were lined by a distinct endothelium. These findings are in accordance with the findings of Nevalainen (1969) who had reported that the cellular cords in the parathyroid gland of chicken are irregular in shape and are separated by numerous capillaries.

The present recorded finding on the presence of numerous sinusoids and blood capillaries in the parenchyma of the parathyroid gland of native chicken of all the groups in both the sexes studied is in total conformity with similar findings in avian species (Benoit, 1950; Nevalainen 1969; and Hodges 1974), but differs from the statement of Montsko *et al* (1953) who have authentically emphasized that the capillaries are running only at the surface of the parathyroid gland below the capsule and not within the parenchyma of the gland in the frog.

Occurrences of the parenchymal cells in the connective tissue capsule were common in the parathyroid gland of native chicken. It is agreeable to the earlier report on White Leghorn by Yashwant Singh and Bharadwaj (1982) who have reported the presence of parenchymal cells in the capsule of the parathyroid of chicks aged between 8 to 32 weeks.

Three different zones were appreciated in the parenchyma of the parathyroid gland of all the ages of post hatch group in both the sexes. Similar published reports could not be reviewed

on any species during the period of study. The presence of different zones may be attributed to the density of the cellular population of the chief cells, different stages of their activity and the arrangement of cells in various formations (Nevalainen, 1969).

Three varieties of chief cells could be noticed in the parenchyma of the parathyroid gland of all the age group of both the sexes. These findings are in confirmation with the findings of Dorn (1960) who had classified the parenchymal cells of the parathyroid gland in chicken on the basis of staining variability into dark, light and clear chief cells.

The presence of fine basophilic granules with few vacuoles in the cytoplasm of dark cells and lesser content of basophilic granules with more vacuoles in the cytoplasm of light chief cells of the parathyroid gland of all the age groups of both the sexes are in support of the findings of Benoit (1950) and Urist (1967) in domestic birds and Yashwant Singh and Bharadwaj (1982) in White Leghorn chicken of 8 to 32 weeks of age.

Abundance of lipids in the interstitial connective tissue and lipid droplets in some of the parenchymal cells observed in the native chicken of adult age groups are in confirmation with the findings of Gilmour (1939) and Copenhaver (1964) in human parathyroid and Biswal and Das (1966) and Mookkappan and Mariappa (1978) in bovines.

Colloid vesicles lined by cuboidal epithelium were noticed in the parathyroid of all the age groups of both the sexes in the native chicken. 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 has reported the existence of a large follicle filled with PAS positive colloid mass in the cranial parathyroid of 32 weeks old female White Leghorn birds.

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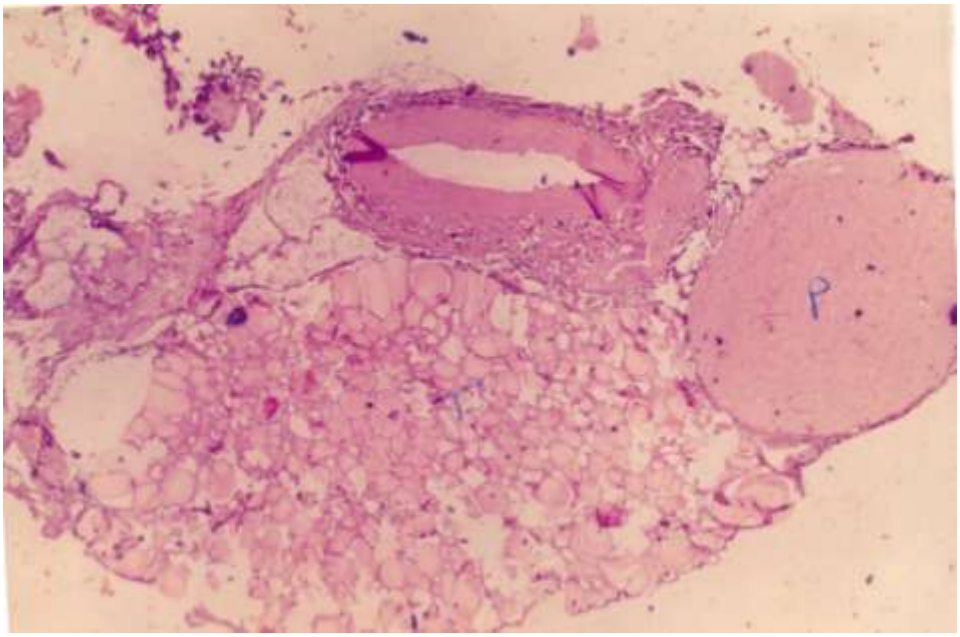

Fig 1. Photomicrograph showing parathyroid gland in native chicken (20 week old)

P- Parathyroid T - Thyroid

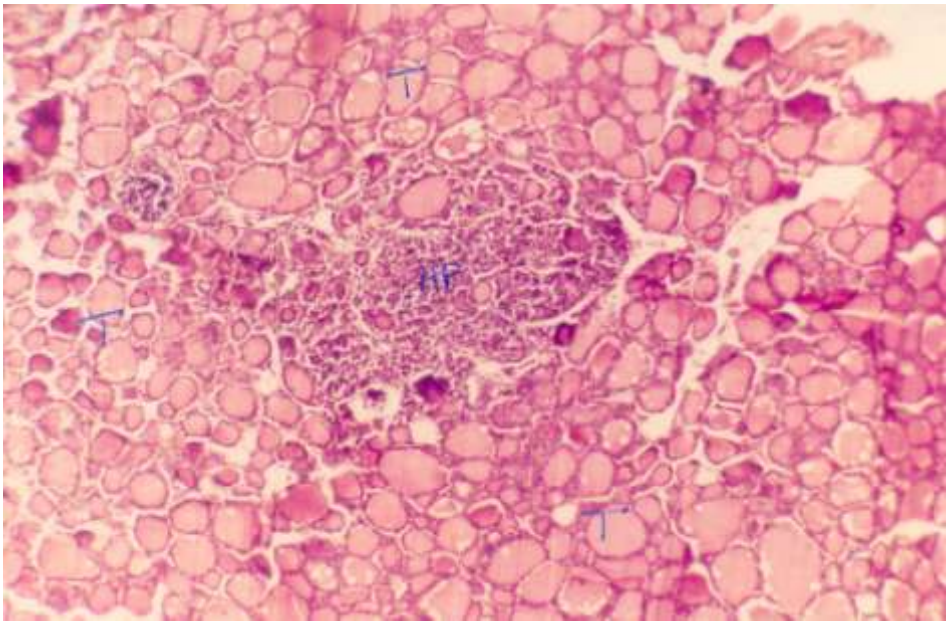

Fig 2. Photomicrograph showing parathyroid gland in the paraenchyma of thyroid in native chicken (6 week old)

AP- Parathyroid T - Thyroid