PARATHYROID SURGERY IN NORMOCALCAEMIC PATIENTS WITH BILATERAL OR RECURRENT RENAL STONES

ESSAY SUBMITTED

By

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A C K N O W L E D G E M E N T

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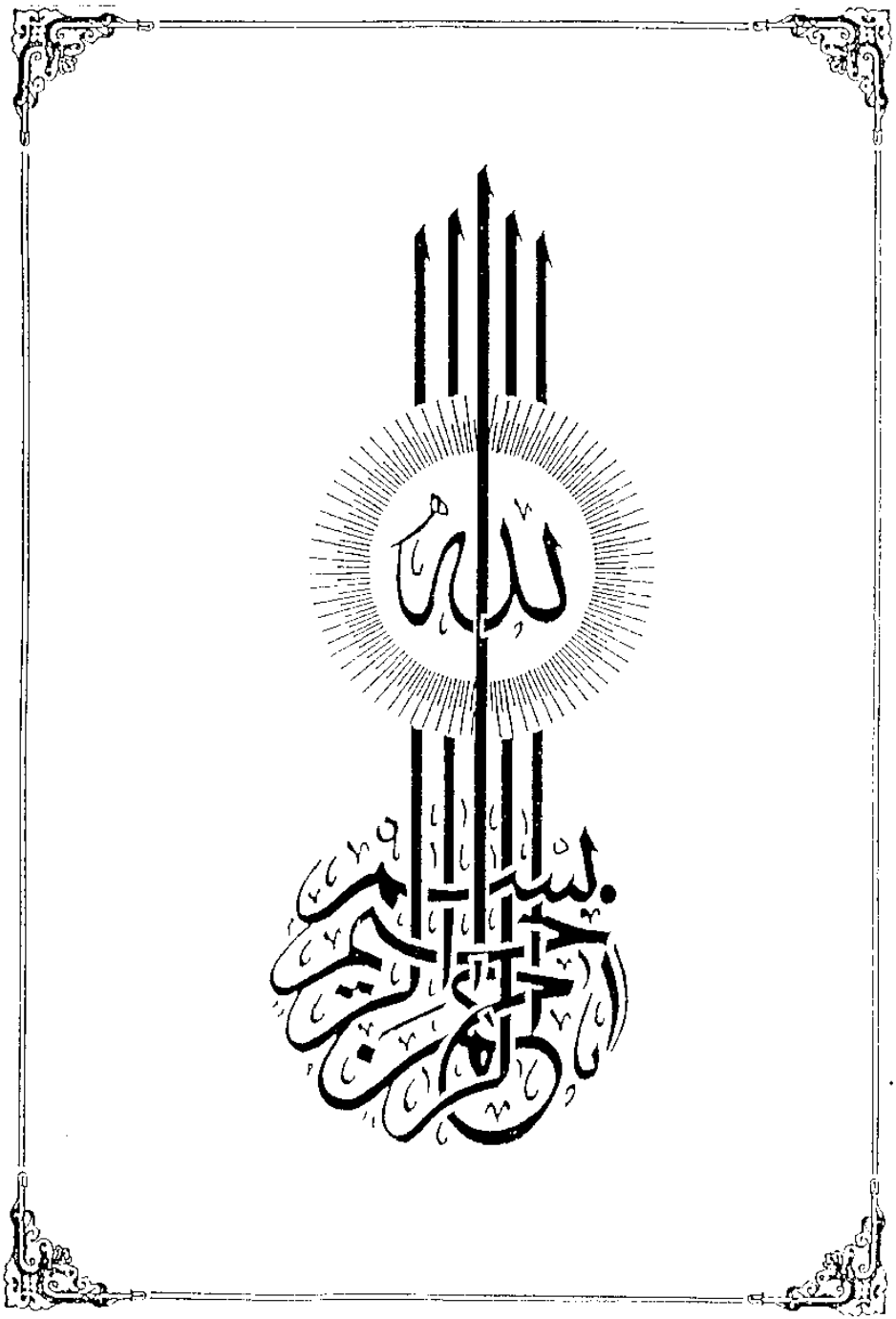

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A N A T O M Y

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ANATOMY OF THE PARATHYROID GLANDS

One hundred five years ago a swedish student named Ivar Sandstrom discovered the parathyroid glands and described their macroscopic and microscopic characteristics in several animal species, including man.

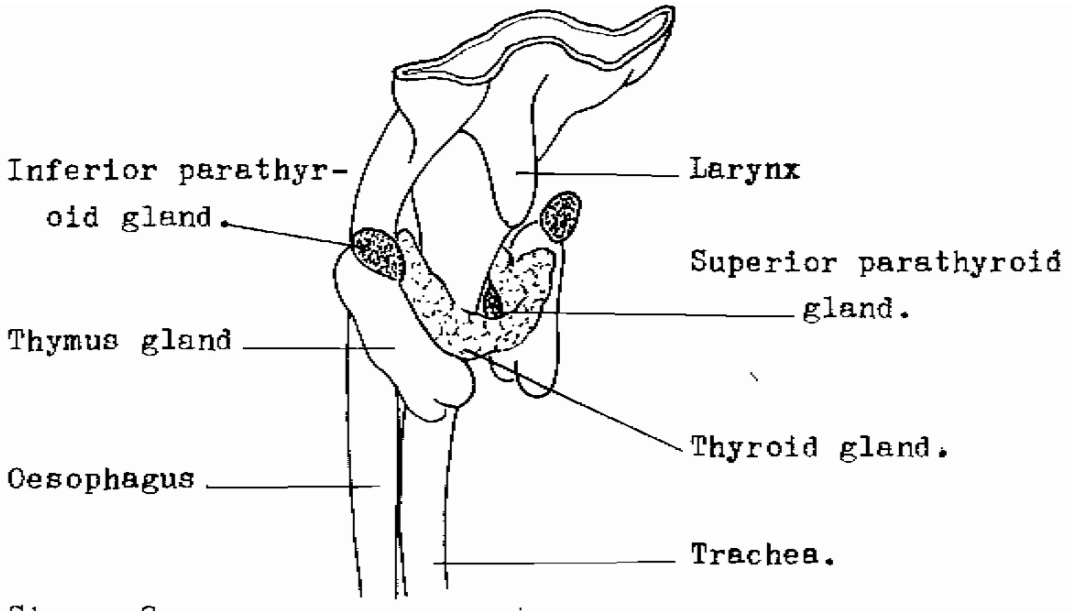
EMBRYOLOGY OF THE PARATHYROID GLANDS

The parathyroid glands derive from the dorsal endoderm of the pharyngeal pouches. The upper two glands arise from the 4th pharyngeal pouches in association with the lateral thyroid complex.The lower two glands develop from the 3 rd pharyngeal pouches with the thymus gland.

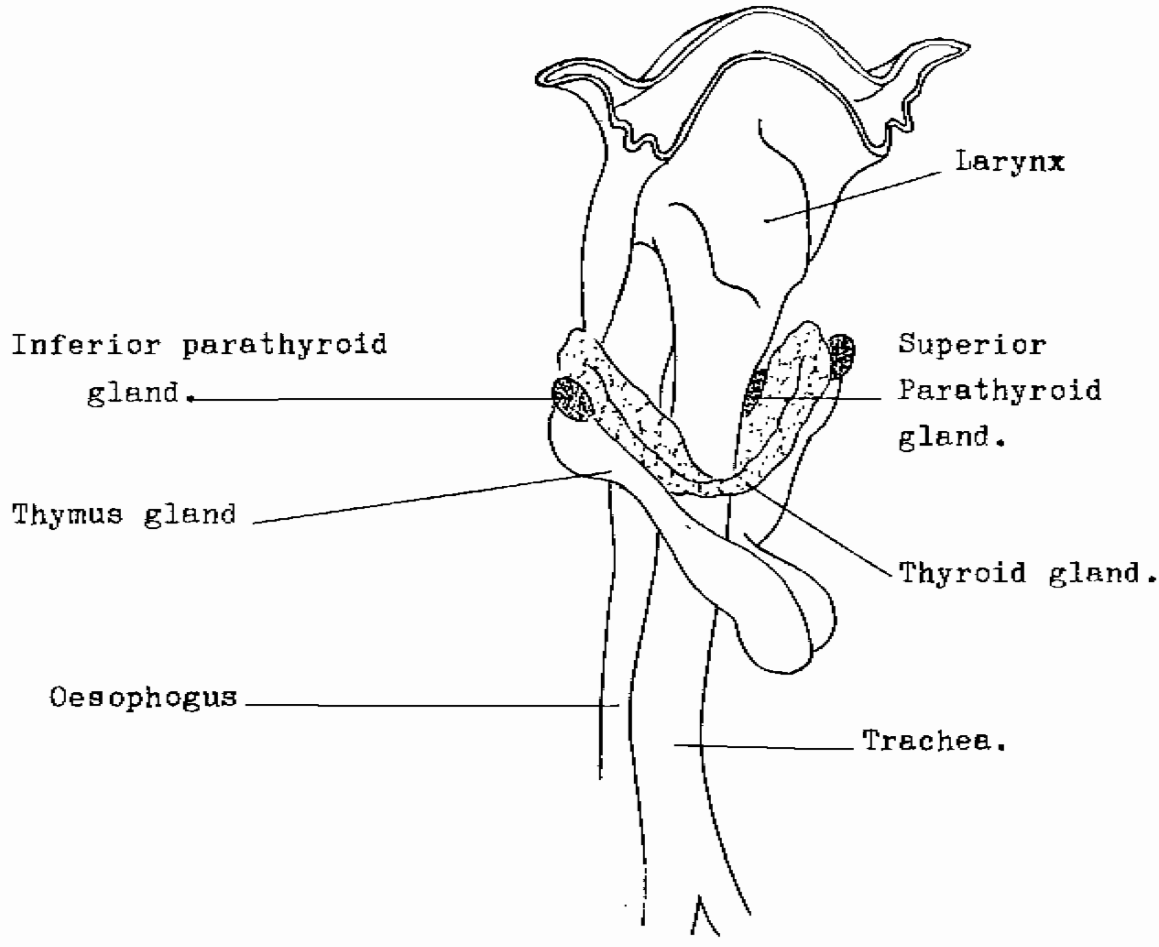
During embryogenesis the upper and lower parathyroids lie in close proximity to the thyroid and thymus glands, but as fetal maturation progresses, separation of the adjacent structures occurs (Figure 1.). This process may carry developmental anomalies in the form of ectopic location of the parathyroid glands .

1. The upper parathyroid glands may not completely separate from the thyroid, so that in adult, one or both may be partially or completely embedded within the thyroid glands (Edward Poloyan, 1976).

2. The lower parathyroid glands may be incorporated within the submucosa of the pharynx or cervical oesophagus. More commonly,



Stage: 8 mm.



Stage : 23 mm.

Figure(1) Development of the parathyroid gland.

arrested descent of the lower glands, and thymus between the pharynx and the middle part of the thyroid gland occurs (undescended parathymus).

3. One or both of the lower glands may be situated into the anterior mediastinum, frequantly within the capsule of the thymus gland.

NUMBER, SHAPE, SIZE, WEIGHT AND COLOUR:

Humans have at least 4 parathyroid glands, this fact must be considered before going on exploration of a patient presumed to have hyperparathyroidism. Gilmour in 1938 found more than 4 parathyroid glands (5 or 6) in 6.5% of autopsy cases. Wang found only 2.5% of 160 cadavers had supernumerary glands (Wang, C.A., 1976).

Supernumerary glands are frequently associated within a lobe of thymic tissue, which suggests its multiple divisions in the course of embryologic descent. It can be the cause of postoperative persistant hyperparathyroidism.(Wang,C.A., 1976).

Great variation in shape had been reported (Figure 2.). Most parathyroid glands tend to be flat like a pancake or a leaf. It may be oval or spherical shape. Occasionally a gland appears to be bean, sausage or rod shaped (wang, C.A.,1976). The average dimensions of a normal gland in a living subject are 2 x 3 x 7 mm.

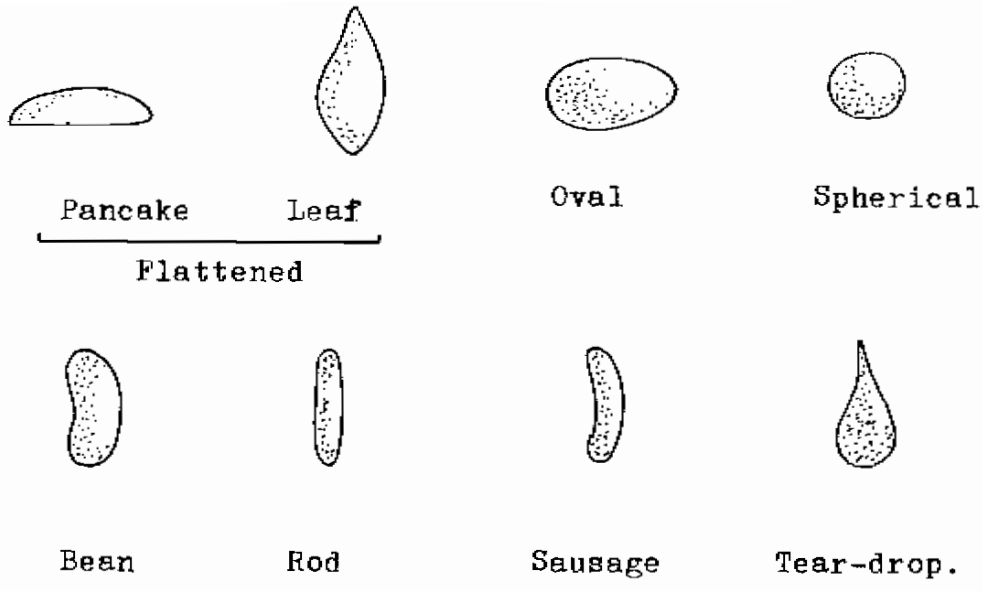
The weight of the normal gland is less variable than the size, averaging 35 to 40 mg. It varies with age and sex. Glands tend to be heavier in males and in persons between 20- 30 years of age, and lighter in females and in subjects between 70-80 years of age(Wang, C.A., 1976). Generally, the lower glands are larger than the upper glands.

The colour of a parathyroid gland depends on the amount of fatty tissue and the degree of vascularity. It ranges from yellowish-tan to reddishbrown colour. Sometimes it is very similar to the colour of fat (Harding Rains and Richie, 1981).

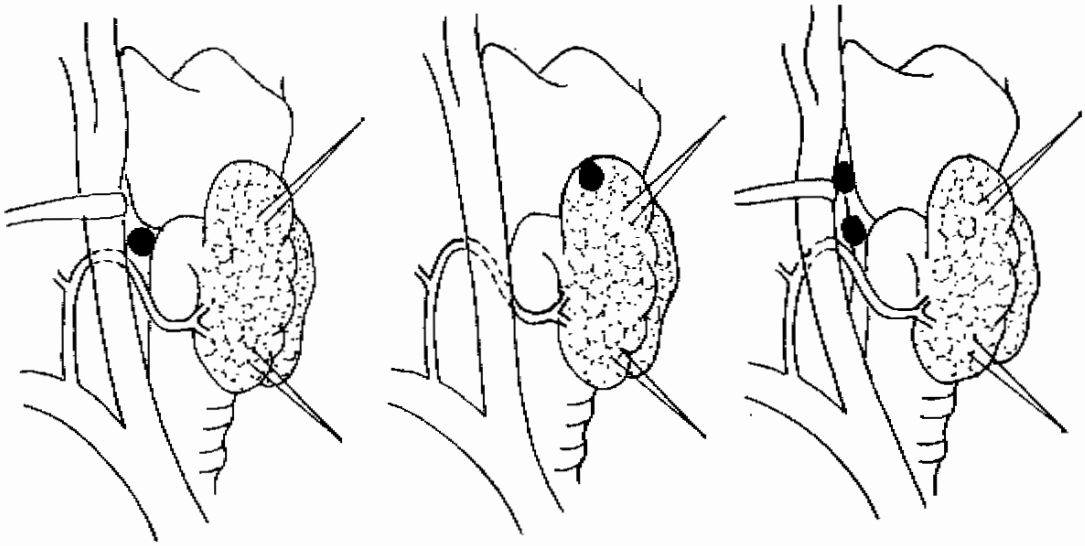
LOCALIZATION OF THE PARATHYROID GLANDS:

The parathyroid glands are arranged in upper and lower pairs closely applied to the thyroid gland, but usually outside its capsule. Rarely, they are found within the substance of the gland itself.

The upper parathyroid glands are more or less constant in position. They are usually found close to the dorsolateral surface of the thyroid, at the level of inferior border of the cricoid cartilage (Figure 3, a & b). A few of the glands may be located in the retro-pharyngeal or retro-esophageal space (Figure 3, c). (Wang, C.A., 1976).



Figure(2): Variations in shape of normal parathyroid glands.



(a)Cricothyroidal 77%

b) Behind the upper pole of Thyroid 22%

c) Retro-pharyngeal and retro-esoph. 1%

Fig.3 : Antomic distribution of the upper parathyroid glands.

The lower parathyroid glands are more variable in position because they arise from the 3rd pharyngeal pouches and travel a longer distance than the upper glands. Usually, they are found close to the dorsal thyroid capsule at the level of the first tracheal ring. Also, they may be found at any point from this position to the upper pole of the thymus, at the thoracic inlet(Figure 4) . In 10-20% of individuals one or both inferior glands are situated into the anterior mediastinum, frequently within the thymic capsule (Edward Poloyan, 1976).

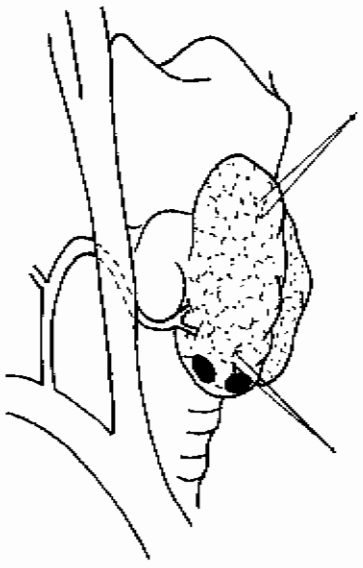
BLOOD SUPPLY:

The upper parathyroids are usually supplied by the inferior thyroid artery or branches of an anastomotic archades between the superior and inferior thyroid arteries. The lower glands have blood supply from the inferior thyroid artery, rarely from the thyroid ima artery.

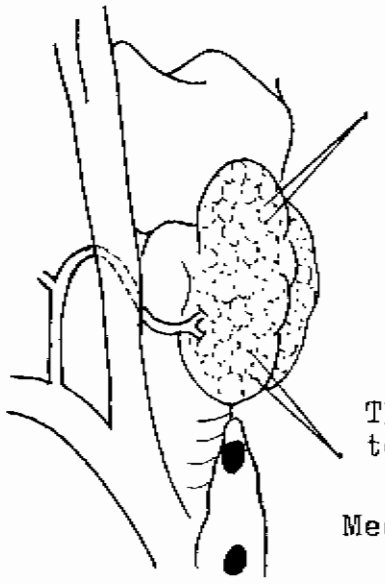
Each one of the parathyroid glands has a single leach of blood vessels running in the subcapsular plane (Harding Rains and Richie.1981, Somuel et al, 1981). The glands are very vascular that subcapsular haematomas readily develop if the glands are handled roughly, and the cut surface bleeds freely.

VENOUS AND LYMPHATIC DRAINAGE:

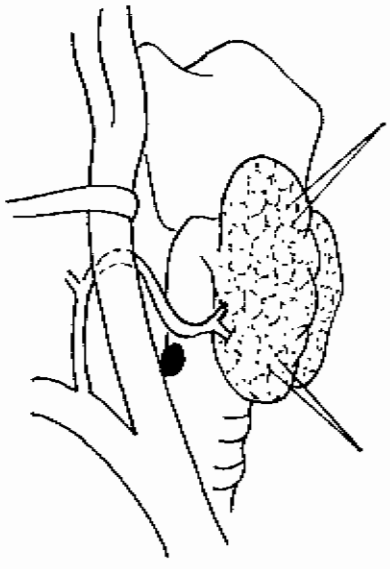
Both superior and inferior parathyroid glands drain via the inferior thyroid veins. If these vessels are ligated,



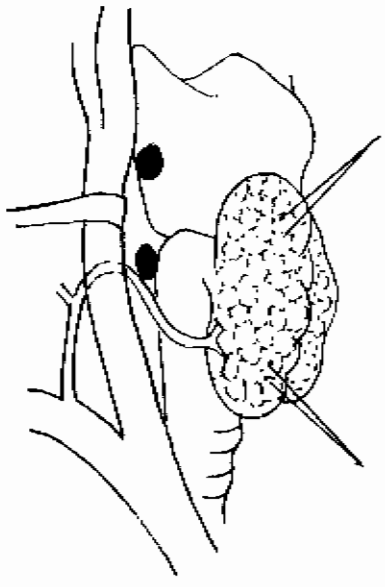
a) Close to the lower thyroid 42%



b) Intrathymic



c) Juxtathyroidal 15%



d) Ectopic 2%

(Figure (4) Anatomic distribution of the lower parathyroid glands.

drainage can continue through the middle or superior thyroid veins .

The lymphatic drainage of the parathyroid glands extends to small peritracheal nodes, which in turn drain into the internal jugular lymph nodes (Edward Polovan, 1976).
