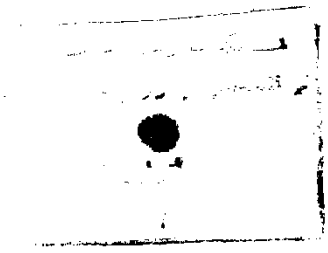
Surgical Treatment of Primary Hyperparathyroidism



Essay

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of the Master Degree in
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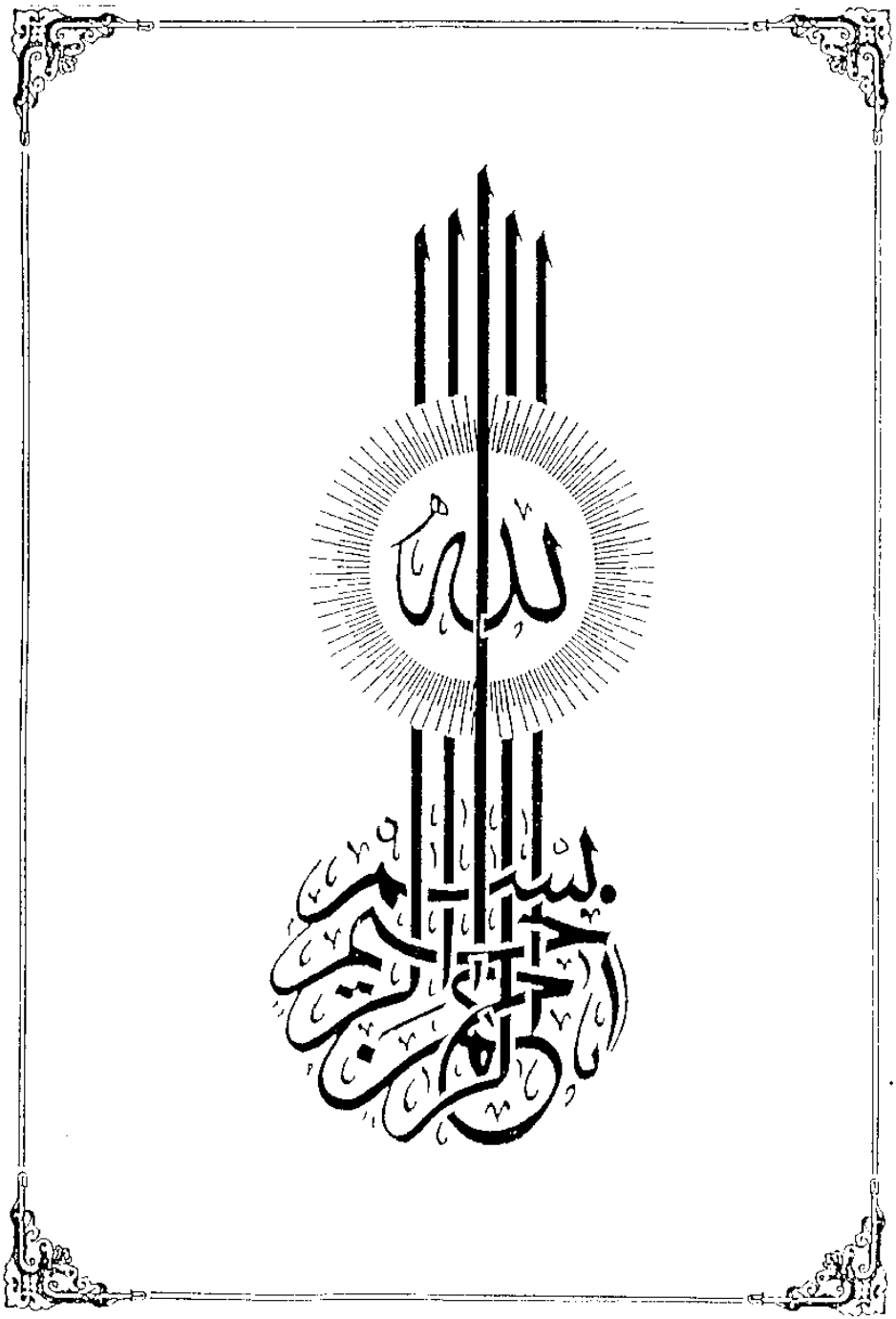

TO MY FAMILY

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INTRODUCTION

Introduction

Historical Aspects:

The parathyroid glands were first discovered in 1849 in a one-horned Indian rhinoceros by Sir Richard Owen, curator of the Hunterian Museum, but his own brief report was ignored.

In 1880, a Swedish student, Ivar Sandstrom, first described the parathyroid glands in several animals and also in man, but his discovery went unnoticed until 1891 when the glands were rediscovered by Gley, who also demonstrated that their removal led to tetany.

In 1893, Von Recklinghausen described the characteristic bone changes of sever hyperparathyroidism (ostetis fibrosa cystica). However, Askanazy was the first to note a parathyroid tumour in a patient who had died with this disease in 1904.

In 1926, the first parathyroidectomy was performed by Mandl in Vienna. His patient had severe bone disease and pathologic fracture.

In 1929, the first successful parathyroidectomy in the United States was reported by Barr and Bulger, who proposed the term hyper-parathyroidism for this disease.

From 1924 until 1963, the physiology of calcium metabolism and its regulation by the parathyroid glands were gradually elucidated.

Nephorolithiasis was most common condition led to the diagnosis of primary hyperparathyroidism (P.H.T.).

After the discovery of a radioimmunoassay for parathyroid hormone by Burson and Yalow in 1963 and the widespread availability of serum calcium analysis, the diagnosis and surgical treatment of hyper-parathyroidism rapidly became common events.

ANATOMY

Anatomy of the Parathyroid Glands

A basic understanding of the embryologic development and the normal anatomy of the parathyroid glands is of great importance in the strategy of parathyroid surgery. The surgeon has to be familiar with the gross appearances of normal and abnormal glands to be able to decide which gland or glands should be excised and histopathologically evalutated.

Embryology:

The embryologic development of the parathyroid glands explains why their positions may vary.

The parathyroid glands develop as epithelial thickning of the dorsal endoderm of the third and fourth pharyngeal pouches. As a result of their subsequent migration, the derivatives of the third pouch become the inferior parathyroids (Parathyroids III), while those of the fourth pouch become the superior parathyroids (parathyroids IV). The inferior parathyroid is closely connected in the early stages of its development with the diverticulum from the third pouch which forms the thymus gland and is drawn down with the thymus in the caudal migration of the latter. Normally the inferior parathyroid migrate only as far as the inferior pole of the lobe of the thyroid gland, but it may descend with the thymus into the

thorax, or it may not descent at all and remain above its normal level near the bifurcation of the common carotid artery. ***(Warwick 1973).***

When the inferior parathyroid gland descends into the mediastinum it is almost always anterior to the recurrent laryngeal nerve. ***(Kaplan et al., 1992).***

On the other hand, the association of the superior parathyroids with the thyroid gland, which derived ventrally from the fourth pouch, prevents them from descending ***(Last 1988).***

Gross Anatomy:

Usually, there are four parathyroid glands. However, in Alveryd's series 1968 of 354 adults studied at autopsy, 90.6 per cent had four glands, 3.7 per cent had five glands, 5.1 per cent had three glands and 0.6 per cent had two glands. ***(Wells 1986)***. Moreover, Gilmour 1937 in a study of 527 autopsies, found that roughly 80 per cent had four glands, 6 per cent had five, and 13 per cent had three. Indeed Kaplan (1989) stated that two glands or six glands were present very rarely.

Akerstrom in 1984 in an autopsy study of 503 cases found that 421 cases (84%) had four glands. 64 cases (13%) had more than four glands, and 18 cases (3%) only three glands could be identified. The difficulty in finding all parathyroid glands in some individuals and the somewhat lower

total glandular weight in the cases where only three glands were found would strongly suggest that in these cases a fourth gland had been missed. In the individuals in whom more than four glands were found, the majority of the supernumerary glands were either rudimentary or divided ***(Akerstrom 1984).***

The parathyroids are of vaiable sizes, but commonly measures about 6mm longitudinally, 3-4mm transversely, and 1-2mm anteroposteriorly ***(Warwick 1980).***

Wells in (1986), demonstrated that parathyroids show a great variability in shape. They may be flat or ovoid, but on enlargement become globular.

The glnads were usually oval or bean shaped or occasionally spherical (83% with these three types) and sometimes elongated (11%). A few glands were bilobated (27 cases, 5%) or flattened to form a thin leaflike multilobated structure (4 cases, 1%) Fig (1). ***(Akerstrom, 1984).***

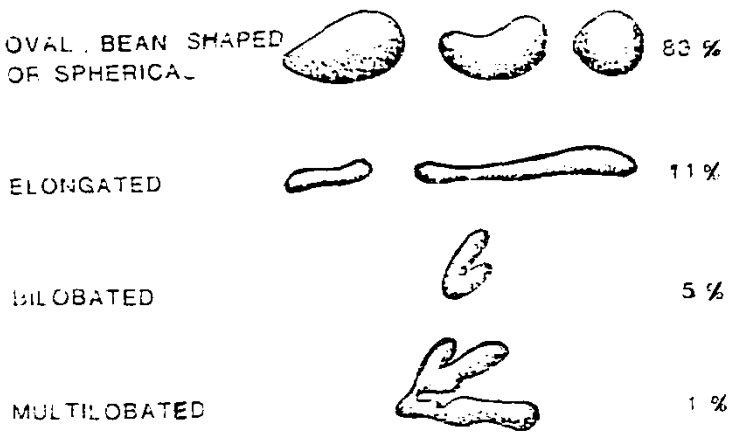

Fig. (1): Different shapes of parathyroid glands and their frequencies.

The average weight of a parathyroid gland is 35 to 40mg. It varies somewhat with age and sex, being heavier in man and in persons between 20-30 years of age, and lighter in women and those between 70 to 80 years ***(Wang 1976).*** The combined weight of the glands show a variation from 90 to 130 mg. ***(Wells 1986).***

In adults, the parathyroids are usually red-brown to yellow, wherease in the newborn, they are gray and semitransparent ***(Wells 1986).*** The glands are usually yellowish tan - a colour distinictive from the brighter yellow fat - although they may be surrounded by fat and thus be obscured. When the parathyroid gland is traumatized, its colour, owing to haemorrhage, becomes mahogany which is distinctive ***(Rossi & Cady 1991).*** The glands were more reddish and dense when they had a high