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The Parathyroid Glands and Hyperparathyroidism: I

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I. INTRODUCTION

Hyperparathyroidism, the major disorder of the parathyroid glands, is a common endocrine disease characterized by excessive secretion of parathyroid hormone (PTH) and by hypercalcemia. Occurring in 0.2% of women and 0.05% of men in the United States,¹ this condition most commonly occurs sporadically with an unknown cause but may occur as a long-term sequela of external-beam radiation to the head or neck, of iodine-131 treatment of Graves' disease, or, rarely, as part of several inherited conditions (**Table 1**). Currently, the only definitive therapy for hyperparathyroidism is parathyroidectomy. To successfully treat this disorder, the surgeon must understand the anatomy, embryology, histology, and physiology of the parathyroid glands as well as have a comprehensive knowledge of clinical manifestations, diagnosis, methods of preoperative and intraoperative localization of abnormal parathyroid glands, and recent technological advances in the treatment of patients with hyperparathyroidism.

This manual is the first of a 2-part review on the parathyroid glands and hyperparathyroidism. The first

part focuses on embryology, anatomy, histology, and cell physiology of the parathyroid glands. The second part focuses on diagnosis and surgical treatment of hyperparathyroidism. A case patient is presented to illustrate important principles in the management of patients with hyperparathyroidism.

II. EMBRYOLOGY, ANATOMY, AND HISTOLOGY OF THE PARATHYROID GLANDS

Inferior and superior parathyroid glands are formed through similar processes in the embryo. At the fourth week of embryonic development, 5 pairs of endodermally lined pouches arise from the lateral walls of the pharynx (**Figure 1**). The inferior parathyroid glands and the thymus develop from the third pharyngeal pouch (**Figure 2**). These glands then descend and undergo an extensive migration with the thymus primordia, eventually becoming positioned on the dorsolateral surface of the thyroid's inferior pole. The superior parathyroid glands develop with the lateral anlage of the thyroid gland from the fourth branchial pouch (**Figure 2**). As they lose their connection with the pharynx, superior glands attach to the thyroid and ultimately lie adjacent