Parathyroid adenoma.

by Lester D. R. Thompson, MD

A parathyroid adenoma is a benign neoplasm of parathyroid parenchymal cells. There is an association with the *HRPT2* gene (1q25-q31), which is associated with hyperparathyroidism-jaw tumor syndrome (an autosomal dominant disorder). Parathyroid adenoma is the single most common cause of hyperparathyroidism. It is usually seen in patients in the fourth and fifth decades of life, and women are affected more often than men by a margin of 3 or 4 to 1.

The lower glands are affected most often; most lesions are identified in glands within their usual anatomic location instead of in an ectopic or supernumerary site. Patients usually present with symptoms related to hypercalcemia, including fatigue, weakness, depression, nephrolithiasis, and osteopenia. In general, patients have elevated serum calcium and parathyroid hormone levels. Technetium-99m sestamibi imaging is one of the most helpful studies for localizing hyperfunctioning parathyroid gland tissue.

Surgical removal, often with intraoperative parathyroid hormone level or radioisotopic assessment, helps to achieve a cure. It is possible that patients may develop brown tumors of bone as a result of proliferation of multinucleated giant cells and osteoclasts. The multinucleated giant cells and osteoclasts are set within a hemorrhagic background with hemosiderin-laden macrophages.

Macroscopically, there is usually a single, firm gland with a rounded border, contained by a delicate capsule. The weight of the affected gland varies, ranging from 0.3 g to more than 1.0 g. An uninvolved remnant or atrophic remnant of tissue is seen at the periphery. Cystic degeneration may be seen, including scarring and calcification.

Histologically, there is usually a single mass, which is most often composed of chief cells that are surrounded by an uninvolved or atrophic rim of parathyroid tissue (figure 1), with or without a separating fibrous connective tissue capsule. The nodule usually lacks stromal adipose tissue. The parenchymal cells are enlarged, with a slightly increased nucleus-to-cytoplasm ratio. The cells have eosinophilic to clear cytoplasm with hyperchromatic nuclei (figure 2). Cytoplasmic oxyphilia, referred to as “oncocytes,” may be seen. The parenchymal cells may be arranged in sheets, cords, nests, or glandular structures. Eosinophilic secretions may be seen in the lumen of the glandular component. Mitoses may be seen, with an upper limit of about 4/10 high-power fields without any atypical forms. Several variants (e.g., oxyphilic, lipoadenomatous) are recognized.

Figure 1. A thin strip of compressed, atrophic epithelium (top) is separated from the adenoma by a thin capsule. The tumor is cellular, but it lacks pleomorphism, increased mitoses, and stromal adipose tissue (fatless).

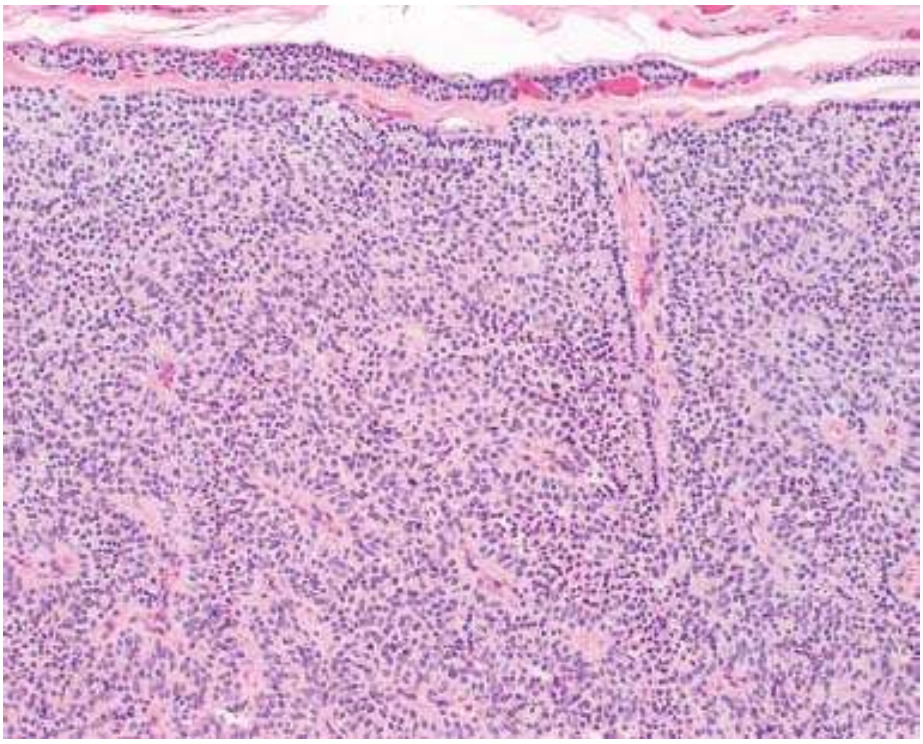
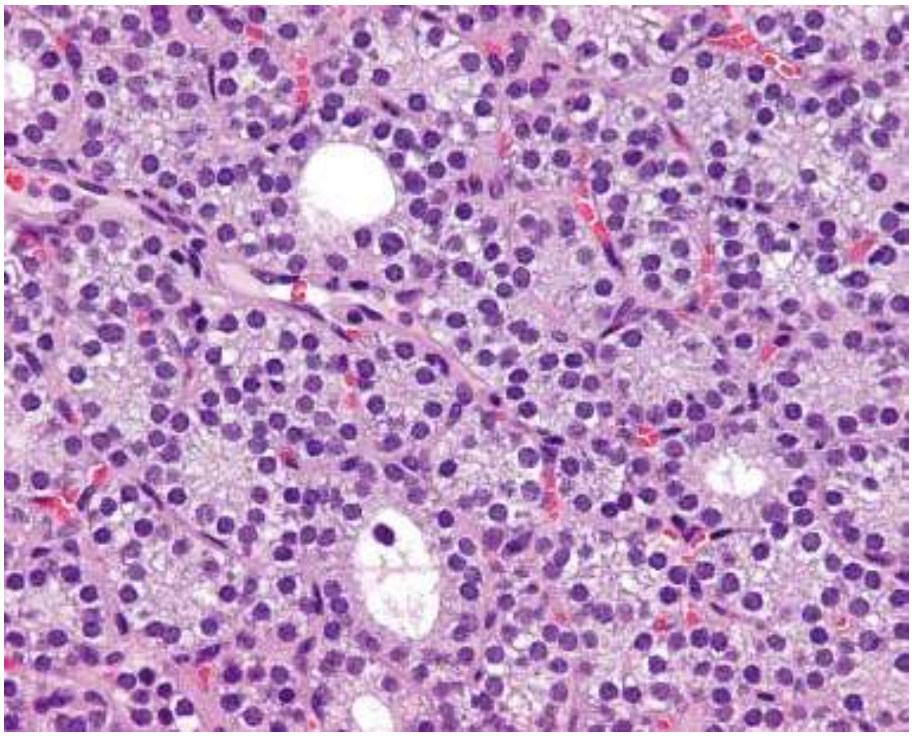


Figure 2. A glandular or acinar architecture is frequently present in an adenoma. The cells are of intermediate size, and there is a slightly increased nucleus-to-cytoplasm ratio. The cells are monotonous with even nuclear placement. There is no stromal fat.



On histochemistry, fat stains (oil red O, Sudan black) will usually show that the amount of intracellular fat is significantly less than it is in normal or suppressed parenchymal cells. Chromogranin, synaptophysin, and parathyroid hormone will be reactive by immunohistochemistry. Parafibromin will usually show a strong nuclear reaction in adenomas, compared with an absent to remarkably decreased reaction in carcinomas. Adenomas must be separated from parathyroid gland hyperplasia, uneven nodular hyperplasia, thyroid gland lesions, and parathyroid gland carcinoma.

Suggested reading

1. DeLellis RA, Mazzaglia P, Mangray S. Primary hyperparathyroidism: A current perspective. Arch Pathol Lab Med 2008; 132 (8): 1251-62.
2. Gill AJ, Clarkson A, Gimm O ,et al. Loss of nuclear expression of parafibromin distinguishes parathyroid carcinomas and hyperparathyroidism-jaw tumor (HPT-JT) syndrome-related adenomas from sporadic parathyroid adenomas and hyperplasias. Am J Surg Pathol 2006; 30 (9): 1140-9.

From the Department of Pathology, Woodland Hills Medical Center, Southern California Permanente Medical Group, Woodland Hills, Calif.

Ear Nose Throat J. 2014 July;93(7):246-268.