Practical Imaging of the Parotid Gland

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The parotid gland may be affected by numerous patholo-gies, and physicians from many different medical and surgical specialties request parotid imaging. Mastering the typical imaging features of various types of parotid pathology is facilitated by understanding how various diseases produce their characteristic imaging findings. In this review article, we present succinct overviews of the normal anatomy and the common pathologies of the parotid gland and recommend a practical approach to differential diagnosis that can be easily implemented in day-to-day radiology practice.

Introduction

Anatomy

The parotid glands are the largest of all salivary glands, each weighing approximately 15-30 g.[1] Each parotid gland is positioned in the *parotid space*, which is bordered anteriorly by the mandibular ramus and masticator space, posteriorly by the mastoid tip, medially by the styloid process and parapharyngeal space, and laterally by the subcutaneous tissues. The superior margin of the parotid space is formed by the external auditory canal and mastoid tip, and inferiorly, the glands blends between platysma and the anterior margin of sternocleidomastoid muscle. Superficial layers of the deep cervical fascia enclose the parotid space, which contains the parotid gland as well as the retromandibular vein, the external carotid

artery, branches of the facial nerve, and lymph nodes. Lymph nodes are present both within and adjacent to the parotid parenchyma. Intraglandular extensions of the fascial layers subdivide the parotid gland into multiple lobules. In approximately 10%-20% of the general population, an accessory parotid gland is also present, extending anteriorly along the main parotid duct (Stensen duct), superficial to the masseter muscle.[2] A normal parotid gland contains both adipose and glandular tissue in variable proportions, resulting in a multivariate appearance on cross-sectional imaging[3] (Fig 1). Several branches of the external carotid artery supply blood to the parotid gland; venous drainage occurs via the internal jugular vein. Sympathetic parotid innervation is from the carotid plexus; parasympathetic innervation is derived from the auriculotemporal nerve, a branch of the fifth cranial nerve via the glossopharyngeal nerve.

Despite widely used terminology, no anatomical structure separates the superficial lobe of the parotid from the deep lobe of the parotid. The plane of the intraglandular course of the facial nerve is used as a landmark for distinguishing the larger (~80%) super-ficial lobe of the parotid gland from the smaller (~20%) deep lobe of the parotid gland. As the facial nerve cannot often be visualized with cross-sectional imaging, the gland can be divided into a superficial portion and deep portion using the retromandibular vein as a landmark, with the superficial lobe lateral to and the deep lobe medial to the vein. The deep lobe extends medially through the stylomandibular tunnel (between the ramus of the mandible anteriorly and the anterior border of the styloid process) and the posterior belly of the digastric muscle posteriorly (Figs 2 and 3). The ramus of the mandible can also be used as an alternative landmark on cross-sectional imaging. The distinction between the superficial and deep portions of the parotid is primarily important for surgical planning, as the surgical approach and
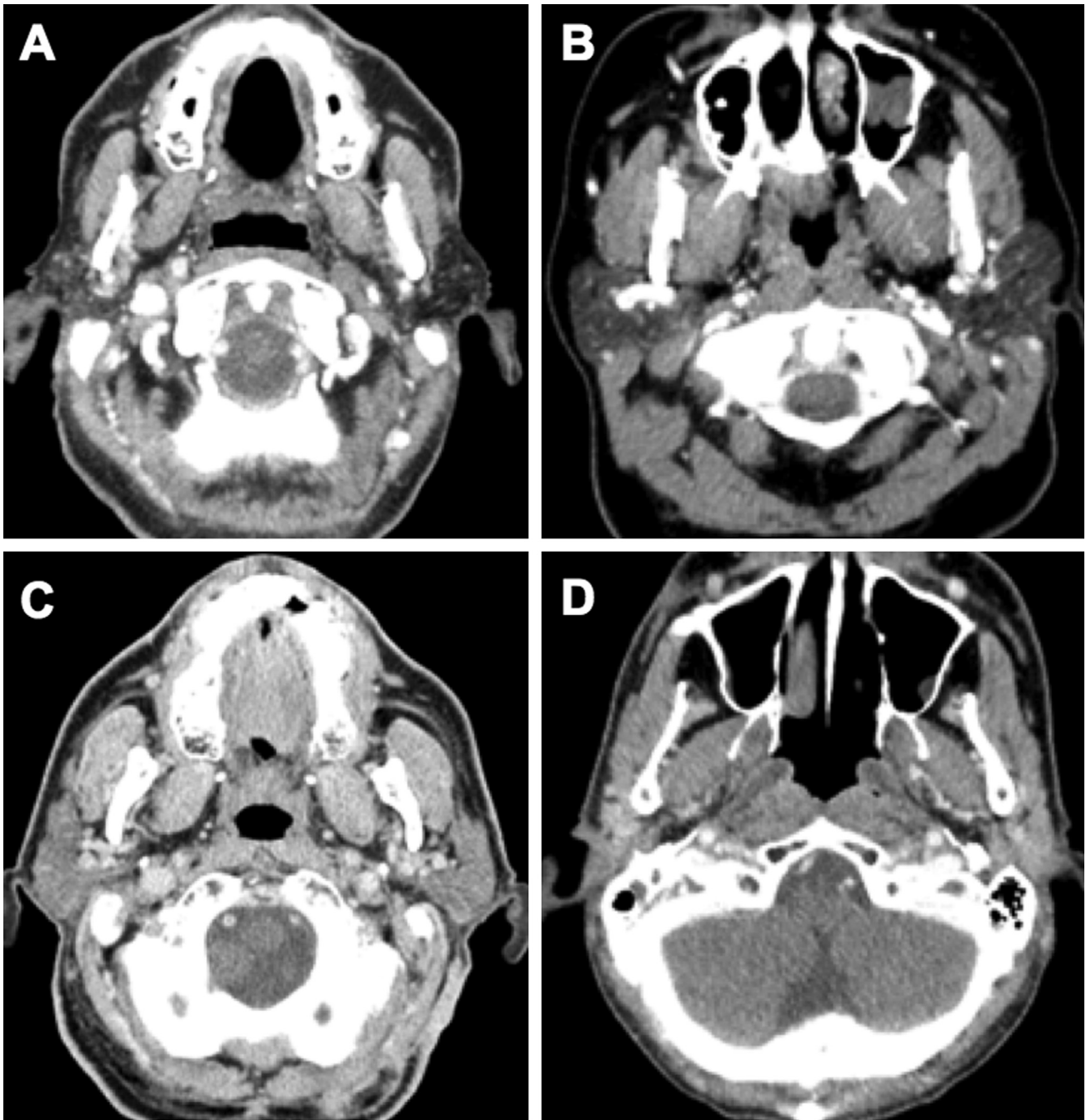
FIG 1. Normal CT appearance of parotid gland depending on the adipose tissue content of the gland in 4 different patients. (A) The density of the left parotid gland in the image is similar to the adjacent fat whereas the right parotid gland has slightly higher density in comparison with the adjacent fat. (B) Both parotid glands are hyperdense in comparison with the adjacent fat but hypodense in comparison with the adjacent muscles. (C) The parotid glands are hyperdense to the adjacent fat and slightly hypodense to the adjacent muscles. However, the density of the glands is slightly higher in comparison with the density of the glands on (B). (D) The density of the glands is isodense to the adjacent muscles.

possible lymph node dissection for a lesion involving the deep portion of the gland differs from that for a lesion confined to the superficial portion.

The Stensen duct carries saliva from the parotid gland to the oral cavity. The duct is approximately 7-cm long from the anterior margin of the gland to the parotid duct opening. The parotid duct arborizes inside the gland with a treelike branching pattern from the main duct to the parotid acini (Fig 4). There are usually approximately 1-5 segmental branches off the main parotid duct at the hilum, although there is no specific branching pattern.