Intercalated Duct Lesion of the Parotid

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Received: 25 October 2011 / Accepted: 13 January 2012 / Published online: 22 January 2012
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Abstract Intercalated duct lesions of the salivary glands are rare tumors that were only recently described. However, their resemblance to other salivary gland tumors as well as their association with malignant neoplasms makes their detection, treatment, and follow-up paramount. We present the case of a 63-year-old woman diagnosed with an intercalated duct lesion of the parotid. Her case is illustrative of the difficulty and importance of an accurate pathologic diagnosis in the management of patients with these lesions.

Keywords Intercalated duct · Intercalated duct adenoma · Intercalated duct hyperplasia · Intercalated duct lesion · Tubular adenoma · Monomorphic adenoma of salivary gland

Case Description

A 63-year-old woman presented with a 1-month history of a small nodule at the angle of her left mandible. The lesion had grown in size over the month but was not painful. She denied any facial numbness, weakness, or difficulty chewing.

Physical examination demonstrated a soft, mobile, non-ulcerated nodule of less than 1.0 cm in the left parotid gland. The right parotid was normal, and there was no cervical lymphadenopathy on palpation. Examination of the oral cavity, oropharynx, and larynx were normal. Cranial nerve VII was symmetric and intact bilaterally. Computed tomography (CT) was performed, which showed a 0.5 cm parotid gland node with surrounding fat stranding, suggestive of an inflammatory process (Fig. 1). No intraparotid stone was seen, and the neck was radiographically negative. Fine needle aspiration biopsy (FNAB) was performed but yielded only fibroadipose tissue and was considered non-diagnostic.

A superficial parotidectomy was performed. On gross examination, the cut surface of the specimen revealed a tan lobulated appearance. Microscopically, the tissue contained a 0.6 cm unencapsulated nodule comprised of numerous small tubules (Fig. 2). The nodule exhibited an irregular border and contained occasional acinar cells around the periphery, but lacked evidence of infiltrative growth. The tubules consisted of a single layer of cuboidal ductal cells with small round, cytologically bland nuclei and with pale amphophilic cytoplasm (Fig. 3b), as well as scattered abluminal myoepithelial cells (Fig. 3a). There was no evidence of fibrosis or chronic inflammation within the tumor. Immunohistochemical studies showed a p63-positive, calponin-positive, and smooth muscle actin (SMA)-positive myoepithelial cell layer surrounding each

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Fig. 1 Axial CT image demonstrating a 5 mm left parotid gland node (arrow) deep to the skin marker with surrounding fat stranding

Fig. 2 Low magnification view showing a proliferation of small ducts and lacking a well-defined fibrous capsule (H&E, $\times 100$)

tubule (Fig. 4). S-100 was diffusely positive in luminal cells and some abluminal cells and CD117 was positive primarily in luminal ductal cells. Based upon these histologic features, the tumor was diagnosed as an intercalated duct lesion with features of intercalated duct hyperplasia. No other neoplastic lesions were identified. Given this pathology, no further therapy was pursued. The patient

Fig. 3 The tubules are composed of a single layer of small, cytologically bland luminal ductal cells with inconspicuous abluminal myoepithelial cells (H&E, a $\times 400$, b $\times 1,000$)

continued to do well under close follow-up and had no evidence of disease at 4 months following surgery.

Discussion

The basic histologic structure of salivary glands consists of acinar cells and ductal components, the latter being divided into intercalated, striated, and excretory ducts. The intercalated duct, which is hypothesized to contain stem cells that give rise to several salivary gland neoplasms [1], lies closest to the acinus and receives its secretions. Simple cuboidal epithelium comprises its luminal border, with a continuous abluminal layer of myoepithelial cells at the periphery [2].

Intercalated duct lesions (IDLs) are abnormal proliferations of the intercalated duct cells, and range along the morphologic spectrum from hyperplasia (IDH) to adenoma (IDA) [3]. Although proliferation of the intercalated ducts can occur as a reaction to many conditions, including

Fig. 4 Immunohistochemical staining for calponin highlights an abluminal myoepithelial layer surrounding each small duct ($\times 400$)

chronic sialadenitis and after radiation therapy, it is particularly relevant for otolaryngologists because it is also seen in conjunction with several low-grade salivary gland tumors [3, 4]. It has been suggested that some of these tumors, including epithelial-myoeplithelial carcinomas (EMCs) and basal cell adenomas, may be derived from hyperplasia of the intercalated ducts [3, 5, 6]. A recent pathologic review of 34 IDLs by Weinreb and colleagues concurs, noting IDL as a probable precursor to these neoplasms [3]. However, this has not been shown in all studies, and it therefore remains unclear if the link between hyperplasia and true neoplasia is causal or simply associative [3, 4, 6, 7].

Clinically, IDLs typically present as a unifocal palpable salivary gland mass, most often in the parotid. IDLs are usually small, ranging in size from 1 to 8 mm, and in some cases, they can be incidental findings in the setting of other salivary gland pathology. On histopathology, IDLs show a spectrum of architectural appearances, including intercalated duct hyperplasia (IDH), a non-encapsulated intercalated duct proliferation that blends somewhat with the surrounding salivary gland parenchyma. In contrast, intercalated duct adenomas (IDA) have a well-defined fibrous capsule separating them from the surrounding normal salivary gland parenchyma. Hybrids of these two types have also been described [3]. Given the lack of encapsulation and presence of occasional acinar cells, our patient's lesion was compatible with IDH.

The pathologic diagnosis of IDLs can be challenging given the overlap with other low-grade salivary gland tumors including striated duct adenoma, basal cell adenoma and adenocarcinoma, acinic cell carcinoma, adenocarcinoma NOS, oncocytoma and canaliculal adenoma [7]. They can often be differentiated from reactive lesions (e.g., tissue response to radiation, starvation, infection, or

sialadenitis) by the lack of fibrosis, edema, inflammation, or atrophy in the adjacent salivary gland [3]. Additionally, staining for myoepithelial markers can be positive in IDLs versus other similar lesions such as striated duct adenoma (SDA) or canaliculal adenoma [7]. IDLs typically resemble intercalated ducts on immunohistochemistry (positive for S100, CK7, and lysozyme) [3] and they lack mitotic activity, necrosis, atypia, and features of parenchymal, perineural, and lymphovascular invasion [6]. The differential diagnosis of IDLs with basal cell neoplasms (basal cell adenoma and basal cell adenocarcinoma) is probably the most challenging because of significant histomorphologic overlap. Hyperplastic forms of IDLs are distinguished, in part, by their lack of encapsulation, lack of basal lamina-like deposits, and incorporation of acinic cells in some cases. For IDLs with features of adenoma, several additional findings that aid in distinguishing them from basal cell neoplasms are documented by Weinreb et al. [3] and mostly relate to the histologic and immunohistochemical pattern of the myoepithelial component, which is less conspicuous in IDLs than in basal cell neoplasms.

There are no specific criteria for the management of IDLs, since they are rare and often go undetected. However, given the likelihood that IDLs act as precursor lesions to malignant neoplasms, accurate diagnosis and surgical consideration are crucial for proper management. In our patient, a superficial parotidectomy was performed after a non-diagnostic FNA, without any further treatment due to the benign histologic appearance of the lesion. In cases where IDL is associated with neoplasia that is located deep in the parotid, associated with nodal disease, or found to have positive margins, post-operative radiation therapy may be warranted. The histopathologic diagnosis and analysis of IDL, therefore, can have a significant impact on the therapeutic course of these salivary gland tumors.

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