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Salivary Duct Carcinoma of the Parotid Gland Definitively Diagnosed by Immunohistochemical Examination of Pulmonary Metastases

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Abstract

Salivary duct carcinoma (SDC) is a rare, high-grade, aggressive malignancy, as having a morphologic resemblance to ductal carcinoma of the breast. We present here an atypical SDC of the parotid gland in a 63-year-old man that was diagnosed from immunohistochemical findings. The immunohistochemistry was similar in the parotid lesion and pulmonary metastases in autopsy specimens, but only the latter showed a cribriform pattern and comedolike necrosis. Although the parotid tumor was treated with concurrent chemoradiotherapy and adjuvant chemotherapy for over 21 months, the patient died of respiratory failure caused by advanced pulmonary metastases.

Keywords

Salivary Duct Carcinoma (SDC); Immunohistochemistry; Parotid Tumor; Pulmonary Metastases; Autopsy

1. Introduction

Salivary duct carcinoma (SDC) is a rare, high-grade, aggressive malignancy initially described by Kleinsasser *et al*. in 1968 [1], as having a morphologic resemblance to ductal carcinoma of the breast. SDC represents 1% - 3% [2] of all malignant salivary gland tumors, and has a male to female predominance of between 4:1 and 8:1, with a mean age of onset of 60 to 66 years [1]-[5]. The tumor is histologically diagnosed on the basis of characteristic

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features, such as a cribriform pattern and/or comedolike necrosis [3]. However, the diagnosis of SDC is difficult in a specimen that does not exhibit these histologic features, and its definitive diagnosis requires immunohistochemical examination. This report presents an atypical SDC of the parotid gland that was diagnosed from immunohistochemical findings. The immunohistochemistry was similar in the parotid lesion and pulmonary metastases, but only the latter showed a cribriform pattern and comedolike necrosis.

2. Case Report

A 63-year-old man was referred to us with a complaint of a painless mass of the left preauricular region that he had noticed for 2 months. Palpation revealed a fixed, firm, and ill-defined mass, 40 mm in diameter, under normal-appearing skin of the left parotid region. Salivary discharge from the left parotid gland was slightly reduced compared with the right side. Opening of the mouth was slightly restricted, but no facial nerve paralysis or cervical lymphoadenopathy was discernible. Computed tomography (CT) demonstrated an ill-defined lesion with low enhancement in the superficial lobe of the left parotid gland (**Figure 1**). A chest radiogram and CT revealed multiple nodular lesions in the bilateral lungs that were suspected to be pulmonary metastases.

A biopsy of the mass showed it to be carcinoma, but the histological analysis did not reveal a cribriform pattern or comedolike necrosis. The parotid tumor (T3N0M1) was treated with irradiation (total 60.0 Gy) concurrently with 2 courses of chemotherapy consisting of fluorouracil, calcium folinate and nedaplatin. As the tumor moderately reduced after the chemoradiotherapy, the patient underwent 10 courses of chemotherapy, consisting of a combination of two or three of fluorouracil, nedaplatin, docetaxel hydrate, pirarubicin hydrochloride and peplomycin sulfate, at appropriate intervals over 21 months. Although he tolerated well for several intensive chemotherapies performed repeatedly, the primary tumor progressed, and metastatic lesions were detected in the liver. The patient died of respiratory failure caused by advanced pulmonary metastases. The autopsy revealed metastases in the bilateral lungs, liver, and adrenal gland.

3. Histological Findings

The biopsy specimen of the parotid lesion showed that the tumor cells were polymorphic with large vesicular nuclei, an increased nucleo-cytoplasmic ratio, and a high mitotic ratio (**Figure 2**). The autopsy specimen of the parotid lesion showed a tumor resembling scirrhous invasive ductal carcinoma (DC) (**Figure 3**). The pulmonary lesions consisted primarily of an invasive component with comedolike necrosis, and resembled infiltrating DC of the breast, both architecturally and cytologically (**Figure 4**).

The neoplastic cells of both the primary and metastatic lesions in the autopsy specimen were positive for cytokeratin, EMA, and CEA, and negative for smooth muscle actin, S-100 protein, vimentin, and PSA. The mucous cells were negative for PAS and alcian blue. In addition, the tumor cells showed the overexpression of human epidermal growth factor receptor 2 (HER-2) protein on their cytoplasmic membrane (**Figure 4**). The

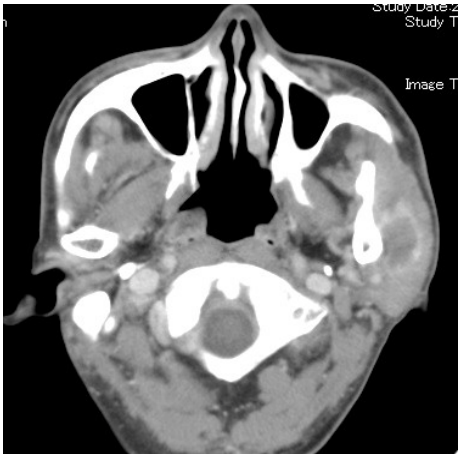


Figure 1. CT demonstrated an ill-defined lesion with low enhancement in the superficial lobe of the left parotid gland.

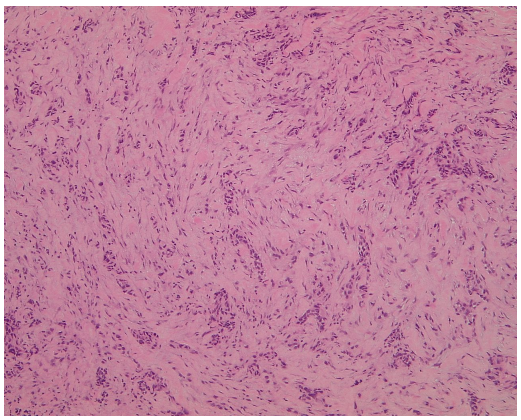
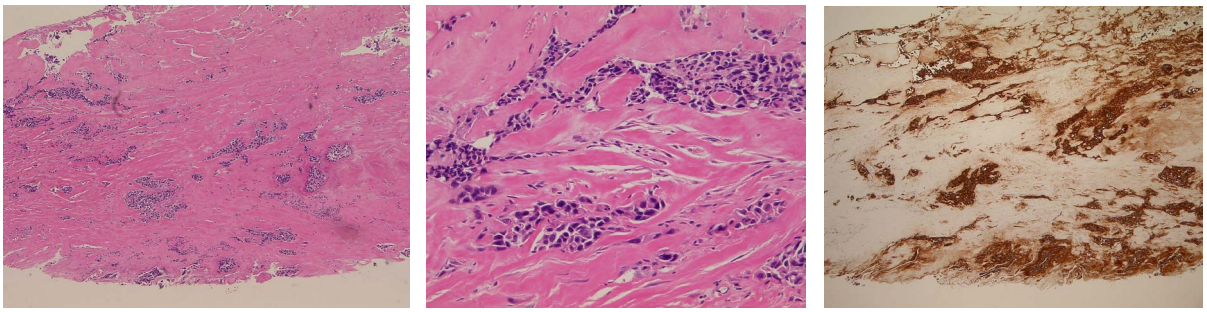
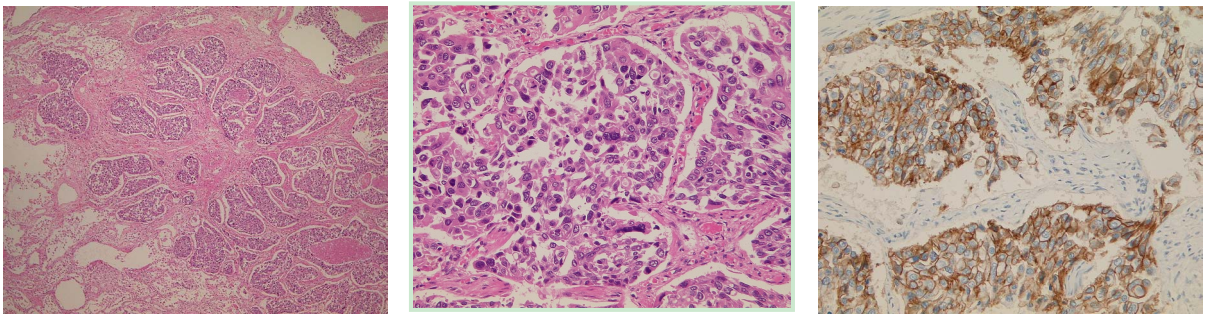


Figure 2. Biopsy specimen of the parotid lesion. The tumor cells were polymorphic with large vesicular nuclei, an increased nucleo-cytoplasmic ratio, and a high mitotic ratio (HE ×20).



(a) (b) (c)

Figure 3. Autopsy specimen of the parotid lesion. The parotid lesion showed a tumor resembling scirrhous invasive ductal carcinoma. The neoplastic cells were positive for EMA. (a) HE ×20, (b) HE ×200, (c) EMA.



(a) (b) (c)

Figure 4. Autopsy specimen of the lung. The pulmonary lesions consisted primarily of an invasive component with comedolike necrosis, and resembled infiltrating ductal carcinoma of the breast, both architecturally and cytologically. The tumor cells showed the overexpression of human epidermal growth factor receptor 2 (HER-2) protein on their cytoplasmic membrane. (a) HE ×20, (b) HE ×200, (c) HER-2.

immunohistochemistry was similar in the parotid lesion and pulmonary metastases, but only the latter showed a cribriform pattern and comedolike necrosis.

4. Discussion

The histopathological diagnostic criterion for SDC is the presence of tumor cells with a cribriform growth pattern and/or intraductal comedolike necrosis [5] [6]. The biopsy specimen in this case showed solid tumor cell

nests surrounded by fibrous tissue, but the histological analysis did not provide further information about the tumor type. However, the autopsy specimen of the lung lesions showed conspicuous comedolike necrosis that was similar to scirrhous breast DC. The histological features of the autopsy specimen of the parotid tumor did not show a cribriform pattern or comedolike necrosis, but were identical to those of the lung lesions, suggesting the possibility of SDC. As previously reported for SDC [2] [4] [5] [7], the immunohistochemistry of the parotid tumor showed positive staining for EMA, cytokeratin, CEA, HER-2, and was negative for S-100 protein, PAS, alcian blue, and PSA, consistent with those of the lung lesions. Thus, the immunohistochemical characterization provided useful information for diagnosing atypical SDC in this case, and a definitive diagnosis of SDC of the parotid gland and lung metastases was made.

Although historically associated with DC, HER-2 overexpression is also seen in more than 80% SDC cases [5], whereas other salivary gland tumors show a lower frequency. HER-2 overexpression is also reported to be a significant predictive marker of chemotherapy resistance and poor prognosis in breast cancer [8] [10]. In addition, HER-2-positive tumors are commonly sensitive to trastuzumab, which is a recombinant monoclonal antibody against HER-2 that has been reported to increase disease-free intervals and/or prolong the survival of DC patients [8] [10]. Trastuzumab has recently been used as a treatment for SDC because of its similarities to DC [9]. In the present case, the immunohistochemical analysis of HER-2 was not performed in the biopsy specimen, and there was no opportunity to try using trastuzumab [10]. Consequently, early evaluation of HER-2 expression in SDC including atypical histological type would be recommended for application of trastuzumab in addition to conventional treatment modalities.

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