Breast Cancer Metastasis to the Parotid: A Case Report with Imaging Findings

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Financial support: None declared
Conflict of interest: None declared

Patient: Female, 59-year-old
Final Diagnosis: Breast cancer metastasis to the parotid
Symptoms: Growing mass in the parotid gland
Medication: —
Clinical Procedure: —
Specialty: Radiology

Objective: Rare disease
Background: Metastasis to the salivary gland is rare, with the parotid being the most commonly involved site among the salivary glands. Breast cancer metastasis to the parotid gland has been rarely reported in the literature, and relatively few case reports have described the imaging findings.

Case Report: A 59-year-old woman presented with a recently growing mass in the left parotid gland. She had a past history of left breast cancer 6 years ago, treated by left modified radical mastectomy with axillary lymph node dissection followed by adjuvant chemotherapy, radiation therapy, and trastuzumab. During follow-up, multiple metastases developed and the patient was subsequently treated with palliative chemotherapy. Neck ultrasonography revealed a heterogeneous echoic mass with indistinct margins, irregular shape, and weak rim vascularity in the left parotid gland. Contrast-enhanced neck computed tomography revealed an irregular mass with heterogeneous enhancement in the inferior pole of the left parotid gland. Ultrasonography-guided 18-gauge core needle biopsy was performed, and the histopathology report was metastasis from ductal carcinoma of breast with positive expression of human epidermal growth factor receptor 2 and negative expression of estrogen receptor, progesterone receptor, and androgen receptor. Despite palliative chemotherapy and trastuzumab, the patient died 2 months after the diagnosis of metastasis to the parotid gland.

Conclusions: We report a rare case of metastasis from breast cancer to the parotid gland, with imaging findings including neck ultrasonography and contrast-enhanced neck computed tomography. Breast cancer rarely metastasizes to the parotid gland, but radiologists should be aware of this possibility, especially in patients with a prior history of breast cancer.

Keywords: Breast Neoplasms • Ultrasonography • Parotid Gland • Neoplasm Metastasis • Multidetector Computed Tomography

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/934311
Background

Metastasis to the parotid gland is rare. According to a recent report, 24 cases of breast cancer metastasis to the parotid gland have been reported from 1982 to 2018 [1]. Furthermore, few cases of breast cancer metastasis to the parotid gland have reported the imaging findings [1-6]. Here, we report a rare case of breast cancer metastasis to the parotid gland in a 59-year-old woman, with the imaging findings and a brief review of the literature.

Case Report

A 59-year-old woman presented with a recently growing mass in the left parotid gland. She had a past history of left breast cancer 6 years ago, which was diagnosed as invasive ductal carcinoma, no special type, with human epidermal growth factor receptor 2 (HER2) immunophenotype (Figure 1A, 1B). She underwent left modified radical mastectomy with axillary lymph node dissection followed by adjuvant chemotherapy, radiation therapy, and trastuzumab. The pathologic stage of the tumor was pT4N3. During follow-up, multiple metastases developed involving the right axilla, liver, skin, bone, and brain and the patient was subsequently treated with palliative chemotherapy. On physical examination, a hard mass was palpated in the left parotid gland. Neck ultrasound (US) using 7-15 MHz linear-array transducer (Ascendus, Hitachi Aloka Medical) showed a 2-cm heterogeneous echoic mass with indistinct margins, irregular shape, and weak rim vascularity (Figure 2A, 2B). The patient underwent US-guided biopsy of the left parotid gland with an 18-gauge needle (Mission disposable needle, Bard.

Figure 1. Microscopic appearance of the tumor showing typical histologic appearance of invasive ductal carcinoma, no special type (A: Hematoxylin & Eosin, ×100), with Her-2 immunophenotype (B: Her-2 immunohistochemistry, ×100).

Figure 2. Longitudinal ultrasonography (A) shows a 2-cm heterogeneous echogenic mass with indistinct margins and irregular shape in the left parotid gland (arrows). Color Doppler ultrasonography (B) shows a weak rim vascularity around the mass.
AZ, USA). The histopathology report was metastasis from ductal carcinoma of breast with positive expression of HER2 and negative expression of estrogen receptor, progesterone receptor, and androgen receptor (AR) (Figure 3A-3C). A contrast-enhanced neck computed tomography (CT) scan that was taken 6 months earlier showed a 1.3-cm irregular mass with relatively circumscribed margins and heterogeneous enhancement in the inferior pole of the left parotid gland (Figure 4A). At that time, we did not further evaluate the parotid mass because of work-up and treatment of her brain metastasis. On follow-up CT, the mass showed increased in size, measuring 2.2 cm, with irregular shape and margins, and heterogeneous enhancement (Figure 4B). Multiple enlarged lymph nodes in the left cervical neck chain, left jugular vein thrombosis, and left pleural effusion were also detected. Despite palliative chemotherapy and trastuzumab, the patient died 2 months after the diagnosis of metastasis to the parotid gland.

Discussion

Malignant salivary tumors account for 0.5-1% of all cancers, and less than 10% of them are metastatic [2]. Metastatic disease of the parotid gland accounts for 9-14% of all parotid tumors [7]. The most common malignancies metastasizing to the parotid gland are tumors arising from the head and neck, such as squamous cell carcinoma and malignant melanoma, and rare malignancies that metastasize to the parotid includes tumors arising from the breast, kidney, gastrointestinal tract, and prostate [8,9]. Erra et al [10] suggested 3 different pathways: (1) direct invasion from adjacent malignancy; (2) lymphatic invasion from regional malignancy, which is particularly arising from the cutaneous area such as squamous cell carcinoma and melanoma and commonly involving the parotid gland rather than the submandibular gland; and (3) hematogenous metastasis from distant primary tumors. However, the pathogenesis of this condition is still unclear.

Katz [11] reported 10 unusual lesions of the parotid gland in 1975, and one of them was a metastatic adenocarcinoma from the left breast to the right parotid gland in a 49-year-old woman. Bohli et al [1] reviewed 24 previously reported cases of breast cancer metastasis to the parotid gland from 1982 to 2018. They reported that the mean age at diagnosis was 59.6 years with range of 40-76 years. It usually occurred in women, but was also reported in a 71-year-old man who had invasive ductal carcinoma. The most common patient-reported symptom was a palpable mass with a mean size of 3 cm (18 cases) and the second most common was peripheral facial nerve palsy (5 cases). Invasive ductal carcinoma (15 cases) was the most common type of breast cancer. Invasive lobular carcinoma (2 cases) and malignant phyllodes tumor (1 case) were also reported. Ipsilateral involvement was noted in 14 cases and contralateral involvement was reported in 10 cases. There were 3 cases of synchronous parotid gland metastasis.
However, because of its rarity, imaging findings of breast cancer metastasis to the parotid gland have been rarely reported. To the best of our knowledge, 2 case reports have described the sonographic features and furthermore, and only 1 study included a US image [1,3]. US may show a well-defined hypoechoic mass or a poorly-defined heterogeneous echoic mass with hypervascular areas. In the present case, it presented as a heterogeneous mass with indistinct margins, irregular shape, and a weak rim vascularity on US. Zhang et al [5] reported metastasis from malignant phyllodes tumor of the breast to the parotid gland in a 40-year-old woman imaged using non-enhanced CT. CT showed an oval or lobulated soft tissue mass with internal high attenuation areas. In the present case, the CT findings were that of an irregular mass with heterogeneous enhancement. Kmeid et al [2] reported metachronous ipsilateral metastasis from breast cancer to the parotid gland in a 65-year-old woman with magnetic resonance imaging showing an ill-defined mass with low signal intensity on T1-weighted image, high signal intensity on T2-weighted image, and moderate enhancement.

Our initial diagnosis on imaging was a pleomorphic adenoma. It is the most common benign salivary gland tumor and usually occurs in middle-aged people [12]. Imaging findings may differ according to the tumor size. Small tumors are relatively well-defined masses with strong enhancement, whereas large tumors may be seen as lobulated heterogeneous masses with necrotic or hemorrhagic areas [12]. A differential diagnosis is salivary duct carcinoma, which is an uncommon and highly aggressive primary salivary gland tumor. It is more likely to affect elderly men [13]. It is known to resemble ductal carcinoma of the breast [13]. Comedonecrosis, perineural invasion, and lymph-vascular tumor emboli are very common [13]. It is characterized by diffuse, strong expression of AR on immunohistochemistry [14]. Mammary analog secretory carcinoma is a rare tumor of the salivary gland that resembles breast secretory carcinoma with similar histologic and genetic features [15]. It tends to affect males, with a wide range of ages [13]. Tumor cells show pink or vacuolated cytoplasm, vesicular nuclei, and distinct nucleoli [13]. Mitotic figures and lymphovascular invasions are rare and necrosis is typically absent [16]. On immunohistochemistry, tumor cells show diffuse, strong expression of pancytokeratin, CK7, CK8, CK18, CK19, CK18, CK19, epithelial membrane antigen, S-100 protein, vimentin, signal transducer and activator of transcription 5a, and mamoglobin [17]. However, tumor cells are negative for HER2 or AR [15]. Mucoepidermoid carcinoma may be included in the differential diagnosis. It usually occurs in the parotid gland and is the most common malignant salivary gland tumors in children and adults [12]. Imaging findings depend on the histological grade. On CT, low-grade mucoepidermoid carcinoma presents as a well-circumscribed enhancing mass with cystic component, whereas high-grade presents as an ill-defined infiltrating mass [12]. Clinically, in the present case, the parotid mass was hard and rapidly growing. Radiologically, the mass presented as an ill-defined mass with irregular shape and heterogeneous enhancement, with internal low attenuation in the left parotid gland. Moreover, the patient had a past history of

Figure 4. Contrast-enhanced computed tomography scan of the neck that 6 months prior (A) shows a 1.3-cm irregular mass with relatively circumscribed margins and heterogeneous enhancement in the inferior pole of the left parotid gland (arrow). Follow-up computed tomography scan of the neck (B) shows interval increase of the mass with irregular shape and margins and heterogeneous enhancement in the left parotid gland (arrow).
breast cancer. Therefore, the possibility of metastasis of breast cancer to the parotid gland should be considered. Clinical history is important because metastasis to the parotid gland may be the first manifestation of a previously unknown primary tumor [3]. Distinction between primary and metastatic salivary gland tumor is important for patient management [11]. However, imaging work-up cannot distinguish between a primary malignant tumor and metastasis [6].

Fine-needle aspiration has an important role in the work-up of a parotid mass for distinguishing between benign and malignant, with high accuracy [2]. However, in case of metastasis of breast cancer to the salivary gland, it is difficult to differentiate between a primary salivary malignancy and metastatic breast carcinoma because of morphological and immunocytochemical similarities [18]. Although there is the risk of bleeding, facial nerve damage, and tumor seeding, US-guided core-needle biopsy can be used for the preoperative diagnosis of a parotid mass [19]. Management should be individualized depending on the patient’s situation and course of the disease [4]. In case of a single metastasis to the parotid gland, an appropriate parotidectomy with negative margins and preservation of the facial nerve, when possible, should be considered [2,3]. Adjuvant radiotherapy or chemotherapy could be recommended when local control was not achieved by surgery [2].

In summary, we report the US and CT findings in a case of breast cancer metastasis to the parotid gland. The radiologic findings of metastatic lesions are different from those of common benign parotid tumors. Although breast cancer rarely metastasizes to the parotid gland, radiologists should be aware of this possibility, especially in patients with a prior history of breast cancer.

Conclusions

In this case report, we described the US and CT findings in a rare case of breast cancer metastasis to the parotid gland. The radiologic findings of metastatic lesions are different from common benign parotid tumors. Although breast cancer rarely metastasizes to the parotid gland, radiologists should be aware of this possibility, especially in patients with a prior history of breast cancer.

Declaration of Figures’ Authenticity

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