

Received: 2021.08.06

Accepted: 2021.10.14

Available online: 2021.10.21

Published: 2021.11.23

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

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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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

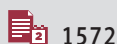
**Background:** Metastasis to the salivary gland is rare, with the parotid being the most commonly involved site among the salivary glands. Breast cancer metastasis to the parotid gland has been rarely reported in the literature, and relatively few case reports have described the imaging findings.

**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 echic 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>



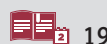
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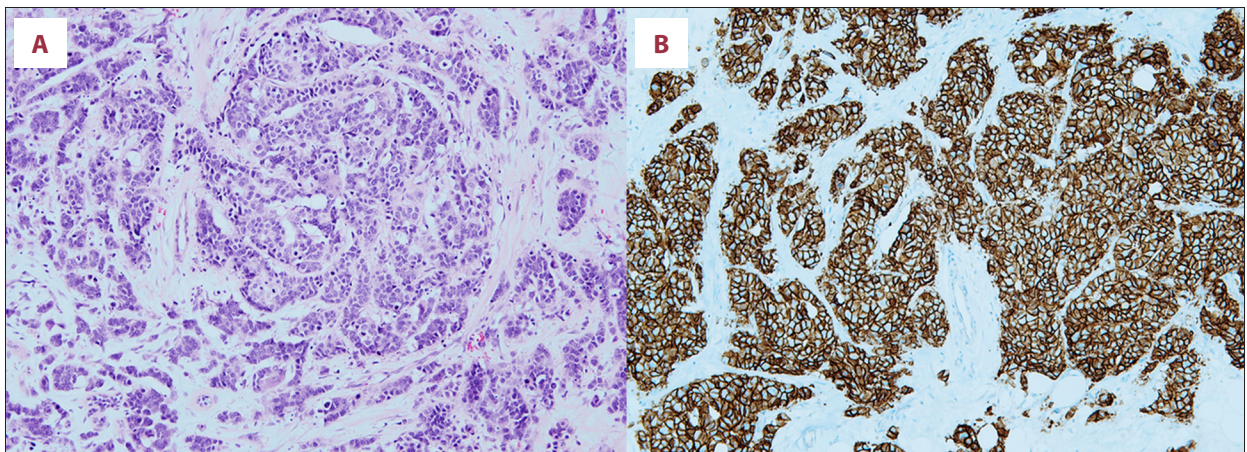
## Background

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.

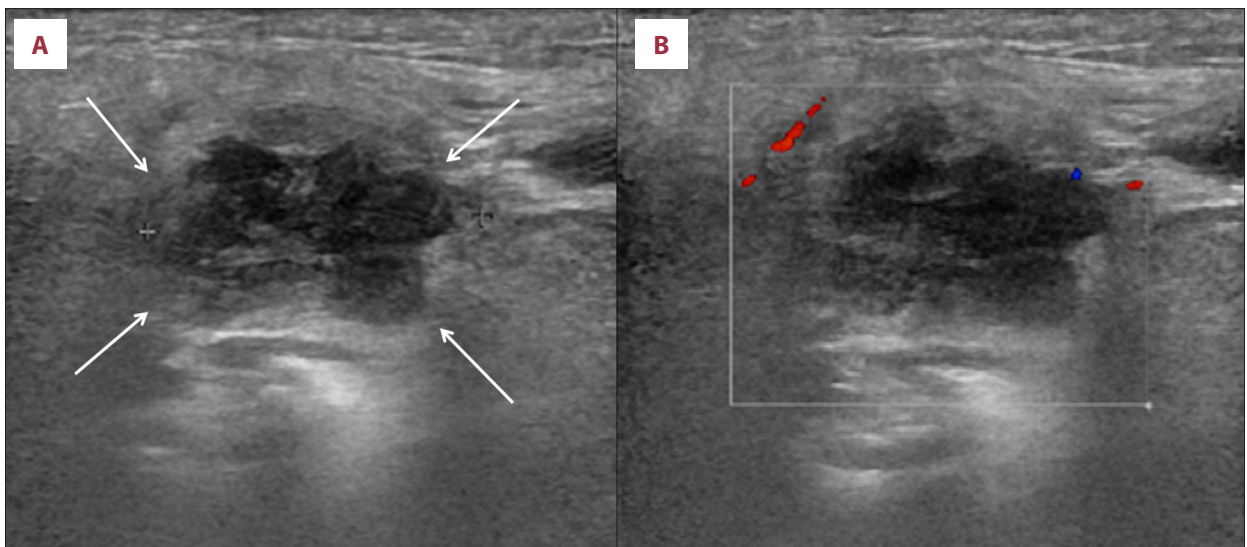
## Case Report

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 echogenic 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,

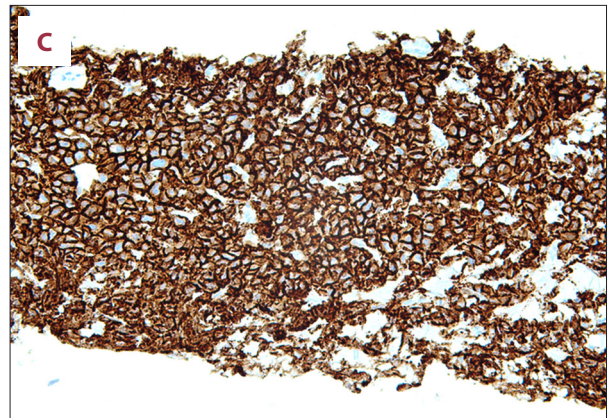
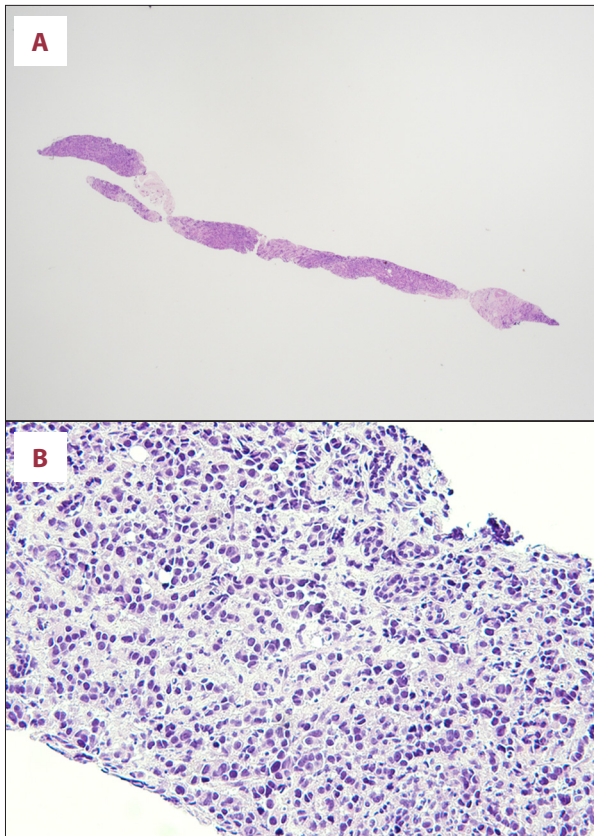


**Figure 1.** Microscopic appearance of the tumor showing typical histologic appearance of invasive ductal carcinoma, no special type (A: Hematoxylin & Eosin,  $\times 100$ ), with Her-2 immunophenotype (B: Her-2 immunohistochemistry,  $\times 100$ ).



**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.





**Figure 3.** (A) The biopsy specimen of the left parotid gland is composed of only tumor component without any salivary gland tissue (Hematoxylin & Eosin,  $\times 12.5$ ). (B) The needle biopsy of the left parotid gland shows proliferation of atypical medium-sized cells with abundant cytoplasm and hyperchromatic nuclei with prominent nucleoli (Hematoxylin & Eosin,  $\times 200$ ). (C) All tumor cells show diffuse strong membranous expression of Her-2, confirming a morphology similar to the primary breast tumor (Her-2 immunohistochemistry,  $\times 200$ ).

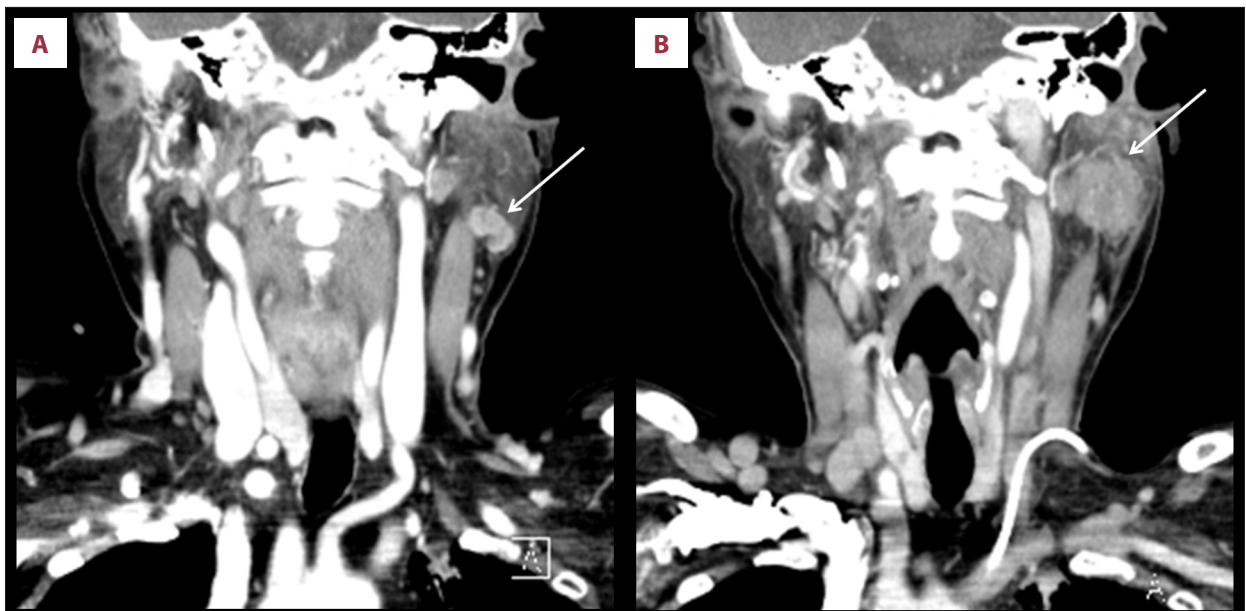
AZ, USA). The histopathology report was metastasis from ductal carcinoma of breast with positive expression of HER2 and negative expression of estrogen receptor, progesterone receptor, and androgen receptor (AR) (Figure 3A-3C). A contrast-enhanced neck computed tomography (CT) scan that was taken 6 months 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 neck 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.



**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).

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 echogenic 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, homogeneous 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, epithelial membrane antigen, S-100 protein, vimentin, signal transducer and activator of transcription 5a, and mammaglobin [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

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].

## References:

1. Bohli M, Tebra S, Jaffel H, Bouaouina N. Parotid gland metastasis from breast origin. *J Clin Case Rep*. 2018;8:1139-42
2. Kmeid M, François GK, Nasser S, Moukarzel N. Metachronous, single metastasis to the parotid, from primary breast cancer: A case report and review of the literature. *Case Rep Oncol Med*. 2016;2016:3965283
3. Franzen AM, Günzel T, Lieder A. Parotid gland metastases of distant primary tumours: A diagnostic challenge. *Auris Nasus Larynx*. 2016;43:187-91
4. Sellinger M, Neubauer K, William M, et al. Contralateral metastasis of parotid gland in advanced breast cancer with peripheral facial paralysis. *Arch Gynecol Obstet*. 2011;284:1557-60
5. Zhang JZ, Gu M. Malignant phyllodes tumor of the breast metastatic to the parotid gland diagnosed by fine needle aspiration biopsy: A case report. *Acta Cytol*. 2003;47:253-58
6. Dhia SB, Belaid I, Stita W, et al. Bilateral parotid gland metastasis from a breast invasive ductal carcinoma. *J Cancer Res Ther*. 2020;16:672-74
7. Ando K, Masumoto N, Sakamoto M, et al. Parotid gland metastasis of breast cancer: Case report and review of the literature. *Breast Care*. 2011;6:471-73
8. Laforga JB, Gasent JM. Mammary invasive duct carcinoma metastatic to parotid gland: Report of a case diagnosed by fine-needle aspiration. *Diagn Cytopathol*. 2009;37:154-58
9. Nuyens M, Schüpbach J, Stauffer E, Zbären P. Metastatic disease to the parotid gland. *Otolaryngol Head Neck Surg*. 2006;135:844-48
10. Erra S, Costamagna D. Breast cancer metastatic to the submandibular gland. Case report. *G Chir*. 2011;32:194-98
11. Katz AD. Unusual lesions of the parotid gland. *J Surg Oncol*. 1975;7:219-35
12. Thoeny HC. Imaging of salivary gland tumours. *Cancer Imaging*. 2007;7:52-62
13. Kuo YJ, Weinreb J, Perez-Ordóñez B. Low-grade salivary duct carcinoma or low-grade intraductal carcinoma? Review of the literature. *Head Neck Pathol*. 2013;7:S59-67
14. Udager AM, Chiosea SI. Salivary duct carcinoma: An update on morphologic mimics and diagnostic use of androgen receptor immunohistochemistry. *Head Neck Pathol*. 2017;11:288-94
15. Terada T, Kawata R, Noro K, et al. Clinical characteristics of acinic cell carcinoma and secretory carcinoma of the parotid gland. *Eur Arch of Otorhinolaryngology*. 2019;273:3461-66
16. Parekh V, Stevens TM. Mammary analogue secretory carcinoma. *Arch Pathol Lab Med*. 2016;140:997-1001
17. Khalele BA. Systematic review of mammary analog secretory carcinoma of salivary glands at 7 years after description. *Head Neck*. 2017;39:1243-48
18. Alath P, Kapila K, Hussein S, et al. Parotid gland metastasis of breast cancer diagnosed on fine needle aspiration cytology: Case report and review of literature. *Cytopathology*. 2014;25:346-48
19. Howlett DC, Skelton E, Moody AB. Establishing an accurate diagnosis of a parotid lump: Evaluation of the current biopsy methods – fine needle aspiration cytology, ultrasound-guided core biopsy, and intraoperative frozen section. *Br J Oral Maxillofac Surg*. 2015;53:580-83

## 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.

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