

# Metastasizing pleomorphic adenoma in the multiple organs

## A case report on FDG-PET/CT imaging

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### Abstract

**Rationale:** Pleomorphic adenoma, the most common tumor of the salivary glands, is usually benign. It is well known, however, that pleomorphic adenomas occasionally undergo malignant transformation to carcinoma ex pleomorphic adenoma and can metastasize. More rarely pleomorphic adenomas can metastasize without histological malignant transformation. We herein report an unusual case of pleomorphic adenoma with multiple metastases comprehensively demonstrated on F-18 fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT).

**Patient concerns:** A 63-year-old woman was referred to our hospital because of urine occult blood and lung nodules detected on a health checkup. She had a history of resection of a pleomorphic adenoma in the parotid gland at the age of 40 years and tumor recurrence at the age of 53 years. CT scan and magnetic resonance imaging revealed bilateral renal tumors, multiple pulmonary nodules, and an osteolytic lesion in the first lumbar vertebra.

**Diagnoses:** Ultrasonography-guided percutaneous biopsy of the right renal tumor revealed a myxoid epithelial tumor that was consistent with metastasis of the pleomorphic adenoma from the parotid gland.

**Interventions:** The patient was carefully observed with regular imaging examinations.

**Outcomes:** The multiple lesions gradually progressed, and FDG-PET/CT subsequently revealed additional metastases in the liver and perineum.

**Lessons:** Metastases of pleomorphic adenomas may occur years after the initial disease in association with local recurrences. Careful observation with whole-body imaging such as FDG-PET/CT is necessary.

**Abbreviations:** CT = computed tomography, FDG-PET/CT = F-18 fluorodeoxyglucose positron emission tomography/computed tomography, L1 = first lumbar, MR = magnetic resonance, SUVmax = maximum standard uptake value.

**Keywords:** FDG-PET/CT, metastasizing pleomorphic adenoma, parotid gland

## 1. Introduction

Pleomorphic adenoma, the most common tumor of the salivary glands, is usually benign. It is well known that pleomorphic adenomas occasionally undergo malignant transformation to carcinoma ex pleomorphic adenoma and can metastasize. More rarely pleomorphic adenomas can metastasize without a histological malignant transformation, especially when incomplete excision was performed.<sup>[1,2]</sup> There is often a long time interval (mean, 15

years; maximum, 51 years) between the primary pleomorphic adenoma and the detection of metastases.<sup>[3–5]</sup> The 3 most common sites for metastasizing pleomorphic adenoma are the bone, lung, and cervical lymph nodes. We experienced a case of pleomorphic adenoma metastasizing to the bone, lungs, kidneys, liver, and perineum after surgical treatment of a local recurrence detected on F-18 fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT).

## 2. Case report

### 2.1. Ethical review and patient consent

This retrospective study is dealt only with the patient's medical record and related images. Ethical approval was not thought to be necessary because the entire clinical course of the case was completely within usual medical care. Written informed consent was given from the patient on each occasion of diagnostic examinations and therapeutic procedures and also for the publication of this case report.

### 2.2. Case report

A 68-year-old woman had a history of resection of a pleomorphic adenoma in the left parotid gland at the age of 40 years and tumor recurrence at the age of 53 years. At the time of surgery for the

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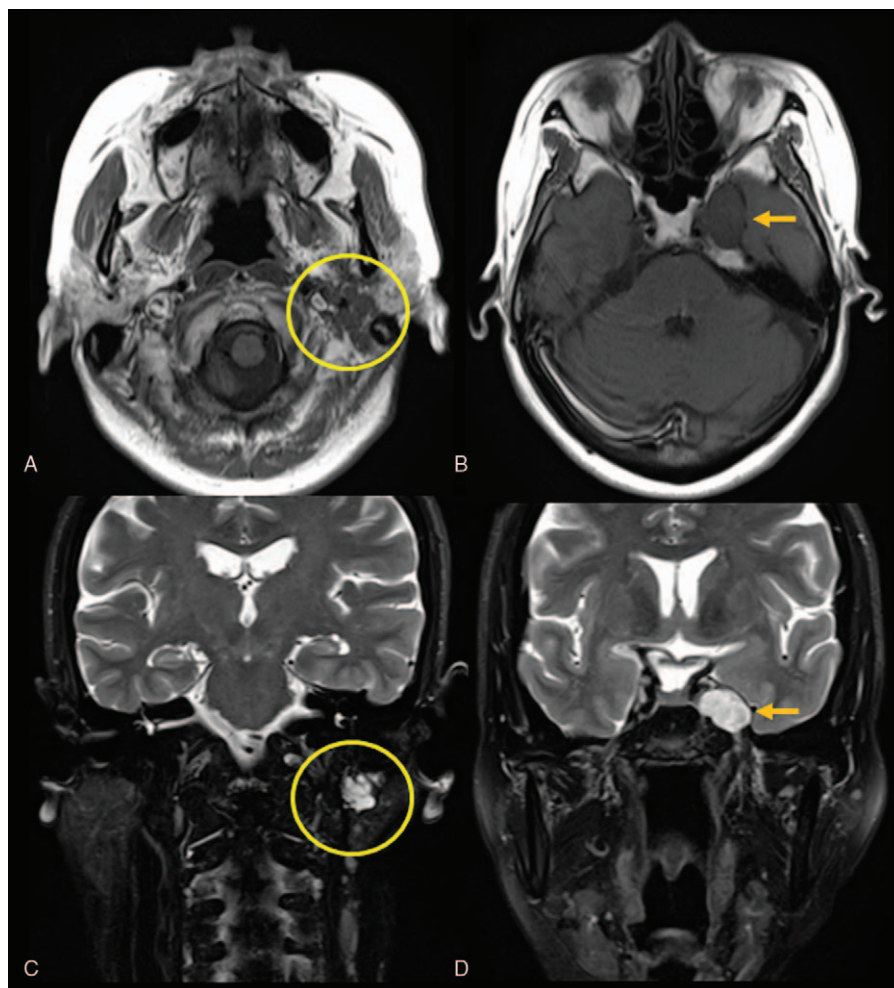
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**Figure 1.** Magnetic resonance imaging [T1-weighted (A) and fat-suppressed T2-weighted (B) coronal images] of the abdomen revealed multiple nodular or lobulated masses in the bilateral kidneys showing low signal intensity on T1-weighted image and inhomogeneous high signal intensity on T2-weighted image. There was also a lesion in the first lumbar (L1) vertebra showing similar but more inhomogeneous signal intensity (arrows).



**Figure 2.** Magnetic resonance imaging [transaxial T1-weighted (A, B) and coronal fat-suppressed T2-weighted (C, D) images] of the head revealed the recurrent tumor like a cluster of grapes in the left parotid gland (circle) and metastases in the middle cranial fossa (arrows) as masses with low signal intensity on T1-weighted images and high signal intensity on T2-weighted images.



**Figure 3.** Bone scintigraphy showed activity in the right ribs suggesting traumatic changes and in the cervical and lumbar spine suggesting degenerative changes. No abnormal uptake was noted in the L1 vertebra.

recurrence, residual tumor was found around the trunk of the facial nerve. At the age of 63 years, urine occult blood and lung nodules were detected on a health checkup. A family physician noted renal tumors and multiple pulmonary nodules on CT and considered the possibility of renal cell carcinoma and pulmonary metastases. The patient was referred to a urologist in our hospital.

Magnetic resonance (MR) imaging of the abdomen (Fig. 1) revealed multiple masses in the bilateral kidneys showing low signal intensity on T1-weighted images and inhomogeneous high signal intensity on T2-weighted images. There was also a lesion in the first lumbar (L1) vertebra showing similar but more inhomogeneous signal intensity. MR imaging of the head at that time (Fig. 2) revealed the recurrent tumor in the left parotid gland and metastases in the middle cranial fossa as masses with low signal intensity on T1-weighted images and high signal intensity on T2-weighted images. Thus, metastases to the kidneys and L1 vertebra were suspected. On a bone scan, although traumatic changes in the right ribs and degenerative change in the cervical and lumbar spine were suspected, no abnormal uptake was noted in the L1 vertebra (Fig. 3).

Ultrasonography-guided percutaneous biopsy of the right renal tumor revealed a myxoid epithelial tumor (Fig. 4).

Immunohistochemical staining was positive for pan-cytokeratin AE1/3 in the epithelial cells and p63 in the myoepithelial cells. These features resembled the original pleomorphic adenoma of the parotid gland. Thus, the tumor was consistent with metastasis of the pleomorphic adenoma from the parotid gland.

The patient complained of no pain and was observed carefully. We followed up by CT imaging every 3 months. No significant changes were noted.

After 1 year, the patient underwent FDG-PET/CT to evaluate the metastatic foci (Fig. 5). The metastatic lesions in the kidney showed mild FDG uptake that was inconspicuous compared with the renal parenchyma. Avid FDG uptake was noted in osteolytic lesion in the L1 vertebra. Sclerotic margin was observed on CT. The recurrent tumor in the left parotid gland and metastases in the left middle cranial fossa and lungs were noted as foci with mild uptake.

She had no complaints for 2 years, but then experienced gradual disturbance of ocular motility and low vision of the left eye. However, she was able to do light farm work without pain. PET/CT 5 years after the initial study (Fig. 6) revealed gradual progression of the local recurrent tumor and multiple metastatic lesions involving the skull base to the cavernous sinus, lungs, mediastinum, bones, and kidneys. In addition, a mass with mild FDG uptake was demonstrated in the liver and left perineum, suggesting metastases.

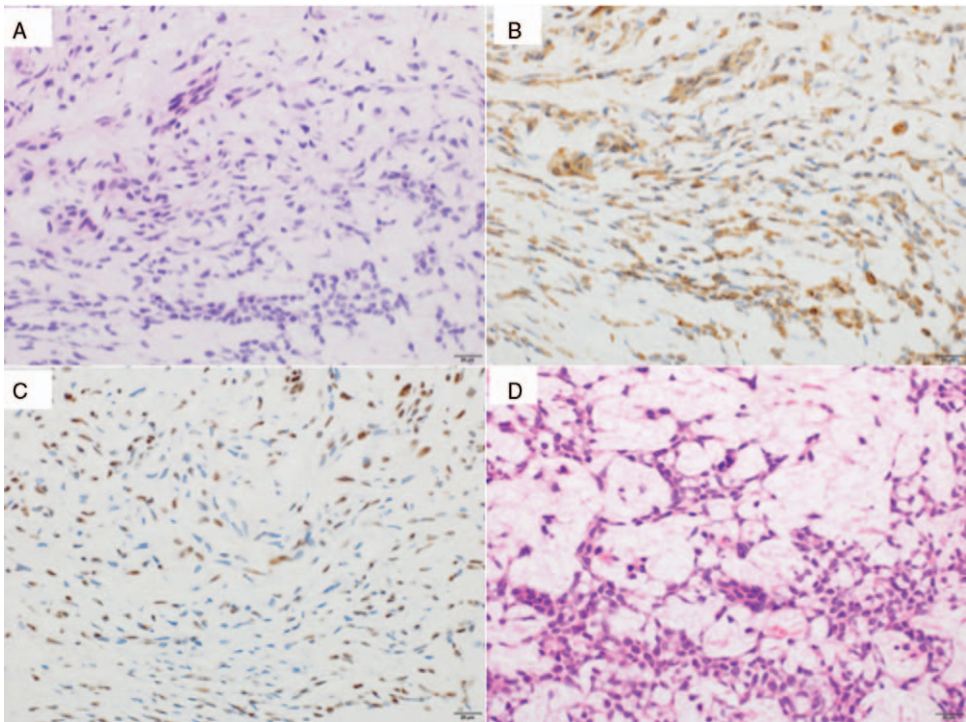
### 3. Discussion

Although pleomorphic adenoma is a benign tumor, it can metastasize especially when the excision was incomplete.<sup>[1,2]</sup> The most frequent primary site of a metastasizing pleomorphic adenoma is the parotid gland, where complete excision is difficult due to critical anatomical problems such as the presence of the facial nerve.<sup>[2]</sup> Previous studies have shown that there is often a long time interval (mean, 15 years; maximum 51 years) between the primary pleomorphic adenoma and the detection of metastases.<sup>[3–5]</sup> The 3 most common sites for metastasizing pleomorphic adenoma are the bone (36.6%), lung (33.8%), and cervical lymph nodes (20.1%). Other sites include the kidneys, skin, liver, and brain.<sup>[6,7]</sup> Metastasis of a pleomorphic adenoma to the cavernous sinus is very rare, with only 1 case been previously reported.<sup>[8]</sup>

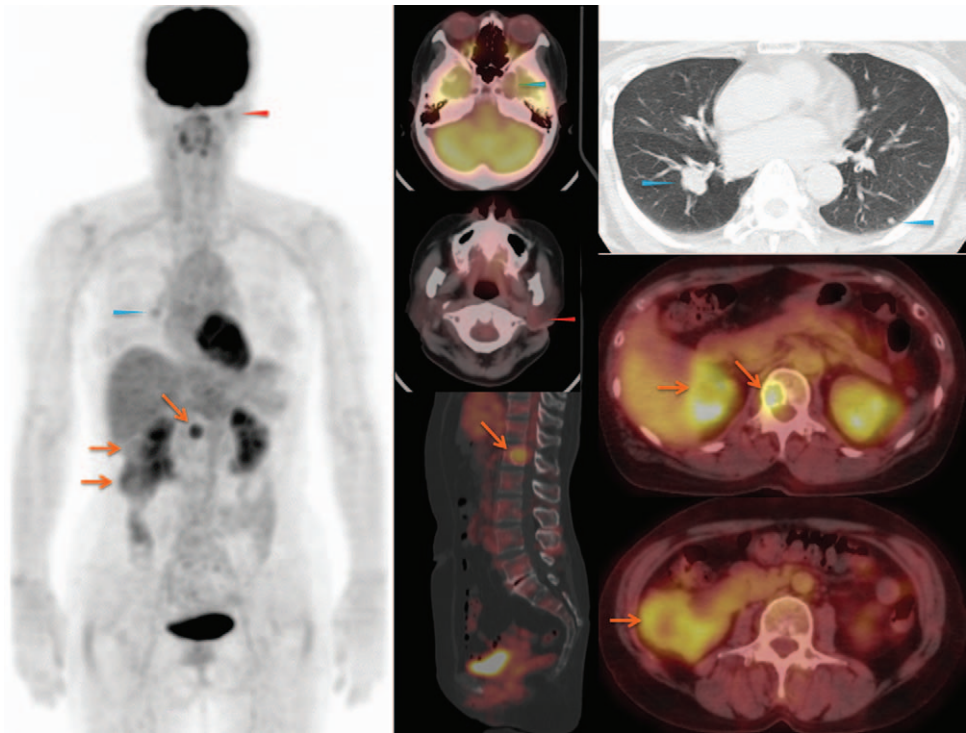
In the rare patient with histologically benign metastasizing pleomorphic adenoma, it is postulated that primary recurrences and subsequent surgical manipulations result in vascular implantation at the time of surgery with subsequent hematogenous spread and the development of metastases.<sup>[9]</sup> We consider that our patient met this postulation because residual tumor was found during the surgery for the local recurrence.

MR imaging is practical and useful to identify recurrent pleomorphic adenomas, as they have high T2-weighted signal intensity and grouped like a cluster of grapes.<sup>[10,11]</sup> Recurrent pleomorphic adenomas tend to be multiple and multiplicity of lesions is considered to be a reliable indicator of recurrent disease.<sup>[12]</sup> Reportedly, metastasizing pleomorphic adenoma also shows high signal intensity on T2-weighted images.<sup>[13]</sup> In our case, local recurrence and metastatic lesions showed these typical characteristics. On FDG-PET/CT, recurrent or metastatic lesions demonstrated variable avidity, presumably due to mixture of epithelial and myxoid mesenchymal elements. Lesions showed marked T2 hyperintensity seems to correspond to myxoid elements and relatively low FDG avidity. Singhal et al<sup>[14]</sup> described a hepatic metastasis from pleomorphic adenoma of

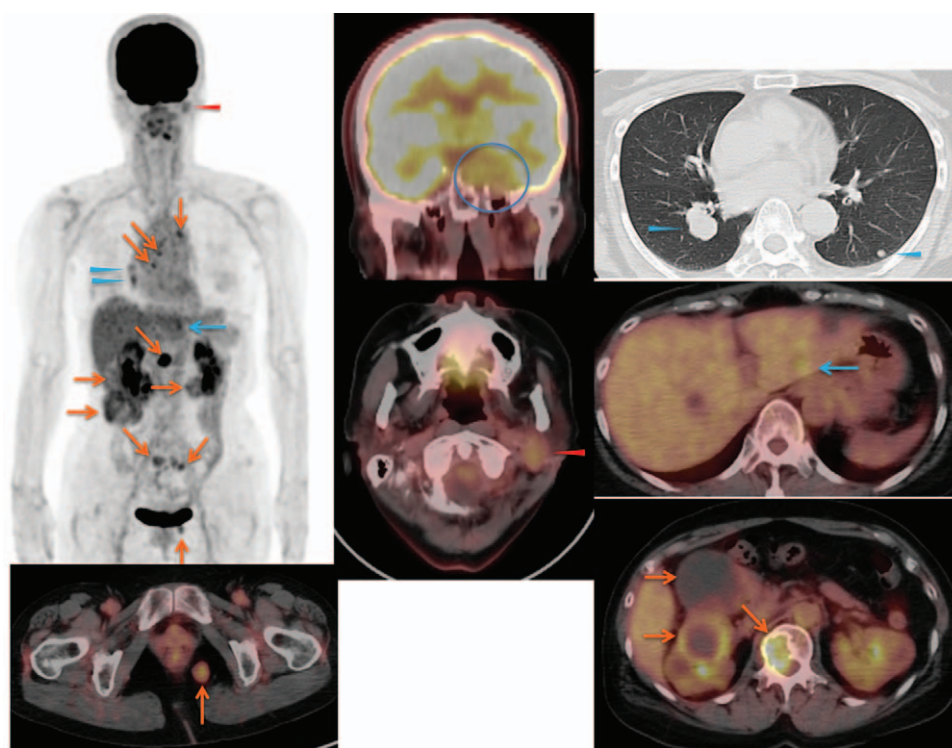




**Figure 4.** Ultrasonography-guided percutaneous biopsy of the right renal tumor revealed a myxoid epithelial tumor (A, hematoxylin-eosin stain. A-D, original magnifications  $\times 400$ ). Immunohistochemical staining was positive for pan-cytokeratin AE1/3 in the epithelial cells (B) and for p63 in the myoepithelial cells (C). These features resembled the original pleomorphic adenoma of the parotid gland (D, hematoxylin-eosin stain).



**Figure 5.** F-18 fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT). The metastatic lesions in the kidney showed inhomogeneous FDG uptake (right arrows). Avid FDG uptake was shown in the L1 vertebra with osteolysis (oblique arrows). The recurrent tumor in the left parotid gland (red arrowhead) and metastases in the middle cranial fossa (green arrowhead) and lungs (blue arrowheads) were foci with mild uptake.



**Figure 6.** Five years after the initial study, PET/CT showed gradual progression of the local recurrent tumor (red arrowheads) and multiple metastatic lesions involving the skull base to the cavernous sinus (circle), lungs (blue arrowheads), mediastinum (downward arrow), bones (oblique arrows), and kidneys (right arrows). In addition, a mass with mild FDG uptake was shown in the liver (blue arrows) and left perineum (upward arrows), suggesting metastases.

salivary gland showing FDG uptake at edge and septate area of a cystic mass in the liver.

Regarding osseous metastasis, bone scan failed to demonstrate the vertebral metastasis because the lesion was predominantly osteolytic and only a thin sclerotic margin was noted on CT. Reportedly, osseous metastases of pleomorphic adenomas manifest as osteolytic lesions.<sup>[9,15]</sup> Therefore, we consider that a metastasizing pleomorphic adenoma, including osseous metastases, is a good indication for FDG-PET/CT.

#### 4. Conclusion

Although pleomorphic adenoma is usually a benign salivary gland tumor, metastases may occur years after the initial disease in association with local recurrences. We reported a rare case of pleomorphic adenoma with multiple metastases involving the skull base, lungs, liver, kidneys, bones, and soft tissue, confirmed by FDG-PET/CT. Careful observation with whole-body imaging such as FDG-PET/CT is thus necessary.

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**Writing – review & editing:** Masamichi Koyama, Takashi Terauchi, Mitsuru Koizumi, Hiroko Tanaka, Yukiko Sato.

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