Pleomorphic Adenoma Mimicking Malignant Tumor in the Parapharyngeal Space in a Patient with Gastric Carcinoma

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Abstract A 68-year-old man underwent total gastrectomy for stomach cancer. On the follow-up FDG PET/CT image 18 months later, intense focal ^{18}F -fluorodeoxyglucose (FDG) uptake was noted in the right parapharyngeal space. This lesion showed intermediate signal intensity on T1-weighted image and heterogeneous high signal intensity on T2-weighted image. The mass was heterogeneously enhanced by gadolinium enhancement. This lesion was pathologically confirmed as pleomorphic adenoma by excision. This case highlights the fact that both benign and malignant lesions in the parotid gland may exhibit intense FDG activity and the need for pathologic confirmation of parotid gland lesions for accurate disease staging.

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Introduction

Tumors arising in the parapharyngeal space are uncommon. We report a patient with a mass demonstrating high ^{18}F -fluorodeoxyglucose (FDG) uptake in right parapharyngeal space, which mimicked a malignant tumor. This lesion was pathologically confirmed as pleomorphic adenoma by excision.

FDG positron emission tomography (PET) and ^{18}F -FDG PET/computed tomography (CT) imaging are increasingly accepted as modalities for staging and restaging of many malignancies, including stomach and head and neck cancer. However, FDG can be accumulated intensely by benign tumor or inflammation. Out of benign salivary gland tumors, pleomorphic adenoma often showed increased FDG uptake.

Case Report

A 68-year-old man underwent total gastrectomy for stomach cancer. The histologic type of the cancer was tubular adenocarcinoma and the pathologic stage was T1N0M0. He received oral chemotherapy and FDG PET/CT was performed 18 months later for routine surveillance. Intense focal FDG uptake was noted in the right parapharyngeal space and the maximum standard uptake value (SUVmax) was measured as 5.9. It was initially considered to be a malignancy, such as metastatic disease or other primary malignant tumor, because of intense FDG uptake and history of stomach cancer (Fig. 1a).

Fig. 1 **a, b** PET and PET/CT fusion images showed intense focal FDG uptake in the right parapharyngeal space with a SUVmax of 5.9. Parapharyngeal lymph node metastasis from gastric carcinoma was highly suspected. **c, d** On the axial CT image of the neck, a 3-cm sized hypodense mass relative to muscle was noted in the right parapharyngeal space. This lesion was slightly enhanced after contrast infusion. **e** T2-weighted axial image demonstrated a well-defined hyperintense mass. **f, g** This lesion showed an intermediate signal intensity on T1-weighted image and heterogeneously enhanced on post-contrast T1 weighted image. CT and MR findings were suggestive of a benign tumor such as a neurogenic tumor. **h** The parapharyngeal mass was excised and confirmed pathologically as pleomorphic adenoma. Interspersed islands and strands of myoepithelial cells with amorphous myxoid stroma were noted. ($\times 100$, H & E stain)

To evaluate tumor characteristics, subsequent contrast-enhanced CT and MRI of the neck were performed. A CT scan demonstrated a 3.0-cm sized, slightly enhancing hypodense mass in the right parapharyngeal space (Fig. 1b). This lesion showed intermediated signal intensity

on T1-weighted image and heterogeneous high signal intensity on T2-weighted image (Fig. 1c, d, e). With gadolinium enhancement, the mass heterogeneously enhanced (Fig. 1f, g). These CT and MR findings were suggestive of a benign tumor, such as a neurogenic tumor. For accurate

diagnosis and a proper therapeutic plan, he had an operation. This lesion was pathologically confirmed as pleomorphic adenoma by excision (Fig. 1h).

Discussion

Parapharyngeal space neoplasms are rare and account for less than 0.5% of head and neck tumors [1]. Several studies reported that 70–80% of parapharyngeal tumors are benign [2–5]. Pleomorphic adenoma, neuronegic tumor, and paraganglioma are the most common benign tumors at this location. Among malignant parapharyngeal tumors, adenoid cystic carcinomas, ex pleomorphic adenomas, and mucoepidermoid carcinomas are common. There were few reports on the incidence of metastatic disease in parapharyngeal space, possibly due to quite rare incidence. Malone et al. [4] reported that 9% (3/33) of parapharyngeal tumors are metastatic.

Although the majority of parapharyngeal neoplasms are benign, this patient had a history of malignant stomach cancer. Several studies have revealed that neurogenic tumors with high FDG uptake have the possibility of malignancy [6]. Thus, we could not rule out the possibility of malignancy, though CT and MR findings suggested a benign tumor. The patient received an operation and a pleomorphic adenoma was diagnosed pathologically.

Although FDG PET or PET/CT plays a key role in oncology, FDG accumulation is not cancer-specific. FDG uptake also can be increased in inflammation, granulomatous disease, or benign tumor. Out of benign salivary gland tumors, pleomorphic adenoma and Warthin's tumor can mimic malignancy due to FDG avidity [7–9].

It is very well known that pleomorphic adenomas, which are comprised of a combination of epithelial and myoepithelial cells, might show intense FDG uptake. But the mechanism for abnormal FDG uptake in pleomorphic adenomas is not well understood, and FDG uptake does not correlate with the proportion of epithelial tumors [10]. To the best of our knowledge, there has been no report demonstrating

pleomorphic adenoma in the parapharyngeal space with FDG PET/CT.

In summary, this case demonstrated that a benign salivary gland tumor mimicked a malignant tumor in the parapharyngeal space. When intense FDG uptake is found in the parapharyngeal space, pleomorphic adenoma or Warthin's tumor arising from the minor salivary gland should be considered as well as malignant tumor. Further imaging study and pathologic confirmation are advisable for accurate diagnosis.

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