Incidentally Detected Carcinoma Ex Pleomorphic Adenoma of Parotid Gland by F-18 FDG PET/CT

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Parotid incidentalomas detected by FDG PET/CT during the workup of various malignancies are almost always benign tumors or inflammations [1]. The authors report an unusual case of an incidentally detected carcinoma ex pleomorphic adenoma originating from the parotid gland. A 62-year-old man underwent FDG PET/CT to determine the initial stage of gastric carcinoma, and the scan revealed an incidental FDG-avid mass in the left parotid gland. The patient

underwent gastrectomy, and no further evaluation was made of the parotid mass. However, 4.5 years later, the patient underwent FDG PET/CT for regular follow-up of his gastric cancer, and the scan showed an FDG-avid parotid mass with multiple cervical lymphadenopathies. He subsequently underwent surgery, and the final diagnosis was of carcinoma ex pleomorphic adenoma with cervical lymph node metastasis (Figs. 1 and 2).

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Fig. 1 A 62-year-old man underwent F-18 2-fluoro-2-deoxy-glucose positron emission tomography/computed tomography (FDG PET/CT) to determine the initial clinical stage of his early gastric carcinoma (adenocarcinoma with moderate differentiation). FDG coronal, axial PET (**a**, **c**), axial CT (**b**) and axial PET/CT fusion (**d**) images revealed an incidental FDG avid mass (SUVmax 7.4, about 29 mm in size) with a lobulated shape and a circumscribed border with heterogeneous FDG uptake in both superficial and deep lobes of the left parotid gland. FDG PET/CT was re-performed 4.5 year later, during which time the parotid mass had not been treated or evaluated. FDG coronal and axial PET (**e**, **g**), axial CT (**f**) and axial PET/CT fusion (**h**) images revealed relatively no interval change of the parotid mass (SUVmax 7.0) in terms of FDG avidity or morphologic characteristics; multiple newly developed hypermetabolic cervical lymphadenopathies were observed around the parotid mass. Although the medial border of the tumor seemed to be more irregular than on the previous CT scan, a malignant tumor of the left parotid gland was considered. Liquid-based aspiration cytology was performed, and the cytopathologic diagnosis was adenocarcinoma. The patient underwent left total parotidectomy with left selective neck dissection 2 months later, and the histopathologic report confirmed carcinoma ex pleomorphic adenoma with cervical lymph node metastasis. Pleomorphic adenoma is the most common tumor of the salivary glands, and may be encountered as an incidentaloma with high FDG uptake in the parotid gland [2]. It is generally considered a benign and slow-growing tumor, but 1.6–7.5 % of cases exhibit carcinomatous transformation (i.e., carcinoma ex

pleomorphic adenoma) [3]. Carcinoma ex pleomorphic adenoma is a rare, highly malignant tumor that develops from long-standing primary or recurrent pleomorphic adenoma. It typically occurs in patients in the sixth to eighth decades of life. Increased preoperative duration of pleomorphic adenoma increases the risk of malignant transformation into carcinoma ex pleomorphic adenoma [4]. Furthermore, previous PET studies have reported unexpected parotid lesions and described the significance of incidental FDG uptake in parotid glands and its impact on patient management [5, 6]. Asymmetric or focal FDG uptake warrants further radiological and histopathological correlating study to rule out the possibility of disease involvement [5]. The differential diagnoses includes inflammation, benign tumor (e.g., pleomorphic adenoma, Warthin's tumor, lymph epithelial cyst), primary malignancy (e.g., mucoepidermoid adenocarcinoma, malignant mixed tumor, acinic cell carcinoma, adenocarcinoma, lymphoma), and metastases [2, 7–11]. Because malignant and benign lesions show significant SUV overlap [9, 10], consideration of mass shapes and borders could improve the diagnostic accuracy of parotid malignancies. If combined CT of PET/CT reveals a round or oval shape, a well-defined border, and uniform density, the FDG-avid parotid mass is probably a benign tumor; otherwise, it is likely a malignant tumor [9]. In the presented patient, it is unclear whether pleomorphic adenoma changed to carcinoma ex pleomorphic adenoma or whether the tumor was malignant 4.5 years earlier. Based on our experience in this case, we propose that an FDG-avid parotid mass without a round shape or well-defined border detected by routine FDG PET/CT should not be ignored

Fig. 2 Histologic findings of the left parotid gland mass (**a**, **b**) and lymph node (**c**). **a** Photomicrograph showing a pleomorphic adenoma area (*left lower side, asterisk*) and a carcinomatous component exhibiting infiltrative growth (arrow) (H&E stain, $\times 10$). **b** The pleomorphic

adenoma area showed prominent myxoid stroma, and the carcinomatous component showed adenocarcinomatous differentiation (arrow) (H&E stain, $\times 40$) (**c**) Metastatic tumor cells with a cribriform pattern were observed within the level II lymph node (H&E stain, $\times 100$)

Conflict of interest Eunjung Kong, KyungAh Chun and IhnHo Cho declare that they have no conflict of interest.

Ethical approval All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

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