阪大歯学誌　65(2)：61 ～ 66，2021

Incidental finding of an abdominal aortic aneurysm detected on the unenhanced CT portion of FDG-PET/CT for preoperative screening in a patient with oral squamous cell carcinoma

Atsushi Shudo[1), 2)]

（令和３年１月７日受付）

ABSTRACT

Aim: In patients with oral cancer, the head and neck and lung fields are often evaluated by several imaging examinations. Among the imaging examinations other than fluorodeoxyglucose positron emission tomography/computed tomography（FDG-PET/CT), whole-body evaluation, including the lower abdomen and below is rarely performed routinely as a preoperative examination for oral cancer. However, a patient with oral cancer may also have potentially an abdominal disease, and early detection is required particularly in a fatal disease. This report discusses the importance of FDG-PET/CT for preoperative whole-body screening and the pitfalls of preoperative evaluation for oral cancer.

Case presentation: This article describes a 65-year-old man with an incidentally-detected abdominal aortic aneurysm at a site remote from the head and neck, on preoperative examination using FDG-PET/CT for oral squamous cell carcinoma. An abdominal aortic aneurysm was detected incidentally on the unenhanced CT portion of the FDG-PET/CT. FDG did not accumulate in the abdominal aortic aneurysm; the abdominal aortic aneurysm was detected only on the unenhanced CT portion. Perioperative blood pressure was carefully controlled, and 2 weeks after the oral surgery, cardiovascular surgeons performed endovascular stent grafting for the abdominal aortic aneurysm.

Conclusions: With FDG-PET/CT examination results, it is important to properly confirm not only FDG accumulation but also the unenhanced CT portion, and it is necessary to consider the possibility that a fatal abdominal disease may be detected by a whole-body evaluation for oral cancer.

1. Introduction

^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography（FDG-PET/CT）is a valuable imaging examination for diagnosis, staging, and treatment in all areas of clinical oncology, including oral cancer, and head and neck cancer [1), 2)]. FDG-PET/CT permits evaluating the entire body as well as the local region of the primary tumor [3)]. This article describes a case of oral squamous cell carcinoma（OSCC）in a 65-year-old man with an incidentally-detected abdominal aortic aneurysm（AAA）on the unenhanced CT portion of FDG-PET/CT imaging.

1）Department of Oral and Maxillofacial Surgery, Kishiwada Tokushukai Hospital, Osaka, Japan（Chief: Dr. Atsushi Shudo）
2）Dental Association of Kishiwada City, Osaka, Japan（Chief: Dr. Masaya Kimura）

2. Case presentation

A 65-year-old man was referred to our outpatient office for further evaluation of a mass on the oral floor. He had a medical history of hypertension, and was taking antihypertensive medications (candesartan cilexetil and amlodipine besilate) orally. He had smoked approximately 1–2 packs of cigarettes per day for over 40 years. The first clinical examination revealed a white mucosal lesion with induration measuring 5 × 5 mm on the left oral floor (Figure 1).

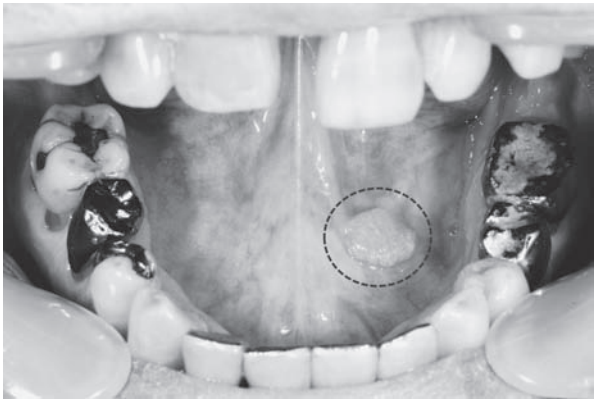

Figure 1　Clinical presentation, intraoral view (published with the patient's consent).

The histopathological diagnosis of OSCC was made by biopsy. We performed imaging evaluations for the primary lesion and for the lung fields, as the most frequent sites of distant metastasis of OSCC. We performed plain chest radiography, contrast-enhanced CT (CECT), magnetic resonance imaging (MRI), and FDG-PET/CT. The imaging range of the CECT was from the head and neck to the upper lung fields, and MRI was limited to the head and neck. The primary lesion was so small that it was only slightly visible on MRI (Figure 2), and not at all visible on CECT or FDG-PET/CT. Plain chest radiography showed no evidence of an aneurysm (Figure 3), and there was no finding suggesting distant metastases (Figure 4). However, an AAA was detected incidentally on the unenhanced CT portion of the FDG-PET/CT (axial plane only). The AAA measured 50 × 38 mm (Figure 5), and FDG did not accumulate in the AAA (Figure 6). We consulted a cardiovascular surgeon and planned to treat the AAA after the OSCC surgery. Because of the clinical diagnosis of stage 1 OSCC (cT1N0M0), tumor resection was performed under general anesthesia (Figure 7). Perioperative blood pressure was carefully controlled to not exceed 110

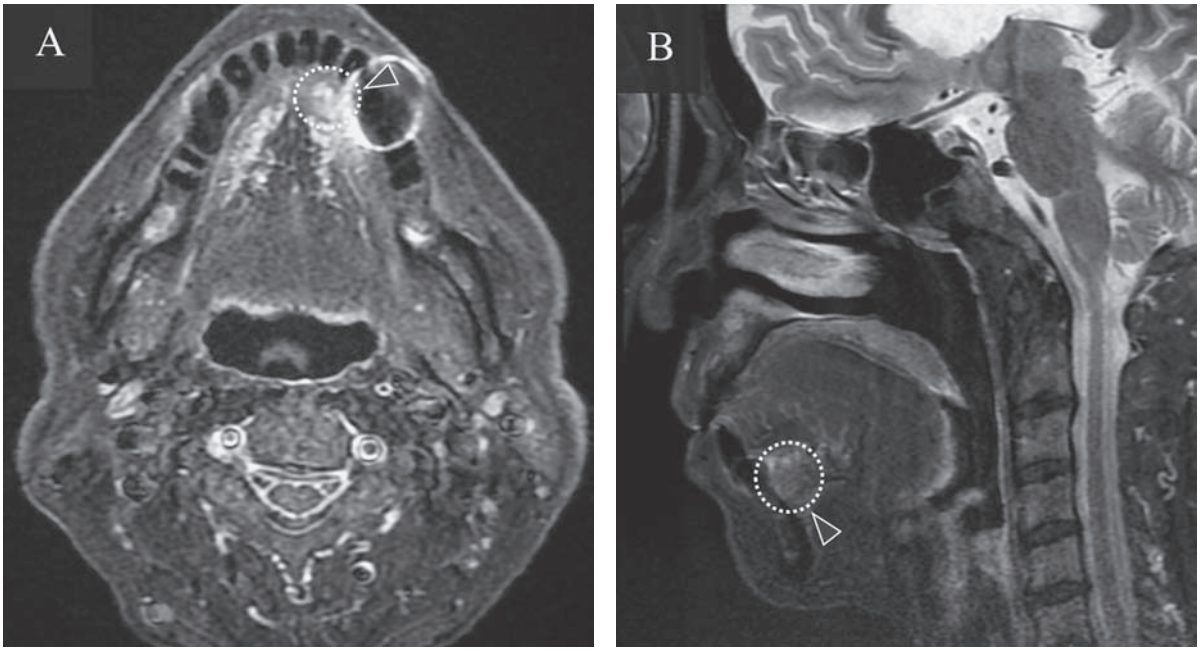

Figure 2　Magnetic resonance image (short TI inversion recovery) showing a contrast-enhanced lesion. (A) Axial plane. (B) Sagittal plane.

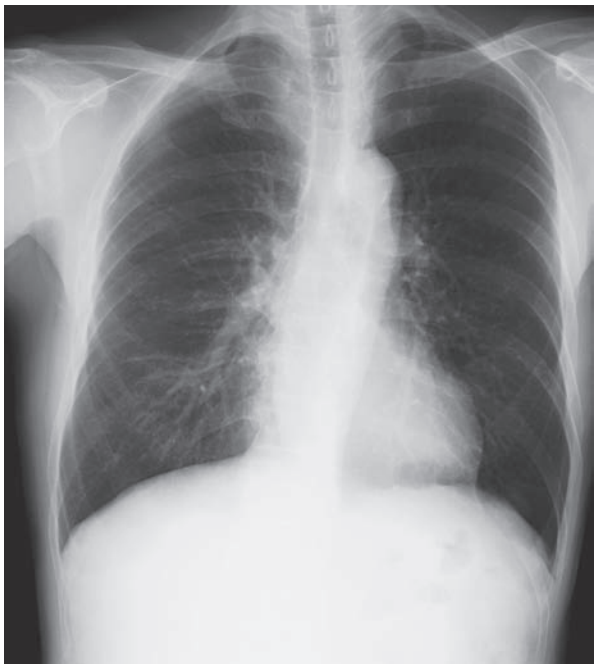

Figure 3 Plain chest radiograph showing no evidence of an aneurysm.

Figure 4 ^{18}F-fluorodeoxyglucose positron emission tomography image showing no findings suggesting distant metastases.

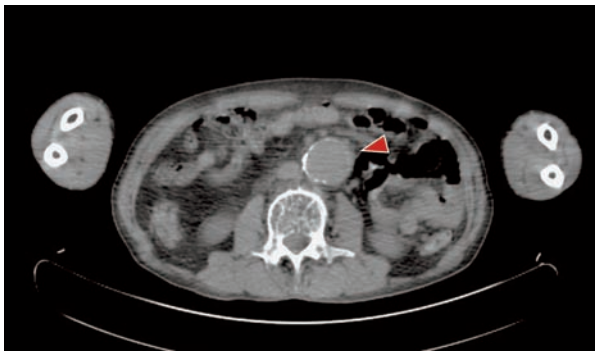

Figure 5 An abdominal aortic aneurysm detected on the unenhanced computed tomography portion of ^{18}F-fluorodeoxyglucose positron emission tomography.

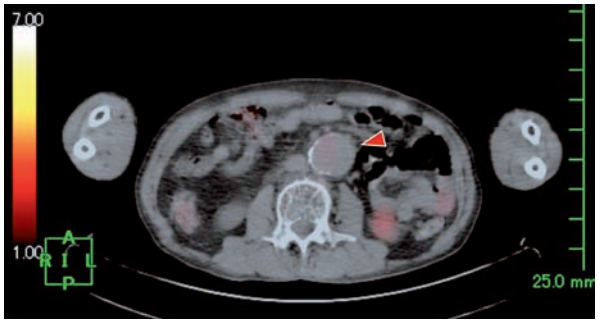

Figure 6 ^{18}F-fluorodeoxyglucose did not accumulate in the abdominal aortic aneurysm.

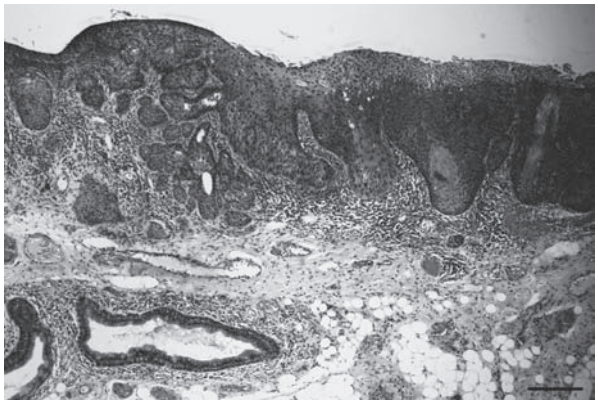

Figure 7 The histological features of the squamous cell carcinoma. (Hematoxylin and eosin staining, ×20; scale bar, 100 μm).

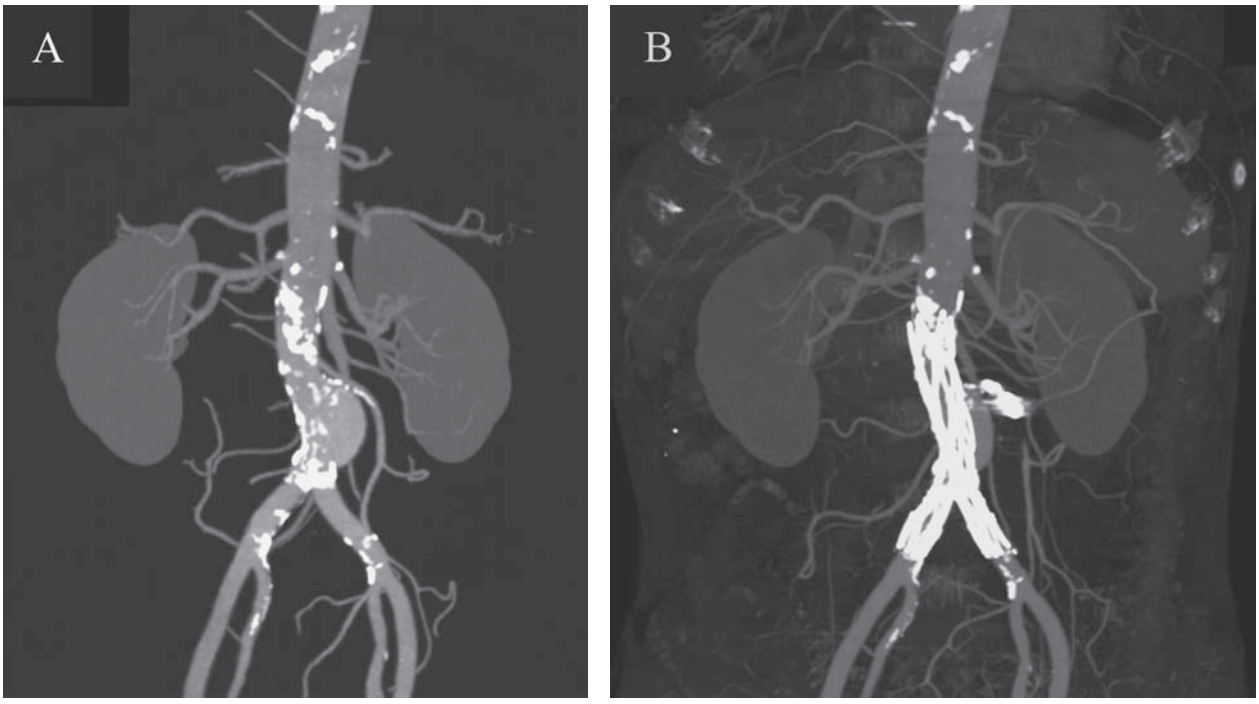

Figure 8　Computed tomography angiography of the aorta. (A) Before the operation. (B) After endovascular stent grafting.

Figure 9　Intraoral examination 6 months after the surgery.

mmHg, and 2 weeks after the oral surgery, cardiovascular surgeons performed endovascular stent grafting for the AAA (Figure 8). The patient's postoperative course was uneventful (Figure 9), and there was no evidence of complications.

3. Discussion

Most AAAs are asymptomatic, and are often detected as an incidental finding in imaging evaluations for other purposes[4), 5)]. The main examinations that detect an AAA are abdominal ultrasonography, abdominal CT, and MRI performed for other abdominal diseases occurring in the same area as the AAA[6), 7)]. However, in head and neck cancer, which is a disease that occurs in a region completely apart from an AAA, it is difficult to detect an AAA by routine preoperative imaging examinations other than FDG-PET/CT.

Because of staging of malignancies, which is one of the roles of FDG-PET/CT, a whole-body evaluation is usually performed. Therefore, FDG-PET/CT may detect another disease incidentally that requires additional inspection in other areas[8)-11)]. According to previous studies, lung diseases such as pulmonary nodules, pleural effusion, and pneumothorax are often detected[8), 9)]. The main diseases for which FDG-PET/CT is used to detect other diseases are malignant lymphoma and lung cancer, and the frequency of its use in head and neck cancer is low[10), 11)].

Recently, it has been suggested that FDG-PET/CT could be valuable for evaluating aortic diseases such as aortic aneurysm, acute thoracic aortic syndromes, atherosclerotic lesions, aortitis, and aortic malignancies[12)-16)]. Regarding aortic aneurysm, FDG accumulation in an AAA may predict expansion and progression in symptomatic patients; however, in asymptomatic patients, FDG-PET/CT results vary widely and are inconsistent[17)-20)]. In our patient, the AAA was asymptomatic and accumulated no FDG; the AAA was detected only on the unenhanced CT portion. With FDG-PET/CT examination results, it is important to properly confirm not only FDG accumulation but also the unenhanced CT portion.

The United States Preventive Services Task Force recommends that men between the age of 65 and 75 years who have ever smoked should be screened at least once for AAAs by abdominal ultrasonography[21)]. However, in patients with oral cancer, it is difficult to perform preoperative abdominal ultrasonography for all target patients. In our patient, the tumor was small; however, surgery under general anesthesia was planned after the diagnosis from the partial biopsy, and as a result, AAA was detected on preoperative screening. Considering that whole-body evaluation is not possible with routine imaging examinations for oral cancer other than with FDG-PET/CT, in the case of target patients, performing FDG-PET/CT may be recommended, even for early-stage cancer. Furthermore, it is necessary to consider the possibility that a fatal abdominal disease may be detected by a whole-body evaluation for oral cancer, and to obtain informed consent before imaging.

4. Conclusion

With FDG-PET/CT examination results, it is important to properly confirm not only FDG accumulation but also the unenhanced CT portion, and it is necessary to consider the possibility that a fatal abdominal disease may be detected by a whole-body evaluation for oral cancer. Identifying any incidental finding is crucial to provide appropriate care for the cancer patient and achieve a better outcome.

Acknowledgments

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The author thanks Jane Charbonneau, DVM, from Edanz Group (www.edanzediting.com/ac) for editing a draft of this manuscript.

Conflict of Interest

The author declares that there is no conflict of interest.

References

1) Veit-Haibach, P., Luczak, C., Wanke, I., Fischer, M., Egelhof, T., Beyer, T., et al. (2007): TNM staging with FDG-PET/CT in patients with primary head and neck cancer. *Eur J Nucl Med Mol Imaging*, **34**, 1953-1962.
2) Gupta, T., Master, Z., Kannan, S., Agarwal, J.P., Ghsoh-Laskar, S., Rangarajan, V., et al. (2011): Diagnostic performance of post-treatment FDG PET or FDG PET/CT imaging in head and neck cancer: a systematic review and meta-analysis. *Eur J Nucl Med Mol Imaging*, **38**, 2083-2095.
3) Boellaard, R., Delgado-Bolton, R., Oyen, W.J.G., Giammarile, F., Tatsch, K., Eschner, W., et al. (2015): FDG PET/CT: EANM procedure guidelines for tumour imaging: version 2.0. *Eur J Nucl Med Mol Imaging*, **42**, 328-354.
4) Vardulak, K.A., Prevost, T.C., Walker, N.M., Day, N.E., Wilmink, A.B., Quick, C.R., et al. (1999): Incidence among men of asymptomatic abdominal aortic aneurysms: estimates from 500 screen detected cases. *J Med Screen*, **6**, 50-54.
5) Aggarwal, S., Qamar, A., Sharma, V., Sharma, A. (2011): Abdominal aortic aneurysm: A comprehensive review. *Exp Clin Cardiol*, **16**, 11-15.
6) Akkersdijk, G.J., Puylaert, J.B., de Vries, A.C. (1991): Abdominal aortic aneurysm as an incidental finding in abdominal ultrasonography. *Br J Surg*, **78**, 1261-1263.
7) Khosa, F., Krinsky, G., Macari, M., Yucel, E.K., Berland, L.L. (2013): Managing incidental findings on abdominal and pelvic CT and MRI, Part 2: white paper of the ACR Incidental Findings Committee II on vascular findings. *J Am Coll Radiol*, **10**, 789-794.
8) Sheldo, J.A., Yap, K.K., Taubman, K.L., Schlicht, S.M. (2018): Prevalence of non ^{18}F-fluorodeoxyglucose-avid incidental findings of clinical significance on whole body positron emission tomography/computed tomography: A review of 500 consecutive cases. *J Med*

Imaging Radiat Oncol, **62**, 194–202.

9) Toriihara, A., Yamaga, E., Nakadate, M., Oyama, J., Tateishi, U. (2017): Detection of unexpected emergency diseases using FDG-PET/CT in oncology patients. *Jpn J Radiol*, **35**, 539–545.

10) Osman, M.M., Cohade, C., Fishman, E.K., Wahl, R.L. (2005): Clinically significant incidental findings on the unenhanced CT portion of PET/CT studies: frequency in 250 patients. *J Nucl Med*, **46**, 1352–1355.

11) Muzaffar, R., Kudva, G., Nguyen, N.C., Osman, M.M. (2011): Incidental diagnosis of thrombus within an aneurysm on ^{18}F-FDG PET/CT: Frequency in 926 patients. *J Nucl Med*, **52**, 1408–1411.

12) McBride, O.M.B., Joshi, N.V., Robson, J.M.J., MacGillivray, T.J., Gray, C.D., Fletcher, A.M., et al. (2016): Positron emission tomography and magnetic resonance imaging of cellular inflammation in patients with abdominal aortic aneurysms. *Eur J Vasc Endovasc Surg*, **51**, 518–526.

13) Reeps, C., Pelisek, J., Bundschuh, R.A., Gurdan, M., Zimmermann, A., Ockert, S., et al. (2010): Imaging of acute and chronic aortic dissection by 18F-FDG PET/CT. *J Nucl Med*, **51**, 686–691.

14) Rudd, J.H., Warburton, E.A., Fryer, T.D., Jones, H.A., Clark, J.C., Antoun, N., et al. (2002): Imaging atherosclerotic plaque inflammation with ^{18}F-fluorodeoxyglucose positron emission tomography. *Circulation*, **105**, 2708–2711.

15) Murakami, M., Morikage, N., Samura, M., Yamashita, O., Suehiro, K., Hamano, K. (2014): Fluorine-18-fluorodeoxyglucose positron emission tomography-computed tomography for diagnosis of infected aortic aneurysms. *Ann Vasc Surg*, **28**, 575–578.

16) Sibille, L., Ilonca, D., Oziol, E., Gandilhon, P., Micheau, A., Vernhet-Kovacsik, H., et al. (2010): FDG PET/CT in aortic angiosarcoma. *Clin Nucl Med*, **35**, 134–137.

17) Courtois, A., Nusgens, B.V., Hustinx, R., Namur, G., Gomez, P., Somja, J., et al. (2013): 18F-FDG uptake assessed by PET/CT in abdominal aortic aneurysms is associated with cellular and molecular alterations prefacing wall deterioration and rupture. *J Nucl Med*, **54**, 1740–1747.

18) Marini, C., Morbelli, S., Armonino, R., Spinella, G., Riondato, M., Massollo, M., et al. (2012): Direct relationship between cell density and FDG uptake in asymptomatic aortic aneurysm close to surgical threshold: an in vivo and in vitro study. *Eur J Nucl Med Mol Imaging*, **39**, 91–101.

19) Kotze, C.W., Groves, A.M., Menezes, L.J., Harvey, R., Endozo, R., Kayani, I.A., et al. (2011): What is the relationship between 18F-FDG aortic aneurysm uptake on PET/CT and future growth rate? *Eur J Nucl Med Mol Imaging*, **38**, 1493–1499.

20) Kim, J. and Song, H.C. (2018): Role of PET/CT in the Evaluation of Aortic Disease. *Chonnam Med J*, **54**, 143–152.

21) LeFevre, M.L., U.S. Preventive Services Task Force. (2019): Screening for abdominal aortic aneurysm US Preventive Services Task Force Recommendation Statement. *JAMA*, **322**, 2211–2218.