CASE REPORT

Management of incidental esophageal uptake on FDG PET/CT

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SUMMARY

A 51-year-old Caucasian man with a history of colon carcinoma, status post right hemicolectomy, now with elevated carcinoembryonic antigen underwent positron emission tomography (PET)/CT for evaluation of tumour recurrence. An incidental focal esophageal uptake was noted on PET/CT, without associated mass. Subsequent endoscopy revealed Barrett's esophagus. The second patient, a 63-year-old Caucasian man, underwent a PET/CT to characterise a 12 mm lung nodule. The PET/CT had linear diffuse uptake within the esophagus. Endoscopy and biopsy findings were consistent with reflux esophagitis. This case report discusses management of incidental esophageal uptake on fludeoxyglucose PET/CT.

BACKGROUND

Positron emission tomography (PET)/CT is a useful tool primarily for characterisation of lung nodules and staging/surveillance of malignancy.¹ The radiotracer, fludeoxyglucose (FDG) is administered intravenously prior to PET/CT imaging, and accumulates in areas with metabolic activity. On occasion, incidental abnormalities in the aerodigestive system on PET/CT can be significant for non-neoplastic disease or in detecting incidental malignancies, which can then be confirmed through endoscopy. The cost of performing an endoscopy on every patient is prohibitive, therefore it may be helpful to recognise patterns of esophageal uptake that warrant further workup with endoscopy.¹⁻³

Gastroesophageal reflux disease (GERD) is prevalent in the USA. The pathophysiology of this common disease is suspected to be related to a hiatal hernia or a weakened lower esophageal sphincter, allowing stomach contents to flow back into the esophagus. Many factors contribute to GERD, including smoking, coffee, spicy foods, over the counter medications and alcohol. The concern is that GERD can progress to Barrett's esophagus, where the lining of the esophagus undergoes metaplasia from stratified squamous epithelium to simple columnar epithelium. Barrett's esophagus is a risk factor for adenocarcinoma where the 5-year survival rate is 15–20%. National Cancer Institute (NCI) estimates the number of new cases of esophageal cancer to be 17 990 in 2013.^{4 5}

CASE PRESENTATION

Case 1

A 51-year-old Caucasian man had a history of colon cancer, status post right hemicolectomy, now

with elevated carcinoembryonic antigen (CEA) of 6.9. On FDG PET/CT, no abnormal activity was noted to suggest metastatic disease. Incidentally noted was focal asymmetric activity in the distal esophagus, without associated mass (figure 1A). A subsequent endoscopy revealed Barrett's esophagus in the lower third of the esophagus (figure 1B). Reflux of gastric contents into the esophagus was also observed. He was treated medically for GERD and Barrett's esophagus. CEA levels declined on subsequent follow-up.

Case 2

A 63-year-old Caucasian man underwent a PET/CT to characterise a 12 mm spiculated right upper lobe lung nodule. He has a 45-pack-year history of smoking, but quit in the past 5 years. PET/CT increased within the lung nodule, which on biopsy revealed adenocarcinoma. Incidentally noted was linear diffuse uptake in the entire length of the esophagus, without a gross mass on CT (figure 2A). He underwent endoscopy 3 weeks later, which showed multiple scattered white patches (figure 2B). The biopsy revealed findings consistent with a reflux esophagitis. He had no esophageal malignancy, no Barrett's esophagus, and no fungal infiltrates.

OUTCOME AND FOLLOW-UP

In Case 1, it was recommended that the patient undergo direct visualisation and a colonoscopy if CEA continued to rise.

DISCUSSION

A PET/CT study has two components, the CT and the PET components of the study. It is important to note that esophageal mucosal disease is usually difficult to characterise on CT due to lack of distension of the esophagus. Typically, the wall of bowel loops on CT is uniformly thin. A PET scan is used to image the areas of radiotracer uptake.⁶ FDG is a radiotracer which accumulates in the areas of increased metabolic activity. FDG is also excreted physiologically in the saliva and therefore is often noted to be within the lumen of the esophagus. Intraluminal uptake of FDG in the esophagus, therefore, requires no further workup. In one study, it was noted that 3% of patients undergoing PET/CT had incidental gastrointestinal tract uptake. Of those cases, 60% were due to malignancy or considered precancerous.⁶ We note FDG is not a tumour-specific probe. Oftentimes there are areas of FDG accumulation/activity on PET imaging which are not physiological and are

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Figure 1 Case 1: (A) this is a fludeoxyglucose positron emission tomography (EDG PET)/CT showing asymmetric uptake in the distal esophagus, without associated mass. (B) Upper endoscopy from the same patient demonstrating Barrett's esophagus.

Figure 2 Case 2: (A) sagittal view of fludeoxyglucose positron emission tomography (FDG PET)/CT showing diffuse uptake in the gastrointestinal tract. (B) Upper endoscopy demonstrating white patches. Biopsy was conclusive for reflux esophagitis.

Learning points

- Factors which may help us decide if an endoscopy is required to evaluate esophageal uptake may include whether the uptake is in the wall of the esophagus or in the lumen, the intensity of uptake, and the focality/asymmetry or diffuse/linear.
- Linear uptake without mass is likely reflux. However, focal uptake with or without mass on positron emission tomography (PET)/CT could be caused by Barrett's esophagus or esophageal cancer. In the latter case, an endoscopy may be warranted and encouraged.
- Incidental findings on PET/CT may or may not warrant further treatment or diagnostic workup.
- Gastroesophageal reflux disease (GERD) and Barrett's esophagus are prevalent diseases in the USA and may present as an incidental finding of fludeoxyglucose (FDG) PET/CT.
- Additional studies are suggested to assess incidental esophageal uptake patterns on FDG PET/CT.

unexpected, resulting in a diagnostic dilemma with respect to management. Incidental areas of uptake within the esophagus can represent a variety of diseases including benign and malignant tumours, infection, inflammation, GERD and Barrett's esophagus. We use the distribution of the FDG uptake as well as the CT findings to determine further management. Often an endoscopy is recommended to further evaluate areas of uptake within the esophagus.

A focal, asymmetric uptake, without mass on CT, was consistent with Barrett's esophagus. A diffuse mild linear uptake localised to the wall of the esophagus, without associated mass, was consistent with reflux esophagitis. FDG uptake localised to a mass would increase the suspicion of malignancy. In these cases we suspect there is a pattern of FDG uptake, which may help us decide if further testing such as endoscopy is required.

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