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Case report

Gallbladder activity on sodium fluoride positron emission tomography/computed tomography bone scan

ABSTRACT

We incidentally identified gallbladder activity on ^{18}F sodium fluoride (NaF) positron emission tomography/computed tomography (PET/CT) bone images in five patients. Variable degree of bowel activity is usually seen on NaF PET/CT images, and its mechanism is unknown. Gallbladder activity in our cases may indicate that hepatobiliary excretion of the ^{18}F NaF is the reason for bowel activity on NaF PET/CT images. However, excretion of radiotracer through bowel may also contribute to the bowel activity.

Keywords: ^{18}F sodium fluoride, bowel, gallbladder, positron emission tomography/computed tomography, sodium fluoride

INTRODUCTION

There is increasing use of ^{18}F sodium fluoride (NaF) positron emission tomography/computed tomography (PET/CT) bone scan mainly in the detection of bone metastases.[1-3] Uptake mechanism of ^{18}F NaF in the bone includes exchange of ^{18}F ions with hydroxyl ions (OH–) on the surface of the hydroxyapatite to form fluorapatite.[4] Major route of excretion of the radiotracer is through the kidneys. In addition to intense renal and bladder activity, mild physiologic soft tissue activities may be seen in various tissues, such as choroid plexus, heart and large vessels (blood pool), and bowel. We also incidentally identified mild gallbladder activity in some of our patients. These patients also showed faint liver and splenic and gastric wall activity. In this article, we will present the images of our patients and briefly discuss the reasons for uptake/activity in these tissues.

CASE REPORT

In routine evaluation of NaF PET/CT bone images, we incidentally identified gallbladder activity in five patients. All the patients had a history of prostate cancer (age range 61–73 years).

NaF PET/CT images were acquired 60 min following intravenous injection of 222 MBq (6 mCi) ^{18}F NaF. Before PET images, a low-dose CT was obtained for attenuation correction and anatomic localization purposes. PET acquisition was 3 min/bed from top of the head to toes. PET images were corrected for attenuation on the basis of the CT data and reconstructed using a standard iterative algorithm and reformatted into transaxial, coronal, and sagittal views. Maximum intensity projection (MIP) images were also generated. Both attenuation corrected and uncorrected PET images as well as PET/CT fusion and MIP images were evaluated visually to assess activities in bone and soft tissues.

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In addition to gallbladder activity, patients also showed varying degree of bowel activity (mild, moderate, or significant). Faint activities in one or more of the following tissues: liver, spleen, and gastric wall were also identified. Figures 1-3 demonstrate activity in the gallbladder as well as bowel, liver, spleen, and gastric wall in our patients.

DISCUSSION

The exact mechanism of bowel activity on NaF PET/CT was reported to be unknown.[5] Visualization of the gallbladder in our NaF PET/CT studies may indicate that hepatobiliary excretion of ^{18}F NaF is the reason for bowel activity. However, in addition to hepatobiliary excretion, excretion through the intestine may also contribute to bowel activity. Faint diffuse activity in the liver could be due to blood pool activity and/or hepatocellular uptake of radiotracer. Mild diffuse splenic activity is likely from blood pool activity as it is more prominent on early than delayed images. Mild reticuloendothelial cell uptake may also contribute to uptake in the liver and spleen. Mild diffuse stomach wall uptake could be physiologic and due to muscular uptake.

CONCLUSION

Gallbladder activity on the NaF PET/CT may indicate that hepatobiliary excretion of the radiotracer is the reason for bowel activity. However, excretion of radiotracer through bowel may also contribute to the bowel activity.

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Nil.

Conflicts of interest
There are no conflicts of interest.

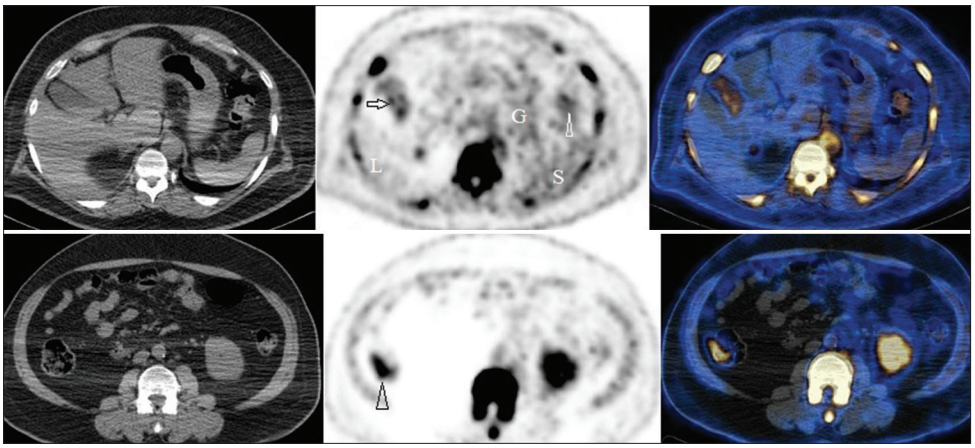

Figure 1: Selected transaxial computed tomography, positron emission tomography, and positron emission tomography/computed tomography fusion images demonstrate mild activity in the gallbladder (arrow) and bowel (arrowhead). Note the slight misregistration of bowel on positron emission tomography/computed tomography fusion images and photopenic artifact medially. Further, note the faint liver (L), and mild splenic (S) and gastric wall (G) activity

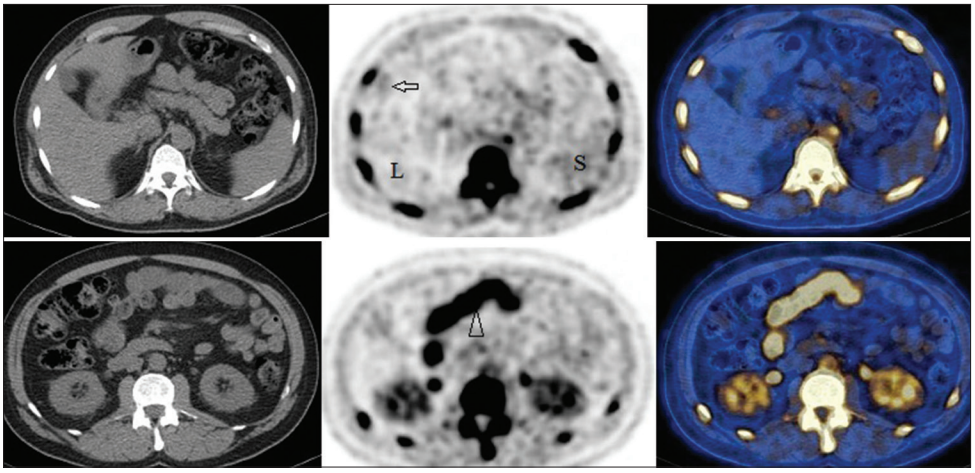

Figure 2: Selected transaxial computed tomography, positron emission tomography, and positron emission tomography/computed tomography fusion images demonstrate mild activity in the tip of the gallbladder sac (arrow) and significant activity in the bowel (arrow head). Further, note the faint liver (L) and splenic (S) activity

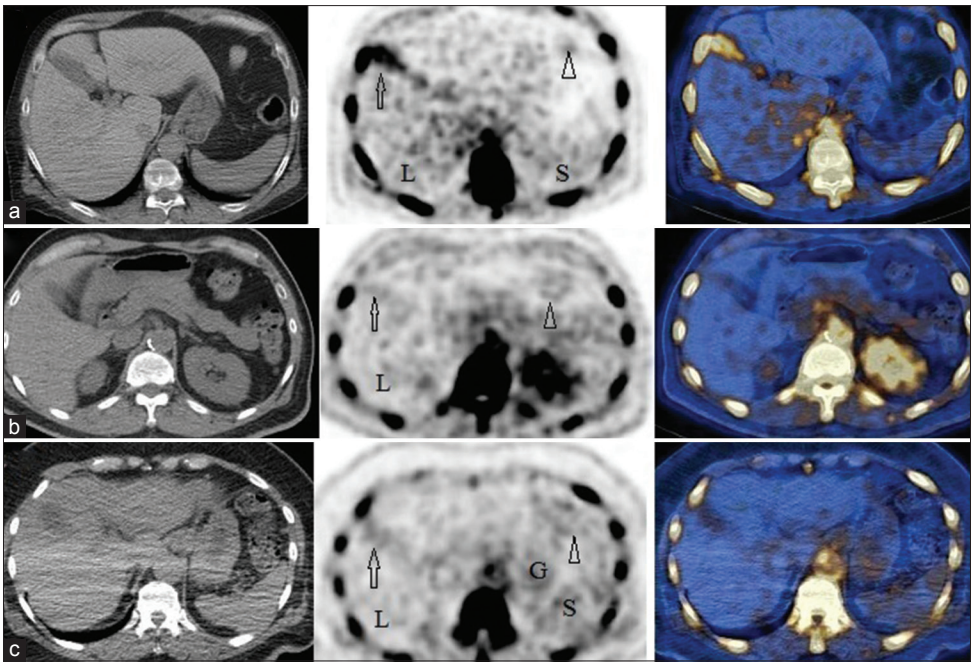

Figure 3: Selected transaxial computed tomography, positron emission tomography, and positron emission tomography/computed tomography fusion images of three patients (a-c) demonstrate mild activity in the gallbladder (arrows) and bowel (arrow heads) and faint activity in the liver (L), spleen (S), and gastric wall (G)

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