FDG PET/CT diagnosis of hepatic lymphoma mimicking focal fatty infiltration on CT

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ABSTRACT

Areas of hypoattenuation in the liver which do not have mass effect are typically thought to represent focal fatty infiltration. Rarely, tumors can present without mass effect in the liver. We present a case in which areas of liver hypoattenuation which were initially thought to represent focal fatty infiltration on CT due to lack of mass effect had abnormal uptake on a FDG PET/CT exam; these areas were due to secondary hepatic involvement from non-Hodgkin's lymphoma.

CASE REPORT

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A 72-year old man presenting with anemia, abdominal pain, and nausea and vomiting underwent a contrast-enhanced computed tomography (CT) of the abdomen and pelvis which demonstrated a short segment of severe small bowel thickening. The patient also had two areas of hypodensity in the liver (Figs. 1,2) which were thought to represent focal fatty infiltration given the lack of mass effect. The CT was followed by a F-18 fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) exam (Figs 1-3) which demonstrated intense FDG uptake in the small bowel lesion and areas of liver hypodensity. The patient underwent resection of the small bowel lesion which was a large B-cell lymphoma and core biopsy of the liver (Fig. 4) which demonstrated metastatic lymphoma. This case demonstrates that hepatic lymphoma can present without mass-effect; this finding has not been well-described. FDG PET/CT can differentiate hepatic tumors without mass-effect from focal fatty infiltration.

DISCUSSION

Focal fatty infiltration is a common finding on CT exams. It is typically geographic or ovoid in shape and is notable for lack of mass-effect. Characteristic locations for focal fatty infiltration are adjacent to the falciform ligament, gallbladder fossa, or porta hepatis (1). However, there are multiple other patterns which have been described such as multifocal nodules and perivascular low-attenuation (2,3). Thus, the lack of mass-effect is primary finding which differentiates focal fatty infiltration from hepatic tumors. Contrast-enhancement is typically not helpful in differentiation, as fatty infiltration demonstrates enhancement after contrast (4).

Secondary involvement of the liver in lymphoma is much more common than primary liver lymphoma, which represents only 0.4% of cases of extranodal lymphoma (5). Non-Hodgkin's lymphoma is more likely to have hepatic involvement than Hodgkin's lymphoma. Diffuse subtypes are more likely to infiltrate the liver compared to nodular histologies (5). Secondary hepatic lymphoma is relatively common and often subclinical. In two reports, the incidence of liver involvement was 26% (6) and 40% (7), and many patients had no biochemical or clinical evidence of liver involvement before biopsy.

Hepatic lymphoma does not have a specific appearance on computed tomography exams. The lesions have been hypoattenuating in all reported cases, and in a minority of cases have demonstrated a thin enhancing rim (8-10). Primary hepatic lymphoma often presents as a single lesion, or multiple lesions simulating metastatic disease (8). Secondary hepatic lymphoma has a wider range of appearances, it may appear as multiple or diffusely infiltrating lesions, but is unlikely to appear as a solitary lesion (8). Hepatic lymphoma would typically not be confused with focal fatty infiltration as it has mass-effect. Non-Hodgkin lymphoma presenting as intrahepatic periportal low attenuation has been described (11), but this report mass-effect was also noted with compression of the adjacent bile ducts. There has been one report (12) of two cases of lymphoma with undisturbed extension of vessels through the lesion. In this report, other malignancies which resulted in this finding were metastatic melanoma and metastatic adenocarcinoma. In other parenchymal organs, lymphoma may have relatively little mass-effect. Pancreatic lymphoma, unlike adenocarcinoma, is not typically associated with ductal obstruction (13). Lymphoma can infiltrate the renal sinus but cause only minimal hydronephrosis (14). Bowel lymphoma may not narrow the lumen, and in some cases the bowel can be aneurysmally dilated (15).

FDG PET/CT is well-established for staging, prognosis, and therapy follow-up in patients with Hodgkin's and aggressive non-Hodgkin lymphoma (16.17). In non-Hodgkin lymphoma, FDG uptake varies depending upon histologic type (18), but the common diffuse B-cell lymphomas typically have substantial FDG uptake. Follicular and mantle cell lymphomas also have substantial uptake, but in one study FDG PET only detected disease in 67% of marginal zone lymphomas and 40% of peripheral T-cell lymphomas (18). FDG uptake in hepatic lymphoma has been well-described (19-23). FDG uptake in focal fatty infiltration has not been described, and the FDG uptake in this case would not be consistent with focal fatty infiltration. In this case, the FDG PET/CT abnormalities lead to the biopsy of liver lesions were previously thought to represent focal fatty infiltration. MRI was not performed in this case. Although MRI has not been specifically described in differentiating hepatic lymphoma in fatty infiltration, it would likely have been helpful in this case as chemical shift MRI can differentiate focal fatty infiltration of the liver from metastatic disease (24). Interpreters of FDG PET/CT and CT should be aware of the potential presentation of hepatic lymphoma without mass-effect.

TEACHING POINT

Hepatic lymphoma can present without mass-effect and mimic focal fatty infiltration on CT exams. However, hepatic involvement in patients with lymphoma can be diagnosed by PET/CT despite a benign CT appearance.

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FIGURES

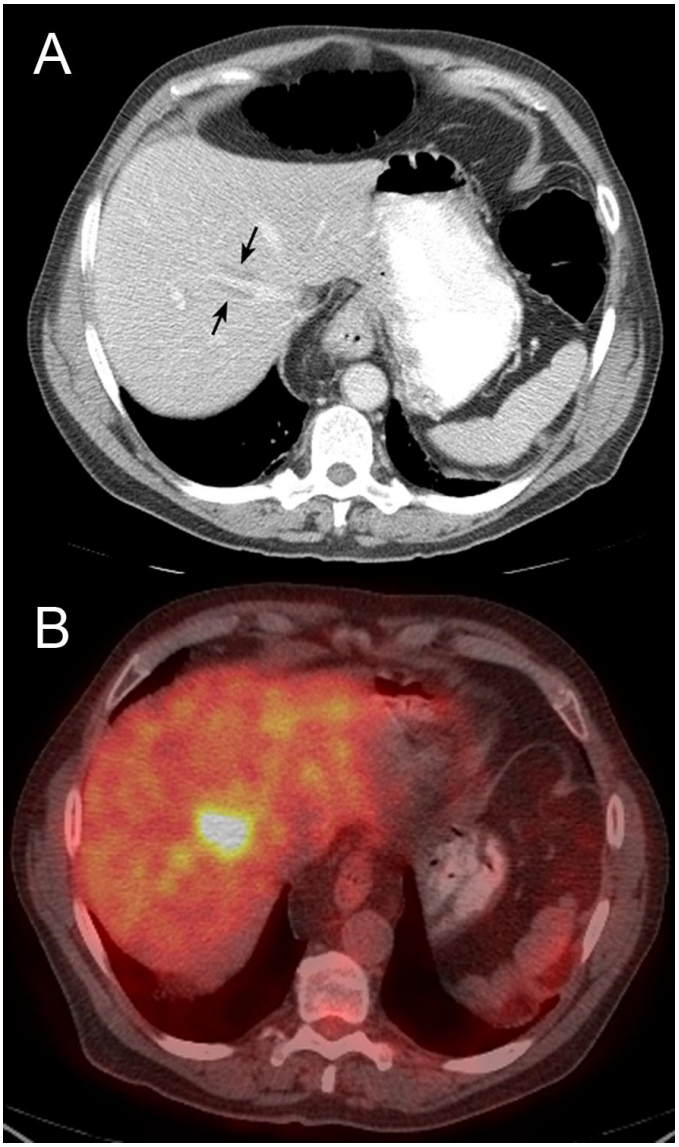

Figure 1 (bottom left): 72-year old man with hepatic lymphoma mimicking focal fatty infiltration on CT. (A) Contrast-enhanced CT (General Electric Lightspeed VCT, kVp 120, mAs 433, 5 mm slice reconstruction) performed with 125 cc of Isovue-370 intravenous contrast demonstrates linear hypodensity (arrows) surrounding the middle hepatic vein. There is no mass-effect upon the vein. This was thought to represent focal fatty infiltration given the lack of mass-effect. However an axial fused image from a PET/CT (B) performed with 19.1 mCi of F-18 FDG imaged 60 minutes after injection demonstrates intense FDG uptake at this site.

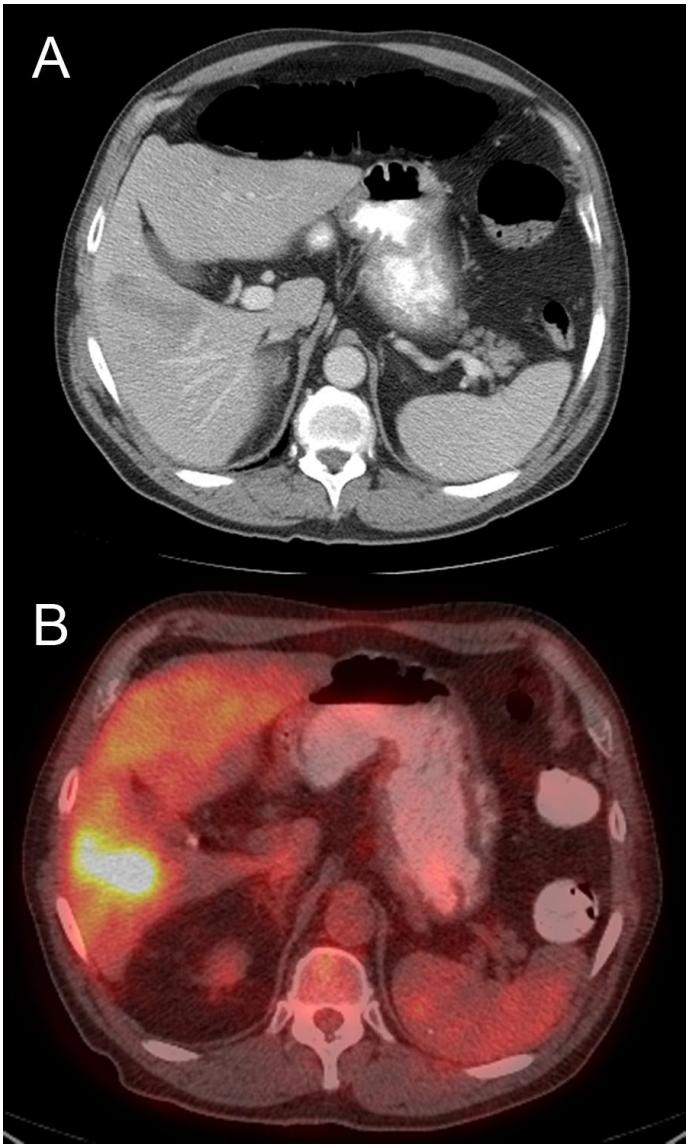

Figure 2 (bottom right): 72 year-old man with hepatic lymphoma mimicking focal fatty infiltration on CT. (A) Contrast-enhanced CT (General Electric Lightspeed VCT, kVp 120, mAs 433, 5 mm slice reconstruction) performed with 125 cc of Isovue-370 intravenous contrast demonstrates a geographic area of hypodensity in the inferior right liver. There is no mass-effect despite the relatively large size of the lesion. This was also thought to represent focal fatty infiltration. (B) Axial fused image from the PET/CT demonstrates intense FDG uptake in this area.

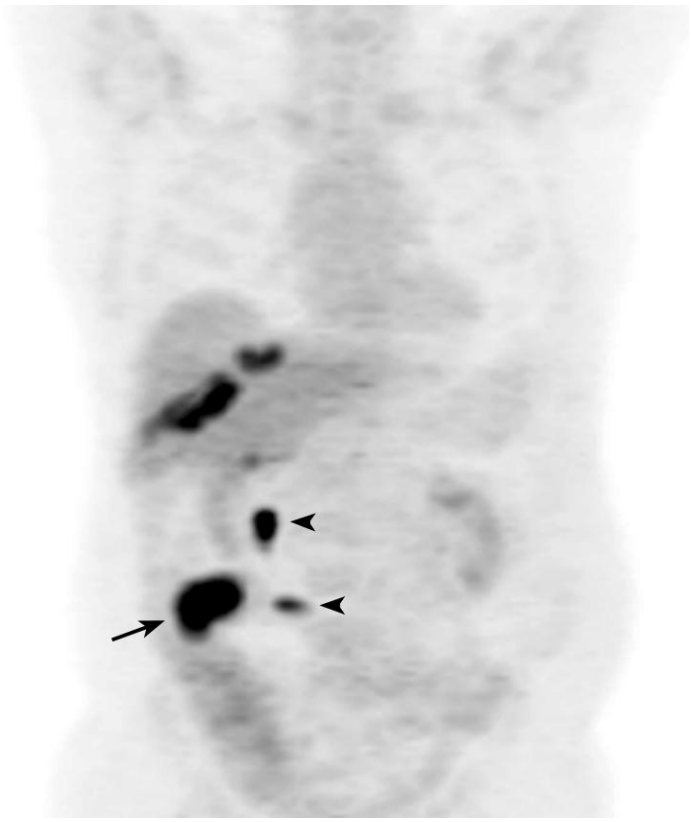

Figure 3: 72 year-old man with hepatic lymphoma mimicking focal fatty infiltration on CT. Multiple intensity projection image from a FDG PET/CT scan performed with 19.1 mCi of F-18 FDG imaged 60 minutes after injection (same study as Figures 1,2) demonstrates intense uptake in the primary small bowel lymphoma (arrow) and in nodal (arrowheads) and liver metastases.

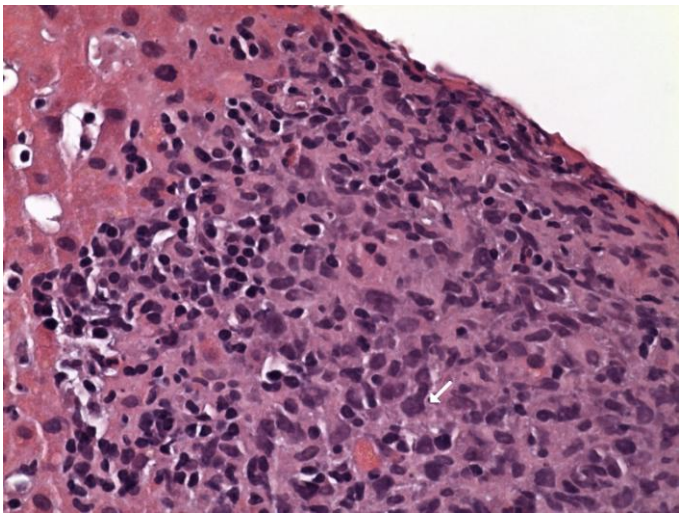

Figure 4: 72 year old man with hepatic lymphoma mimicking focal fatty infiltration on CT. Liver core biopsy specimen. Liver extensively infiltrated by diffuse large B-cell lymphoma. Normal liver parenchyma is in the upper left corner along with small lymphocytes at the interface. The lymphoma is composed of large cells with angulated nuclei (arrow) which almost completely replaces the liver parenchyma in this section. (400x, H&E stain).

ABBREVIATIONS

mCi = milliCurie
PET = positron emission tomography
CT = computed tomography
FDG = fluorodeoxyglucose

KEYWORDS

Liver, Lymphoma, Positron Emission Tomography, PET