Case Report

Pancreatic tuberculosis: Evaluation of therapeutic response using F-18 fluoro-2-deoxy-D-glucose positron emission tomography/computed tomography

Sampath Santhosh, Anish Bhattacharya, Surinder Singh Rana[1], Deepak Kumar Bhasin[1], Radhika Srinivasan[2], Bhagwant Rai Mittal

Departments of Nuclear Medicine, [1]Gastroenterology and [2]Cytology and Gynaecological Pathology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

ABSTRACT

F-18 fluoro-2-deoxy-D-glucose positron emission tomography/computed tomography (FDG PET/CT) is a functional imaging technique that monitors glucose metabolism in tissues. Pulmonary tuberculosis (TB) has been reported to show intense uptake of FDG, with a decrease in metabolism of the tuberculous lesions after successful anti-tubercular treatment (ATT). The authors present a patient with pancreatic TB and demonstrate the usefulness of FDG PET/CT in monitoring the response to ATT.

Keywords: F-18 fluoro-2-deoxy-D-glucose, pancreas, positron emission tomography/computed tomography, tuberculosis

INTRODUCTION

Abdominal tuberculosis (TB) is a type of extra-pulmonary TB commonly affecting the intestinal tract, lymph nodes, peritoneum, and solid organs. Isolated pancreatic TB is rare and preoperative diagnosis is difficult.[1] As the clinical and radiographic presentation mimics pancreatic cancer, preoperative diagnosis of pancreatic TB is rare. Endoscopic ultrasonography guided fine-needle aspiration (EUS-FNA) and F-18 fluoro-2-deoxy-D-glucose positron emission tomography/computed tomography (FDG PET/CT) are complimentary, since the latter can help in localizing the region to be aspirated by EUS-FNA for the diagnosis of peripancreatic TB, avoiding unnecessary surgery for extra hepatic biliary obstruction (EHBO). This case report illustrates how FDG PET/CT imaging can be useful as a noninvasive modality, in conjunction with other clinical and radiological information, in monitoring treatment of extra-pulmonary TB.

Access this article online

Quick Response Code:

Website: www.ijnm.in

DOI: 10.4103/0972-3919.142635

CASE REPORT

A 34-year-old Asian male presented with jaundice, pruritus, loss of appetite and weight and mild abdominal pain for 3 weeks. Abdominal ultrasonography showed a fatty liver with a dilated common bile duct (CBD) and intrahepatic biliary radicles with enlarged lymph nodes at the porta hepatis. Contrast enhanced CT of the abdomen revealed a heterogeneous soft tissue mass involving the head and uncinate process of the pancreas, CBD and main pancreatic duct, with necrotic lymph nodes at the porta hepatis. The chest X-ray was normal. However, the Mantoux test was strongly positive, suggesting mycobacterial infection. FDG PET/CT [Figure 1] was done to characterize the lesion. Intense FDG uptake with a standardized uptake value (SUVmax) of 23.4 was noted in the pancreatic lesion as well as in enlarged supraclavicular, mediastinal and retro-peritoneal lymph nodes and the marrow of both humeri [Figure 1]. The mild symmetrical FDG avidity in the humeri was considered to be due to reactive marrow. EUS confirmed a heteroechoic mass involving the head of the pancreas with adjacent lymphadenopathy. The EUS-FNA specimen from the pancreatic mass showed predominantly necrosis with inflammatory cells and a few ill-formed epithelioid cell granulomas; stain for acid fast bacilli was positive, leading to a diagnosis of peripancreatic TB. Anti-tubercular treatment (ATT) was started.

Address for correspondence:
Dr. Anish Bhattacharya, Department of Nuclear Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh - 160 012, India. E-mail: anishpgi@yahoo.co.in

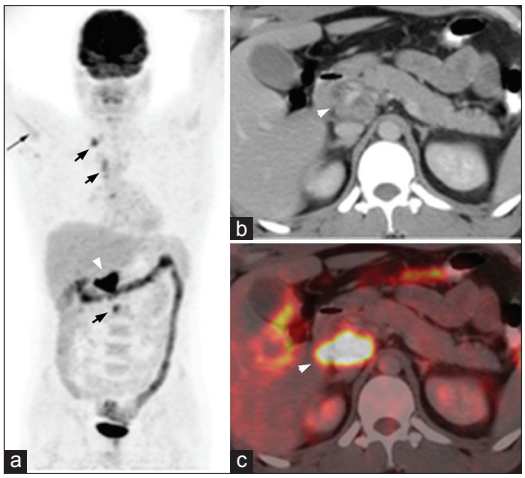

Figure 1: Maximum intensity projection (a), axial computed tomography (CT) (b) and axial fused positron emission tomography/CT (c) images of the baseline scan showing increased F-18 fluoro-2-deoxy-D-glucose uptake (standardized uptake value 23.4) in the peripancreatic lesion (arrowhead) as well as in enlarged supraclavicular, mediastinal and retro-peritoneal lymph nodes and the marrow of the humeri (arrows)

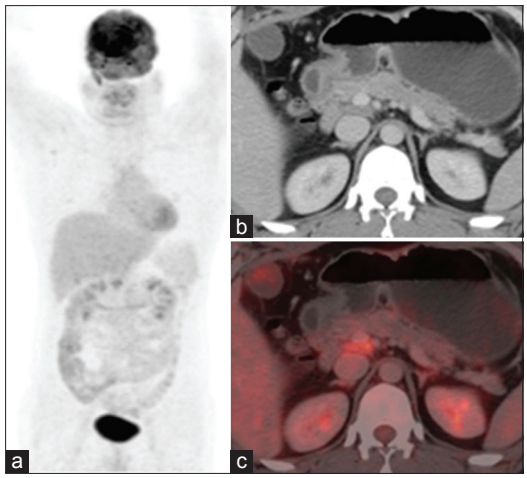

Figure 2: Maximum intensity projection (a), axial computed tomography (CT) (b) and axial fused positron emission tomography/CT (c) images 3 months after starting anti-tubercular treatment, showing complete resolution of the lesions in the pancreatic head and elsewhere. The peripancreatic lymph nodes (b and c) show a significant reduction in size and F-18 fluoro-2-deoxy-D-glucose avidity (standardized uptake value 4.7)

Three months after the initiation of ATT, jaundice resolved and the patient reported improvement in symptoms. FDG PET/CT at this time [Figure 2] showed complete resolution of the lesion in the pancreatic head and significant reduction in size and FDG avidity of the peripancreatic lymph nodes with reduction of SUVmax from 23.4 to 4.7. There was completion resolution of all other FDG avid foci seen in the baseline scan. The patient completed 6 months course of ATT and is currently symptom free under follow-up.

DISCUSSION

Abdominal TB commonly affects the intestinal tract, lymph nodes, peritoneum and solid organs. Isolated pancreatic TB is rare and preoperative diagnosis is difficult.[1] The pancreas is relatively resistant to mycobacterial invasion, requiring a large intrapancreatic inoculum of *Mycobacterium tuberculosis* to cause pancreatic lesions. The two postulated routes of spread are directly from involved peripancreatic lymph nodes and more rarely from hematogenous spread. In our patient, the disease in the peripancreatic nodes might have contiguously spread to the pancreatic head, which is sometimes difficult to distinguish radiologically. Common clinical manifestations include abdominal pain and anorexia with weight loss.[2] It may also present with features of EHBO.[3] Radiographically, complex cystic lesions are reported more frequently than solid masses. Findings that may suggest mycobacterial infection include the presence of rim-enhanced lymph nodes in the peripancreatic region or the mesentery, ascites, and a thickened bowel wall in the ileo-cecal region.[4] As the clinical and radiographic presentation mimics pancreatic cancer, preoperative diagnosis of pancreatic TB is rare.

Endoscopic ultrasonography guided-FNA has emerged as a safe and promising method for the diagnosis of peripancreatic TB. Song *et al.* in their study reported 76.2% sensitivity for EUS-FNA in the diagnosis of pancreatic/peripancreatic TB.[5] Usually, the amount of sample acquired by EUS-FNA is small and could lead to an inconclusive cytological result. FDG PET can help in locating a specific region for aspiration, potentially increasing the yield from this invasive procedure. Sanabe *et al.* have demonstrated FDG uptake in pancreatic TB.[6] While our patient showed features of EHBO, the radiological findings were not diagnostic for any specific pathology. However, EUS-FNA confirmed the diagnosis of pancreatic TB, avoiding unnecessary surgery for EHBO.

The duration of ATT is variable in extrapulmonary TB.[7] Clinical and radiological information are used as tools for monitoring treatment. During ATT, some bacillus-negative tuberculomas do not decrease in size or may continue to grow, making it difficult for physicians to decide on alternate treatment regimens. Park *et al.*[8] have showed that FDG PET/CT imaging can be useful in this situation. If the SUV increases, it is likely that the tuberculoma is active and treatment needs to be prolonged or the patient switched to other drugs. A decrease in SUV would indicate a tuberculoma responsive to ATT and that current treatment should be continued according to the standard protocol.

In an experimental study, serial pulmonary FDG PET was compared with standard microbiological methods to monitor the response to treatment in mice infected with *M. tuberculosis* aerosol.[9] FDG PET correctly identified the bactericidal activity of the drug regimens. Imaging was available in real time, as opposed to having colony-forming unit counts 4 weeks later; and could also detect relapse in a time frame similar to that of the standard method. The significant reduction of SUVmax in our patient after 3 months of ATT provided objective evidence of response to the ongoing treatment protocol. Patients with HIV have a higher incidence of extrapulmonary TB and in many cases are multi-drug resistant. FDG PET/CT can be used as an ideal treatment-monitoring tool in these patients.

CONCLUSION

We suggest that FDG-PET/CT may provide an important noninvasive means of evaluating therapeutic response in patients with peripancreatic TB.

REFERENCES

1. Tan KK, Chen K, Liau KH, Ho CK. Pancreatic tuberculosis mimicking pancreatic carcinoma: Series of three cases. Eur J Gastroenterol Hepatol 2009;21:1317-9.
2. Xia F, Poon RT, Wang SG, Bie P, Huang XQ, Dong JH. Tuberculosis of pancreas and peripancreatic lymph nodes in immunocompetent patients: Experience from China. World J Gastroenterol 2003;9:1361-4.
3. Pandya G, Dixit R, Shelat V, Dixit K, Shah N, Shah K. Obstructive jaundice: A manifestation of pancreatic tuberculosis. J Indian Med Assoc 2007;105:133-4,136.
4. Pombo F, Díaz Candamio MJ, Rodriguez E, Pombo S. Pancreatic tuberculosis: CT findings. Abdom Imaging 1998;23:394-7.
5. Song TJ, Lee SS, Park do H, Lee TY, Lee SO, Seo DW, *et al.* Yield of EUS-guided FNA on the diagnosis of pancreatic/peripancreatic tuberculosis. Gastrointest Endosc 2009;69:484-91.
6. Sanabe N, Ikematsu Y, Nishiwaki Y, Kida H, Murohisa G, Ozawa T, *et al.* Pancreatic tuberculosis. J Hepatobiliary Pancreat Surg 2002;9:515-8.
7. Lee HS, Oh JY, Lee JH, Yoo CG, Lee CT, Kim YW, *et al.* Response of pulmonary tuberculomas to anti-tuberculous treatment. Eur Respir J 2004;23:452-5.
8. Park IN, Ryu JS, Shim TS. Evaluation of therapeutic response of tuberculoma using F-18 FDG positron emission tomography. Clin Nucl Med 2008;33:1-3.
9. Davis SL, Nuermberger EL, Um PK, Vidal C, Jedynak B, Pomper MG, *et al.* Noninvasive pulmonary [18F]-2-fluoro-deoxy-D-glucose positron emission tomography correlates with bactericidal activity of tuberculosis drug treatment. Antimicrob Agents Chemother 2009;53:4879-84.

How to cite this article: Santhosh S, Bhattacharya A, Rana SS, Bhasin DK, Srinivasan R, Mittal BR. Pancreatic tuberculosis: Evaluation of therapeutic response using F-18 fluoro-2-deoxy-D-glucose positron emission tomography/computed tomography. Indian J Nucl Med 2014;29:257-9.

Source of Support: Nil. **Conflict of Interest:** None declared.