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Biliary Fascioliasis Mimicking Focal Cholangiocarcinoma on PET/CT

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Fascioliasis is a zoonotic infection caused by a trematode of the liver, *fasciola hepatica*. The infection cycle begins in the human when aquatic vegetation or contaminated water is ingested. The clinical manifestrations can mimic most other obstructive, inflammatory, or neoplastic hepatobiliary disease. We present the case of a patient with high SUV (standardized uptake variable) at the common hepatic duct hilum area on 15F-FDG PET/CT (positron emission tomography and computed tomography). The lesion was interpreted as a hypermetabolic malignancy such as focal cholangiocarcinoma. The final diagnosis was reached by endoscopic removal of the *Fasciola hepatica*.

key words: fascioliasis, liver fluke, cholangiocarcinoma, PET/CT, ERCP

INTRODUCTION

Fascioliasis is a zoonotic disease caused by *Fasciola hepatica*, a liver fluke, which more commonly affects sheep and cattle. A number of human cases were reported throughout the worldwide. The geographical pattern of fascioliasis is not uniform. The rural areas of South America are the most heavily affected region.[1] Human are affected only occasionally by ingestion water and water vegetables that contain the larvae. When eating infected material, infective metacercariae excyst in the duodenum and larvae emerge. The larvae penetrate the wall of the small intestine into the peritoneal cavity, then penetrate the liver capsule and pass through the liver tissue and into the biliary tract. The disease occurs in two phases: the young fluke penetrate the liver (acute or hepatic phase) and migrates from venous radicals into the biliary tree (chronic or biliary phase). We report a case of asymptomatic fascioliasis of the chronic biliary phase, which was interpreted as a hypermetabolic malignancy such as focal cholangicarcinoma on ^{15}F-FDG PET/CT.

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CASE REPORT

A 49-year-old man was referred to our department because of an abnormal a ^{15}F-FDG PET/CT showing a

probable cholangiocarcinoma. He had recently attended a general health examination center and underwent a whole body screen ^{15}F-FDG PET/CT study. Past medical history was positive for diabetes of 1 year duration. He was born in an urban area and lived the last 10 years in Deajeon, Korea. He denied ingestion of raw freshwater vegetables or any animal's raw liver. And he had not re-sided or traveled in proximity to sheep and cattle. He had no other symptoms, such as nausea, vomiting, abdominal pain, fever, chill or jaundice. Laboratory investigations demonstrated a normal white blood cell count without eosinophilia {WBC 6,200/uL (neutrophils 48.6%, lymphocytes 44.0%, eosinophils 2.6%, basophils 0.3%), hemoglobin 12.5 g/dL, platelets 232,000/uL) and liver function tests (total bilirubin 0.4 mg/dL, AST 25 IU/L, ALT 14 IU/L, alkaline phosphatase 59 IU/L), amylase 63 U/L, total cholesterol 194 mg/dl, and triglycerides 129 mg/d. Tumor markers, carcinogen embryonic antigen (CEA) and carbohydrate antigen 19-9 (CA 19-9) levels were within normal limits {CA 19-9 10.7 U/ml (normal 0 - 37 U/L), CEA 2.1 ng/ml (normal 0 - 3.0 ng/ml)}. Fecal examination for parasite eggs or worms was negative. An abdominal ultrasonography (US) showed normal diameter bile ducts with normal liver, gallbladder, and pancreas. ^{15}F-FDG PET/CT localized the area of increased ^{15}F-FDG uptake at the common hepatic duct portion. Maximum standard uptake values (mSUV) was measured as 3.98 metabolic activities and appeared to be intraluminal and not extend extraluminally (Fig. 1). The patient was referred with a suspected diagnosis of

Fig. 2. ERCP showed a movable, radiolucent elliptical filling defect with ductal irregularity at the confluence level of intrahepatic bile ducts (black arrow).

focal biliary cholangiocarcinoma. An endoscopic retrograde cholangiopanctreatography (ERCP) was performed, which showed movable filling defect of elliptical shape with ductal irregularity in the confluence level of intrahepatic bile ducts (Fig. 2). Sphincterotomy and balloon retrieval resulted in removal of leaf-like, flat, worm-like structures from the biliary tract, which were later identified macroscopically as *Fasciola hepatica* (Fig. 3). After retrieval of the parasites, no filling defects were seen on final cholangiogram. Triclabendazole, 10mg/kg, two times a day for 2 days was prescribed. The patient was discharged without any complications and

has remained asymptomatic for 12 months. Follow up ^{15}F-FDG PET/CT scan has not been done and the patient showed normal laboratory findings (white blood cell

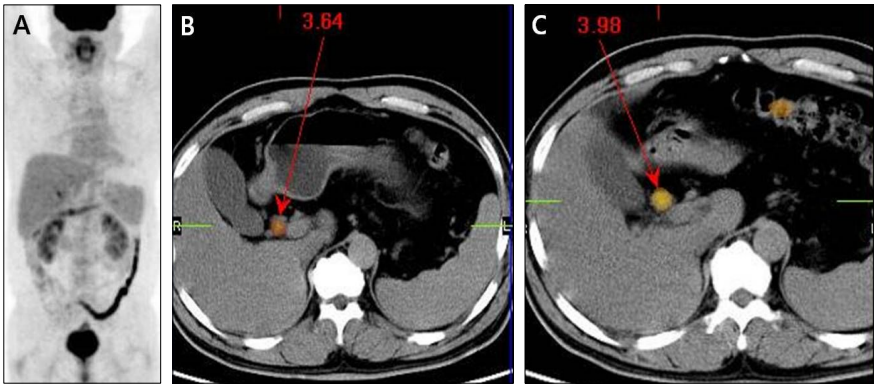

Fig. 1.
A) MIP (Maximum intensity projection) PET image shows focal hypermetabolic lesion in the CBD region (black arrow).
B) PET/CT showed the area of increased FDG uptake (Max SUV 3.64) in the middle of CBD.
C) 1 hour delayed image, max SUV was increased as 3.98.

counts, liver function tests, tumor markers and fecal examinations for parasites) and abdominal US findings on follow up health examination after 1 year.

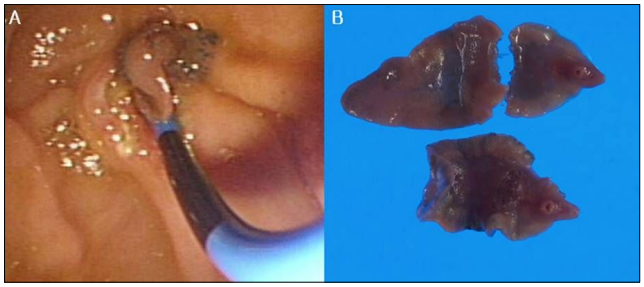

Fig. 3.
A) A sphincterotomy and balloon retrieval result in removal of leaf-like, flat, worm-like structure from the biliary tree. B) Organisms were later identified macroscopically as Fasciolahepatica.

DISCUSSION

Adult large flukes of Fascioliasis are leak-like, flat worms; measuring approximately 2.0 to 4.0 cm long and 1 to 1.5 cm wide. Fascioliasis has been reported in more than 60 countries throughout the world across Africa, America, Asia and Europe. The rural area of the Andean Region of Peru and Bolivia, South America are the most heavily affected region with prevalence rates between 6 and 68%.[1] Humans are accidental hosts and most commonly and classically acquired infection by eating watercress or contaminated unboiled water containing encysted larva in sheep raising areas. When eating infected material, infective metacercariae excyst in the duodenum and larvae emerge. The larvae penetrate the wall of the small intestine into the peritoneal cavity and then penetrate the Glisson's capsule and entering the liver parenchyma. In the liver, the flukes slowly migrate randomly trough the hepatic parenchyma making multiple small holes and cavities, until they reach the larger bile duct and penetrate into the lumen, which is their permanent residence.[2, 3]

The clinical picture usually reflects the worm burden, phase and the duration of infection. In approximately 50% of infected humans, the presentation can be subclinical.[3] Typical symptoms can be divided by phase of the disease: acute or liver phase, the chronic or biliary phase. The first acute or liver phase last from 3 - 5 months and is caused by the migration of immature larvae from duodenum to the liver. Symptoms include prolonged fever, hepatomegaly causing abdominal pain and mild eosinophilia. Other manifestations are anorexia, weight loss, nausea, vomiting, cough, diarrhea, urticaria, lymphadenopathies and arthralgia.[4] The chronic or biliary phase begins after approximately 6 months, when the parasite matures in the bile ducts. It may last several years (>10 years) and is asymptomatic more than half of the cases. When symptoms appear, these reflect commonly biliary obstruction with upper abdominal pain, intermittent jaundice and extrahepatic cholestasis.[1, 3]

Diagnosis can be made by finding characteristic ova in feces, duodenal aspirates, or bile specimens. The diagnosis may also be made during surgery or endoscopy for biliary obstruction when adult flukes are found in the biliary tree. Specific serologic tests, like enzyme-linked immunosorbent assay (ELISA), complement fixation, and immunofluorescence have high sensitivity and specificity, as dose direct indentification of parasite ova in feces or in bile.[1, 3] Our patient did not perform specific serologic tests for parasites, like ELISA, because we could not suspect the parasites infection. He had been asymptomatic and showed normal laboratory findings. He was referred to our department to further evaluate the suspected cholangiocarcinoma on screening ^{15}F-FDG PET/CT. Before ERCP, we did not consider possibility of parasites infection.

Image findings in the hepatic phase typically shows multiple, small clustered, necrotic cavities or abscesses in the peripheral part of the liver, showing "tunnels and caves" sign, reflecting parasite migration in the liver parenchyma. In the biliary phase, the fluke are demonstrated in the intra and extrahepatic bile duct and the gallbladder as small intraluminal flat objects, sometimes moving spontaneously. Adult flukes are visualized

as a single or multiple, elongated filamentous, echogenic lesions on sonograms, or as filling defects on cholangiogram. Due to chronic inflammation, the wall of the extrahepatic bile duct and gallbladder are usually thickened adjacent to the parasite.[2] ERCP are more useful in biliary stage of infection, and may show mobile flukes in the bile ducts and gallbladder, often associated with stones.[5]

Triclabendazole is the treatment of choice for both phases of fascioliasis.[1,3] The most frequent adverse event is biliary colic caused by the passage of dead or dying parasites passing through the bile ducts. The chronic, biliary phase is managed by endoscopic mechanical clearance of the bile ducts because of the risk of biliary obstruction caused by dead flukes due to the drug therapy, while acute, liver phase can be treated adequately by drug only. In biliary obstruction due to fascioliasis, ERCP and sphincterotomy has been used successfully and safely to extract parasites from the biliary tree by balloon or basket.[5,6] Follow-up after therapy should optimally include monitoring for the disappearance of eosinophilia, stools for ova, and a decrease in serology titers. Resolution of biliary tract findings on ultrasound after therapy may also be helpful.[7]

Infection with liver fluke has been reported to be associated with bile duct malignancy. A large body of evidence indicates that *Opisthorchis viverrini* is a definite cause of human cholangiocarcinoma whereas *Clonorchiasis sinensis* is a probable cause. Chronic inflammatory changes and adenomatous hyperplasia of the biliary epithelium in patients with these infections may transform into dysplasia and cholangiocarcinoma.[1,2] Fascioliasis has a strong association with liver fibrosis. In addition, hepatic cirrhosis has been reported in infected children and adults, especially those with high-density infections.[1] No report has shown an association between fascioliasis and cholangiocarcinoma.

Inflammatory and infectious processes are frequently noted to have increased glucose metabolism and as a result cause false-positive interpretation of FDG-PET images when they are acquired for the evaluation of patients with various malignancies.[8] In this case, the inflammation due to parasite was the cause which is mimicking focal cholangiocarcinoma on PET/CT. Other investigators have suggested that ^{15}F-FDG PET/CT is a sensitive and specific adjunct method to diagnose *Echinococcus multilocalis* liver lesions. Increased FDG uptake in PET imaging possibly reflects viability of parasite.[9,10]

In our case, viable *fasciola hepatica* within the bile duct caused localize FDG uptake similar to be seen that in cholangiocarcinoma on screening ^{15}F-FDG PET/CT. We endoscopically removed the living *fasciola hepatica*. After retrieval of the parasites, no filling defects or irregular duct shape were seen on final cholangiogram. These were the cause that we did not do biopsy or cytology. And we treated the patient with triclabendazole after effective ERCP and sphincterotomy. After 12months, follow up ^{15}F-FDG PET/CT scan has not been done. But the patient showed normal abdominal US findings and laboratory findings (white blood cell counts, liver function tests, tumor markers and fecal examinations for parasites). Those are reasons to think that the patient is cured.

Summary

Fascioliasis is a zoonotic infection caused by a trematode of the liver, *fasciola hepatica*. We present the case of a patient with high ^{15}F-FDG uptake at the common hepatic duct hilum area on ^{15}F-FDG PET/CT. The lesion was interpreted as a hypermetabolic malignancy such as focal cholangiocarcinoma. The final diagnosis was reached by endoscopic removal of the *Fasciola hepatica*. The authors report a case of biliary fascioliasis with a review of literature.

Conflict of Interest

The authors have no financial conflict of interest.

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