THE ROLE OF ^{99M}TECHNETIUM (Tc) DIETHYL - IMINODIACETIC ACID (EHIDA) HEPATOBILIARY SCINTIGRAPHY IN THE DIAGNOSIS OF A RARE CAUSE OF OBSTRUCTIVE JAUNDICE

F M Lai, M Paramsothy, J George, C H Yip

ABSTRACT

This paper illustrates the role of 99m-Technetium(Tc) diethyl-iminodiacetic acid (EHIDA) hepatobiliary scintigraphy in a patient who developed obstructive jaundice as a result of afferent loop syndrome, which is a rare occurrence. The computed tomographic (CT) and ultrasonographic findings are also described.

Keywords: *afferent loop syndrome, jaundice, 99m-Tc EHIDA hepatobiliary scintigraphy*

SINGAPORE MED J 1996; Vol 37: 261-263

INTRODUCTION

Obstructive jaundice is a rare presentation of afferent loop syndrome which itself is an uncommon complication of subtotal gastrectomy with gastrojejunostomy. Prompt recognition of this condition is important as perforation of the obstructed loop may occur[1]. The characteristic anatomical configuration of the dilated loop is used in both sonography and computed tomography to diagnose this syndrome. By demonstrating the morphology and functional appearance of the biliary tract and the afferent loop, ^{99m}Tc diethyl-IDA hepatobiliary scintigraphy was able to show that the jaundice was secondary to the obstructed afferent loop.

CASE REPORT

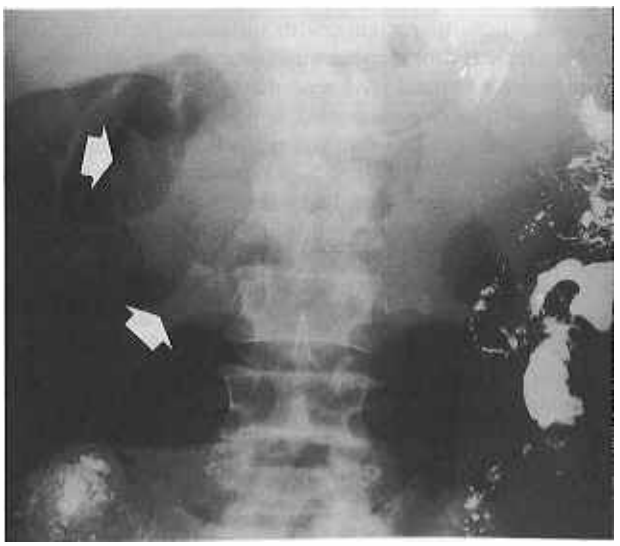
A 63-year-old man presented to the Casualty Department with a complaint of colicky abdominal pain for two days, which was aggravated by eating. He had not been able to take much solid food in the preceding 2 weeks.

He gave a history of having had an operation for carcinoma of the stomach in a private hospital three months earlier. According to the medical report made available at a later date, there was a large mass in the distal half of the stomach with adhesion to the transverse colon and pancreas. Enlarged lymph nodes were found in the greater and lesser omenta. A high gastrectomy with gastro-jejunostomy was performed. He developed post-operative haemorrhage and required a repeat laparotomy on the same night to secure haemostasis. The histopathological examination of the surgical specimen revealed poorly differentiated adenocarcinoma of the stomach with infiltration in the muscular and part of the serosal layer. The surgical margin was free of tumour. No metastasis to the perigastric lymph nodes was noted. He was subsequently discharged and was relatively well until two weeks prior to this admission.

On examination, his vital signs were stable. He was afebrile and not icteric. There was generalised tenderness over his abdomen but no mass was felt. The bowel sounds were present and normal. A nasogastric tube was inserted and what was thought to be faeculent material was aspirated. An oesophago-gastroscopy was performed which revealed oesophagitis. No tumour recurrence within the remnant stomach or at the anastomotic site was noted.

The plain abdominal radiograph showed an upper abdominal soft tissue mass displacing the bowel inferiorly. A barium meal and follow-through done showed free passage of barium from the remnant of stomach into the efferent loop. More distally, the small bowel appeared to be displaced inferiorly and to the left by a soft tissue density mass as shown on the plain radiography (Fig 1). The afferent (duodenal) loop was not visualised.

Fig 1 – Barium follow-through study showing the small bowel being displaced to the left and inferiorly by a central soft tissue mass (arrows) in the upper abdomen.



Division of Nuclear Medicine
Department of Medicine
University Hospital Kuala Lumpur
59100 Kuala Lumpur
Malaysia

F M Lai, MBBS
Medical Officer

M Paramsothy, MBBS, FRCP (Lond), AM
Professor

Department of Radiology
University Hospital Kuala Lumpur

J George, MBBS, FRCS
Lecturer

Department of Surgery
University Hospital Kuala Lumpur

C H Yip, MBBS, FRCR
Associate Professor

Correspondence to: Prof M Paramsothy

About 1 week following admission, he developed jaundice associated with abdominal pain. The total serum bilirubin level was 97 μmol/L (normal < 17 μmol/L) with conjugated bilirubin of 45 mmol/L. A computer tomography (CT) of the abdomen was done to investigate the cause of the jaundice. The CT images were degraded by the artifacts caused by the dense barium from the previous follow-through study. A moderately enlarged liver with dilatation of both intra- and extra- hepatic biliary ducts were noted. No focal intrahepatic lesions were seen. The gallbladder was distended. Fluid-filled dilated loops of bowel were noted in the upper abdomen. Initially, this did not appear to be of much importance. However on closer scrutiny, this loop of bowel appeared to be U-shaped, crossed the midline and situated posterior to the superior mesenteric vessels (Fig 2). These findings were suggestive of a dilated duodenal loop. To confirm our suspicion that this was the cause of his jaundice, a ^{99m}technetium(Tc) diethyl-iminodiacetic (EHIDA) radionuclide scan was done. There was marked delay in the emptying of the radionuclide into the dilated biliary tree. The 24-hour post injection image showed subsequent emptying of the radiopharmaceutical from the biliary system into a dilated duodenal loop. A filling defect which was suspected to be a mass present in the distal portion of this loop. Radionuclide activity was seen in the rest of the small bowel which indicated that the obstruction was incomplete. The gallbladder was grossly distended (Fig 3).

This dilated duodenal loop was also seen on abdominal ultrasound as a large U-shaped fluid-filled tubular mass situated between the gallbladder and the head of pancreas. It extended across the midline and was situated posterior to the superior mesenteric vessels. Echogenic sludge was seen floating in it. No gas echo was seen within it. Dilated intra- and extrahepatic ducts were also noted.

Surgical intervention to relieve the obstructed bowel was done. Intraoperatively, a tumour mass was noted in the upper abdomen near the previous gastro-jejuno anastomosis, within the afferent (duodenal) loop, which was why it was not noted on endoscopy. The afferent loop of small bowel was grossly dilated with bile and sludge proximal to this tumour mass. The gallbladder was distended with thickened wall. The surface of the liver was found to be nodular.

Fig 2 – Axial CT section showing a dilated third part of the duodenum (A) between the aorta and the superior mesenteric vessels (arrow). Streaky artifacts due to the residual dense barium in the small bowel are seen.

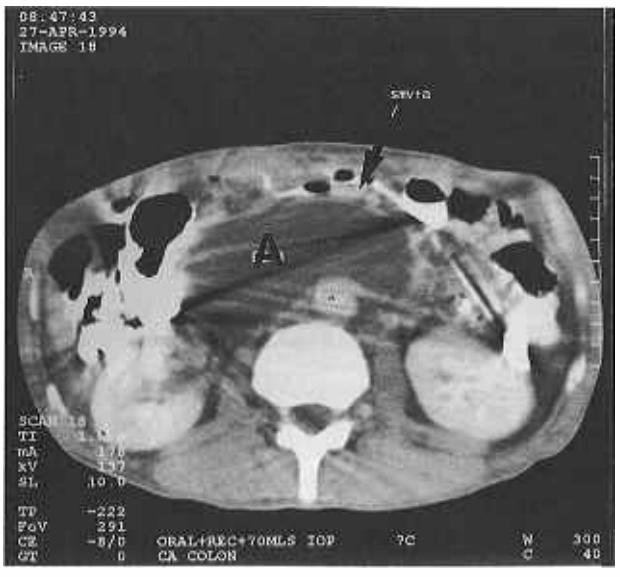
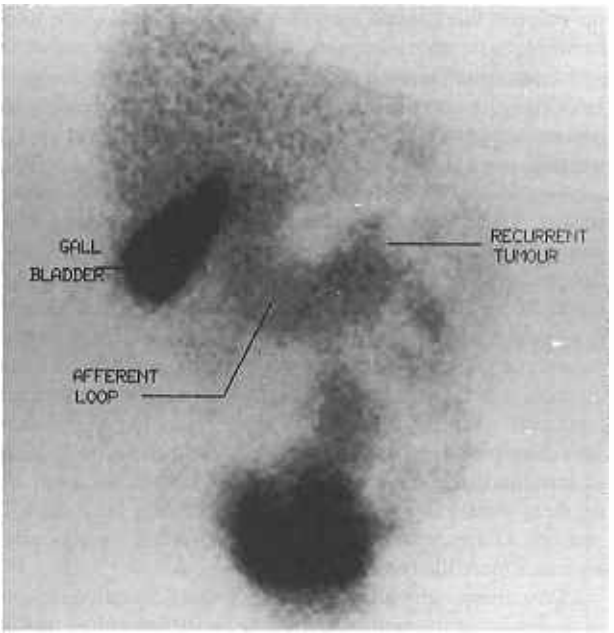


Fig 3 – Anterior planar images of the ^{99m}Tc EHIDA scan at 24-hour post injection. A dilated afferent (duodenal) loop is shown, with a filling defect in the distal portion caused by the tumour mass. A distended gallbladder is seen on the right of the afferent loop.



A cholecysto-enteric and two entero-enteric bypass were performed in an attempt to decompress the system. He improved slightly following surgery and was able to tolerate oral fluids. He was sent on home leave but came back prematurely within a week due to deterioration in his condition and expired a few days later.

DISCUSSION

Afferent loop syndrome is caused by obstruction of the duodenum and jejunum at any site proximal to the gastrojejunal anastomosis[1,2]. This may develop from a variety of causes which include internal hernia, adhesions, kinking, intussusception, marginal ulcer, stomal stenosis and tumour recurrence[1-4]. The clinical symptomatology has been generally divided into acute and chronic forms. The acute form usually occurs in the immediate post-operative period and is characterised by sudden upper abdominal pain, vomiting and rapid clinical deterioration. The chronic form presents with early postprandial distress which is relieved after an hour or two by vomiting copious bilious material. Our patient however presented with an uncommon third form which is characterised by progressive, insidious obstruction with signs of obstructive jaundice[5]. Only 4 patients who developed obstructive jaundice as a result of afferent loop obstruction had been reported[5-8] in the literature. All the 4 cases, like this patient, were associated with gastric cancer. The jaundice developed secondary to the markedly increased intraluminal pressure in the obstructed loop which is transmitted back into the biliary tracts[3,4]. The gallbladder may also be distended in the process.

Plain abdominal radiograph is often not helpful in the diagnosis as the afferent loop is fluid-filled and gasless[1,9]. An upper gastrointestional barium series may exclude an obstruction if the afferent loop is filled with barium. Although non-filling of the afferent loops is the typical finding, this is not diagnostic as even in the best hands, only 20% of the normal afferent loop will be filled. As such, no firm conclusion can be drawn if this occurs[2,10].

The dilated afferent loops is most often seen as a tubular or U-shaped fluid-filled structure on ultrasound. This structure is situated in the upper abdomen crossing transversely over the midline[1,9]. Multi layered intestinal wall and mucosal folds may be recognised[3,9]. Mapping of the structure on the patient's skin had been advocated by a previous author[10], to help determine the shape of this unusual mass. The typical position of the loop between the superior mesenteric vessels and the abdominal aorta or inferior vena cava will confirm that this is a dilated duodenal loop[3,9]. Furthermore, sonography may also show the disease process causing the obstruction as well as dilatation of the biliary tracts[3].

On CT, two fluid-filled masses can be detected in the upper section. These become continuous inferiorly, suggesting a U-shaped mass ie lying along the normal course of the duodenum[4,11,12]. The superior mesenteric vessel are easily identified on CT and the anterior displacement of these vessels is a useful finding to differentiate the dilated duodenum from a pancreatic pseudocyst. However, a rare pseudocyst of the uncinate process may protrude slightly between the abdominal aorta and the superior mesenteric vessels[22], and may be mistaken for a dilated duodenal loop. In addition, since there is equalisation of intraluminal pressure throughout the obstructed loop, all segment should have nearly equal diameter on the axial CT sections. Other cystic masses such as pancreatic pseudocysts, are much more likely to vary in size[4].

Concurrent intra- and extrahepatic biliary dilatation as well as distension of the gallbladder can be easily recognised on CT sections.

The vast majority of obstructive jaundice developing in patients who had gastrectomy for gastric cancer are due to recurrent tumour in the head of pancreas or in the hepatoduodenal ligament lymph nodes[7]. To confirm that the obstructive jaundice is caused by the obstructed afferent loop, CT cholangiography (following intravenous injection of Biligrafin)[11] and percutaneous transhepatic cholangiography (PTC)[8] had previously been used. Both will show the continuity of the dilated afferent loop with the biliary system. In this patient, a hepatobiliary scintigraphy with ^{99m}Tc EHIDA was done as it is a much safer, non-invasive and simpler alternative to intravenous cholangiography, which carries a significant mortality risk of 1 in 5,000, and to PTC which is an invasive procedure and has a morbidity of approximately 5% and mortality of 0.1%. The ^{99m}Tc EHIDA is excreted into the biliary tree and subsequently into the afferent (duodenal) loop. In a normal study, activity should be seen in the duodenum and jejunum within 20 to 60 minutes. When the afferent loop is obstructed, there will be a delay in the passage of the radiopharmaceutical[13]. This scan may assist in determining the severity and possibly the site of the obstruction.

An important point to note is that a normal endoscopic examination, as was in this patient, does not exclude a diagnosis of afferent loop syndrome. Similar observation had been noted in one previous report[10]. The afferent loop may be anastomosed at an acute angle and is therefore difficult to access by endoscopy.

In conclusion, afferent loop syndrome should be considered in patients who develop jaundice following subtotal gastrectomy with gastrojejunostomy. The characteristic anatomical configuration of the U-shaped fluid-filled structure should be carefully traced on U/S or CT to identify the dilated loop. The ^{99m}TC EHIDA hepatobiliary scintigraphy should then be the modality of choice to confirm that this is indeed the cause of the jaundice. It will also be useful in differentiating the dilated duodenal loop from the rare pseudocyst of the uncinate process as the latter will not take up the EHIDA.

References

1. Lee DH, Lim JH, Ko YT. Afferent loop syndrome: sonographic findings in seven cases. Am J Roentgenol 1991; 157: 41-3.
2. Diba AA, Grossman ET, Dolan EP. Afferent loop syndrome: a different picture. Am J Gastroenterol 1976; 66: 72-5.
3. Derchi LE, Bazzocchi M, Brovero PL. Sonographic diagnosis of obstructed afferent loop. Gastrointest Radiol 1992; 17: 105-7.
4. Gale ME, Gerzof SG, Kiser LC, Snider JM, Stavis DM, Larsen CR, et al. CT appearance of afferent loop obstruction. Am J Roentgenol 1982; 138: 1085-8.
5. Warrier RK, Stienheber FU. Afferent loop obstruction presenting as obstructive jaundice. Dig Dis Sci 1979; 24: 74-6.
6. Morita S, Takemura T, Matsumoto S. Septic shock after percutaneous drainage of obstructed afferent loop: case report. Cardiovasc Intervent Radiol 1989; 12: 66-8.
7. Locke GR, Alexander GL, Sarr MG. Obstructive jaundice: an unusual presentation of afferent loop obstruction. Am J Gastroenterol 1994; 89: 942-4.
8. Phillips PH. Obstructive jaundice secondary to afferent loop obstruction. Australas Radiol 1982; 26: 141-3.
9. Matsusue S, Kashhihara S, Takeda H, Koizumi S. Three cases of afferent loop obstruction - the role of ultrasonography in the diagnosis. Jpn J Surg 1988; 18: 709-13.
10. Berger LA. Chronic afferent loop obstruction diagnosed by ultrasound. Br J Radiol 1980; 53: 810-2.
11. Kuwabara Y, Nishitani H, Numaguchi Y, Kamoi I, Matsuura K, Saito S. Case report: afferent loop syndrome. J Comput Assist Tomogr 1980; 4: 687-9.
12. Peretz G, Simmon KC. A case of afferent loop syndrome. Australas Radiol 1983; 27: 22-4.
13. Rao K, Gooneratne N, Asokan S, Davis T, Nitekman M. Afferent loop obstruction documented with hepatobiliary imaging. Gastrointest Radiol 1983; 8: 345-7.