

CASE REPORT

Rupture of a Spontaneous Aortoduodenal Fistula Visualized with Tc-RBC Scintigraphy

Chi-Kwan Yen, Myron Pollycove, Howard Parker, and Gail Nalls

University of California School of Medicine, and San Francisco General Hospital Medical Center, San Francisco, California

We present what we believe is the first reported case of a spontaneous aortoduodenal fistula, with massive rupture into the duodenum during the performance of a radionuclide study of gastrointestinal bleeding. Our experience suggests that nuclear scintigraphy with labeled red blood cells can help in the diagnosis of this disorder by demonstrating both the presence of an abdominal aortic aneurysm and bleeding in the gut.

J Nucl Med 24: 332-333, 1983

Aortoduodenal fistula now occurs most commonly as a complication of prosthetic grafting of the aorta. However, spontaneous aortoduodenal fistula can occur, usually as a complication of arteriosclerosis of the aorta, often with aneurysm formation. Frequently the presenting complaint is recurrent gastrointestinal bleeding. We report the first case of spontaneous aortoduodenal fistula, with massive rupture into the duodenum during the performance of a radionuclide study of gastrointestinal bleeding.

CASE REPORT

The patient was a 76-yr-old man with a history of prostatic carcinoma, initially diagnosed in May, 1981. Ultrasonic examination at that time revealed an abdominal aortic aneurysm, measuring approximately 3.5 × 3.5 cm. Surgery was recommended but the patient refused. Subsequently he received radiation therapy for the prostatic carcinoma. Following a 6-wk course of radiation therapy, the patient was admitted to San Francisco General Hospital on December 1, 1981 with a history of bright-red blood per rectum for 1 day. The hematocrit on admission was 28% compared with 45% five months previously. The bleeding stopped spontaneously and the patient was given two units of blood. Sonography was repeated and the abdominal aortic aneurysm now measured approximately 3.5-4 cm in diameter. The patient continued to refuse surgery for his aneurysm and was discharged on December 7, 1981 in stable condition. He was readmitted on December 28 for recurrent intermittent bleeding per rectum. This time his hematocrit was 20%. Sigmoidoscopy and barium enema were both negative. Endoscopy showed a 0.5 cm prepyloric ulcer

on the anterior wall and hyperemia in the region of the duodenal bulb. No active bleeding site was seen. He was treated with cimetidine and antacids. His condition was stable until January 5, when bleeding recurred, requiring multiple transfusions. Repeat endoscopy revealed a mild distal antritis with a 0.4-cm prepyloric erosion and no active bleeding.

The patient was then referred to the Nuclear Medicine Department for a gastrointestinal bleeding study in an attempt to locate the bleeding site. In vivo RBC labeling technique was used (1). Injection of stannous pyrophosphate was followed in 30 min by intravenous injection of 20 mCi of sodium pertechnetate (Tc-99m). Images were taken at 1-min intervals for the first 30 min after injection, then at 5-min intervals for the next 30 min, but they revealed no evidence of GI bleeding. An abdominal aortic aneurysm was clearly seen, located just cephalad of the iliac bifurcation (Fig. 1). A subsequent image taken at 90 min showed a dramatic change: the stomach, duodenum, and multiple segments of the remaining small bowel were clearly outlined by radiotracer (Fig. 2). The patient's condition then deteriorated rapidly, leading to profound hypotension and cardiac arrest. Cardiopulmonary resuscitation was performed and the patient was taken immediately to the operating room. At operation, massive inflammation was seen surrounding the aortic aneurysm, extending into the region of the duodenum. The aneurysm had ruptured into the third portion of the duodenum, with blood distending the lumen of the stomach and duodenum. During placement of an aortic tube graft, the patient had a cardiac arrest, and resuscitation failed.

DISCUSSION

Spontaneous aortoenteric fistula occurs rarely, one autopsy series reporting an incidence of 7 per 10,000 (2). The most common site of fistula formation is between aorta and duodenum,

Received Oct. 12, 1982; revision accepted Nov. 19, 1982.

For reprints contact: Chi-Kwan Yen, MD, Dept. of Nucl. Med., San Francisco General Hospital Med. Ctr., San Francisco, CA 94110.

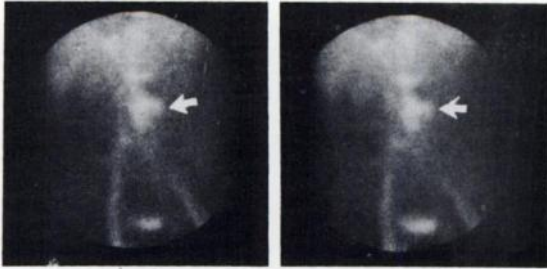


FIG. 1. Anterior abdominal images taken at 1 min (L) and 60 min (R) after injection. One-min image shows radiotracer in abdominal vasculature, liver, and bladder. An abdominal aortic aneurysm is clearly visualized (arrows), represented by irregular and relatively intense radiotracer activity located just cephalad of iliac bifurcation. Image taken at 60 min indicates essentially no change in radiotracer distribution.

occurring in about 80% of the reported cases (3). The most common cause is arteriosclerosis of the aorta with aneurysm formation (4), which occurs in 1% of all patients with abdominal aortic aneurysm (5). Other causes include aortic dissection, posttraumatic aneurysm, infective aneurysm (including syphilitic, tuberculous, and mycotic), pancreatic pseudocyst, and carcinoma of the pancreas (4,6). The exact mechanism of fistula formation is unknown. A possible mechanism is aortic inflammatory changes producing adhesions between the duodenum and the aorta (7,8). The duodenum is then eroded by the pulsations of the nearby aortic aneurysm. The third portion of the duodenum, due to its close proximity to the aorta and relative immobility, thus becomes the most likely site for fistula formation and subsequent rupture (4,7).

The clinical course of a patient with this disease is usually that of recurrent bleeding (4). An initial bleeding episode is usually followed by a latent period with stable clinical conditions. This latent period lasts more than 24 hr in 59% of the patients and less than 6 hr in only 20% (8). In the majority of reported cases, there is time after the initial presentation to arrange for surgical treatment. In our patient, after the initial bleeding there was a 3-wk latent period followed by multiple episodes of bleeding over a 7-day period before the final fulminating hemorrhage.

While most patients have sufficient time after onset of symptoms for surgical correction (the only successful treatment), the preoperative diagnosis of aortoduodenal fistula is difficult. Barium contrast studies of the enteric tract have been of little help in defining the fistula (3). Arteriography is helpful only during active hemorrhage (8). Endoscopy has been advocated, mainly in post-aortic-graft patients, as the procedure of choice (3), and has been reported to visualize prosthetic grafts that eroded into the duodenum (9). With spontaneous aortoduodenal fistula, however, the fistulous tract must be visualized, which is very difficult. The coexistence of upper GI bleeding with an aortic aneurysm in the region of the third portion of the duodenum is highly suggestive. In the present case, the abdominal aortic aneurysm was clearly visualized (Fig. 1). The subsequent bleeding seen with the Tc-labeled red blood cells was brisk, and a tentative diagnosis of aortoduodenal fistula was made even though the precise bleeding site was identified only in retrospect. This appears to be the first reported case of ruptured aortoduodenal fistula visualized with nuclear medicine technique.

Our experience therefore suggests that nuclear scintigraphy, using labeled red blood cells, can help in the diagnosis of this disorder. Of course other causes of GI bleeding may exist in a patient with an aortic aneurysm. Duodenal ulcers appear to occur more frequently in these patients (10), and undoubtedly are the cause



FIG. 2. Image at 90 min after injection. Camera position is more cephalad. Intense radiotracer accumulation is noted in duodenum and multiple loops of distal small bowel, as well as in distal portion of stomach. Due to intense radioactivity in small bowel, liver is seen only faintly.

of GI bleeding in many cases. In our patient, endoscopic finding of ulcer served to obscure the true cause of bleeding. Therefore, a high degree of suspicion is necessary. In a small percentage of patients with aortoduodenal fistula, the fistula may exist in the presence of a very small aortic aneurysm, or even with no aneurysm at all (1,4,7). Definitive diagnosis of a ruptured spontaneous aortoduodenal fistula in these patients remains very difficult.

REFERENCES

1. PAVEL DG, ZIMMER AM, PATTERSON VN: In vivo labeling of red blood cells with ^{99m}Tc : A new approach to blood pool visualization. *J Nucl Med* 18:305-308, 1977
2. FERGUSON MJ, ARDEN MJ: Gastrointestinal hemorrhage secondary to rupture of aorta. A review of four duodenal and three esophageal cases. *Arch Intern Med* 117:133-140 1966
3. GRAEBER GM, BREDEBERG CE, GREGG RO, PARKER F, WEBB W: Diagnosis and management of spontaneous aortoenteric fistulas. *Am J Surg* 136:269-272, 1978
4. EVANS DM, WEBSTER JH: Spontaneous aortoduodenal fistula. *Br J Surg* 159:368-372, 1972
5. FIELDING JW, BLACK J, ASHTON F, et al: Diagnosis and management of 528 abdominal aortic aneurysms. *Br Med J* 283:355-359, 1981
6. SINDELAR WF, MASON GR: Aortocystoduodenal fistula. Rare complication of pancreatic pseudocyst. *Arch Surg* 114:953-955, 1979
7. BHAGAVAN B, WEINBERG T: Delayed fatal exsanguination from aorticoduodenal fistula: Report of two cases. *Gastroenterology* 55:113-117, 1968
8. REINER M, BRAU S, SCHANZER H: Primary aortoduodenal fistula. *Am J Gastroenterol* 70:292-297, 1978
9. PUPPALA AR, MUNASWAMY M, DOSHI AM, and STEINHEBER FU: Endoscopic diagnosis of aortoduodenal fistula. Complication of abdominal aortic by-pass grafts. *Am J Gastroenterol* 73:414-417, 1980
10. JONES AW, KIRK RS, BLOOR K: The association between aneurysm of the abdominal aorta and peptic ulceration. *Gut* 11:679-684, 1970