Inferior Mesenteric Arteriovenous Fistula Eight Years after Sigmoidectomy


Abstract

We report a 69-year-old woman with liver cirrhosis due to chronic hepatitis C virus (HCV) infection in whom iatrogenic arteriovenous fistula (AVF) developed after sigmoidectomy. A soft mass with bruit led to the diagnosis of inferior mesenteric AVF. Most mesenteric AVF cases have portal hypertension, but this patients showed none of the usual symptoms of portal hypertension; however, she had a splenomegaly that became worse after sigmoidectomy. Clinicians should be aware of the possibility of AVF in patients with a history of abdominal surgery.

Key words: postoperative arteriovenous fistula, portal hypertension

Case Report

A 69-year-old woman with liver cirrhosis due to chronic hepatitis C virus (HCV) infection was admitted to our hospital in June 2000 for examination of a suspected hepatocellular carcinoma. Abdominal ultrasonography showed a space occupying lesion, but enhanced computed tomography (CT) denied the possibility of hepatocellular carcinoma or another cancer. Eight years previously, the patient had undergone a sigmoidectomy for sigmoid colon cancer. On physical examination, vascular spider was found on the anterior thorax and erythema palmaris on the bilateral palms. Abdominal examination revealed a soft, mobile mass with systolic-diastolic bruit in the left lower quadrant. The mass was egg-sized and had a palpable thrill. The patient had no symptoms, such as abdominal pain, related to the abdominal mass. Laboratory findings showed pancytopenia and liver dysfunction due to chronic HCV infection (Table 1). Upper gastrointestinal endoscopy revealed no esophageal or gastric varices. A barium enema (Fig. 1) showed a smooth surfaced, elevated mass close to the anastomosis at the sigmoidectomy. The mass appeared to be extra-luminal and was causing compression of the colon. Laboratory findings showed pancytopenia and liver dysfunction due to chronic HCV infection (Table 1). Upper gastrointestinal endoscopy revealed no esophageal or gastric varices. A barium enema (Fig. 1) showed a smooth surfaced, elevated mass close to the anastomosis at the sigmoidectomy. The mass appeared to be extra-luminal and was causing compression of the colon. We retrospectively checked a former barium enema and found that the size of the mass had obviously increased over the year from May 1999 to June 2000. Color doppler sonography (Fig. 2) showed that this mass was a vascular abnormality. Enhanced CT of the abdomen (Fig. 3) also revealed the mass to be a vascular abnormality. Magnetic resonance angiography (MRA) (Fig. 4) showed the inferior mesenteric vein and the artery emerging from the lesion. The mass seemed to be an AVF, and the location of the fistula was very close to the anastomosis of the inferior mesenteric AVF can occur after abdominal surgery, usually following colonic resection (6, 10, 13). We herein report our diagnosis and treatment of a patient who was asymptomatic and who developed inferior mesenteric AVF eight years after sigmoidectomy. This is the first report in Japan of postoperative inferior mesenteric AVF.

Introduction

In abdominal surgery, abdominal aortic aneurysm (AAA) remains a frequent emergency situation and must be treated as soon as possible. We recently encountered a case of abdominal arteriovenous fistula (AVF), which is very rare compared to AAA in abdominal vascular surgery. AVF is an abnormal direct communication between an artery and a vein, bypassing the capillary bed, and may be congenital or acquired. Congenital AVF is the result of persistent embryonic vessels that fail to differentiate into arteries and veins (1). Acquired AVF may be caused by procedures to provide vascular access for hemodialysis, may occur as a result of a penetrating injury such as a gunshot or knife wound (2), or may be a complication of arterial catheterization or surgical dissection (2–4).

Although around 200 cases of splanchnic AVF have been reported, mainly between the hepatic, splenic, and superior mesenteric vessels, only eleven cases of inferior mesenteric AVF have been reported in the literature (5–14). Iatrogenic in-
### Table 1. Blood Test Results

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<thead>
<tr>
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<tbody>
<tr>
<td>White blood cell count (μl)</td>
<td>4,280</td>
<td>2,460</td>
<td>2,450</td>
</tr>
<tr>
<td>Red blood cell count (x10³μl)</td>
<td>3.6</td>
<td>3.7</td>
<td>3.5</td>
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<tr>
<td>Hemoglobin (mg/dl)</td>
<td>11.7</td>
<td>11.8</td>
<td>10.2</td>
</tr>
<tr>
<td>Platelet count (x10⁴μl)</td>
<td>9.8</td>
<td>3.8</td>
<td>6.6</td>
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<tr>
<td>Prothrombin time (%)</td>
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<td>74</td>
<td>72</td>
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<tr>
<td>Total protein (g/dl)</td>
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<td>7.1</td>
<td>7.1</td>
</tr>
<tr>
<td>Albumin (g/dl)</td>
<td>4.1</td>
<td>3.9</td>
<td>4.1</td>
</tr>
<tr>
<td>Blood urea nitrogen (mg/dl)</td>
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<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Serum creatinine (mg/dl)</td>
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<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Total bilirubin (mg/dl)</td>
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<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Aspartate aminotransferase (U/l)</td>
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<td>59</td>
<td>0.5</td>
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<tr>
<td>Alanine aminotransferase (U/l)</td>
<td>57</td>
<td>61</td>
<td>69</td>
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<tr>
<td>Alkaline phosphatase (U/dl)</td>
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<td>240</td>
<td>50</td>
</tr>
<tr>
<td>γ-glutamyl transpeptidase (U/dl)</td>
<td>46</td>
<td>52</td>
<td>43</td>
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<tr>
<td>Cholinesterase (U/l)</td>
<td>114</td>
<td>108</td>
<td>106</td>
</tr>
</tbody>
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Figure 1. Barium enema. A was given in May 1999. The arrow indicates a smooth surfaced, elevated mass close to the anastomosis at the sigmoidectomy of 1992. The lesion appeared to be an extraluminal mass causing compression of the colon. B was given in June 2000. The arrow indicates the same mass as Fig. 1A, but the size of the mass had obviously increased over the year.
a sigmoidectomy that had been done eight years before. Because we thought the fistula was connected directly to the colon, percutaneous endovascular embolization would involve the risk of colon ischemia, so we decided on surgery for this case.

Figure 2. Color doppler sonography showed the lesion to be a vascular abnormality.

Figure 3. Enhanced computed tomography of the abdomen. A) CT in May 1999, indicated the mass to be a vascular abnormality. B) CT in May 2000, revealed the size of the mass to have increased over the year.

Figure 4. Magnetic resonance angiography revealed the mass to be an arteriovenous fistula (AVF) (broad arrow). The inferior mesenteric vein (double arrow) and the inferior mesenteric artery (narrow arrow) were shown emerging from the lesion.
Over eight years after sigmoidectomy, hepatic synthetic markers such as serum total protein, cholinesterase and albumin levels showed little change, but the platelet count had decreased from $9.8 \times 10^4$ to $3.8 \times 10^4$ and the spleen size index by abdominal ultrasonography (15) had enlarged from $52 \text{ cm}^2$ to $84 \text{ cm}^2$.

On September 29, 2000 the patient underwent laparotomy. The fistula was located at the previous bowel anastomosis. After the mesocolon was ligated and divided, the sigmoid colon with the mass was divided with a linear-cutter and end-to-end anastomosis was performed. The freshly resected specimens revealed the fistula to be a 4.5 cm soft tumor without erosions or ulcers on the mucosa. Pathological findings (Fig. 5A, B) of the resected specimens showed dilated veins formed by a thickened wall with sparse elastic fiber, compatible with AVF. The postoperative course was uneventful, and abdominal CT taken almost one year after the surgery showed the fistula to have completely disappeared. The patient is being followed as an outpatient and remained asymptomatic as of November 2001.

**Discussion**

AVF involving the inferior mesenteric vessels is rare. To our knowledge, only eleven cases have been reported in the literature (5–14) (Table 2). Of these, four cases were of congenital origin, and the other seven appeared as late postoperative complications of colonic resections, as in the present case. Mesenteric AVF is usually diagnosed within days or weeks of the initial injury, although delays in diagnosis of up to twenty years have been reported (12). Although eight years had passed, the fistula of the present case was located very near the anastomosis and there was no medical history of abdominal injury, therefore our case was probably related to the sigmoidectomy. It seemed reasonable to assume that the fistula originated from a transfixion suture that passed through the artery and vein.

A unique feature of AVF involving portal circulation is the tendency to produce portal hypertension. Portal hypertension may result from increased vascular resistance or increased blood flow (11). In a review by Van Way et al (5), 26 of 61 patients with AVF involving portal circulation had either signs or symptoms of portal hypertension or had measured elevation of portal venous pressure. The leading cause of death in their series of patients was bleeding varices. There was no relation between various fistula sites and the presence or absence of portal hypertension. Schilling et al (16, 17) studied portal AVF in a canine model and noted short-term (18 months) survival without sequelae. However, on follow-up 5 years later, arterIALIZation of the portal vein wall, fatty infiltration of the liver, hepatic fibrosis, and terminal liver failure were evident. Adamsons et al (18) experimentally arterialized the portal vein in conjunction with portacaval shunting and noted that arterIALIZation of the portal vein caused sclerosis of the portal venous radicles, which increased resistance to portal venous inflow; the induced fibrosis may have perpetuated portal hypertension even when portal flow had been restored to normal. These studies suggest
that AVF can produce irreversible changes in the liver.

In the present case, the patient reported none of the usual symptoms, such as abdominal pain, ascites, or bleeding esophageal varices, but she had moderate splenomegaly. The splenomegaly was thought to be caused by both the chronic HCV infection and the inferior mesenteric AVF. Hepatic synthetic markers such as serum total protein, cholinesterase and albumin levels did not change over eight years after sigmoidectomy, but portal hypertension markers, such as platelet count and splenic sequestration markedly worsened during the observation. Therefore, portal hypertension due to AVF might have influenced the state of the disease of our patient.

Donell and Hudson (19) classified AVF into two types; U type (end-to-end) and H type (side-to-side). The therapy of choice is surgical correction of the AVF with or without associated bowel resection. Another choice is percutaneous endovascular embolization of the feeding artery (10). Of concern is whether or not the embolization may occlude an important source of blood supply to the gut. In our case, because the fistula was the U type and connected directly to the colon, percutaneous endovascular embolization was thought to include the risk of colon ischemia, so we decided on surgery.

Inferior mesenteric AVF is uncommon, easily overlooked, and can develop many years after bowel resection, in this case 8 years. It should be suspected in any patient with a history of abdominal surgery before the development of complications.

References


