

Inferior mesenteric arteriovenous fistula with ischemic colitis: Multidetector computed tomographic angiography for diagnosis

İskemik kolitin eşlik ettiği inferior mezenterik arteriyovenöz fistülün tanısında multidetektör bilgisayarlı tomografik anjiyografi

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Inferior mesenteric arteriovenous fistula is rare and may be congenital or acquired. Two serious manifestations may occur in the course of the disease: portal hypertension and bowel ischemia. The diagnosis is generally established by conventional angiography. In this report, we present a case with multiple inferior mesenteric arteriovenous fistulas, considered idiopathic due to no known cause related to the etiology, and associated ischemic colitis, which were clearly demonstrated by multidetector computed tomographic angiography. We also review the available literature.

Nadir görülen inferior mesenterik arteriyovenöz fistül, konjenital ya da edinsel olabilir. Hastalığın seyrinde portal hipertansiyon ve barsak iskemisi gibi iki ciddi klinik tablo görülebilir. Tanı genellikle konvansiyonel anjiyografi ile konulur. Biz bu raporda, iskemik kolitin eşlik ettiği, etyolojisi ile ilişkili bilinen bir neden olmadığı için idiyopatik olarak kabul edilen ve multidetektör bilgisayarlı tomografik anjiyografi ile açıkça ortaya konan, multipl inferior mezenterik arteriyovenöz fistüllü bir olguyu sunduk ve mevcut literatürü gözden geçirdik.

Key words: Inferior mesenteric artery, arteriovenous mesenteric fistula, arteriovenous malformation, ischemic colitis, MDCT, angiography

Anahtar kelimeler: Inferior mezenterik arter, arteriyovenöz mezenterik fistül, arteriyovenöz malformasyon, iskemik kolit, MDBT, anjiyografi

INTRODUCTION

Arteriovenous fistula (AVF) is an abnormal direct communication between an artery and a vein, bypassing the capillary bed, and may be acquired or congenital. Acquired AVFs are uncommon sequelae of a penetrating injury such as a gunshot or knife wound, rupture of a preexisting aneurysm into the nearby vein, or a complication of arterial catheterization or surgical procedures (1). Iatrogenic inferior mesenteric AVF can occur after abdominal surgery, usually following colonic resection. The history of trauma or bowel surgery may be recent or distant, ranging from hours to decades (2-8). Congenital AVF is the result of persistent embryonic vessels that fail to differentiate into arteries and veins. Splanchnic fistulas are mostly single; multiple fistulas are generally regarded as congenital (1). Congenital splanchnic fistulas represent approximately 25% of previously reported cases (3, 6).

Although about 200 cases of splanchnic AVFs have been reported, mainly between the hepatic, splenic, and superior mesenteric vessels, to our knowledge, only 14 cases of inferior mesenteric AVFs have been reported in the literature (1-13). The diagnosis is generally established by angiography.

Multidetector computed tomographic (MDCT) angiography has emerged as an essential imaging technique in the evaluation of the mesenteric vasculature because of its low cost, and because it is noninvasive and safe, fast, and informative, as it permits small peripheral branches to be assessed reliably due to its high spatial resolution. The diagnosis of AVF involving splanchnic vessels can easily be made with MDCT angiography, which is also useful as an anatomic reference because of its three-dimensional capabilities (14-16).

In this report, we present a case with multiple inferior mesenteric AVFs, considered idiopathic due to no known reason related to the etiology, and associated ischemic colitis, which were clearly demonstrated by MDCT angiography. We also review the available literature.

CASE REPORT

An 83-year-old male with abdominal pain and bloody diarrhea during the previous two months was admitted to our hospital. He had no history of trauma or abdominal surgery. His blood pressure was 110/80 mmHg and pulse rate 80 beats/min. Abdominal examination revealed systolic-diastolic bruit in the left lower quadrant. There was no clinical evidence of portal hypertension. Laboratory findings showed anemia. Upper gastrointestinal endoscopy revealed no esophageal or gastric varices. Endoscopic examination of the sigmoid and left colon disclosed a diffusely congestive and edematous mucosa with multiple small ulcerations disseminated in necrotic or hemorrhagic areas. MDCT angiography was performed with suspicion of mesenteric ischemia.

MDCT angiography was performed using a 16-row multislice CT (Lightspeed Ultra, General Electrical Medical Systems; Milwaukee, WI, USA). The patient was examined while supine and all images were acquired during a single breathhold, extending from the diaphragm to the groin. Imaging parameters were as follows: 16x1.25 mm collimation, 120 kV, 400 mA, table feed 11.2 mm/sec, and gantry rotation 500 msec. After determining the contrast agent transit time using the smart prep bolus technique, we acquired image data during an intravenous injection of 120 ml of iodinated contrast agent (Iodixanol, Visipaque 320 mgI/ml, GE Healthcare; Milwaukee, WI, USA) at a rate of 4 ml/sec. The venous phase images were acquired after a 70-sec delay. For three-dimensional image reconstruction, the raw CT data were processed on a separate workstation (Advanced Workstation 4.2, GE Healthcare; Milwaukee, WI, USA). MDCT angiography demonstrated multiple fistulous communications between the inferior mesenteric artery branches and inferior mesenteric vein tributaries in the arterial phase. Dilated feeding arteries and densely opacified early draining ectatic veins were clearly shown in MDCT (Figure 1). Additionally, MDCT revealed wall thickening with irregular luminal narrowing, intramural air inclusion and hypoperfusion of the descending and sig-

moid colon in the venous phase (Figure 2). There was no imaging evidence of portal hypertension.

Diagnosis of multiple inferior mesenteric AVFs associated with ischemic colitis was established, and surgical correction of the fistulas and left colectomy were performed. Multiple arteriovenous

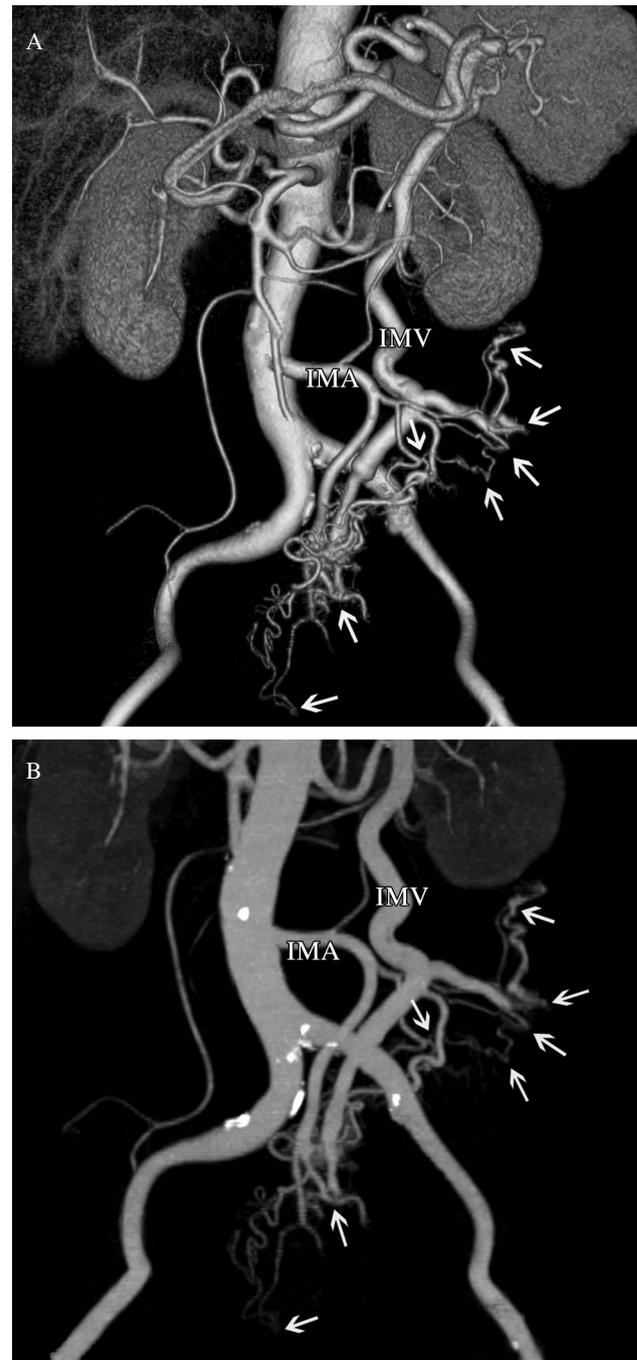


Figure 1. Volume rendering (A) and maximum intensity projection (B) images show multiple fistulous communications (arrows) between the inferior mesenteric artery (IMA) branches and inferior mesenteric vein (IMV) tributaries in the arterial phase.

communications on the serosal surface and mesocolon of the descending and sigmoid colon were found during surgery. Large feeding arteries and drainage veins were clearly apparent, especially in major lesions. The pathologic examination of the surgical specimen showed multiple AVFs and characteristic features of severe ischemic colitis.

DISCUSSION

Splanchnic AVFs can have variable locations. Most develop in the celiac artery or its branches, notably the hepatic (45%) or the splenic (30%) artery. The superior mesenteric, gastroduodenal and inferior mesenteric arteries are involved in decreasing order of frequency (1, 3, 6). AVF involving the inferior mesenteric vessels is uncommon. To our knowledge, only 14 cases of inferior mesenteric AVFs have been published (1-13). Of these, six cases were probably of congenital origin (1, 9-13), and the other eight cases appeared as late postoperative complications of colonic resection (2-8).

The main clinical signs, as in other vascular sites, were abdominal pain (1-5), mass (6, 7, 9, 10), or bruit (9). Some patients are asymptomatic, the diagnosis being suggested by the finding of an abdominal bruit. Two serious manifestations might occur in the course of splanchnic AVF -- portal hypertension and bowel ischemia. Symptoms caused by mesenteric AVF may include nonspecific abdominal pain, ascites, and bleeding esophageal varices due to portal hypertension, abdominal angina, diarrhea, malabsorption, and lower gastrointestinal hemorrhage due to bowel ischemia (1, 4).

Portal hypertension is present in approximately 50% of patients with splanchnic AVF (4). It may

result from increased vascular resistance or increased blood flow (11). Portal hypertension is found more frequently in hepatico-portal or splenic fistulas (6). Among the inferior mesenteric AVFs published to date, 9 of 14 patients had either signs or symptoms of portal hypertension (1, 3, 5-8, 11-13). The portal pressure was generally lowered following correction of the fistula.

Bowel ischemia constitutes the second possible complication in splanchnic fistulas. Among the inferior mesenteric AVFs published to date, 4 of 14 patients had either signs or symptoms of bowel ischemia (2, 4, 6, 8). In our patient, the colonic mucosal abnormalities revealed in colonoscopy and pathology were suggestive of ischemic injury. Thus, inferior mesenteric AVF may be considered as a new factor predisposing to non-occlusive ischemic colitis (4, 6, 17).

Arteriovenous fistula of the intestine is an uncommon cause of gastrointestinal hemorrhage. Gastrointestinal hemorrhage can originate from several sites. In Pietri et al.'s (6) series, the sources of bleeding were esophageal or cardiac varices secondary to portal hypertension, massive hematochezia due to rupture of cecal AVF, hemobilia secondary to hepatic biopsy, and bloody diarrhea secondary to colonic ischemia. Hemorrhage due to an AVF may be caused by either vascular engorgement or ulceration of the bowel (5).

Recently, MDCT angiography has become a useful tool in the evaluation of the mesenteric vasculature. It enables the visualization of normal vascular anatomy and its variants as well as the assessment of pathologic conditions. MDCT angiography is an excellent noninvasive screening technique for patients suspected of having mesenteric ischemia of all causes, and it obviates conventional angiography. It can provide reliable diagnostic information in mesenteric ischemia due to its higher spatial resolution and faster acquisition times, allowing assessment of the peripheral visceral branches (14-16). Although axial images may be diagnostic for evaluation of the mesenteric ischemia, multiplanar- and three-dimensional volume-rendered images afford excellent anatomic localization and enhance the diagnostic value of computed tomography.

The therapeutic modality of choice is surgical correction of the inferior mesenteric AVF with or without associated bowel resection. Percutaneous endovascular embolization of the feeding artery is being advocated with increasing frequency as an



Figure 1. Axial-oblique image shows wall thickening with irregular luminal narrowing, intramural air inclusion (arrow) and hypoperfusion of the sigmoid colon (SC) in the venous phase.

alternative to surgery (4, 6, 8). Arterial embolization can not be performed when the fistula is developed in a large vessel due to the risk of extensive arterial thrombosis and the ischemia that may result. When the flow rate of the fistula is high, and its diameter greater than 8 mm, metallic coil embolization may be dangerous because of the risk of migration into the portal venous system (18). In cases of congenital or multiple iatrogenic AVFs, embolization may be difficult, as it will be efficient only if all active as well as quiescent shunts are closed (6). In our patient with multiple AVFs associated with severe colonic ischemia, surgical correction of the AVF with bowel resection was required to prevent progression to infarction, necrosis and perforation.

The differential diagnosis of AVFs, especially the small peripheral lesions, includes angiodysplasias in older patients. Angiodysplasia is a disease of the elderly that predominates in the right colon.

At angiography, a large lesion with dilated feeding arteries and ectatic as well as rapidly draining veins are all in keeping with an AVF (11). At pathologic examination, peripheral AVFs of the bowel are characterized by thick-walled blood vessels that extend through the mucosa and submucosa into the muscle. Conversely, angiodysplasia is characterized by thin or normal-sized blood vessels that proliferate in the submucosa. Unlike angiodysplasia, which may be subtle on pathologic examination, AVFs represent substantial lesions that may actually distort adjacent tissues (19, 20).

In conclusion, we present a case of bowel ischemia resulting from multiple inferior mesenteric AVFs, which was easily and consistently demonstrated with MDCT angiography. We suggest MDCT angiography be considered as the primary study in the setting of suspected mesenteric ischemia. Conventional angiography can be considered for evaluation of possible intervention.

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