



Portal hypertension caused by postoperative superior mesenteric arteriovenous fistula

Portna hipertenzija prouzrokovana gornjom mezenteričnom arteriovenskom fistulom

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Abstract

Introduction. Arteriovenous fistula of the superior mesenteric blood vessels is a rare complication in abdominal surgery. **Case report.** We presented a 49-year-old man with cramp-like abdominal pain, abdominal distension and weight loss symptoms, with a history of previous small bowel resection and right colectomy, due to Crohn disease, 16 years ago. Clinical examination revealed a paraumbilical pulsation with systolic murmur and thrill. Ultrasonography and computed tomography revealed cystic dilatation of the superior mesenteric vein, hepatomegaly and ascites. Upper endoscopy revealed grade I esophageal varices with portal hypertensive gastropathy. The diagnosis of arteriovenous fistula between superior mesenteric artery and vein was confirmed by angiogram of the superior mesenteric vessels and resection of the fistula was performed. Control examination after nine months showed no signs of portal hypertension. **Conclusion.** Early diagnosis and treatment of mesenteric blood vessel arteriovenous fistula prevents portal hypertension development and its complications.

Key words:

arteriovenous fistula; mesenteric arteries; mesenteric veins; diagnosis; surgical procedures, operative; prognosis; hypertension, portal.

Apstrakt

Uvod. Razvoj arteriovenske fistule mezenteričnih krvnih sudova je retka komplikacija abdominalnih hirurških intervencija. **Prikaz bolesnika.** Bolesnik, star 49 godina, primljen je u našu ustanovu zbog bolova u trbuhu, nadimanja i gubitka telesne mase. Bolesnik je 16 godina ranije imao resekciju tankog creva i desnu hemikolektomiju zbog Kronove bolesti. Fizičkim pregledom u trbuhu, paraumbilikalno otkrivena je pulsirajuća rezistencija sa čujnim sistolnim šumom. Ultrasonografijom i kompjuterizovanom tomografijom otkriveni su aneurizmatična dilatacija gornje mezenterične vene, hepatomegalija i ascites. Endoskopskim pregledom viđeni su variksi jednjaka I stepena i hipertenzivna portna gastropatija. Angiografskim pregledom verifikovana je arteriovenska fistula između gornje mezenterične arterije i vene, te je sprovedena resekcija fistule. Na kontrolnom pregledu nakon devet meseci, bolesnik nije imao znakove portne hipertenzije. **Zaključak.** Ranim otkrivanjem i lečenjem arteriovenskih fistula mezenteričnih krvnih sudova sprečava se razvoj portne hipertenzije i njenih komplikacija.

Ključne reči:

arteriovenska fistula; aa. mesentericae; vv. mesentericae; dijagnoza; hirurgija, operativne procedure; prognoza; hipertenzija, portalna.

Introduction

Arteriovenous fistula (AVF) affecting superior mesenteric vessels are uncommon, and have usually been observed in patients who have undergone abdominal surgery or have abdominal trauma¹⁻⁷. Due to localisation in the portal circulation, it increases blood flow in the portal vein and may produce portal hypertension with its complications. We presented a patient with superior mesenteric AVF, which devel-

oped 16 years after small bowel resection and right colectomy.

Case report

A 49-year-old-male patient was admitted to our hospital due to cramp-like abdominal pain, abdominal distension, malaise, fatigue and weight loss of 8 kg for one month. Symptoms appeared one month before admission. Sixteen

years ago, the patient had small bowel resection and right colectomy for ileus caused by ileitis terminalis (Morbus Crohn). He had no complains until the present illness. At physical examination, the patients was subicteric. Abdominal examination revealed a soft, mobile, pulsating mass in the paraumbilical region. The abdominal, systolic murmur was heard and thrill was palpated. Laboratory tests showed elevated leucocyte count $12 \times 10^9/L$ ($4.0-10.0 \times 10^9/L$), erythrocyte sedimentation rate 32 mm/h ($2-10$ mm/h), fibrinogen 7.9 g/L ($2-4$ g/L), total bilirubin 28.7 $\mu\text{mol/L}$ ($3-22$ $\mu\text{mol/L}$), conjugated bilirubin 15.5 $\mu\text{mol/L}$ ($0-7$ $\mu\text{mol/L}$), aspartate aminotransferase 155 U/L ($14-50$ U/L), alanine aminotransferase 477 U/L ($21-72$ U/L), alkaline phosphatase 310 U/L ($38-126$ U/L) and gamma-glutamyl transpeptidase 287 U/L ($8-78$ U/L). Other biochemical parameters were within the reference range. Other causes of liver diseases were excluded (no history of alcohol consumption, negative viral markers, autoantibodies and laboratory tests for metabolic diseases). Ultrasonography and computed tomography (CT) of the abdomen showed hepatomegaly, ascites around the liver and a small polyp in the gallbladder. The superior mesenteric vein (VMS) was dilated, aneurismatic ($8 \times 5 \times 12$ cm) (Figure 1). Doppler ultrasonography revealed dilatation

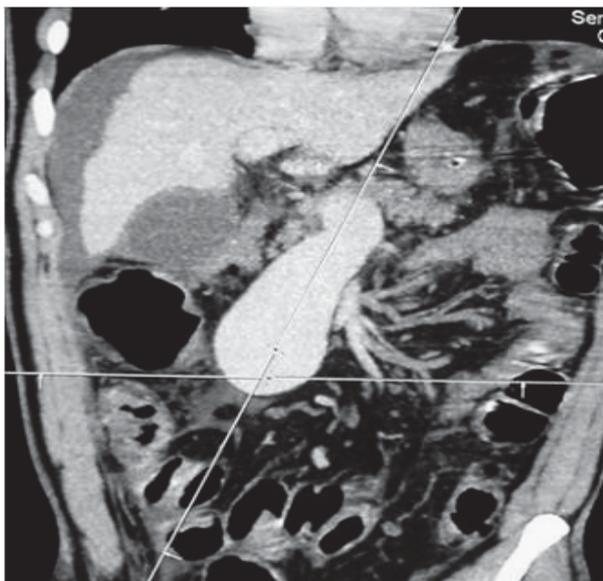


Fig. 1 – Computed tomography showed dilatation of the superior mesenteric vein

of portal vein (28 mm) with hyperkinetic flow ($v = 31$ cm/s). The lienal vein was considered normal, as well as diameter and its flow. Upper endoscopy revealed grade I esophageal varices without „red cherry spots“. Portal hypertensive gastropathy also often described as snake-skin appearance was detected in the fornix and corpus of the stomach. Colonoscopy did not detect recidive of Crohn's disease. Selective arteriography of the superior mesenteric artery (AMS) demonstrated dilatation of AMS, aneurismatic dilatation of VMS and its early filling directly from the AMS (Figure 2). Midline laparotomy was performed. Fistulous communication between the AMS and VMS was demonstrated (Figure 3). An AVF had a thick wall and external appearance of the

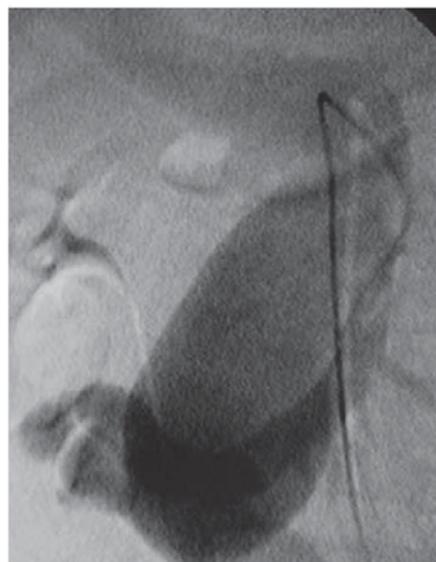


Fig. 2 – Selective arteriography of superior mesenteric artery (AMS) demonstrated dilatation of AMS and aneurismatic dilatation of the superior mesenteric vein

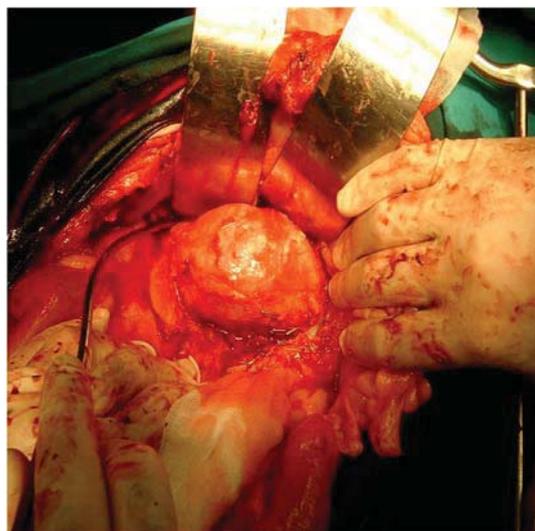


Fig. 3 – A fistulous communication between the superior mesenteric artery and vein after midline laparotomy and its release

large artery and vein. After occlusion of the AMS and VMS proximally and distally, transverse incision was made into the artery aspect of the AVF. Communication between AMS and VMS, was about 15 mm in diameter. After closure of the AVF with continuous suture, partial resection of arteriovenous aneurysm has been performed followed by venous closure. After release of clamps, the veins in the mesentery of the small bowel decreased in size. The postoperative course was uneventful. The patient was discharged on the 10th postoperative day. On control examination after nine months the patient had no complains. He gained 13 kg weight, biochemical parameters were within the reference range. Doppler ultrasonography and upper endoscopy were without sign of portal hypertension.

Discussion

Portal hypertension is characterized by an increase in portal vein pressure as a result of impediment to portal flow⁸. According to the level of impediment it may be prehepatic, intrahepatic and posthepatic. AVF is a pathological, direct communication between an artery and a vein, when blood bypasses a capillary bed. An AVF may be congenital or acquired: congenital one is a result of persistent embryonic blood vessels that fail to differentiate into arteries and veins⁹, while an acquired occurs as a consequence of surgery or injury⁹⁻¹². AVF of the superior mesenteric blood vessels is a rare complication of abdominal surgery. The first case was described in 1960 by Movitz and Finne¹³. Delays in diagnosis after surgery have been reported up to 20 years¹⁴. In case of our patient, the AVF became symptomatic 16 years after the surgery. Clinical presentation varies from asymptomatic to manifest, most commonly as cramping abdominal pain with or without diarrhea^{3, 7, 12, 15, 16}. Pain is a result of ischemic bowel, as blood is "stolen" by the portal system leaving the segment distal to the fistula with a compromised arterial circulation. Diarrhea is probably related to impaired perfusion of the mucosa¹⁷. Portal hypertension, congestive heart failure, or gastrointestinal tract hemorrhage have also been reported^{14, 15, 17-21}. In the presented patient, the first symptoms were abdominal distension and cramp-like abdominal pain, as a result of portal hypertension. Clinical examination is performed to detect paraumbilical pulsation and systolic murmurs with thrill, such was in our patient. Abdomi-

nal ultrasonography and CT indicate the presence of AVF between AMS and VMS, with portal dilatation vein^{3, 21}. However, selective arteriography AMS, allows the determination of exact location and extensiveness of AVF. In the presented patient, AVF was diagnosed by ultrasonography and CT of the abdomen, and the diagnosis was confirmed by selective arteriography of AMS. There are two modalities of the therapy: surgery and interventional radiology methods (percutaneous catheter embolisation)^{3-5, 7, 19, 20, 23, 24}. Surgery has traditionally been the method of choice for treating AVF involving superior mesenteric vessels, but significant morbidity and mortality associated with surgical treatment has made interventional radiology methods priority, except in patients with relative or absolute contraindications for surgery^{25, 26}. The presented patient had achieved complete recovery after operative treatment. Early diagnosis and treatment of mesenteric blood vessel AVF prevents the development of portal hypertension and liver damages with its sequelae of variceal bleeding and ascites²¹.

Conclusion

AVF of the superior mesenteric blood vessels is a rare complication of abdominal surgery. This disease should be kept in mind in patients who present with cramping abdominal pain, diarrhea and signs of portal hypertension, who in the past had abdominal surgery or trauma. Early diagnosis and treatment prevents the development of liver and heart damages, with all eventual complications.

R E F E R E N C E S

1. *Van Way CW 3rd, Crane JM, Riddell DH, Foster JH.* Arteriovenous fistula in the portal circulation. *Surgery* 1971; 70(6): 876-90.
2. *Yeo KK, Dawson DL, Brooks JL, Laird JR.* Percutaneous treatment of a large superior mesenteric artery pseudoaneurysm and arteriovenous fistula: a case report. *J Vasc Surg* 2008; 48(3): 730-4.
3. *Wu CG, Li YD, Li MH.* Post-traumatic superior mesenteric arteriovenous fistula: endovascular treatment with a covered stent. *J Vasc Surg* 2008; 47(3): 654-6.
4. *Chiriano J, Ternya TH, Zhang WW, Abou-Zamzam AM, Bianchi C.* Treatment of superior mesenteric artery portal vein fistula with balloon-expandable stent graft. *Ann Vasc Surg* 2009; 23(1): 99-102.
5. *Narayanan G, Mohin G, Barbery K, Lamus D, Nanavati K, Yrizarry JM.* Endovascular management of superior mesenteric artery pseudoaneurysm and fistula. *Cardiovasc Intervent Radiol* 2008; 31(6): 1239-43.
6. *Chiriano J, Abou-Zamzam AM Jr, Ternya TH, Ballard JL.* Delayed development of a traumatic superior mesenteric arteriovenous fistula following multiple gunshot wounds to the abdomen. *Ann Vasc Surg* 2005; 19(4): 470-3.
7. *Shintani T, Mitsuoka H, Masuda M.* Transcatheter coil embolization of an iatrogenic superior mesenteric arteriovenous fistula: report of a case. *Surg Today* 2011; 41(4): 556-9.
8. *Wongcharatrawee S, Groszmann RJ.* Diagnosing portal hypertension. *Baillieres Best Pract Res Clin Gastroenterol* 2000; 14(6): 881-94.
9. *Okada K, Furusyo N, Sawayama Y, Ishikawa N, Nabeshima S, Tsuchibashi T, et al.* Inferior mesenteric arteriovenous fistula eight years after sigmoidectomy. *Intern Med* 2002; 41(7): 543-8.
10. *Donell ST, Hudson MJ.* Iatrogenic superior mesenteric arteriovenous fistula. Report of a case and review of the literature. *J Vasc Surg* 1988; 8(3): 335-8.
11. *Salimov DR, Ignat'ev IM.* A case of successful surgical treatment of a patient with portal hypertension and ascites induced by a fistula between the superior mesenteric artery and the vein. *Angiol Sosud Khir* 2010; 16(2): 129-32. (Russian)
12. *Weinstein D, Altschuler A, Belinki A, Peer A, Gayer G, Halevy A, et al.* Superior mesenteric artery to superior mesenteric vein arteriovenous fistula presenting as abdominal pain and gastrointestinal bleeding 3 years after an abdominal gunshot wound: report of a case and review of the literature. *J Trauma* 2009; 66(1): E13-6.
13. *Movitz D, Finne B.* Postoperative arteriovenous aneurysm in mesentery after small bowel resection. *JAMA* 1960; 173(1): 42-4.
14. *Diehl JT, Beven EG.* Arteriovenous fistulas of the mesenteric vessels. Report of a case and review of the literature. *J Cardiovasc Surg (Torino)* 1982; 23(4): 334-7.
15. *Mick SL, Bush HL Jr, Barie PS.* Superior mesenteric arteriovenous fistula causing massive hematemesis. *Surgery* 2003; 134(1): 102-4.
16. *Michels G, Bovenschulte H, Libicher M, Nierhoff D, Töx U.* Nausea, diarrhea and paraumbilical flow murmur after ileum resection. Arteriovenous fistula of the superior mesenteric artery. *Dtsch Med Wochenschr* 2010; 135(5): 193-4. (German)

17. *Varner JE, Oliver RI.* Superior mesenteric arteriovenous fistula. *Ann Surg* 1969; 170(5): 862–5.
18. *von Kroge H, Bartscher U, Belz J, Eggers UP.* Arteriovenous fistula of the superior mesenteric artery after resection of the ileum. *Vasa* 1991; 20(2): 169–75. (German)
19. *Lau KY, Lo SW, Sy NL.* Emergency transcatheter embolisation of superior mesenteric arteriovenous fistula complicated by recurrent haematemesis. *Singapore Med J* 2009; 50(1): e12–5.
20. *Guzman EA, McCabill LE, Rogers FB.* Arteriportal fistulas: introduction of a novel classification with therapeutic implications. *J Gastrointest Surg* 2006; 10(4): 543–50.
21. *Kato S, Nakagawa T, Kobayashi H, Arai E.* Superior mesenteric arteriovenous fistula: report of a case and review of the literature. *Surg Today* 1993; 23(1): 73–7.
22. *Iwai M, Kashivadani M, Suyama Y, Miyoshi M, Kashima K.* Iatrogenic superior mesenteric arteriovenous fistula: ultrasonographic, CT and angiographic features and histological findings of the liver biopsy. *J Gastroenterol Hepatol* 1990; 5(5): 586–9.
23. *White RD, Ananthakrishnan G, Bhat R.* Arteriovenous fistula of a colic branch of the superior mesenteric artery: endovascular therapy. *Cardiovasc Intervent Radiol* 2010; 33(4): 866–9.
24. *Al-Khayat H, Haider HH, Al-Haddad A, Al-Khayat H, Ginzburg E.* Endovascular repair of traumatic superior mesenteric artery to splenic vein fistula. *Vasc Endovascular Surg* 2007; 41(6): 559–63.
25. *De Gregorio MA, Gimeno MJ, Medrano J, Schönholz C, Rodriguez J, D'Agostino H.* Ileocolic arteriovenous fistula with superior mesenteric vein aneurysm: endovascular treatment. *Cardiovasc Intervent Radiol* 2004; 27(5): 556–9.
26. *Yamagami T, Nakamura T, Nishimura T.* Portal hypertension secondary to spontaneous arterio-portal venous fistulas: transcatheter arterial embolization with n-butyl cyanoacrylate and microcoils. *Cardiovasc Intervent Radiol* 2000; 23(5): 400–2.

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