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Ischemic colitis after endovascular abdominal aneurysm repair in a patient with bilaterally patent internal iliac arteries: a case report

İnternal iliyak arterleri iki taraflı açık olan hastada endovasküler abdominal anevrizma tamiri sonrası iskemik kolit: Olgu sunumu

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ABSTRACT

Ischemic colitis is a well-known complication of endovascular abdominal aneurysm repair caused by the blockage of the inferior mesenteric artery and bilateral internal iliac arteries by a stent graft or thrombus. However, postoperative ischemic colitis is rarely seen in patients with bilaterally patent internal iliac arteries. A 72-year-old male patient with a 4.7 cm non-ruptured abdominal aortic aneurysm developed ischemic colitis following endovascular abdominal aneurysm repair, although internal iliac arteries and inferior mesenteric artery were patent. As the ischemic colitis was mild to moderate in severity, the patient was treated conservatively and uneventfully discharged.

Keywords: Abdominal aortic aneurysm; colitis; internal iliac artery; ischemia.

ÖZ

İskemik kolit, inferior mezenter arter ve iki taraflı internal iliyak arterlerin stent grefti veya trombüs ile tıkanması sonucu oluşan, endovasküler abdominal anevrizma tamirinin iyi bilinen bir komplikasyonudur. Ancak, ameliyat sonrası iskemik kolit, internal iliyak arterlerin iki taraflı açık olduğu hastalarda nadiren görülür. 4.7 cm boyutunda yırtılmamış abdominal aort anevrizması olan 72 yaşında erkek hastada, internal iliyak arterler ve inferior mezenter arter açık olmasına rağmen, endovasküler abdominal anevrizma tamiri sonrasında iskemik kolit gelişti. İskemik kolitin şiddeti hafif ila orta düzeyde olduğu için, hasta konservatif olarak tedavi edildi ve sorunsuz bir şekilde taburcu edildi.

Anahtar sözcükler: Abdominal aort anevrizması; kolit; internal iliyak arter; iskemi.

Ischemic colitis (IC) is a well-known complication of abdominal endovascular aneurysm repair (EVAR) of an abdominal aortic aneurysm (AAA) with an incidence of 1.2 to 2.9%.[1,2] In particular, it is thought to occur more frequently in patients in whom the inferior mesenteric artery (IMA) and bilateral internal iliac arteries (IIAs) are blocked by a stent graft or thrombus.[1,2] Ischemic colitis cases with bilaterally patent IIAs have been rarely reported following EVAR. Herein, we report a rare case of IC in the light of literature review.

CASE REPORT

A 72-year-old male patient with a complaint of abdominal discomfort was admitted with an infrarenal fusiform AAA with an eccentric irregular mural thrombosis. The size of the aneurysm on computed tomography angiography (CTA) increased from 4.0 to 4.7 cm over a six-month period. The patient underwent subtotal gastrectomy for gastric cancer and coronary artery bypass grafting before. The patient was slender with an easily palpable periumbilical pulsatile mass. His preoperative laboratory test results were within the

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normal range. The celiac trunk, superior mesenteric artery (SMA), IMA, and both IIAs were patent; however, collateral flow from the SMA to the IMA was not clearly seen in preoperative CTA (Figure 1a). In addition, CTA showed moderate atherosclerotic changes with calcifications and atheromas along the infrarenal aorta and both iliac arteries, while the middle colic artery remained intact.

A written informed consent was obtained from the patient. We performed an elective EVAR under general anesthesia. We administered intraoperative systemic heparinization and deployed stent grafts along the infrarenal abdominal aorta and both common iliac arteries, and preserved both IIAs. The respective sizes of the stent grafts were 28x13 mm and 16x13 mm (Endurant Stent Graft System, Medtronic Inc., Portsmouth, NH, USA). The duration of the EVAR procedure was 85 min. The patient's blood pressure was well-controlled, and no adverse events developed during the procedure. On postoperative Day 1, the patient suffered from abdominal pain and hematochezia. Sigmoidoscopy revealed a diffusely ischemic mucosal injury involving the watershed area of the sigmoid colon (Figure 1b). The findings were suggestive of IC, and the patient was treated with conservative management. Sigmoidoscopy

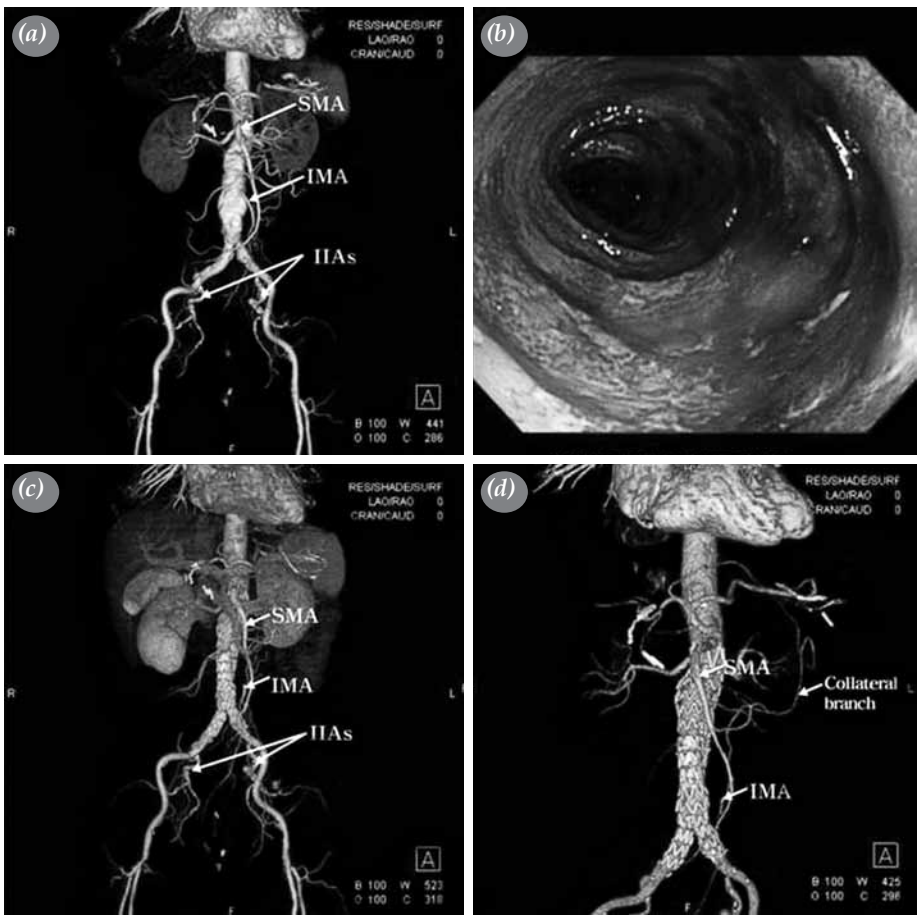

Figure 1. (a) A 4.7 cm fusiform abdominal aneurysm in the axial plane was seen in the superior mesenteric artery on preoperative computed tomography angiography. Both internal iliac arteries and the distal part of the inferior mesenteric artery were patent. **(b)** Sigmoidoscopic images of ischemic colitis on postoperative Day 1. A diffusely ischemic mucosal injury in the sigmoid colon was seen at 60 cm from the anal verge to 3 cm distally. **(c)** Follow-up computed tomography angiography on postoperative day 1. The superior mesenteric artery, both internal iliac arteries and the distal part of the inferior mesenteric artery were patent; however, the proximal part of the latter and collateral circulation were not detected. **(d)** Follow-up computed tomography angiography on postoperative Day 12. The collateral vessel from the superior mesenteric artery to the distal inferior mesenteric artery was able to be well-visualized.

Table 1. Published reports of ischemic colitis following endovascular abdominal aneurysm repair in patients with bilaterally patent internal iliac arteries

		Patency of preoperative IMA				Cause of IC		
Reference	Cases	Patent	Not patent	Colectomy	Conservative	Thromboembolism	Unknown	Mortality
Dadian et al.[1]	5	3	2	1	4	2*	3	1
Hinchliffe et al.[3]	1	1	0	1	0	1	0	1
Geraghty et al.[5]	3	0	3	3	0	3	0	2
Sfyroeras et al.[7] (using IBD)	1	1	0	0	1	0	1	0
Kim et al.[8]	1	1	0	1	0	0	1	0
Our case (2014)	1	1	0	0	1	0	1	0
Total	12	7	5	6	6	6	6	4

IMA: Inferior mesenteric artery; IC: Ischemic colitis; IBD: Iliac branch device; * One patient had widespread microembolization and the diagnosis was confirmed by the pathological examination in the other.

was repeated two days later to determine, if redo surgery was needed to resect the injured colon, and showed that the ischemic bowel appeared somewhat improved. Before discharge, CTA revealed patent SMA, bilateral IIAs, and distal IMA with occlusion of the IMA orifice by a thrombus (Figure 1c). The patient was discharged on postoperative Day 11. He was scheduled for CTA 10 days after discharge. Although collateral circulation between the SMA and IMA was not clearly apparent 10 days prior, the collateral vessel was able to be well-visualized (Figure 1d). We believe that the mild course of IC can be accounted for by the gradual development of good collateral circulation from the SMA to IMA.

DISCUSSION

Colonic ischemia is a well-known complication of EVAR, but rarely occurs in patients with bilaterally patent IIAs. Although occlusion of either the IMA or IIAs and related factors are thought to result in IC, the underlying pathophysiology still remains unknown. Multiple factors, including microthromboembolisms and hypotension during the procedure, are thought to be associated with the occurrence of IC after EVAR.[3] Becquemin et al.[4] reported that aortic rupture, operative time, and the presence of renal disease also increased the risk for IC. However, except for a few case reports, to the best of our knowledge, no publication on IC associated with bilaterally patent IIAs are available in the literature.

Review of the literature revealed five studies of IC related to the EVAR procedure.[1,3,5,7,8] A total of 12 patients with bilaterally patent IIAs developed IC after EVAR. Six patients (50%) were treated by colectomy and four patients died. The remaining

Table 2. Medical histories of all reported cases of ischemic colitis following endovascular abdominal aneurysm repair

Reference	n	History of abdominal surgery	MI	CVA	History of cardiac surgery
Dadian et al.[1]	5	1 Right hemicolectomy	0	0	0
Hinchliffe et al.[3]	1	1 Ilium resection	1	0	0
Geraghty et al.[5]	3	1 Colectomy	0	0	0
Sfyroeras et al.[7] (using IBD)	1	0	0	0	1 AVR
Kim et al.[8]	1	0	1	1	0
Our case (2014)	1	1 Gastrectomy	1	0	1 CABG
Total	12	4	3	1	2

MI: Myocardial infarction; CVA: Cerebrovascular accident; AVR: Aortic valve replacement; CABG: Coronary artery bypass grafting.

patients (50%) recovered with conservative treatment (Tables 1 and 2).

In 2001, Dadian et al.[1] reported that eight of 278 patients developed IC, and five patients had bilaterally patent IIAs. One patient underwent a colectomy and three patients improved with non-surgical management. Hinchliffe et al.[3] also reported a 73-year-old man who developed IC following EVAR. He recovered after colectomy. Histological examination confirmed arterial thrombosis and transmural colonic infarction. Geraghty et al.[5] reported four of 233 patients developed IC. Both IIAs were patent in three patients, and all were treated by colectomy. However, two patients died, and the postmortem diagnosis was atheroembolism.

Iliac branch devices (IBDs) have been used to preserve the IIA since the mid to late 2000s.[6] Sfyroeras et al.[7] reported a 69-year-old man with a 4 cm AAA and a 4 cm aneurysm of the right common iliac artery treated with a bifurcated endovascular graft and a right IBD. Angiography showed that branches of the IIA were patent following EVAR. However, the patient developed IC. He improved with antibiotics and conservative management. Kim et al.[8] reported a case of IC with bilaterally patent IIAs after EVAR. However, they only found transmural bowel infarction with no evidence of atheroembolism.

Most cases of severe IC that resulted in bowel resection were pathologically confirmed to be due to atheroembolism.[1,3,5] Although the underlying pathophysiology of IC is unknown, an atheroembolism after EVAR is thought to be the main cause.[9] In our case, we consider that occlusion of the ostium of the IMA by a thrombus plus an atheroembolism during the intervention played a major role in the development of IC. However, IC was not severe and improved with the development of good collateral circulation from the SMA to the IMA after EVAR.

Additionally, of the cases in Table 2, four patients (33%) underwent previous abdominal surgery and three (25%) had a history of myocardial infarction. Abdominal surgery could result in changes in the anatomy of the abdominal circulation, which might affect the collateral circulation after EVAR. Predisposing factors associated with atherosclerosis, such as coronary artery disease, might also increase the risk of thromboembolism during the intervention.

In conclusion, ischemic colitis following endovascular abdominal aneurysm repair is rare in patients with bilaterally patent internal iliac arteries; however, their clinical outcomes range from complete recovery to death. Although the mechanism of ischemic colitis following endovascular abdominal aneurysm repair still remains to be elucidated, several factors are associated with the onset of the condition.

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