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Mini-Laparotomy for Superior Mesenteric Artery Aneurysm Due to Takayasu's Arteritis

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Superior mesenteric artery aneurysm (SMAA) is reported to be the third-most common type of visceral aneurysm (VA), accounting for 5% of all VAs. The etiology of SMAA is commonly thought to be infection, and it usually exists in the proximal part of the superior mesenteric artery, which is suitable for endovascular treatment. We herein report an extremely rare case of the distal part of SMAA caused by Takayasu's arteritis (TA), which was successfully resected using a mini-laparotomy method without impairing the intestinal blood supply. A 51-year-old woman was admitted to our hospital with sustained fever and lower back pain. Physical examination showed that she had a discrepancies in blood pressure between both arms. Contrast-enhanced whole-body computed tomography showed stenosis of the thoracic aorta and an aneurysm located in the distal part of the superior mesenteric artery. The diameter of the aneurysm was 4.5 cm. The aneurysm was resected via 4-cm mini-laparotomy, and the vascularity of the intestine was successfully preserved. The postoperative course was uneventful, and the patient was diagnosed as having TA based on both clinical and pathologic findings. Additional corticosteroid therapy was started to treat the arteritis, and at 3-month follow-up she was without critical incidents. Mini-laparotomy is a safe and less-invasive approach to treat SMAA, especially when the lesion is located in the distal part of the artery.

Key words: Superior mesenteric artery aneurysm – Takayasu's arteritis – Mini-laparotomy

Visceral aneurysms (VAs) are rare, with an incidence of 0.01% to 2% in routine autopsies.[1,2] However, the recent widespread use of computed tomography (CT) has led to frequent incidental detection of them.[3] Superior mesenteric artery aneurysm (SMAA) is reported to be the third-most common type of VA,[4] accounting for 5% of all VAs.[5] Although SMAA shows few specific symptoms, several reports have revealed that it has a very high risk of rupture and mortality.[4,5] SMAA is

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Table 1 Laboratory data on admission[a]

Variables	Measured value	Range
AST, U/L	16	8–38
ALT, U/L	12	4–44
ALP, U/L	128	104–338
LDH, U/L	293	106–211
T-Bil, mg/dL	0.6	0.1–1.0
TP, g/dL	6.6	6.5–8.1
Alb, g/dL	2.5	3.9–4.9
Na, mEq/L	138	135–151
K, mEq/L	4.0	3.3–4.8
Cl, mEq/L	100	98–108
UN, mg/dL	6	7–21
Cre, mg/dL	0.51	0.4–0.8
WBC, /μL	6800	3200–8500
Hb, g/dL	7.7	11.0–14.8
Plt, 10^4/μL	21.3	16.4–35.8
PT, %	75	>70
APTT, seconds	34.1	25–40
Fbg, mg/dL	359	150–400
CRP, mg/dL	4.34	<0.3
ESR, mm/h	64	3–15

Alb, albumin; ALP, alkaline phosphatase; ALT, alanine aminotransferase; APTT, activated partial thromboplastin time; AST, aspartate aminotransferase; Cre, creatinine; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; Fbg, fibrinogen; Hb, hemoglobin; LDH, lactate dehydrogenase; PLT, platelet; PT, prothrombin time; T-Bil, total bilirubin; TP, total protein; UN, urea nitrogen; WBC, white blood cells.

[a]Underlines show abnormal data.

commonly located in the proximal part of the SMA,[4,6] which is suitable for endovascular treatment (ET).[7,8] Here, we report a rare case of SMAA associated with Takayasu's arteritis (TA), located in the distal part of the SMA and treated by surgical resection using the mini-laparotomy method.

Case Report

A 51-year-old woman who had no significant medical history was admitted to our hospital with sustained fever and lower back pain. Physical examination revealed a bruit in her right subclavian artery and a difference in blood pressure between both arms. The back examination revealed that she had spontaneous pain on her lumber spine, which was worsened by percussion. The abdominal examination was unremarkable. Laboratory data demonstrated that she had moderate anemia, a slightly elevated serum C-reactive protein level, and an elevated erythrocyte sedimentation rate (Table 1). She was also found to carry the following human leukocyte antigens (HLA): A24, B52, B60, CW12, and CW10. Autoantibody tests including antineutrophilic cytoplasmic antibody (ANCA) or rheumatoid factor were negative. Her serum complement levels were normal. The result of blood culture revealed that she had bacteremia resulting from *Streptococcus agalactiae* infection. However, transthoracic and transesophageal echocardiography demonstrated that there were no signs of vegetation in the heart or major vessels. Magnetic resonance imaging (MRI) showed edematous changes in the lumbar disks. Therefore, she was first diagnosed as having purulent diskitis and secondary bacteremia. Then, she was treated with ampicillin/sulbactam for 8 weeks to treat diskitis and the bacteremia. During the treatment, the back pain was gradually improved, but the fever still continued. To seek the cause of sustained fever, contrast-enhanced whole-body CT was performed, and it was revealed that her thoracic aorta was mildly stenosed and an aneurysm in the distal part of the SMA was incidentally detected (Fig. 1). Angiography also revealed an aneurysm in the distal part of the SMA (Fig. 2). No other arterial abnormality was revealed by both CT and angiography.

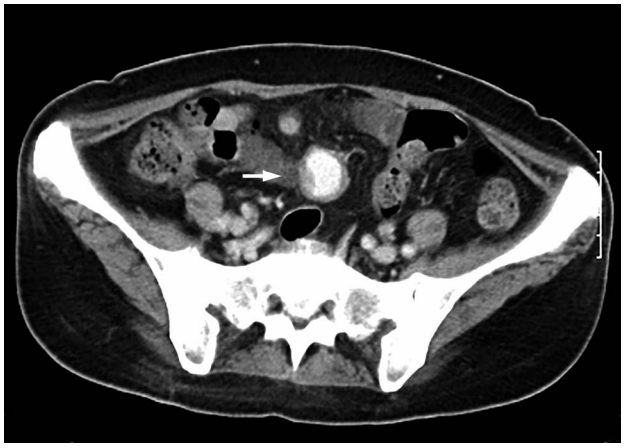

Fig. 1 Contrast-enhanced CT scan demonstrates an aneurysm in the superior mesenteric artery (*arrow*).

Because the aneurysm was very close to the marginal artery of the ileum, we selected surgical resection rather than endovascular treatment (ET) to preserve the vascularity of the ileum.

A mini-laparotomy was performed using a 4-cm incision with the Gelport's double-ring wound retractor (Alexis, Applied Medical, Rancho Santa Margarita, California), and an aneurysmal mass with 4.5-cm diameter was found in the distal part of the SMA (Fig. 3). We could resect the aneurysm and preserve the ileal vascularity by performing careful dissection from the surrounding mesenteric tissue.

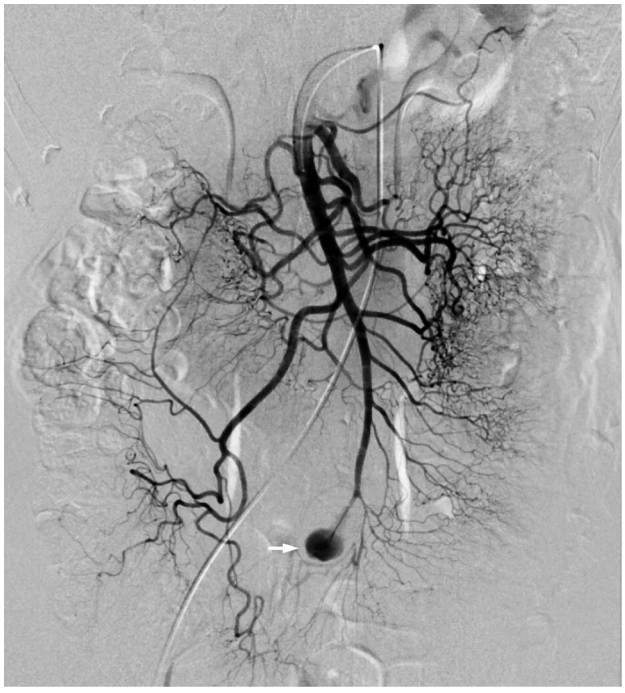

Fig. 2 Selective angiography of the SMA reveals that there is a saccular aneurysm in the distal part of the SMA (*arrow*).

The postoperative course was uneventful. She was diagnosed as having TA based on clinical findings in accordance with the American College of Rheumatology criteria for the classification of TA.[9] The resected aneurysmal wall was markedly thickened macroscopically, and microscopic examinations showed that the inflammatory cells diffusely infiltrated the media, which were compatible with

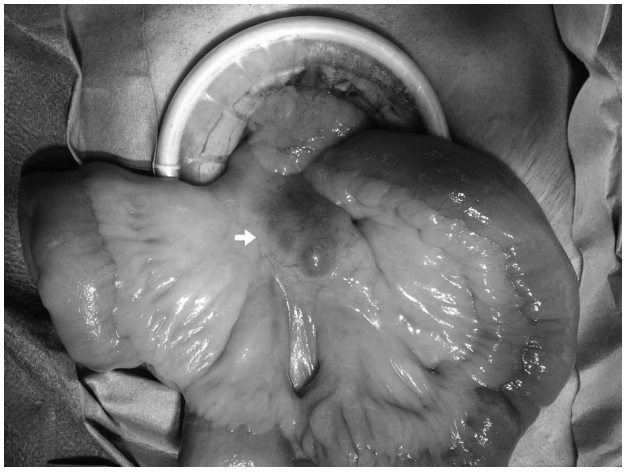

Fig. 3 A 3.5 × 2.5 × 4.5-cm aneurysmal mass is located in the distal branch of the SMA (*arrow*).

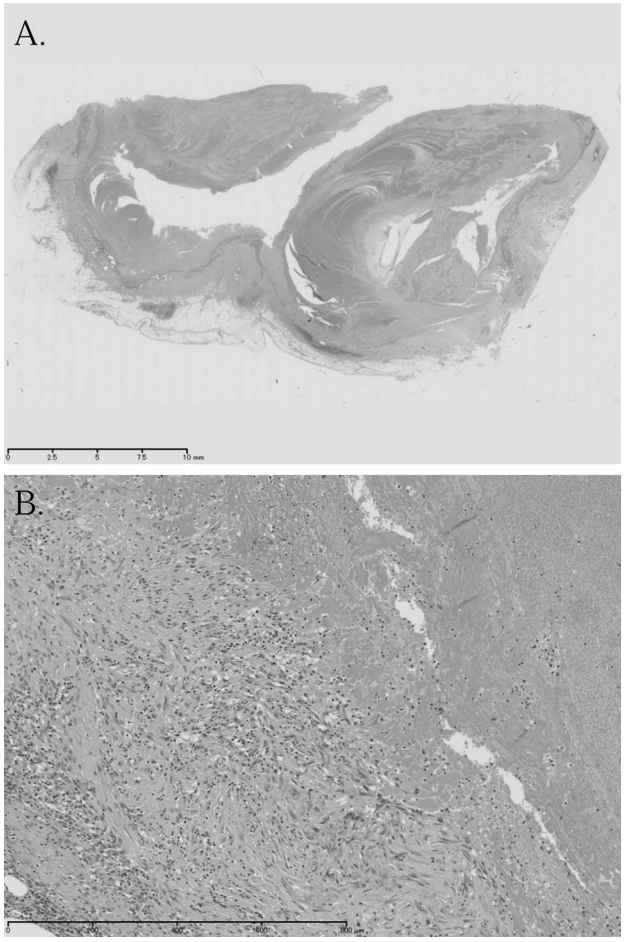

Fig. 4 (A) Microscopic findings show marked thickness of the aneurysmal wall [H&E staining (×40)] and (B) infiltration of lymphocytes, plasma cells, and histiocytes [H&E staining (×100)].

TA (Fig. 4). After surgery, she was administered methylprednisolone, 5 mg/d, to treat TA. Consequently, the back pain and fever completely resolved, and the serum inflammatory markers also returned to normal. At follow-up 3 months after surgery, she had no postoperative complications. She is now treated as an outpatient by the rheumatologist and continues to receive methylprednisolone 5 mg/d.

Discussion

The etiology of SMAA is commonly thought to be infection.[10] A variety of disorders are responsible for it, including atherosclerosis, medial dysplasia, or vasculitis.[4,11] In the present case, the pathologic features of the resected specimen suggested that TA

was a major cause of the aneurysmal formation. TA is an uncommon chronic vasculitis first reported by Takayasu *et al* in 1908.[12] Although the pathogenesis of TA is not fully understood, cell-mediated autoimmune mechanisms are thought to be of primary importance. Patients with TA present initially with fever and anorexia, followed by multiple arterial occlusive symptoms depending on the location of disease involvement.[13] The symptoms are sometimes vague when the activity of the TA is mild and chronic.

In this report, the patient was diagnosed as having TA because she fulfilled 3 of 6 diagnostic criteria for TA[9]: the presence of the right subclavian bruit, discrepancies in blood pressure between both arms, and arteriographic abnormalities. As TA mainly affects the aorta and its primary branches,[14] and the lesions are usually stenotic,[15] it is rare for TA to cause the peripheral arterial aneurysm. A search of the Medline database using the key words "Takayasu's arteritis," "visceral aneurysm," and "mesenteric aneurysm," revealed that this is the first case of peripheral SMAA associated with TA (www.pubmed.gov in the public domain).

In common, surgical treatment of VA includes aneurysmal exclusion or excision and, if necessary, reconstruction of the vessels or resection of the ischemic organ.[3,4] Although a laparoscopic approach is reported to be feasible, especially for splenic artery aneurysm,[2,16,17] the incision to extract the specimen is essential. In this case, the aneurysm was 4.5 cm in diameter, and intracorporeal mobilization was unnecessary because the lesion was located in the distal part of the SMA. Thus, we considered that aneurysmal excision could be performed via a single 4-cm incision with a wound retractor. In addition, by using mini-laparotomy, the surgeon could confirm the arterial pulsation at their finger and control unexpected bleeding more easily and safely.

ET is a choice of treatment for VA.[18,19] ET contains transcatheter embolization and covered stent placement, which can be performed under local anesthesia without abdominal incision. Therefore, it is widely adopted for the treatment of VAs including SMAA, especially for patients with poor surgical risk. Morbidity of surgical treatment is reported to be 0% to 5%, with excellent long-term durability.[16] However, success rates of ET in the literature have varied from 75% to 100%, with morbidity rates ranging from 14% to 25%.[5] Incomplete aneurysm exclusion requires further intervention or surgical treatment. In addition, it is reported that ET is not feasible when the lesion has several collateral arteries, a large diameter, or a short distance to the visceral organ.[8,20] In this case, the aneurysm was located in the near side of both marginal arteries and intestinal wall, and the patient had no particular surgical risk.

Although the natural history of VA is still unclear, several series have documented that patients treated for VA have a good prognosis.[4,6–8,21] For example, Marone *et al* have reported that the overall 10-year survival rate after the treatment of VA is 68%.[8]

Conclusion

We have described the first case of peripheral SMAA associated with Takayasu's arteritis that was successfully resected using a mini-laparotomy method without impairing the vascularity of the ileum.

Mini-laparotomy is a safe and less-invasive approach to treat SMAA, especially when the lesion is located in the distal part of the artery.

Acknowledgments

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