https://doi.org/10.23934/2223-9022-2020-9-4-666-669

Small Intestine Artery False Aneurysm Embolization

S.A. Prozorov*

Department of Radiation Diagnostics

N.V. Sklifosovsky Research Institute for Emergency Medicine of the Moscow Health Department

3 B. Suharevskaya Sq., Moscow 129090, Russian Federation

*** Contacts:** Sergey A. Prozorov, Doctor of Medical Sciences, Leading Researcher of the Department of Radiation Diagnostics, N.V. Sklifosovsky Research Institute for Emergency Medicine.
Email: surgeonserge@mail.ru

SUMMARY Bleeding from an aneurysm of a small intestine artery is a formidable complication, the treatment remains a difficult problem. In this case, aneurysm embolization was indicated. The aim of the article is to describe the role of embolization in the treatment of bleeding in an elderly patient, and to analyze the efficacy and risk of such a procedure. The advantage of the intervention is minimal invasiveness and low blood loss. The presented observation demonstrates the effectiveness of endovascular embolization in the rupture of a pseudo-aneurysm.

Keywords: small intestine artery, aneurysm, embolization

For citation Prozorov SA. Small Intestine Artery False Aneurysm Embolization. Russian Sklifosovsky Journal of Emergency Medical Care. 2020;9(4):666–669. https://doi.org/10.23934/2223-9022-2020-9-4-666-669 (in Russ.)

Conflict of interest Author declare lack of the conflicts of interests

Acknowledgments, sponsorship The study had no sponsorship

Affiliations

Sergey A. Prozorov	Doctor of Medical Sciences, Leading Researcher of the Department of Radiation Diagnostics, N.V. Sklifosovsky Research Institute for Emergency Medicine; https://orcid.org/0000-0002-9680-9722, surgeonserge@mail.ru

VAA - visceral artery aneurysm
SMA - superior mesenteric artery
CT - computed tomography
USE - ultrasound examination

INTRODUCTION

Aneurysms of the branches of the superior mesenteric artery (SMA), small intestinal arteries - a rare pathology in the group of patients with visceral artery aneurysms (VAA). Only from 0.1% to 0.2% of all vascular aneurysms constitute VAA; and of these VAA, splenic artery aneurysms account for 60%, hepatic artery - 20%, superior mesenteric artery - 5.5% (more often in the proximal 5 cm of the vessel), celiac trunk - 4%, gastric and gastroepiploic arteries - 4%, arterial aneurysms of small intestine - 3%, pancreatoduodenal and pancreatic arteries - 2%, gastro-duodenal artery - about 1.5% and inferior mesenteric artery - less than 1% [1].

Most aneurysms of the SMA and of its branches are most often manifested by abdominal pain, nausea, vomiting, up to 50% of patients complain of a sensation of a mass in the abdomen; since most aneurysms contain blood clots, such symptoms may be due to peripheral embolization or arterial narrowing [2].

The diameter of true VAA is 22 ± 18 mm (11-67 mm), and false ones - 9 ± 33 mm (3-150 mm) [3]. The frequency of VAA ruptures is significantly higher if these aneurysms are false - 76% versus true aneurysms - 3.1% [4]. With false VAA bleeding occurs more often than with true aneurysms - 63% versus 25% [3]. Aneurysm size is not a predictor of rupture [4]. Rupture rates of VAA range from 22 to 50% with a mortality rate of 8.5-90% [1, 2, 4, 5, 7]. Therefore, early recognition and treatment of these aneurysms is essential.

Diagnosis of VAA is based on the use of a combination of duplex ultrasound (USE) with computed tomography (CT) angiography and magnetic resonance angiography. Postoperative imaging evaluates blood flow and organ perfusion adequacy, and changes in the size of aneurysms [2].

The most common etiologies of VAA are degenerative-atherosclerotic changes (47%) and iatrogenic postoperative complications (19%) [3]; it is also possible the occurrence of VAA in infections, inflammatory and dysplastic processes, vasculitis, Ehlers-Danlos syndrome, trauma, arterial dissection, bacterial endocarditis [1, 2, 4]. But if up to 50% of aneurysms of the hepatic artery are false aneurysms of the intrahepatic arterial branches arising after percutaneous transhepatic interventions, then iatrogenic aneurysms of the VAA and small intestinal arteries are very rare [1].

Clinical observation

Patient K., 70 years old, was hospitalized in another medical institution for chronic cerebral ischemia, consequences of acute cerebrovascular accident, erosive bulboduodenitis. The patient underwent to endoscopic gastrostomy. On the next day, the patient's condition worsened, abdominal pains appeared, during an USE free fluid in the abdominal cavity was revealed. Diagnostic laparoscopy revealed hemoperitoneum with signs of bleeding. Sanitation, drainage of the abdominal cavity were performed. Migration of the gastrostomy into the subcutaneous tissue has occurred. After 4 days, Kader regastrostomy was performed. Additional examination - multispiral computed tomography (Fig. 1) and ultrasound - revealed a false aneurysm of the SMA branch, extensive retroperitoneal hematoma.

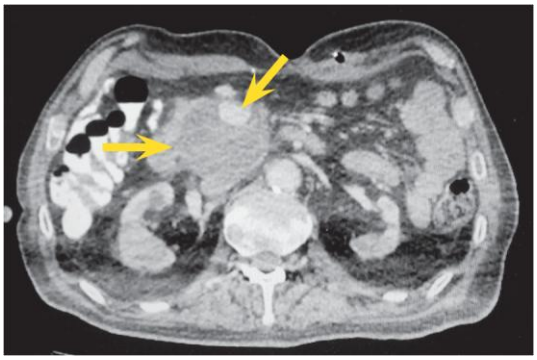

Fig. 1. Computed tomography. Partially thrombosed false aneurysm of a small intestine artery
The patient was transferred to the N.V. Sklifosovsky Research Institute for endovascular treatment.

Angiographic examination on 12/18/2018 (Fig. 2 A, B) visualized a small lateral defect and a false aneurysm of the small bowel artery with uneven, somewhat blurred contours. Through the guide catheter, it was possible to insert a microcatheter through which 4 Cook 0.018 "coils with a diameter of 6, 8.8, 10 mm and a thread length of 14 cm were inserted into the aneurysm cavity. A control study revealed a reduction in blood flow in the aneurysm cavity, stasis of contrasted blood. Blood flow through the artery is preserved. Ultrasound in the color Doppler mapping mode (Fig. 3 A, B) showed no blood flow in the aneurysm a day later. The patient was discharged with improvement of his condition.

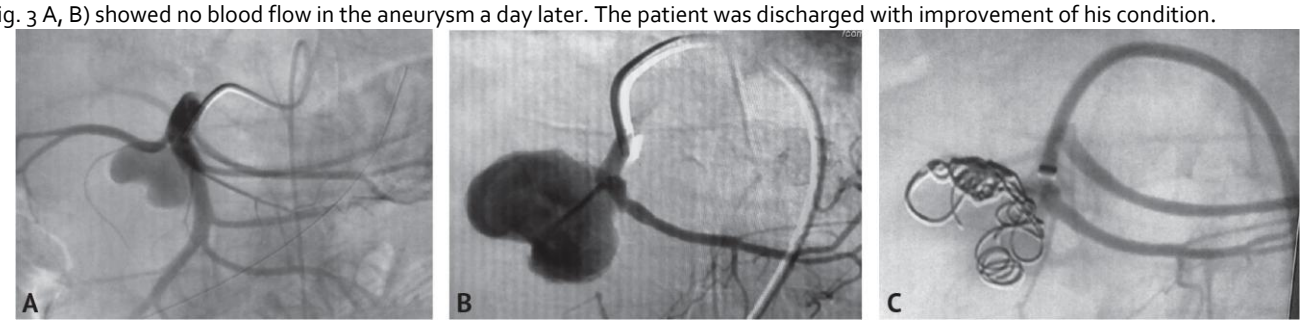

Fig. 2. Angiograms. A — with selective contrasting of the superior mesenteric artery, a false aneurysm is visualized; B — in a superselective study, a lateral defect of the small intestine artery is determined, a stream of contrasted blood enters the aneurysm; C — embolization of a false aneurysm with microcoils was performed, blood flow through the artery was preserved

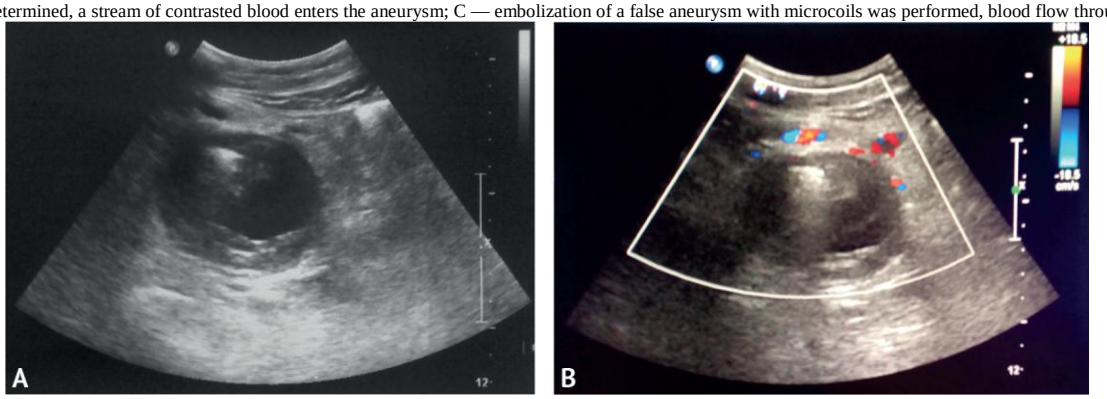

Fig. 3. A — ultrasound examination of a false aneurysm, embolizing coils and thrombotic masses are visualized; B — ultrasound examination in the color Doppler mode, no blood flow in the false aneurysm

DISCUSSION

VAA treatment depends on the patient's condition and the surgical risk. Simple ligation of SMA aneurysms is sometimes possible with an extensive collateral network between the celiac trunk and SMA. Graft revascularization or direct SMA reconstruction was considered necessary in patients with ruptured aneurysm and symptoms of intestinal ischemia [2].

Options for endovascular VAA treatment: introduction of coils, microcoils, liquid embolizing agents into the aneurysm through a catheter or use of a guide catheter with a microcatheter, stent-assisted embolization, stent-graft implantation, combination of methods. Endovascular intervention is possible through transfemoral, transaxillary and transbrachial approaches.

A self-expanding Viabahn stent-graft (W.L. Goreand Associates Inc, Flagstaff, AZ, USA) and an E-ventus® balloon-expandable stent-graft (Jotec, Hechingen, Germany) were used for VAA stenting. These stent grafts can be used for tortuous vessels [5, 8].

The literature presents single observations of patients with SMA aneurysms. A. Ikoma et al. [9] performed balloon dilatation, stenting of SMA stenosis and embolization of an aneurysm of the SMA branch with microcoils. S.J. Jeong et al. [10] embolized with microcoils aneurysm of abnormal flow between the SMA and the celiac trunk. A. Fong et al. [11] successfully embolized an infected SMA aneurysm. C.R. Jacobs et al. [7] performed a hybrid operation in a patient with multiple aneurysms of the SMA branch and gastro-duodenal artery with SMA stenting and aneurysm embolization. R. Drescher et al. [5] for aneurysm of the proximal SMA, a stent graft was implanted.

Sometimes isolated cases of treatment of aneurysms of SMA and its branches are presented in the group of patients with VAA. N. Tulsyan et al. [12] performed endovascular treatment in 48 cases of VAA (only 1 - SMA aneurysm). Coil embolization was performed in 96% of cases. S. Künzle

et al. [13] implanted various stent grafts in 19 patients with VAA (SMA aneurysm - 2 patients). CT examination performed within 2-100 months after stenting allowed the authors to reveal asymptomatic thrombosis of stent grafts in 2 out of 11 patients, all aneurysms decreased in size.

In our observation, the etiology of the aneurysm was an iatrogenic postoperative complication, and according to the literature, the most common aneurysms of the visceral arteries occur with degenerative atherosclerotic changes. The general serious condition of the patient, signs of blood loss, the presence of a large retroperitoneal hematoma created a situation in which reconstructive vascular surgery was risky. In such a situation, the choice was made in favor of endovascular treatment. Considering that the defect of the artery was small, punctate, it was decided not to use a stent-graft, but to pass a microcatheter through a guide catheter, find a point defect, pass a microcatheter distal to the neck of the aneurysm and install microcoils. A point defect in the artery wall made it possible not to use either stent-assisted embolization or liquid embolizing materials. Using the presented method, we managed to achieve a good result.

CONCLUSION

With aneurysms of the visceral arteries, there is a high risk of rupture. For false aneurysms, in symptomatic cases, for ruptures, emergency treatment is indicated. There are several endovascular therapeutic methods that the operator can choose to treat visceral artery aneurysm. The choice of the appropriate technique depends on the type, size of the aneurysm and afferent vessel, anatomical features of the affected artery. Maintaining intestinal perfusion is vital in choosing the optimal endovascular treatment to rule out aneurysm.

The use of the method of endovascular embolization using the technique of catheterization of the adducting vessel with a guide catheter followed by the introduction of a microcatheter into the aneurysm cavity and introduction of microcoils through a microcatheter was effective for rupture of an aneurysm of the small intestinal artery in a complex anatomical zone.

CONSEQUENCE

The presented observation of the treatment of a patient with a false iatrogenic aneurysm of rare localization showed the effectiveness of endovascular embolization in rupture of an aneurysm of the small bowel artery.

REFERENCES

1. Messina LM, Shanley CJ. Visceral artery aneurysms. *Surg Clin North Am*. 1997;77(2)425−442. PMID: 9146723 https://doi.org/10.1016/s0039-6109(05)70559-4
2. Chadha M, Ahuja C. Visceral artery aneurysms: diagnosis and percutaneous management. *Semin Intervent Radiol*. 2009;26(3):196–206. PMID: 21326564 https://doi.org/10.1055/s-0029-1225670
3. Ruhnke H, Kröncke TJ. Visceral artery aneurysms and pseudoaneurysms: Retrospective analysis of interventional endovascular therapy of 43 aneurysms. *Rofo*. 2017;189(7):632−639. PMID: 28511264 https://doi.org/10.1055/s-0043-107239
4. Pitton MB, Dappa E, Jungmann F, Kloeckner R, Schotten S, Wirth GM, et al. Visceral artery aneurysms: Incidence, management, and outcome analysis in a tertiary care center over one decade. *Eur Radiol*. 2015;25(7):2004−2014. PMID: 25693662 https://doi.org/10.1007/s00330-015-3599-1
5. Drescher R, Köster O, von Rothenburg T. Superior mesenteric artery aneurysm stent graft. *Abdom Imaging*. 2006;31(1):113–116. PMID: 16314990 https://doi.org/10.1007/s00261-005-0355-z
6. Huang Y, Banga P, Reis De Souza L, Oderich GS. Endovascular treatment of visceral artery aneurysms. *J Cardiovasc Surg (Torino)*. 2015;56(4):567−577. PMID: 25752257
7. Jacobs CR, Crawford JD, Fatima J. Hybrid management approach for superior mesenteric artery and branch aneurysms. *J Vasc Surg Cases Innov Tech*. 2019;5(4):521−524. PMID: 31909308 https://doi.org/10.1016/j.jvscit.2019.10.002
8. Venturini V, Marra P, Colombo M, Alparone M, Agostini G, Bertoglio L, et al. Endovascular treatment of visceral artery aneurysms and pseudoaneurysms in 100 patients: Covered stenting vs transcatheter embolization. *J Endovasc Ther*. 2017;24(5):709−717. PMID: 28659059 https://doi.org/10.1177/1526602817717715
9. Ikoma A, Nakai M, Sato M, Kawai N, Tanaka T, Sandaet H, et al. Inferior pancreaticoduodenal artery aneurysm treated with coil packing and stent placement. *World J Radiol*. 2012;4(8):387–390. PMID: 22937218 https://doi.org/10.4329/wjr.v4.i8.387
10. Jeong S-J, Lim N-Y, Jang N-K, Choi SJN, Kim JK, Jeong YY, et al. Transcatheter coil embolization of an arc of Buhler aneurysm. *Korean J Radiol*. 2008;9(Suppl):S77–S80. PMID: 18607134 https://doi.org/10.3348/kjr.2008.9.s.s77
11. Fong A, Navuluri R. Infected superior mesenteric artery aneurysm. *Semin Intervent Radiol*. 2016;33(1):61−64. PMID: 27011430 https://doi.org/10.1055/s-0036-1572358
12. Tulsyan N, Kashyap VS, Greenberg RK, Sarac TP, Clair DG, Pierce G, et al. The endovascular management of visceral artery aneurysms and pseudoaneurysms. *J Vasc Surg*. 2007;45(2):276−283. PMID: 17264002 https://doi.org/10.1016/j.jvs.2006.10.049
13. Künzle S, Glenck M, Puippe G, Schadde E, Mayer D, Pfammatter T. Stent-graft repairs of visceral and renal artery aneurysms are effective and result in long-term patency. *J Vasc Interv Radiol*. 2013;24(7):989−996. PMID: 23727420 https://doi.org/10.1016/j.jvir.2013.03.025

Received on 02.03.2020

Review completed on 16.06.2020

Accepted on 30.06.2020