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Giant Splenic Artery Aneurysm – An Analysis of the Recent Literature

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Abstract. *Objective.* This article was composed to review the profile of giant splenic artery aneurysm as reported in the recent literature. *Methodology*. A systematic literature search was conducted through electronic databases and scientific networking sites, including PubMed, Scopus, and Google Scholar, using the key words and terms "giant splenic artery aneurysm", "large splenic artery aneurysm", and "huge splenic artery aneurysm". Only literature in English was considered for inclusion in this study, and the time frame was fixed between 2014 and 2024. *Results.* 16 cases, including 9 (56.25%) females and 7 (43.75%) males, ranging in age from 35 to 84 years (mean 60.4±13.4 years). Years were included in the review. The size of aneurysm varied from 10 cm to 30.68 cm (mean 12.54±5.32 cm). Upper abdominal pain was the commonest presentation, along with shock and palpable lumps. The majority of the cases (n = 11; 68.7%) were managed by laparotomy, and an endovascular approach was adopted in 4 (25%) cases. *Conclusion*. Giant splenic artery aneurysm (GSAA) is a rare but potentially life-threatening condition. Physicians need to be aware of this condition so that a diagnosis is made promptly. There is no role of conservative management, and all giant aneurysms need appropriate treatment after detection. Open surgical aneurysmectomy is the mainstay of management.

Keywords: giant splenic artery aneurysm, spleen, rupture, systematic analysis, vascular surgery, endovascular coiling, haemorrhage, pancreas.

Introduction

Splenic artery aneurysms (SAAs) are the third most frequent intra-abdominal aneurysms, following abdominal aorta and iliac artery aneurysms [1]. Beaussier was the first to report them in autopsies in 1770 [2]. In 1920, Hoegler made the first preoperative diagnosis, and Macleod & Maurice undertook the first surgical intervention in 1940 [3, 4]. The diameter of a normal splenic artery (SA) is 0.46±0.03 cm [5], and focal dilation more than 1.5 times (about 0.7 cm) qualifies it as an SAA. The incidence is higher in females, with a 4:1 female-to-male ratio.

SAAs are classified according to their involvement of arterial wall layers: true aneurysms involve all three layers (intima, media, and adventitia), and pseudoaneurysms involve only one or two. True aneurysms ranging in diameter from 6 mm to 30 cm have been reported in the literature, though the size rarely exceeds 3 cm. Larger aneurysms above 10 cm in any one dimension are usually referred to as "giant splenic artery aneurysms (GSAA)"; these are rare, with only a few isolated cases reported in the medical literature [6–9],

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even though numerous published reports have termed aneurysms or pseudoaneurysms of lesser dimensions as "giant" [10–14].

It is still up for debate what the optimal treatment and care plans are for patients who fit into this category. The surgical alternatives sector has undergone remarkable alterations in the last century, ranging from open and endovascular surgeries to more advanced laparoscopic and robotic therapies. These aneurysms have a tendency to rupture and hence timely surgery is crucial [15]. This review of recent literature was conducted in light of the aforementioned context in order to obtain insight into current trends in the clinical presentation and management of GSAA.

Materials and methods

Methods. A systematic literature search was conducted through electronic databases, including PubMed, Scopus, and Google Scholar, using the key words and terms "giant splenic artery aneurysm", "large splenic artery aneurysm", and "huge splenic artery aneurysm". The search was carried out by using individual keywords with a combination of Boolean logic (AND). Only literature in the English language was considered for inclusion in this study, and the time frame was fixed between 2014 and 2024.

Criteria for considering studies. Articles, including "case series", "case reports", "clinical images", and "letters to the editor", that provided a comprehensive account of the variables were included in the review process.

Participants and outcome measures. Only those cases were included where the diagnosis of aneurysm of the splenic artery had been definitively established by imaging, surgical exploration, and/or histopathological analysis. There were nine variables (Table 1) that were analyzed, including: (1) age of the patient; (2) gender; (3) duration of symptoms; (4) clinical features; (5) co-morbidities if any; (6) findings on imaging; (7) management; (8) operative findings if treated surgically; and (9) outcomes.

Exclusion. The original studies, systematic reviews, or meta-analyses that offered condensed data without a comprehensive analysis of the variables were excluded. Similarly, the articles related to pseudoaneurysm of the splenic artery or else in languages other than English were excluded.

Methodological quality checking. Comparisons were made between the checklist utilized for this study and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist items and previously published peer-reviewed literature.

Data synthesis (extraction and analysis). Data related to the variables was extracted and arranged in the form of Table 1. The collected data was then analyzed with Microsoft Excel (Office Version 16). The information was then presented using frequencies, summary measures, tables, and figures as shown in the results. Moreover, the details of the included cases were provided in the form of Table 1.

Results

Study selection. The electronic database search resulted in a total of 70 articles; 34 were identified in PubMed, 23 in Google Scholar, and 13 in Scopus. After excluding 33 duplications, 37 articles were used to screen titles and abstracts, after which 16 relevant articles in English were included as depicted in Figure 1. No automation tools were utilized while drafting this review article, and all the exclusion and inclusion of articles was undertaken by the authors manually.

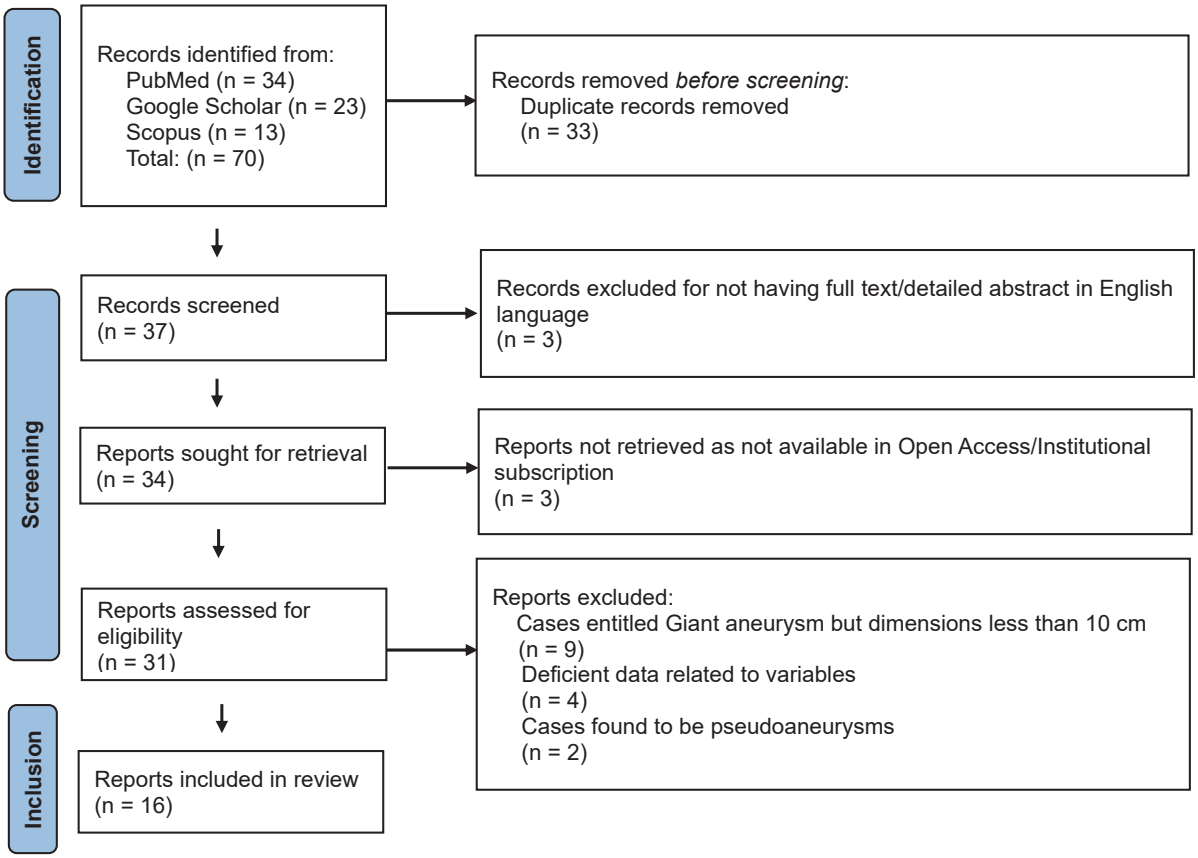

Figure 1. Flowchart of the reviewed articles

Study characteristics. Study characteristics are summarized in Table 2. There were 16 case reports satisfying the inclusion criteria. There was a total of 16 cases, including 9 (56.25%) females and 7 (43.75%) males, ranging in age from 35 to 84 years (mean 60.4±13.4 years). Only two cases were below the age of 50 years. Upper abdominal pain was the commonest presentation (n = 11; 68.8%) and was acute in onset in 5 cases, whereas the other 6 cases had pain varying from 2 weeks to 4 months. 3 (18.8%) cases reported upper gastrointestinal bleed, and in 2 (12.5%) cases, there were no symptoms and GSAA were detected incidentally. On examination, 5 (31.2%) had features of haemorrhagic shock, and in 5 (31.2%), a pulsatile lump was palpable. 10 (62.5%) cases had no comorbidity, whereas 6 (37.5%) cases have various comorbidities, including previous renal transplant on immunosuppression, hypertension, hypercholesteremia, diabetes, and atrial fibrillation. Imaging modalities used in diagnosis included contrast-enhanced CT scan/CCT angiogram, MRI, and USG/colour Doppler. GSAA was located along the distal 2/3rd of splenic artery in 12 (75%) cases, proximal half in 2 (12.5%), and in 22 (12.5%), the SA was diffusely involved.

The maximum dimension of GSAA varied from 10 cm to 30.68 cm (mean 12.54±5.32 cm). 2 (12.5%) cases had synchronous aneurysms in other arteries; in one case there were bilateral popliteal aneurysms, and in the second, there were aneurysms of the left gastric and left ileocolic arteries. GSAA was managed by laparotomy with aneurysmectomy in 11 (68.7%), endovascular occlusion/stent in 4 (25%), and laparoscopic splenectomy with aneurysmectomy in 1 (6.3%) case. 10 (62.5%) cases managed by laparotomy underwent splenectomy, and 6 (37.5%) cases required distal pancreatectomy. Laparotomy was mostly conducted through midline incision and through Mercedes-Benz or roof top incision in one patient each. 10 out of 12 (62.5%)

Table 1. Study characteristics of the patients of giant aneurysm of splenic artery

Serial number	Authors	Year of publication	Gender (M/F)	Age	Clinical presentation	Physical examination	Co-morbidities	Imaging	Site of aneurysm	Maximum dimension of SAA (cm)	Past/present aneurysm of vessel other than SA	Definitive management	Operative findings	Postoperative phase
1.	Zain et al. [16]	2024	M	50	AP, dizziness and alteration of consciousness 1 day	Haemorrhagic shock	Similar episode of acute abdomen 7 months prior when diagnosis was made but surgery was refused by the patient; early satiety after meals and had a history of 20 kg weight loss over the previous seven months; upper GI bleed one week prior	USG, multi-slice CT & DSA: ruptured giant splenic artery aneurysm complicated with gastric and transverse colonic fistula	Distal 1/3	12	None	Exploratory laparotomy & left anterolateral thoracotomy to control the severe aortic bleeding just above the diaphragm, aneurysmectomy, splenectomy, and closing the gastric and transverse colon perforations	A large pulsating mass was detected occupying the epigastrium and the left hypochondrium with severe adhesions with the stomach and transverse colon; large hematoma with purulent collection extending to the greater and lesser gastric curvature	Multiple complications including right pneumothorax due to central venous line insertion and treated by thoracostomy, atelectasis of the left lung, managed successfully by bronchoscopy, pancreatic fistula and bile leakage which recovered spontaneously
2.	Shabunin et al. [17]	2023	F	55	AP, generalized weakness for 4 months	A well-defined, non-tender, pulsatile intra-abdominal lump was palpable in the LHC, LL and Ep	None	USG and CECT abdomen: aneurysmal SAA with hypoechogenic aneurysmal thrombotic masses and occupying two-thirds of the lumen volume	Distal 2/3rd	12	None	Laparotomy, distal splenopancreasectomy with en-bloc excision of the aneurysm	Pulsating SAA densely adhered to spleen and pancreas, and displaying a yellowish appearance, with areas showing calcium salt deposition (dystrophic calcification) and the aneurysm cavity contained long-standing thrombotic masses	Uneventful

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3.	Yoshikawa et al. [18]	2022	M	59	Acute chest pain, syncope	HS	None	ECG – normal. CXR – normal. CECT abdomen: SAA with extravasation of contrast, stomach with significant expansion with mud fluid.	Distal 2/3rd		None	Laparotomy, distal splenopancreasectomy, aneurysmectomy, partial gastrectomy	SAA densely adhered to the body of the pancreas and to the posterior wall of the stomach covered with necrotic slough around that was the ruptured root of the splenic aneurysm into the stomach	Pancreatic fistula requiring 42 days of hospitalization
4.	Trochimczuk et al. [19]	2022	M	75	AP – 2 weeks	Abdominal distension	AF, COPD, HT, obesity, stroke, hyperuricemia	CECT: a giant. SAA angiography: SAA with inflow from SA	Diffuse	30.68	None	Endovascular occlusion of SA with a 14 mm vascular plug	N/A	Follow-up imaging revealed no flow in the aneurysmal sac, although the diameter of aneurysm did not decrease. Patient was pain-free
5.	Atanasijevic et al. [20]	2021	F	76	AP – 2 months	Large pulsatile mass in LHC	HT, DM	USG abdomen: hypoechoic lesion in close association with the SA. CECT: proximal SSA		10.2	None	Laparotomy, aneurysmectomy, end to end reconstruction of splenic artery	Proximally located SAA densely adhered to pancreas, tortuous distal SA	Uneventful
6.	Mulpuri et al. [21]	2021	F	50	AP (LHC) – 20 days	No specific signs except pallor (Hb 10.2 mg/dl)	None	USG abdomen: two large cystic lesions in relation to the body, tail of the pancreas and splenic hilum. Colour Doppler showed internal colour flow suggesting aneurysm. CECT abdomen: two large well-defined peripherally calcified SAA, 6.3×7.4×6 cm & 7.5×7.5×7.5 cm, one being partially thrombosed	Distal 2/3rd	15	None	Laparotomy; En bloc resection of the distal pancreas, spleen and aneurysm	Bilobed single SAA inseparable from the pancreas	Uneventful

7.	Panzera et al. [22]	2020	M	35	UGIB	HS	None	EGD: 3 cm, non-pulsatile bulging at posterior wall of the stomach with a small erosion on its surface with a visible vessel. CT Angio: middle and distal third of the splenic artery fully replaced by a partially opacified aneurysm packed to the posterior wall of the stomach, with a plugged fistula	Distal 2/3rd	10.5	Two small aneurysms (<2 cm in size) of the left gastric and ileocolic artery	Laparotomy, distal splenopancreasectomy with en-bloc excision of the aneurysm & wedge resection of the posterior gastric wall including the ulcer	SAA located in the distal part of the splenic artery and strictly adherent to the pancreatic tail and the posterior wall of the stomach	Uneventful
8.	Varnavas & Dolapsakis [23]	2020	F	51	UGIB – 2 days	Nontender pulsatile mass in Ep. Malena on DRE	None	EGD: narrowing of gastric body lumen. USG abdomen: well defined mass adjacent to spleen. Doppler USG: turbulent blood flow. CECT: SAA with a mural thrombus, adherent to the stomach and pancreas, without signs of portal hypertension	Distal 2/3rd	10	None	Laparotomy; aneurysmectomy with splenectomy, distal pancreatectomy and sleeve gastrectomy	Aneurysm adherent to pancreas and eroding into gastric wall	Uneventful
9.	de Donato et al. [24]	2020	M	80	Asymptomatic	None	None	CECT: SA had an anomalous isolated origin from the supraceliac aorta, and the aneurysm had an unusual fusiform shape, with diffuse partial thrombosis and severe distal angulation close to the splenic hilum	Diffuse	10	Bilateral popliteal aneurysm	Complete splenic aneurysm exclusion with implantation of three covered polytetrafluoroethylene stents through a percutaneous right femoral approach A	NA	CECT obtained 3 years after surgery revealed excellent patency of the stent grafts with complete splenic aneurysm exclusion and a sac shrinkage of 1 cm
10.	Kalipatnapu et al. [25]	2019	F	44	AP(LHC) – 2 months	Pulsatile mass LHC	None; trivial trauma 12 years ago	CECT: SAA with partial thrombosis	Distal 2/3rd	12.7	None	Laparotomy; ligation of SA proximal and distal to aneurysm after evacuation of thrombus	SAA with thrombus	Uneventful

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11.	Fang et al. [26]	2017	M	64	AP (flank) – 1 day	Subxiphoid tender pulsatile mass	Renal transplantation 17 years ago and has been taking immunosuppressant drugs since then	CT angiography & selective SMA angiography: 10 cm aneurysm at the origin of the SA arising from the SMA, with almost no proximal aneurysm neck	Proximal 1/3rd	10	None	Abdominal angiography through RFA; embolization of inflow of SAA with two control embolization and four microcoils	NA	Uneventful
12.	Wernheden et al. [27]	2017	F	84	AP, back pain; altered consciousness	HS, Pallor, abdominal distension & tenderness	AF; HT	CECT with angiogram: ruptured SAA and free fluid in the abdomen around the liver and in the fossa of Douglas	Distal 2/3rd	15	None	Abdominal angiography through RFA; embolization of inflow of SAA and collateral vessels (lateral to SAA) with microcoils	N/A	Intensive care for 3 days due to AF, atelectasis, infection, and decreased diuresis. 3 months post-top, a CT angio: aneurysm shrunk in size and spleen well perfused, no coil migration
13.	Canbak et al. [28]	2017	F	60	AP – 1 day	Left subcostal stiffness	None	MRI – vascular structure compatible with SAA	Distal 2/3rd	10	None	Laparoscopic splenectomy with aneurysmectomy	NA	Uneventful
14.	Kauffman et al. [29]	2017	F	60	Asymptomatic; detected incidentally on USG	Epigastric tender ness on deep palpation	HT, hypercholesterolemia	Angiotomography and the MRI: vascular structure compatible with SAA	Distal 2/3rd	10	None	Open splenectomy with partial aneurysmectomy	Celiac artery ligated through medial visceral rotation	Uneventful
15.	Hussain et al. [30]	2015	M	58	UGIB	HS, splenomegaly, pulsatile mass in the Ep and LHC with a thrill and bruit over it	None	USG abdomen with CD: massive splenomegaly and a splenic artery aneurysm. CECT abdomen & angiogram: splenic artery aneurysm arising from its origin from the celiac axis	Proximal 2/3rd	10	None	Laparotomy, aneurysmectomy with splenectomy	SAA originating near the celiac axis; proximal control with clamps led to disappearance of pulsations	Uneventful

16.	Yagmur et al. [31]	2015	F	65	AP, dyspepsia, fatigue of 3 months' duration	Epigastric lump	None	USG abdomen: a cystic lesion in the pancreatic tail. CECT: a lesion resembling a subcapsular hemangioma in the spleen, and aneurysmatic dilation of the splenic artery with a maximum dimension of 10 cm. MRI: aneurysmatic dilation about 5 cm, and a hyperintense hemangioma in the spleen	Distal 2/3rd	10	None	Laparotomy (midline incision), en-bloc resection of the spleen, distal pancreas, and SAA	A pulsatile, 10x6 cm SAA located on the pancreatic tail, filling the bursa omentalis cavity, with dense adhesions to the adjacent pancreatic tissue, concordant with chronic pancreatitis. Multiple peripancreatic and peri splenic venous dilations, primarily on the right gastroepiploic vein	Uneventful

UGIB – upper gastrointestinal bleeding, HS – hypovolemic shock, EGD – esophagogastroduodenoscopy, Ep – epigastrium, LHC – left hypochondrium, LL – left lumbar region, USG – ultrasonography, CD – colour doppler, AP – abdominal pain, SA – splenic artery, SAA – splenic artery aneurysm, RFA – right femoral artery, DRE – digital rectal examination, AF – atrial fibrillation, HT – hypertension, COPD – chronic obstructive pulmonary disease, DSA – digital subtraction angiography.

patients undergoing laparotomy had an uneventful postoperative phase, whereas one patient developed a pancreatic fistula lasting 6 weeks and another had multiple organ failure requiring prolonged intensive care. 3 out of 4 (75%) managed by endovascular approach had uneventful recovery, and one required intensive care for three days due to preexisting comorbidities.

Discussion

Splenic artery aneurysms (SAAs) are the third most frequent intra-abdominal aneurysms, following abdominal aorta and iliac artery aneurysms, but giant splenic artery aneurysms (GSAAs) are rare entities. We have adopted the 10 cm dimension in any direction for inclusion of SAA as GSAA based on reports in peer-reviewed literature [6–9], but there is no clear consensus about the precise dimensions beyond which SAA may be labeled as GSAA, and smaller-sized SAA have been published under the title of GSAA [10–14]. Shetty et al. [14] and Connors et al. [10] have respectively published 7.5 cm and 7.2 cm SAA as giant, whereas Uyur et al. [32] termed a 5 cm SAA as GSAA. In this series, the average size varied from 10 cm to 30.68 cm (mean 12.54±5.32 cm).

The incidence of SAA is estimated at 0.01% in the general population and the incidence at autopsy has been found to be 0.2–2% [33]. The incidence has been shown to increase to 10% above the age of 60 years and, the figures may approach 50% in patients with portal hypertension [34]. Other risk factors for SAA mentioned in literature include atherosclerosis, hypertension, cirrhosis [35], post liver transplantation status, female sex, pregnancy, multiple pregnancies [36] and hereditary haemorrhagic telangiectasia [37]. However, data related to GSAA is sparce due to rarity of the condition. In this review, we could trace only 16 such published cases from the peer reviewed literature related to 2014–2024. The cases included 7 (43.75%) males which is a high proportion, considering the fact that SAAs are more common in women with a 4:1 ratio [33, 38].

In clinical presentation, SAA is mostly asymptomatic, but 14 (87.5%) of GSAA were asymptomatic in this review, with abdominal pain being present in (n = 11; 68.8%). A pulsatile lump was palpable in 5 (31.2%) cases, which brings forth the importance of careful physical examination of the patients. In spite of being giant in size, two GSAA were fully asymptomatic and detected incidentally. Furthermore, the patient with GSAA measuring 30.68 cm has had abdominal pain for only two weeks before presentation, inferring thereby that SAA has the potential to grow to dangerous proportions without any symptoms.

Upper gastrointestinal bleeding was the presenting feature in 3 (18.8%) cases of GSAA. Usually, when SAA ruptures, there is bleeding into the peritoneal cavity (or lesser sac). However, bigger aneurysms can potentially induce pressure erosion of the posterior gastric wall and, hence, bleed into the lumen of the stomach [33]. In our cases, endoscopy had demonstrated narrowing of the gastric body lumen and a non-pulsatile bulge in the posterior gastric wall, and the utilization of imaging modalities like contrast-enhanced CT and angiogram had clinched the diagnosis. These cases highlight the importance of maintaining a high index of suspicion about rare pathologies when attempting to establish the cause of UGIB, particularly when the clinical or endoscopic findings are not conclusive [33].

GSAA was located along the distal 2/3rd of splenic artery in 12 (75%) cases, proximal half in 2 (12.5%), and in 2 (12.5%), the SA was diffusely involved. This is in line with the data related to SAA, wherein about 75% have been found in the distal third of the splenic artery (75%), followed by 20% in the middle third (20%), and only about 5% in the proximal splenic artery [39]. 2 (12.5%) cases, both males, had synchronous aneurysms in other arteries; in one case there were bilateral popliteal aneurysms, and in the second, there were aneurysms of the left gastric and left ileocolic arteries.

Depending upon the patient's condition, aneurysm morphology, and the available logistics, GSAA was managed by standard laparotomy with aneurysmectomy in 11 (68.7%) cases with splenectomy (n = 10;

62.5%) and distal pancreatectomy (n = 6; 37.5%). In a case reported by Varnavas & Dolapsakis [23], that had presented by gastrointestinal bleed, sleeve gastrectomy was also added because of the erosion of the stomach wall from the aneurysm, whereas Panzera et al. [22] undertook wedge resection of the posterior gastric wall, including the ulcer. Endovascular occlusion was conducted in only 4 (25%) cases. Laparoscopic splenectomy with aneurysmectomy in one (6.3%) case [28]. Currently there are three treatment modalities available for SAA: open surgery, endovascular treatment, and laparoscopic surgery [20]. For GSAA, open surgical repair is the mainstay of therapy due to the magnitude of the lesion; nonetheless, with constant technical progress, endovascular techniques have gained a significant place in the management of SAAs [20]. De Donato et al. [24] successfully undertook complete splenic aneurysm exclusion with implantation of three covered polytetrafluoroethylene stents through a percutaneous right femoral approach, whereas Fang et al. [26] and Wernheden et al. [27] undertook embolization of inflow of GSAA with microcoils. The case successfully treated with emergency endovascular coiling under local anaesthesia by Wernheden et al. [27] was a ruptured 15 cm GSAA in an 84-year-old woman, and this is one of the few reports of emergency endovascular treatment for ruptured SAA that points towards the viability of this less-invasive modality if proper logistics and trained personnel are available.

Limitations

The study reviewed the articles that were acquired through Open Access, made available by Qassim University and Saudi Digital Library via institutional subscriptions, or otherwise obtained by contacting the authors via the ResearchGate platform. As a result, it's probable that certain articles that were not obtainable through these sources might have been missed.

Conclusion

Giant splenic artery aneurysm (GSAA) is a rare condition that can be asymptomatic for extended periods of time and manifest acutely with potentially life-threatening complications like rupture and gastrointestinal bleed. The cornerstone of treatment is open surgical aneurysmectomy; however, innovative endovascular and laparoscopic techniques are becoming popular. Conservative management has no role, and all giant splenic artery aneurysms require active treatment.

Conflict of interest

No conflict of interest is declared by the author.

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References

1. Hosseinzadeh A, Shahriarirad R, Asgharzadeh Majdazar V, Moeini Farsani M, Tadayon SMK. Spontaneous rupture of a large splenic artery aneurysm in a 59-year-old male patient with pemphigus vulgaris: a case report. J Med Case Rep 2022; 16(1): 382. DOI: 10.1186/s13256-022-03618-x.

2. Beaussier M. Sur un anévrisme de l'artère splénique: dont les parois se sont ossifiées. J Med Toulouse 1770; 32: 157–162.

3. Macleod D, Maurice T. Rupture of a branch of the splenic artery: associated with pregnancy. Lancet 1940: 924–925.

4. Pararas N, Rajendiran S, Taha I, Powar RR, Holguera C, Tadros E. Spontaneous rupture of a huge splenic artery aneurysm: a case report. Am J Case Rep 2020; 21: e919956. DOI: 10.12659/AJCR.919956.

5. Silveira LA, Silveira FB, Fazan VP. Arterial diameter of the celiac trunk and its branches. Anatomical study. Acta Cir Bras 2009; 24(1): 43–47. DOI: 10.1590/s0102-86502009000100009.

6. Bornet P, Medjoubi SA, Tissot A, Jurado A, Hibon J, Terris C. Giant aneurysm of the splenic artery – a case report. Angiology 2000; 51(4): 343–347. DOI: 10.1177/000331970005100411.

7. Russo A, Francia C, Zaottini A, Pagliei M. Giant splenic artery aneurysm, incidentally diagnosed. Ann Ital Chir 2008; 79(5): 371–375.

8. Mechchat A, Idrissi R, El Mahi O, Lekehal B, Sefiani Y, Mesnaoui A, Ammar F, Bensaid Y. Giant aneurysm of the splenic artery. Case report and review of the literature. J Mal Vasc 2008; 33(4–5): 221–224. DOI: 10.1016/j.jmv.2008.09.005.

9. Pescarus R, Montreuil B, Bendavid Y. Giant splenic artery aneurysms: case report and review of the literature. J Vasc Surg 2005; 42(2): 344–347. DOI: 10.1016/j.jvs.2005.04.026.

10. Connors K, Allen R, Snyder M, Gibson G, Jeyabalan G. Hybrid approach for treatment of a symptomatic giant splenic artery aneurysm. Vasc Endovascular Surg 2023; 57(8): 932–936. DOI: 10.1177/15385744231183792.

11. Ho MF, Chan YC, Cheng SW. Successful endovascular management of giant splenic artery aneurysms. Vascular 2013; 21(5): 317–322. DOI: 10.1177/1708538113478744.

12. Borzelli A, Amodio F, Pane F, Coppola M, Silvestre M, Serafino MD, Corvino F, Giurazza F, Niola R. Successful endovascular embolization of a giant splenic artery pseudoaneurysm secondary to a huge pancreatic pseudocyst with concomitant spleen invasion. Pol J Radiol 2021; 86: e489-e495. DOI: 10.5114/pjr.2021.108876.

13. Salimi J, Foroutani L, Miratashi Yazdi SA. Management of huge splenic artery aneurysm with new hybrid procedure including endovascular and open surgical approach: case series. Int J Surg Case Rep 2021; 89: 106585. DOI: 10.1016/j.ijscr.2021.106585.

14. Shetty GS, Bhat PKS, Balaji G, Ravindra BS, Udgire SP. Endovascular trapping of a giant splenic artery aneurysm by liquid embolic in a case of EHPVO with hypersplenism with a complicated post procedure course. Ann Vasc Surg 2021; 72: 666.e1–666.e6. DOI: 10.1016/j.avsg.2020.10.015.

15. Akbulut S, Otan E. Management of giant splenic artery aneurysm: comprehensive literature review. Medicine (Baltimore) 2015; 94(27): e1016. DOI: 10.1097/MD.0000000000001016.

16. Zain AM, Sires AM, Al-Jawad M, Alkanj H. Ruptured giant splenic artery aneurysm with an exceptional concurrent gastric and transverse colonic fistula: a rare case report. Medicine (Baltimore) 2024; 103(31): e39159. DOI: 10.1097/MD.0000000000039159.

17. Shabunin AV, Bedin VV, Tavobilov MM, Karpov A, Alieva FF. Giant splenic artery aneurysm: case report. J Vasc Bras 2023; 22: e20230108. DOI: 10.1590/1677-5449.20230108.

18. Yoshikawa C, Yamato I, Nakata Y, Nakagawa T, Inoue T, Nakatani M, Nezu D, Doi S, Kuroda Y, Fujii K, Kishida S, Kamikubo M, Ko S. Giant splenic artery aneurysm rupture into the stomach that was successfully managed with emergency distal pancreatectomy. Surg Case Rep 2022; 8(1): 148. DOI: 10.1186/s40792-022-01498-3.

19. Trochimczuk M, Gewartowska M, Stańczyk M. Endovascular treatment of a giant splenic artery aneurysm. Pol Arch Intern Med 2022; 132: 16180. DOI: 10.20452/pamw.161810.

20. Atanasijevic I, Babic S, Tanaskovic S, Gajin P, Ilijevski N. Giant splenic artery aneurysm treated surgically with spleen and pancreas preservation. Ann Saudi Med 2021; 41(4): 253–256. DOI: 10.5144/0256-4947.2021.253.

21. Mulpuri VB, Samanta J, Gupta P, Gupta V. En bloc resection in giant bilobed splenic artery aneurysm. BMJ Case Rep 2021; 14(9): e244319. DOI: 10.1136/bcr-2021-244319.

22. Panzera F, Inchingolo R, Rizzi M, Biscaglia A, Schievenin MG, Tallarico E, Pacifico G, Di Venere B. Giant splenic artery aneurysm presenting with massive upper gastrointestinal bleeding: a case report and review of literature. World J Gastroenterol 2020; 26(22): 3110–3117. DOI: 10.3748/wjg.v26.i22.3110.

23. Varnavas G, Dolapsakis C. A giant splenic artery aneurysm. CMAJ 2020; 192(22): E608. DOI: 10.1503/cmaj.191180.

24. de Donato G, Pasqui E, Panzano C, Galzerano G, Palasciano G. Giant fusiform splenic aneurysm with anomalous origin. J Vasc Surg Cases Innov Tech 2020; 6(3): 444–445. DOI: 10.1016/j.jvscit.2020.06.006.

25. Kalipatnapu S, Kota AA, Agarwal S. Giant splenic artery aneurysm. J Vasc Surg 2019; 69(6): 1940. DOI: 10.1016/j.jvs.2019.02.039.

26. Fang G, Fu W, Dong Z. Endovascular treatment for imminent rupture of a giant aberrant splenic aneurysm. J Vasc Surg 2017; 65(2): 544. DOI: 10.1016/j.jvs.2016.03.465.

27. Wernheden E, Brenøe AS, Shahidi S. Emergency endovascular coiling of a ruptured giant splenic artery aneurysm. J Vasc Surg Cases Innov Tech 2017; 3(4): 240–242. DOI: 10.1016/j.jvscit.2017.10.008.

28. Canbak T, Acar A, Tolan HK, Başak F. Giant splenic artery aneurysm: a case report. Arch Clin Exp Med 2017; 2(2): 58–59. DOI: 10.25000/acem.300740.

29. Kauffman P, Macedo ALV, Sacilotto R, Tachibana A, Kuzniec S, Pinheiro LL, Wolosker N. The therapeutic challenge of giant splenic artery aneurysm: a case repport. Einstein (Sao Paulo) 2017; 15(3): 359–362. DOI: 10.1590/S1679-45082017RC3873.

30. Hussain K, Ibrahim T, Masood J. Giant splenic artery aneurysm. J Coll Physicians Surg Pak 2015; 25(1): 83–84.

31. Yagmur Y, Akbulut S, Gumus S, Demircan F. Giant splenic artery pseudoaneurysm: a case report and literature review. Int Surg 2015; 100(7–8): 1244–1248. DOI: 10.9738/INTSURG-D-15-00043.1.

32. Uyar IS, Okur FF, Akpinar BA, Abacilar A, Yurtman V, Sahin V, Ates M. Giant splenic artery aneurysm: a case report. Turkish Journal of Thoracic and Cardiovascular Surgery 2013; 21(3): 799–802. DOI: 10.5606/tgkdc.dergisi.2013.6286.

33. Morare NMT, Bosman C, Ogunrombi AB. Splenic artery aneurysm as a rare cause of an upper GIT bleed. BMJ Case Rep 2019; 12: e232383. DOI: 10.1136/bcr-2019-232383.

34. Ayalon A, Wiesner RH, Perkins JD, Tominaga S, Hayes DH, Krom RA. Splenic artery aneurysms in liver transplant patients. Transplantation 1988; 45(2): 386–389. DOI: 10.1097/00007890-198802000-00028.

35. Kaya M, Baran S, Guya C, Kaplan MA. Prevalence and predictive factors for development of splenic artery aneurysms in cirrhosis. Indian J Gastroenterol 2016; 35(3): 201–206. DOI: 10.1007/s12664-016-0670-z.

36. Shellagi N, Pahari H. Giant splenic artery aneurysm as a rare sequela of chronic pancreatitis. Journal of Clinical and Diagnostic Research 2021; 15(11): PD04–PD05. DOI: 10.7860/JCDR/2021/48973.15654.

37. Sellier J, Karam C, Beauchet A, Dallongeville A, Binsse S, Blivet S, Bourgault-Villada I, Charron P, Chinet T, Eyries M, Fagnou C, Lesniak J, Lesur G, Lucas J, Nicod-Tran A, Ozanne A, Palmyre A, Soubrier F, El Hajjam M, Lacombe P. Higher prevalence of splenic artery aneurysms in hereditary hemorrhagic telangiectasia: vascular implications and risk factors. PLoS One 2020; 15(1): e0226681. DOI: 10.1371/journal.pone.0226681.

38. Korfer D, Grond-Ginsbach C, Hakimi M, Böckler D, Erhart P. Arterial aneurysm localization is sex-dependent. J Clin Med 2022; 11(9): 2450. DOI: 10.3390/jcm11092450.

39. Al-Habbal Y, Christophi C, Muralidharan V. Aneurysms of the splenic artery – a review. Surgeon 2010; 8: 223–231. DOI: 10.1016/j.surge.2009.11.011.