

Visceral artery aneurysms: an institutional review

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Abstract

Introduction: Visceral artery aneurysms (VAA) are uncommon but important form of abdominal vascular disease. VAA frequently present as life-threatening emergencies. This study reviews our experience with management of VAA.

Methods: It is a retrospective review of prospectively kept data of patients treated for visceral artery aneurysms in Tribhuvan University Teaching Hospital and Manmohan Cardiothoracic Vascular and Transplant Center from 1997 to 2009.

Results: Fifteen patients were diagnosed with 16 visceral artery aneurysms. These consisted of 7 splenic (in 6 patients), 4 hepatic, 2 superior mesenteric, 1 gastroduodenal, and 1 renal artery aneurysms. There were 14 symptomatic patients including 4 who presented with rupture. Commonest presenting symptom was pain abdomen (14/15), followed by gastrointestinal bleed (6/15) and mass abdomen (5/15). The diagnosis was made with the help of CECT of abdomen in 13 patients, which was confirmed by conventional angiography in three patients. In two patients with obscure GI bleeding, diagnosis was clinched by conventional angiogram. Eight patients were treated only surgically, with three mortality. Transcatheter embolization alone was used in 5 patients. Two patients were treated with combination of surgical and endovascular therapy. One patient with superior mesenteric artery aneurysm in whom nothing could be done during laparotomy died six months later. Average follow up duration was one year.

Conclusion: Splenic artery remains the most commonly afflicted vessel among the visceral artery aneurysms. The VAAs can be treated surgically or with endovascular means with fair success, although the best mode of treatment needs to be individualized.

Key words: Splenic artery aneurysm; Transcatheter embolization; Visceral artery aneurysms.

Introduction

Visceral artery aneurysms (VAA) are rare, accounting for 0.2% of all vascular aneurysms detected at autopsy.¹ However, angiographic studies have reported an incidence as high as 2%.² Visceral artery aneurysms can occur in the celiac, mesenteric, or renal arteries as well as their branches. The most commonly involved are the celiac/mesenteric group of arteries, among which splenic and hepatic arteries account for 80%.²

Unlike peripheral artery aneurysms, which are largely attributable to arteriosclerotic degeneration, the pathogenesis of VAA is variable. Visceral aneurysms can be true aneurysms or pseudoaneurysms. The etiology of true aneurysms is atherosclerosis, medial degeneration, and fibromuscular dysplasia. Pseudoaneurysms usually result from trauma, inflammation, infection, gestational alterations or vasculitis. A rise in the incidence of hepatic artery aneurysms may also be due to increasing use of percutaneous hepatobiliary interventions.²

VAA are mostly asymptomatic. Although the usual mode of presentation is with vague symptoms, they can manifest dramatically with sudden, unalarmed life-threatening hemorrhage. As untreated VAA enlarge progressively and may rupture spontaneously, their early detection and effective treatment is necessary to improve the outcome.¹ Advances in imaging techniques have led to a better and earlier detection of these lesions. Emergency treatment should be offered those who present with abdominal pain or those with evidence of rupture. Endovascular therapy and surgery are well-accepted modalities of treatment, each being applicable to appropriate patient subgroups, with few complications and low recurrence.³

Methods

This is a retrospective analysis of prospectively kept data of VAA managed at Tribhuvan University Teaching Hospital and Manmohan Cardiothoracic Vascular and Transplant Center over a period of 12 years (1997 to 2009). Demography, clinical presentation, diagnosis, intervention and the outcomes were reviewed and analyzed using simple statistical tools. Ethical approval was obtained from the Institutional Review Board.

Results

Sixteen aneurysms were treated over the study period of 12 years. The series comprised of 4 females and 11 males, with age ranging from 5 years to 67 years (mean 34). Seven (44%) were splenic artery aneurysms. (Table 2)

Clinical presentation

A mass in the splenic hilum during routine abdominal ultrasonography (USG) of a female patient was subsequently confirmed to be a splenic artery aneurysm by spiral Computed Tomographic (CT) scan of abdomen with 3D reconstruction. All other patients were symptomatic at presentation. (Table 1) Abdominal pain was the leading symptom. Eleven patients presented in the emergency, including gastrointestinal (GI) bleed in seven (40%) and rupture in four (27%). Out of 11, five (45%) were splenic artery aneurysms and four were hepatic.

Table 1: Clinical Presentation

Clinical Presentation	Number (%)
Pain abdomen	14 (92%)
Haemoperitoneum	4 (20%)
Mass abdomen	5 (33%)
Gastrointestinal bleeding	6 (39%)
Trauma	1 (7%)
Hypersplenism	1 (7%)

Diagnosis

VAA were suspected in 13 patients in preliminary USG of the abdomen which was later confirmed by contrast enhanced CT (CECT) scan of abdomen. Of them, six had splenic artery aneurysm, one had gastroduodenal artery aneurysm, one had superior mesenteric artery aneurysm and one patient who had sustained trauma had renal artery aneurysm with retroperitoneal hematoma. Among these patients, one had chronic pancreatitis with pseudopancreatic cyst. One patient whose USG and CT scan of abdomen had revealed splenic artery aneurysm as well as left renal artery aneurysm, underwent conventional angiography which confirmed two splenic artery aneurysms, one at the origin and the other at the splenic hilum. Two of the patients who presented with gastrointestinal (GI) bleeding had normal upper and lower GI endoscopies. CECT scan of abdomen of these patients was also normal. One of them presented with massive GI bleeding in the background of tubercular enteritis and underwent laparotomy with on table panendoscopy. This revealed hemobilia. Common bile duct exploration was done which showed bleeding from right hepatic duct that stopped on ligating the right hepatic artery. Patient underwent celiac axis angiogram after recurrence of symptoms which revealed aneurysm of one of the branches of right hepatic artery. The other case with GI bleeding underwent angiogram which revealed left hepatic artery aneurysm.

Intervention

Surgery was the approach of choice in nine patients. Of these, six were managed successfully. Two of these who presented with hemoperitoneum and hemodynamic instability had undergone emergency surgery. Seven patients were operated electively. Six patients were managed with transcatheter embolization using gel-foam, out of which one failed and was subsequently managed with aneurysmorrhaphy of the gastroduodenal artery. One patient who had a failed surgery for hepatic artery aneurysm underwent a rescue embolization therapy when symptoms recurred. Unfortunately, even the latter failed, and the patient had to undergo right hepatectomy as the last resort. All patients with splenic artery aneurysm underwent excision of aneurysm with splenectomy except one who underwent ligation of the artery distal and proximal to the aneurysm without splenectomy. In the patient with superior mesenteric artery (SMA) aneurysm, nothing could be done during laparotomy. The patient with gastroduodenal artery aneurysm was managed with excision. (Table 2)

Table 2: Interventions

S. No.	Age/Sex	Presentation	Diagnosis	Intervention
1	50/F	Asymptomatic	Splenic artery aneurysm	Excision and splenectomy
2	21/M	Obscure GI bleed in the background of tubercular enteritis, Haemobilia	Hepatic artery aneurysm	Laparotomy for massive GI bleed with ligation of right hepatic artery (failed), Transcatheter embolisation (failed), right hepatectomy (expired).
3	30/M	Mass abdomen	Gastroduodenal artery aneurysm	Excision
4	5/F	Mass abdomen	Superior mesenteric artery aneurysm	Open and close
5	43/M	haemoperitoneum with pseudopancreatic cyst	Splenic artery aneurysm	Distal pancreatectomy and splenectomy
6	31/M	mass abdomen with GI bleed	Two splenic artery aneurysms, one at the origin and other at the hilum	Excision and splenectomy
7	12/F	GI bleed	Hepatic artery aneurysm	Transcatheter embolisation
8	39/M	Haemoperitoneum	Splenic artery aneurysm	Ligation of artery distal and proximal to aneurysm
9	30/M	Trauma with retroperitoneal haematoma	Right renal artery aneurysm	Transcatheter embolisation
10	23/F	GI bleed at 29 weeks of pregnancy	Hepatic Artery Aneurysm	Embolization
11	54/M	Painful abdominal mass with GI bleed and obstructive jaundice	Hepatic Artery Pseudoaneurysm	Embolization
12	54/M	Hemoperitoneum	Splenic Artery Aneurysm	Exploratory laparotomy (patient expired on table)
13	67/M	Painful mass abdomen	Superior Mesenteric Artery Aneurysm	Exploration (dissection impossible); patient expired postoperatively
14	29/M	Extrahepatic Portal Vein Obstruction with Hypersplenism	Splenic Artery Aneurysm	Embolization
15	14/M	GI bleeding, in the background of chronic pancreatitis with stented duct	Rt gastroepiploic artery pseudoaneurysm	Coil embolization (failed) Aneurysmorrhaphy

Outcome

Surgical treatment alone resulted in good outcome in 5 out of 8 patients. Two patients died in perioperative period and one after six months due to rupture, in whom nothing surgically could be done. Two patients had surgical morbidity in the form of intra-abdominal sepsis requiring laparotomy in one, and postoperative psychosis in another. Seven

patients underwent transcatheter arterial embolization: as sole therapy with success in five, and as a part of therapy in two in which it failed. One of them underwent right hepatectomy (but died in third postoperative week due to sepsis and coagulopathy), while the other underwent successful aneurysmorrhaphy afterwards. (Table 2) Two patients lost to follow up, with average follow up duration being one year. Abdominal ultrasound was done

in all patients at follow up. No short-term complications/recurrences were noted during this time.

Discussion

Management of VAA remains an extremely challenging clinical problem. The decision of when to treat is usually based on symptoms. A patient who presents with abdominal pain or whose CT scan shows evidence of a rupture should be considered for immediate therapy. In the asymptomatic state treatment should be provided for pseudo-, splenic, or renal aneurysms of any size in women of childbearing age. Significant questions exist regarding the optimal therapeutic choice: surgery is the conventional treatment, and its efficiency and durability are well documented. Angiographic embolization of the aneurysms is an emerging option, with constantly improving results.⁵

However, the ultimate choice depends upon factors like availability of services, surgical practice, and clinical presentation. In a report from Italy, all but one of the 59 pseudoaneurysms in 55 patients were treated with surgery with excellent results.⁶ A retrospective review of 41 patients, on the other hand, showed that endovascular intervention provides compatible, even better early postoperative outcomes for visceral artery aneurysms, when compared to surgery.⁵

Conventional open surgical excision and repair should be considered when patients present with hypotension or when collateral circulation is not adequate to maintain perfusion to the end organ, risking ischemia and infection.²

Endovascular therapy, with the main intent of isolating the aneurysm from circulation while maintaining circulation to end organ, can be accomplished by multiple techniques. Larger arteries and aneurysms are usually embolized using coils; particle embolization is used for smaller and more distal ones. Other options include embolization of only the neck in narrow-necked saccular aneurysms, and placing covered stents across the aneurysms.² We used absorbable gelatin sponge particles exclusively for ease of use, availability and cost issues. On the whole, elective endovascular procedures produce better results than emergent ones.⁷ In our case, though, four out of five successful embolizations were done on an urgent basis for conditions such as rupture and GI bleeding. In two patients, both endovascular and surgical modalities were used when the primary therapy failed. Such a complementary combination has also been reported in the literature.⁵

As in most of the reported series, splenic artery was the most commonly involved one (44%) in our patient population, followed by hepatic (25%) and superior mesenteric (13%) arteries. Interestingly, 4/6 patients with splenic and 4/4 patients with hepatic artery affliction presented as an emergency. In fact, 67% of our patients presented with rupture into GI lumen or into peritoneal cavity or the retroperitoneal space: a significantly higher proportion than previously reported. Perhaps for the same

reason, the mortality rate in rupture stood at a high 20% compared to a mere 8.5% as previously noted.⁸ The overall mortality of 20% (3/15) is comparable to a similar 10-year retrospective series but is much higher than that of a mostly 'asymptomatic-elective' patient population.^{5,6}

Concomitant malignancy, renal failure, chronic lung disease, liver cirrhosis and previous abdominal surgery have been pointed out as possible predictors of unfavorable outcome in some series; similar analysis could not be carried out in the present study.⁵ All the three patients who expired were subjected to surgery as sole or primary therapy. Hence, better selection of patients and identification of suitability of surgical or endovascular therapy for an individual patient probably remain the cornerstone of success. As a report concludes, in general, there is no consensus on the best treatment of VAA and the highest level of evidence is based upon expert opinion.⁴

Conclusion

Splenic artery remains the most commonly afflicted vessel among the visceral artery aneurysms. The VAAs can be treated surgically or with endovascular means with fair success, although the best mode of treatment needs to be individualized.

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