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Research Article

Endovascular Treatment of Visceral Artery Aneurysms and Pseudoaneurysms: A Retrospective Single-Centre Original Research Study

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Abstract: ***Introduction:*** Visceral artery aneurysms are uncommon vascular lesions, yet they carry substantial clinical importance because rupture may result in major hemorrhage and high mortality. Over the last decade, endovascular treatment has emerged as the preferred option for many anatomically suitable lesions because it offers rapid hemorrhage control with lower procedural morbidity than open surgery.**Aim**To evaluate the demographic profile, lesion characteristics, procedural approach, and early as well as late outcomes of endovascular treatment for visceral artery aneurysms and pseudoaneurysms.**Methods**This retrospective single-centre study reviewed 48 patients with 50 visceral artery aneurysms/pseudoaneurysms treated at tertiary care hospital, Mysore, between 2006 and 2021. All patients underwent transcatheter endovascular treatment through common femoral access under local anesthesia with conscious sedation. Demographic data, symptoms, associated conditions, lesion location, aneurysm type, embolization strategy, embolic material, and follow-up outcomes at 24 hours, 4 weeks, 3 months, and 1 year were analyzed.**Results** The cohort comprised 32 men (66.7%) and 16 women (33.3%), with a mean age of 32.1 ± 10.9 years (range 12-57 years). Splenic artery lesions were most common (15/50, 30.0%), followed closely by gastroduodenal artery lesions (14/50, 28.0%). True aneurysms accounted for 29 lesions (58.0%) and pseudoaneurysms for 21 (42.0%). Proximal and distal embolization was the commonest technique (26/50, 52.0%), and coils were the most frequently used embolic agent (39/50, 78.0%). Immediate successful exclusion or hemorrhage control was achieved in 47 of 48 patients (97.9%). At 4 weeks, all patients showed stable exclusion. At 3 months, stable exclusion persisted in 44 patients (91.7%), while 2 required surgery and 2 had died. One-year durable exclusion was documented in 44 patients, with 2 additional exclusions after surgery.**Conclusion**Endovascular treatment provided high technical success and durable short- to intermediate-term control across a heterogeneous spectrum of visceral artery aneurysms. Coil embolization and exclusion techniques were particularly effective in this cohort, supporting endovascular therapy as a practical first-line option in appropriately selected patients.

Keywords: Visceral Artery Aneurysm, Pseudoaneurysm, Endovascular Embolization, Transcatheter Therapy, Interventional Radiology.

INTRODUCTION

Visceral artery aneurysms and pseudoaneurysms are rare lesions arising from the splanchnic or renal arterial circulation. Their clinical significance is disproportionate to their incidence because rupture may present as upper gastrointestinal bleeding, hematuria, abdominal pain, retroperitoneal hemorrhage, or sudden hemodynamic collapse.[1-3] Increasing use of cross-sectional imaging has improved incidental detection, but a substantial number of patients still present only after bleeding or mass effect has occurred.

Management decisions are shaped by lesion size, location, morphology, rupture status, and the physiological reserve of the patient. Contemporary reviews and guideline documents increasingly favor endovascular therapy for many lesions because it can control bleeding quickly, avoid laparotomy, shorten hospital stay, and permit treatment in patients who carry significant operative risk.[1,3-5] Coil embolization, sandwich embolization, sac packing, liquid embolics, and covered stent techniques have all expanded the therapeutic armamentarium.

Even so, the pattern of disease remains heterogeneous. Splenic, gastroduodenal, hepatic, renal, celiac, and superior mesenteric artery lesions do not behave identically, and pseudoaneurysms in particular may be more unstable because they often arise in the setting of pancreatitis, surgery, or iatrogenic injury.[2,6-10] Outcome data from single-centre experiences therefore remain valuable, especially when they describe real-world combinations of lesion types and embolization strategies. The present study was undertaken to analyze the demographic profile, anatomical distribution, procedural details, and early as well as long-term outcomes of endovascular treatment for visceral artery aneurysms and pseudoaneurysms in a retrospective hospital-based cohort.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective review of patients who underwent endovascular treatment for visceral artery aneurysms/pseudoaneurysms at tertiary care hospital, Mysore, from 2006 to 2021.

Study Population

The final study cohort comprised 48 patients. A total of 50 aneurysms were treated, with more than one aneurysm identified in 2 patients. Patients were referred by surgeons and gastroenterologists. All were hospitalized, underwent the necessary investigations, received standard medical management, and were assessed for surgical options before endovascular treatment.

Data Collection and Outcome Measures

Demographic profile, presenting symptoms, associated conditions, aneurysm location, aneurysm type, embolization strategy, embolic material, and follow-up outcomes were reviewed. Follow-up assessment was performed at 24 hours, 4 weeks, 3 months, and 1 year. Successful treatment was defined as cessation of hemorrhage or symptom control, hemodynamic and hematologic stabilization where relevant, and absence of persistent aneurysmal flow on follow-up imaging.

Procedure Details

Conscious sedation with local anesthesia was preferred. Endovascular access for all procedures was obtained through the common femoral artery using a 6F or 7F femoral sheath. Selective angiography was performed with appropriate visceral catheters. The commonly used catheters were Cobra, SIM, RDC, and microcatheters. Embolic materials included coils, glue, polyvinyl alcohol particles, and gelfoam. Depending on aneurysm morphology and parent vessel anatomy, sac embolization, proximal embolization alone, or combined proximal and distal embolization was performed.

Statistical Analysis

Data were summarized descriptively. Patient-based variables were expressed as counts and percentages for categorical data and as mean with standard deviation and range for age. Lesion-related procedural data were analyzed at aneurysm level.

RESULTS

The study included 48 patients with 50 treated aneurysms. Males predominated (32/48, 66.7%), and the mean age was 32.1 ± 10.9 years, with a range of 12 to 57 years. Two patients harbored more than one aneurysm. The study flow is illustrated in Figure 1.

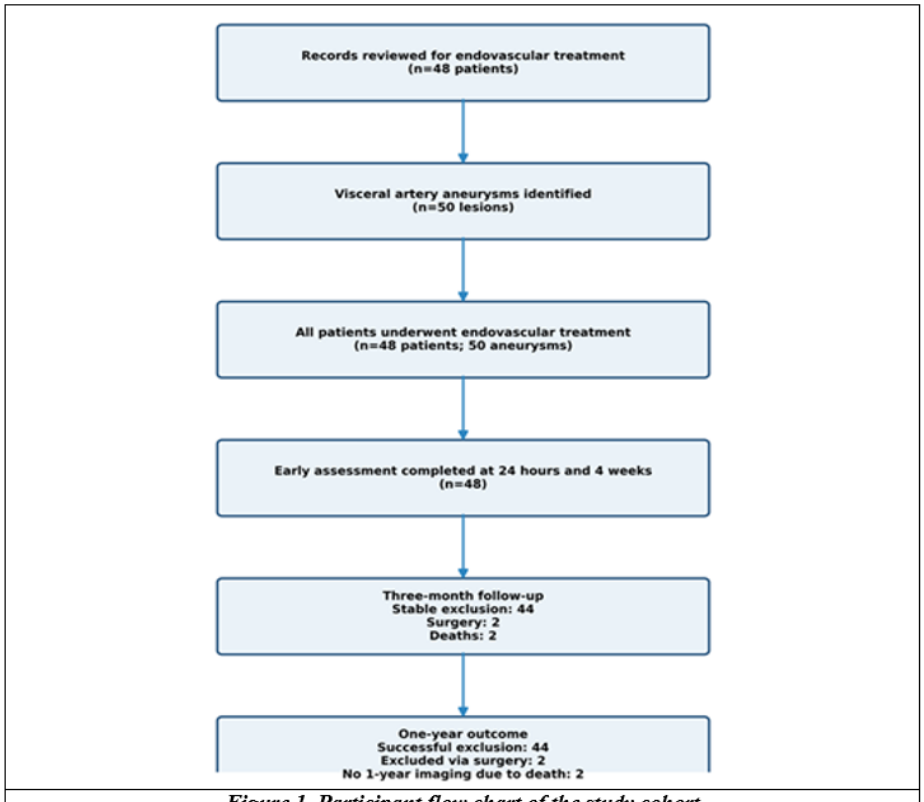


Figure 1. Participant flow chart of the study cohort

Flow chart summarizes inclusion, lesion burden, endovascular treatment, and serial follow-up

Pain was the commonest presenting symptom, followed by gastrointestinal bleeding and hematuria. Chronic pancreatitis was the leading associated condition. The baseline demographic and clinical profile is summarized in Table 1, and the age-group distribution is shown in Figure 2.

Variable	Value
Total patients	48
Total aneurysms treated	50
Patients with >1 aneurysm	2
Male	32 (66.7%)
Female	16 (33.3%)
Mean age ± SD	32.1 ± 10.9 years
Age range	12-57 years
Pain	37 (77.1%)
Gastrointestinal bleeding	31 (64.6%)
Hematuria	18 (37.5%)
Abdominal distension	9 (18.8%)
Chronic pancreatitis	23 (47.9%)
Previous surgery/procedure	14 (29.2%)
Chronic liver disease	6 (12.5%)
Hypertension	5 (10.4%)
Neoplasm	2 (4.2%)

Table 1. Baseline demographic and clinical profile of the study population

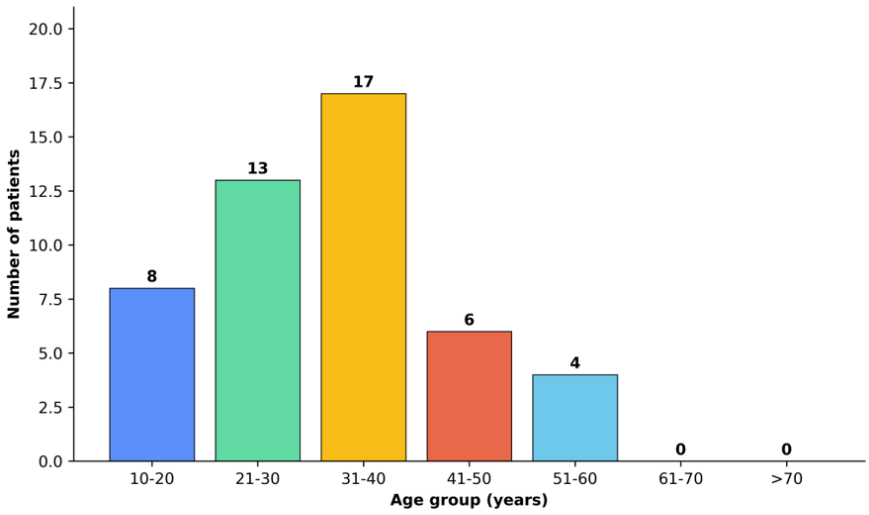


Figure 2. Age-group distribution of patients undergoing endovascular treatment

Values above bars indicate patient counts in each age band.

At aneurysm level, splenic artery lesions were the most frequent (15/50, 30.0%), followed by gastroduodenal artery lesions (14/50, 28.0%). True aneurysms (29/50, 58.0%) slightly outnumbered pseudoaneurysms (21/50, 42.0%). The anatomical distribution and lesion type are detailed in Table 2 and Figure 3.

Arterial Territory	Total Aneurysms	True Aneurysms	Pseudoaneurysms
Splenic	15	9	6
Gastroduodenal	14	6	8
Renal	9	6	3
Hepatic	6	3	3
Celiac	3	3	0
Superior mesenteric artery	3	2	1

Table 2. Anatomical distribution and type of visceral artery aneurysms treated in the series

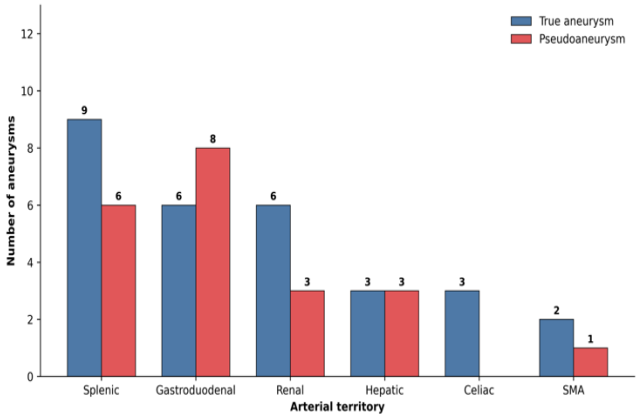


Figure 3. Distribution of treated aneurysms according to arterial territory and aneurysm type

Grouped bars compare true aneurysms with pseudoaneurysms across arterial territories

With respect to technique, combined proximal and distal embolization was the commonest approach (26/50, 52.0%), followed by proximal embolization alone (15/50, 30.0%) and sac embolization (9/50, 18.0%). Coils were the dominant embolic material (39/50, 78.0%), whereas glue, gelfoam, and combined coil plus particulate or gelfoam techniques were used selectively. These procedural details are summarized in Table 3 and Figure 4.

Category	Subgroup	n (%)
Embolization strategy	Sac embolization	9 (18.0%)
Embolization strategy	Proximal and distal	26 (52.0%)
Embolization strategy	Proximal only	15 (30.0%)
Embolic material	Coils	39 (78.0%)
Embolic material	Glue	3 (6.0%)
Embolic material	Gelfoam	2 (4.0%)
Embolic material	Coil + Gelfoam/PVA	6 (12.0%)

Table 3. Endovascular strategy and embolic materials used for treated aneurysms

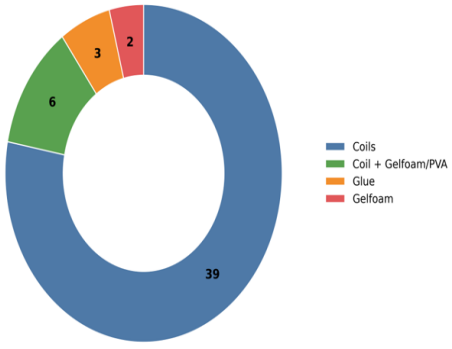


Figure 4. Embolic materials used for endovascular treatment

Donut chart displays lesion-level distribution of embolic agents and material combinations

Clinical success was high across follow-up. Immediate successful hemorrhage control or lesion exclusion was achieved in 47 of 48 patients (97.9%), with one early recurrent bleed. By 4 weeks, all 48 patients demonstrated stable exclusion. At 3 months, stable exclusion persisted in 44 patients (91.7%), while 2 patients required surgery and 2 had died. At 1 year, durable exclusion was documented in 44 patients, and a further 2 aneurysms had been excluded surgically. Follow-up outcomes are shown in Table 4 and Figure 5.

Follow-up Interval	Patients Assessed	Successful/Stable Exclusion	Repeat Intervention or Surgery	Death / Unavailable
Immediate (24 hours)	48	47 (97.9%)	1 (2.1%)	0
Early (4 weeks)	48	48 (100.0%)	0	0
Short term (3 months)	48	44 (91.7%)	2 (4.2%)	2 (4.2%)
Long term (1 year)	48	44 (91.7%)	2 (4.2%)	2 (4.2%)

Table 4. Follow-up outcomes after endovascular treatment of visceral artery aneurysms

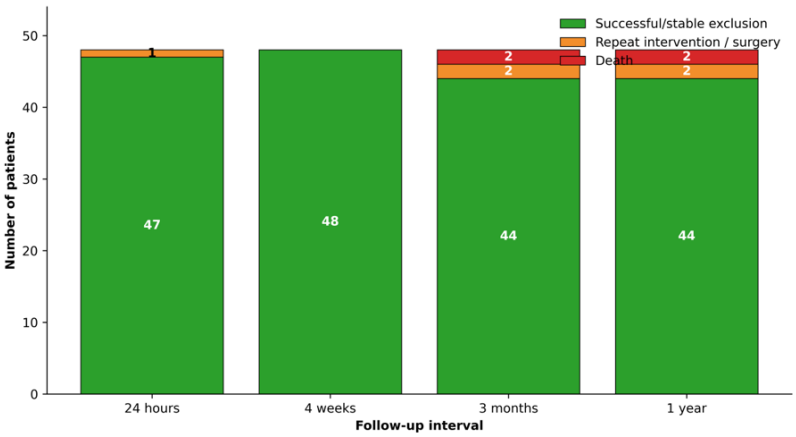
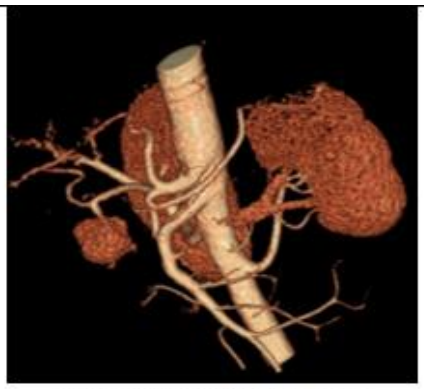


Figure 5. Follow-up status across serial assessment intervals

Stacked bars show successful exclusion, need for further intervention, and deaths at each follow-up interval

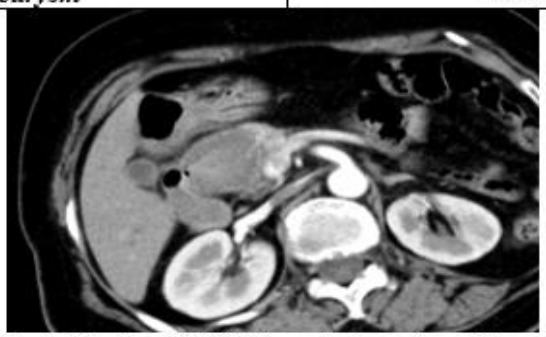
Contrast CT revealing GDA Aneurysm



CT VRT of GDA Aneurysm

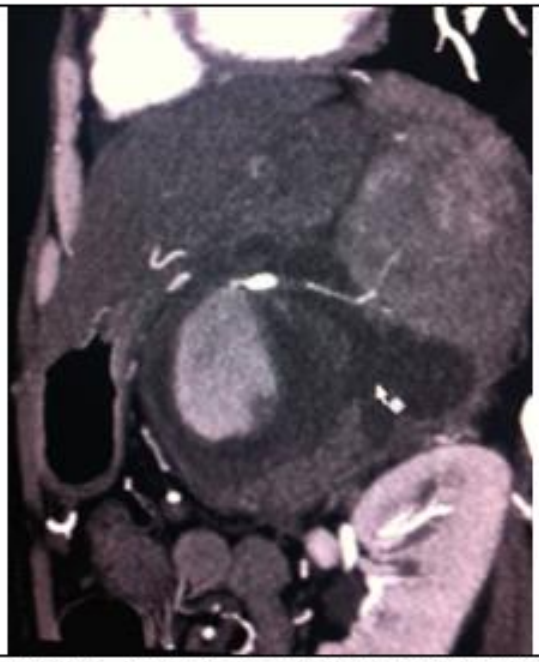
Catheter Angio revealing Large GDA Aneurysm

Coil embolization of neck of GDA aneurysm

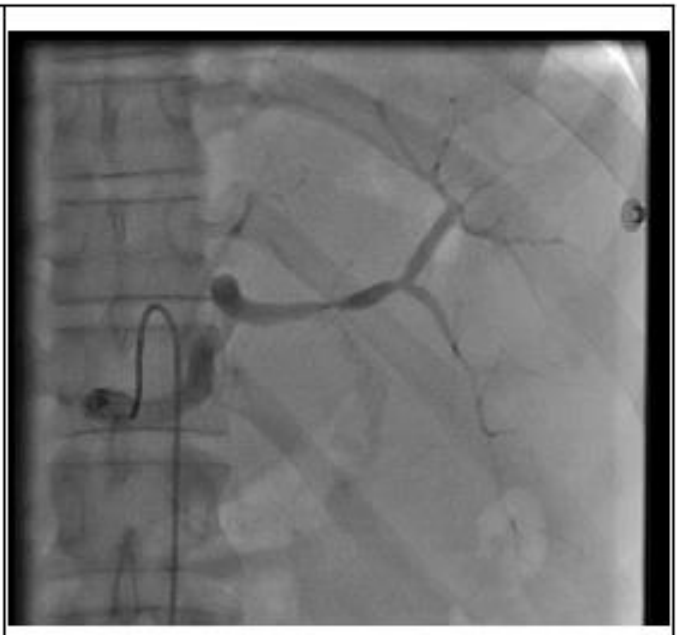


Post Embolization CECT, Reveals thrombosed Aneurysm

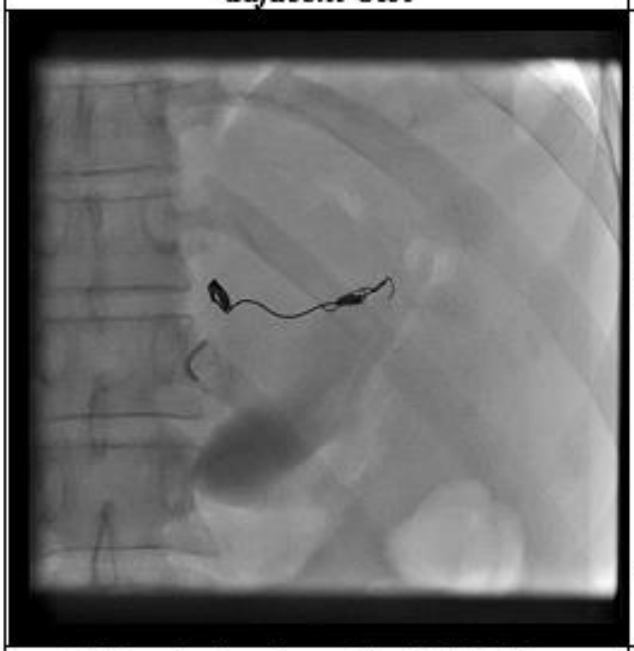
Figure 1: 67 yr Female with Upper GI Bleed



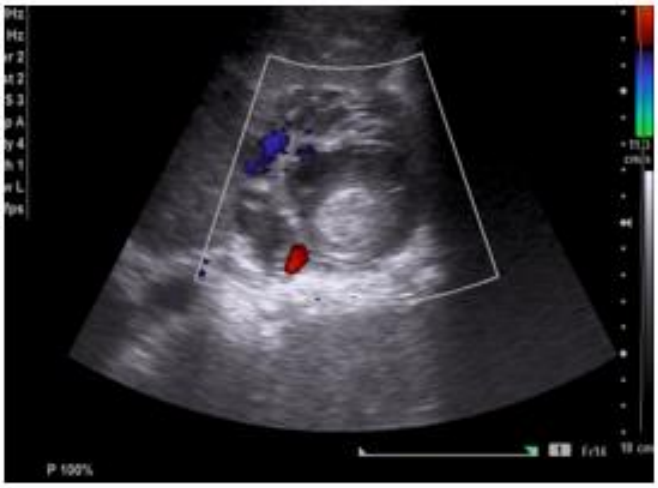
CECT – Splenic artery aneurysm with adjacent Clot



Splenic artery Angio- Aneurysm

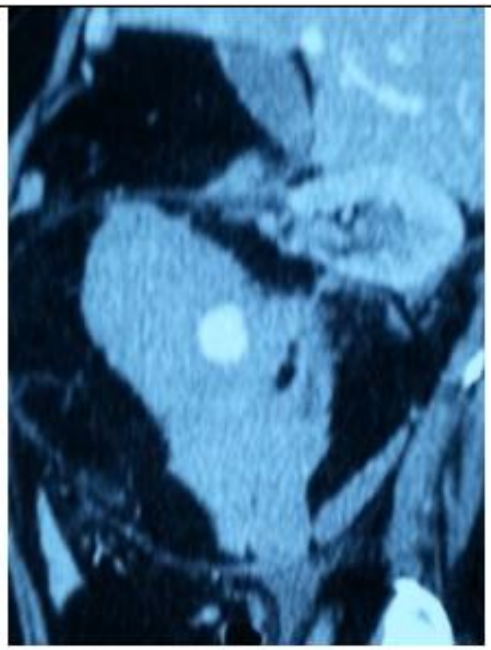


Coil embolization - Sandwich Type

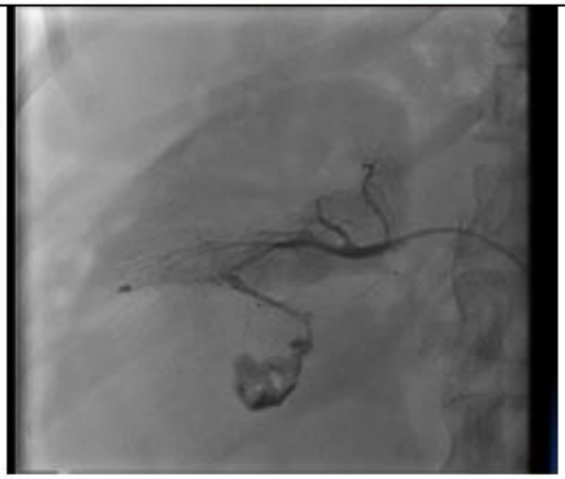


Doppler Ultrasound – Thrombosed Aneurysm

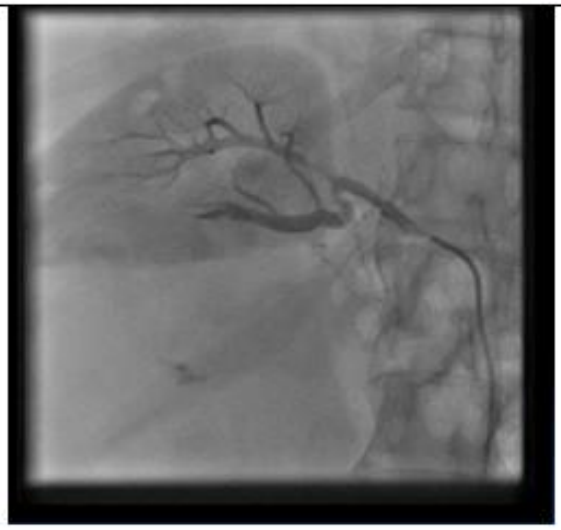
Image 2: 38 yrs male, Chronic Pancreatitis, Melena



CECT Renal Pseudoaneurym with Perinephric Haematoma



Right Renal Angio – Pseudoaneurym from Lower Pole Artery



Post Coil Embolisation

50 year old lady, Suspected AML Right Kidney, Post PCNL Haematuria & Dropping HB

DISCUSSION

This retrospective series demonstrates that endovascular treatment was effective across a broad spectrum of visceral artery aneurysms and pseudoaneurysms. The cohort combined rupture-related presentations, pain syndromes, hematuria, and lesions associated with pancreatitis or prior intervention, which reflects the real-world heterogeneity described in contemporary reviews.[1,2,6,11] Even within that mixed case-mix, immediate clinical success approached 98%, and stable exclusion was maintained in the majority of patients through 1 year.

The anatomical distribution in this study was led by splenic and gastroduodenal artery lesions. That pattern is clinically plausible. Splenic artery aneurysms remain the commonest true visceral aneurysms in most modern series, whereas pseudoaneurysms are frequently linked to pancreatitis, surgery, or inflammatory processes involving the gastroduodenal and peripancreatic circulation.[1,7,10] The burden of chronic pancreatitis in the present cohort supports that association.

Technique selection was individualized according to aneurysm morphology and parent-vessel anatomy. Proximal and distal embolization was the commonest strategy, followed by proximal embolization alone and sac packing. Coils were the dominant embolic material. This preference is in line with contemporary endovascular practice, where coil-based exclusion remains widely used because of its versatility, controllability, and suitability for both true aneurysms and pseudoaneurysms.[3-5,9,11-14] The selective use of glue, gelfoam, and combination therapy in the present series suggests a pragmatic lesion-specific approach rather than dependence on a single device platform.

When the present findings are interpreted against recent literature, the overall message is consistent. Contemporary guideline and observational data support endovascular therapy as a first-line option for many visceral artery aneurysms, particularly when rapid hemorrhage control or organ-preserving minimally invasive management is desired.[2-5,12,13] The high early success observed here and the durable one-year exclusion in most patients align with those broader reports, even though direct comparison must remain cautious because lesion anatomy, rupture status, and follow-up definitions vary between studies.

The study has limitations. It was retrospective, single-centre, and based on treatment-era practice over several years. Follow-up outcomes were primarily descriptive, and the available case records did not support formal comparative modeling across aneurysm subtypes or embolic platforms. In addition, two deaths were recorded during follow-up, but causality could not be explored in detail from the available records. These limitations matter. Still, the study retains practical value because it documents outcome patterns from routine endovascular practice across multiple arterial territories.

Overall, the data support endovascular treatment as a dependable therapeutic option for visceral artery aneurysms and pseudoaneurysms in appropriately selected patients, with high immediate success and durable exclusion in most cases.

CONCLUSION

Endovascular treatment achieved high immediate success and favorable one-year durability in this retrospective cohort of visceral artery aneurysms and pseudoaneurysms. Splenic and gastroduodenal artery lesions predominated, coils were the principal embolic agent, and combined proximal-distal exclusion was the most frequently used strategy. These findings support endovascular therapy as an effective and practical treatment option for a wide range of visceral arterial aneurysmal lesions.

Source of Funding
Nil.

Conflict of Interest
None declared.

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