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MANAGEMENT OF LOWER LIMB PSEUDOANEURYSMS FROM AN IR PERSPECTIVE: A SINGLE-CENTRE 6-YEAR CLINICAL EXPERIENCE

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Background:

- The situation: Lower limb pseudoaneurysms (PSAs) are common vascular complications, most often iatrogenic. Minimally invasive image-guided treatments have largely replaced surgical repair.
- The gap: Literature evaluating and comparing different image guided treatment techniques (Percutaneous/ US guided vs. Hybrid vs. Endovascular) remains limited.

Objectives:

- Primary: Evaluate effectiveness and safety of image-guided treatments in lower limb PSAs.
- Secondary: Describe and compare different image guided treatment techniques, and explore potential reperfusion risk factors and outcome differences between treatments.

Methods

Retrospective Review
(6-year period,
Aug 2020 – Jul 2026)

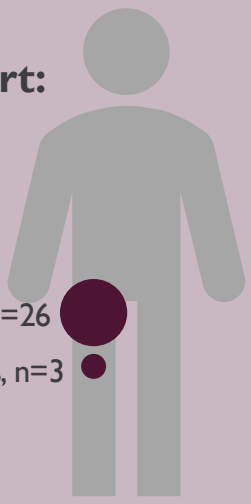
RIS/ PACS Search
(Symptomatic or >2cm PSAs received image guided treatments)

Study Cohort
(29 PSAs in 29 consecutive patients)

Analysis
(etiology, clinical setting, PSA characteristics, techniques, safety)

High risk cohort:

Impaired haemostasis
75.9%, n=22



Distribution

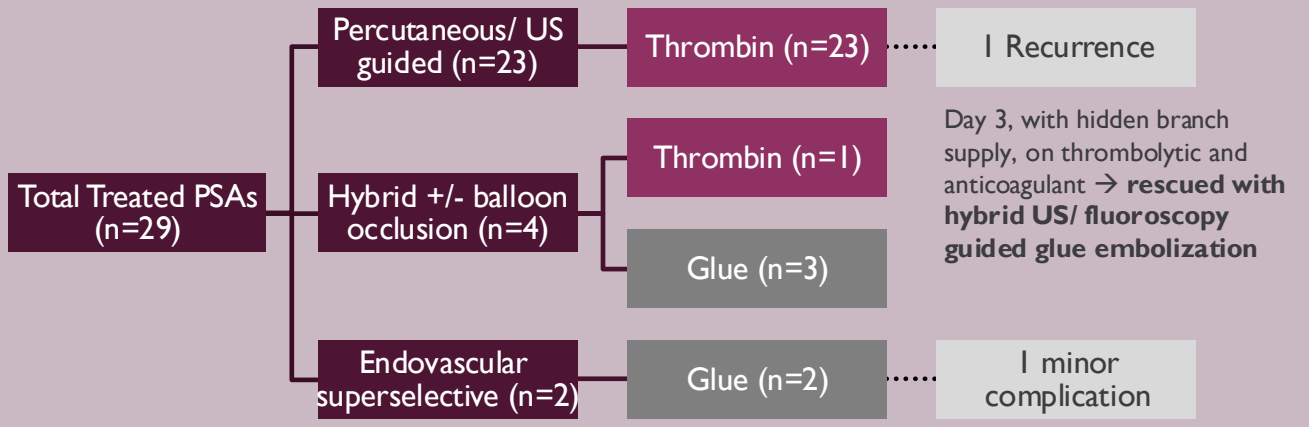
Groin: 89.7%, n=26
Thigh: 10.3%, n=3

Etiology

Unknown 3.4%, n=1
Traumatic: 3.4%, n=1
Iatrogenic: 93.1%, n=27

PSA characteristics

- Mean aneurysmal size: 24mm (6-46mm)
- Mean neck diameter: 2.2mm (1-5mm)
- Wide neck (>3mm): 2 cases
- Sac size ≥5cm: 0 case
- Multilobed complex appearance: 0 case



Note: Secondary analyses limited by the small subgroup sizes

Techniques	Primary Indication	Advantage	Disadvantage/ Limitation
Percutaneous/ US guided thrombin injection (UGTI)	• Superficial/ US accessible sac • Neck and needle tip visualized on Doppler	• No iodinated contrast risk/ radiation • No arterial access • Real-time Dopper monitoring of flow cessation	• May miss occult feeder • Risk of non-target distal embolization for wide or short neck/ large volume/ forceful injection • Potential reperfusion risk on anticoagulants/ thrombolytics
Hybrid US/ fluoroscopy +/- Balloon occlusion	• Sac accessible to percutaneous puncture • Complex anatomy • Neck/ runoff uncertain • Balloon occlusion reserved for unfavourable neck	• Catch distal embolization event immediately • Identify occult feeder that US may miss • Balloon (if used) provides physical parent artery protection during injection	• Iodinated contrast risk/ radiation • Secondary arterial access • Without a balloon: potential embolization risk • With balloon occlusion: adds risk of dissection, ischaemia, adherence of glue to the balloon
Endovascular superselective glue embolization	• Feeder that can be catheterized • Percutaneous sac puncture unsafe/ difficulty/ unsuccessful	• Direct feeder control • Not limited by the percutaneous skin/ soft tissue window or overlying hematoma	• Iodinated contrast risk/ radiation • Arterial access • Reflux risk • Feeder occlusion may be required

100%

Technical success rate for all techniques

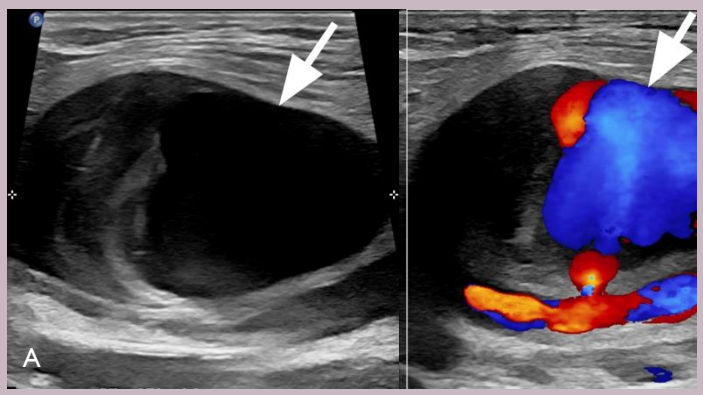
Immediate intra-saccular flow cessation

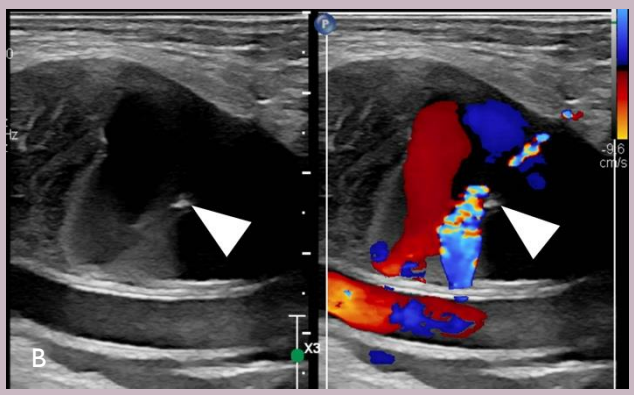
96.6% → 100%

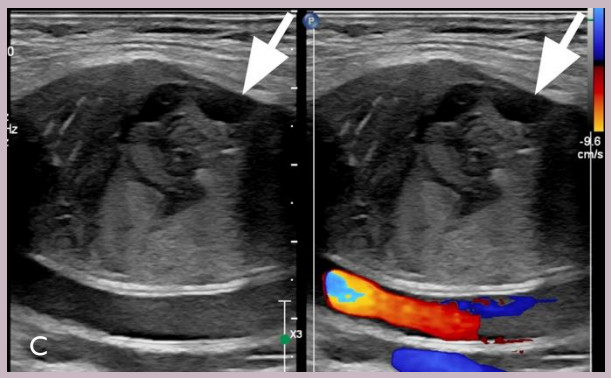
Primary → secondary clinical success rate

1 early recurrence after UGTI, successfully rescued

Safety Profile: Satisfactory overall safety over a median follow up of 4.1 weeks (1-16 weeks), with only 1 minor complication (small secondary access-site PSA)







Case 1: US guided thrombin injection, for a 56/M with right CFA PSA (sac size 46mm, neck diameter 3mm) after renal artery embolization.

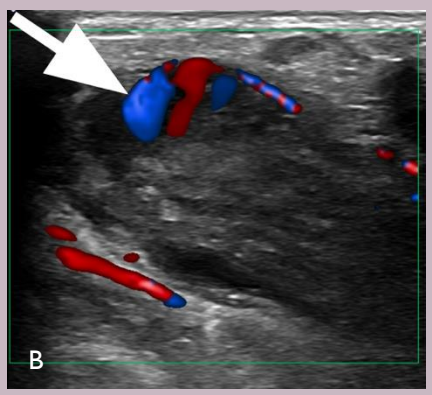
A. US: Partially thrombosed PSA, with Ying-Yang sign (**arrows**).

B. US: Needle tip in sac (**arrowheads**), for thrombin injection under real time US monitoring.

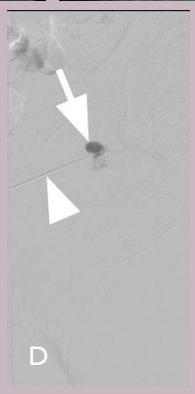
C. US: Complete thrombosis with no intra-saccular flow (**arrows**). Parent artery flow preserved.

Case 2: Hybrid US and fluoroscopy guided glue embolization, for a 73/F with left medial circumflex femoral artery (MCFA) (sac size 7mm, neck diameter 1mm) of unknown etiology.











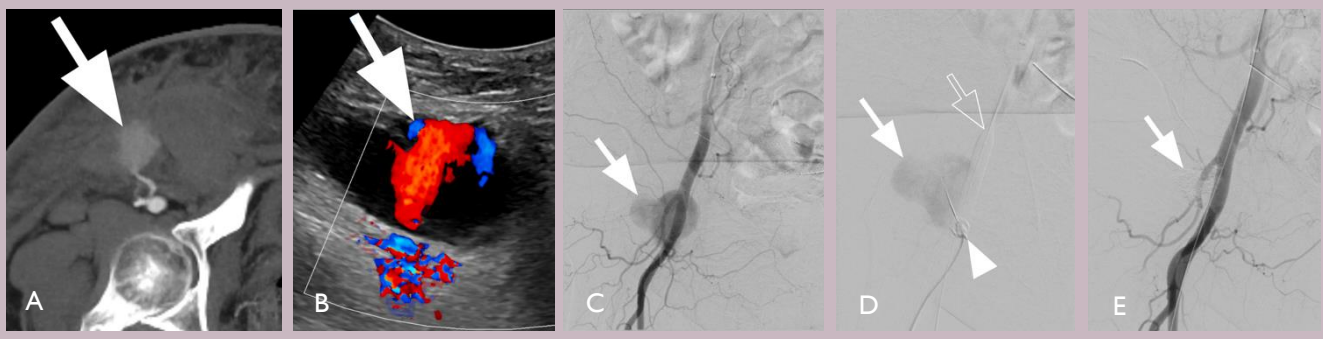
A. CTA (MIP image): A large groin hematoma with a small PSA (**arrow**).

B. US: Partially thrombosed PSA, with Ying-Yang sign (**arrow**), neck not visualized. Decided for left femoral DSA for better delineation of vascular anatomy.

C. DSA: PSA (**arrow**) arising from a MCFA branch, with a narrow neck.

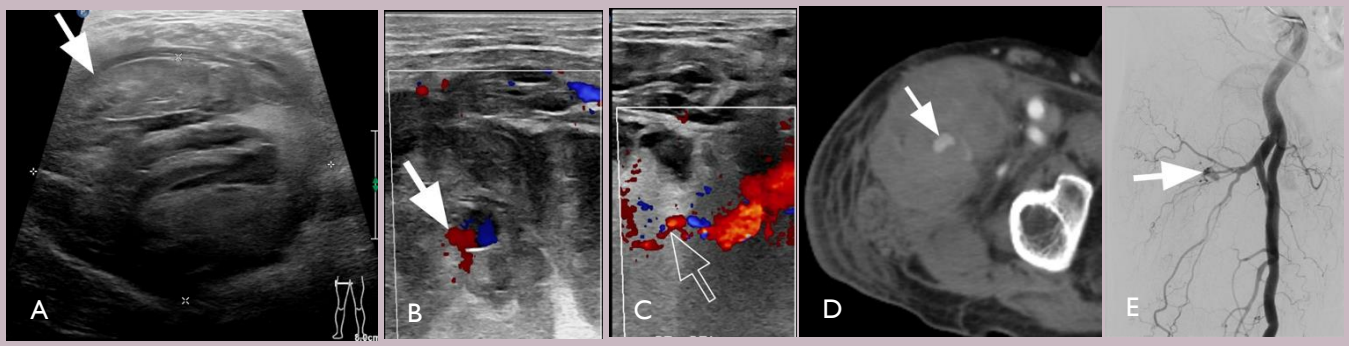
D. DSA: Percutaneous sac puncture under US guidance, intra-saccular position confirmed with contrast (**arrowhead**: needle), for glue embolization under fluoroscopic guidance (**arrow**).

E. Check DSA: No flow in PSA (**arrow**). MCFA flow preserved. No non-target embolization.



Case 3: Hybrid US and fluoroscopy guided balloon assisted glue embolization, for a 72/F with right CFA PSA (sac size 42mm, neck diameter 3mm) after PCI, on antiplatelets.

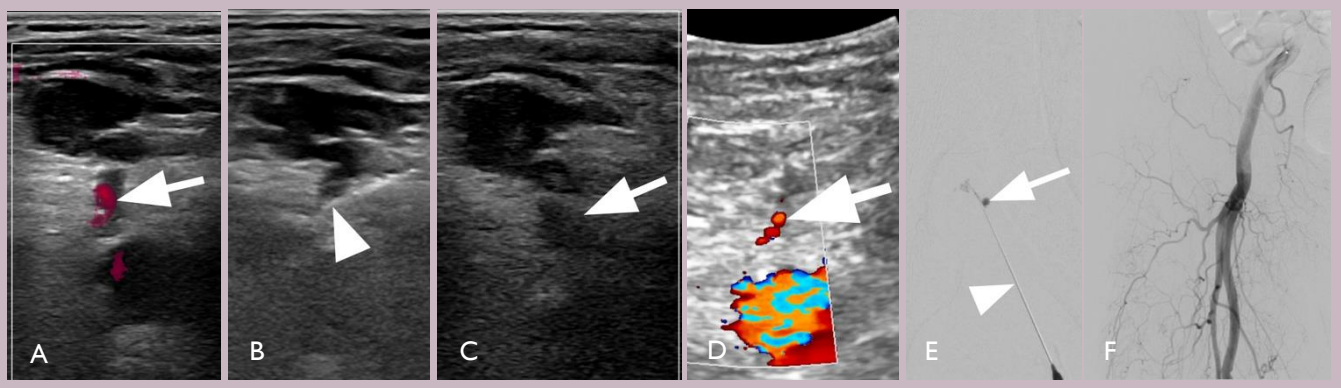
A. CTA (MIP image): A large groin hematoma, PSA (**arrow**) with a tortuous 3mm neck.
B. US: PSA with Ying-Yang sign (**arrow**). The neck which lies deeper is not visualized. Percutaneous US guided thrombin injection deemed difficult. Endovascular approach adopted.
C. DSA: Confirmed a PSA (**arrow**) arising from the right CFA. The supplying neck is again not confidently identified. Attempted endovascular cannulation but unsuccessful.
D. Percutaneous sac puncture after under US guidance (**arrowhead**: needle). Balloon (**open arrow**) inflated at right CFA across the PSA to prevent reflux. Percutaneous glue embolization of the PSA performed under fluoroscopic guidance (**arrow**).
E. Check DSA: No flow in PSA (**arrow**). Parent artery flow preserved. No non-target embolization.





Case 4: Endovascular superselective glue embolization, for a 71/M with with right profunda femoris artery (PFA) branch PSA (sac size 11mm, neck diameter 3mm) after hip joint aspiration.

A. US: A large thigh hematoma (**arrow**).
B. US: Small PSA with Ying-Yang sign (**arrow**).
C. Torturous neck (**arrow**) from PFA.
D. CTA for better vascular anatomy delineation: anterior thigh hematoma, PSA (**arrow**), and a narrow neck from PFA.
E. DSA: PSA (**arrow**) from a PFA branch.
F. DSA: Glue embolization (**arrow**) performed proximal to the feeding artery (**arrowhead**: microcatheter tip) under fluoroscopic guidance.
G. Check DSA: No flow in PSA (**arrow**). Parent artery flow preserved. No non-target embolization.



Case 5: Early recurrence of US guided thrombin injection, successfully rescued with hybrid US and fluoroscopy guided glue embolization, for a 66/M with right groin PSA (sac size 13mm, neck diameter 3mm) after IA thrombectomy for stroke with preprocedural TNK and postprocedural anticoagulant.

A. US: Small right CFA PSA (**arrow**) with a narrow neck, underneath the overlying hematoma.
B. US: Needle tip in sac (**arrowhead**), for thrombin injection under real time US monitoring.
C. US: Complete thrombosis with no intra-saccular flow (**arrow**).
D. FU US 3 days later: Partial reperfusion of the PSA and the neck (**arrow**). Cone-beam CT confirmed PSA reperfusion from right lateral circumflex femoral artery (LCFA) in close proximity to the right CFA (not shown).
E. Percutaneous sac puncture under US guidance (**arrowhead**: needle), percutaneous contrast injection with sac opacification (**arrow**) confirmed intra-saccular position, for glue embolization under fluoroscopic guidance.
F. Check DSA: Successful percutaneous embolization of the target right LCFA branch. No PSA seen. Parent artery flow preserved. No non-target embolization.

Conclusion:

Image-guided (percutaneous/ hybrid/ endovascular) treatment of lower limb pseudoaneurysms with thrombin or glue are **effective and safe** in this cohort despite recognized reperfusion risk factors in most cases.

Limitations:

Small retrospective cohort, limited subgroup sizes, reliance on available documentation.

Further Reading:

1. Bansal, A., Gorsi, U., Farook, S., Savlania, A., & Sandhu, M. S. (2021). Interventional radiology management of extremity pseudoaneurysms: a pictorial essay. *Emergency radiology, 28*(5), 1029–1039. https://doi.org/10.1007/s10140-021-01939-w
2. Shah, K. J., Halaharvi, D. R., Franz, R. W., & Jenkins Ii, J. (2011). Treatment of Iatrogenic Pseudoaneurysms Using Ultrasound-Guided Thrombin Injection over a 5-Year Period. *The International journal of angiology : official publication of the International College of Angiology, Inc, 20*(4), 235–242. https://doi.org/10.1055/s-0031-1295521