

Arteriovenous Fistula Salvage with the Minimally Invasive IRANI Procedure

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Introduction

- Arteriovenous fistulae (AVF) are the preferred hemodialysis access modality.
 - Increased durability, prolonged patency, and low infection rates¹
- Disadvantages:
 - Primary failure rates up to 50%, prolonged maturation times, and significant abandonment rates²
- Primary maturation failure causes:
 - Early thrombosis and failure of the draining vein to dilate, but 46% of all cases are due to alternative outflow routes via accessory veins³
- National Kidney Foundation 2003 Fistula First Breakthrough Initiative:
 - Avoid central venous catheter placement and salvage of non-maturing fistulas⁴
- AVF salvage:
 - Accessory vein occlusion using suture ligation or coil embolization⁵
- Interrupting Rivaling Access-flow with Nonsurgical Image-guided ligation "IRANI" procedure:
 - Tunnel needles deep and superficial to the target vein to serve as conduits for sutures which are then tied to occlude the accessory vein⁶

Case Presentation

- A 55-year-old male with a history of venous hypertension presented following a dialysis session two weeks prior where he reported significant pain at the fistula access with swelling and return of blood clots.
 - Extensive ultrasonography revealed thrombosis with lack of notable flow through the collapsed fistula as well as two large collateral vessels. A fistulogram confirmed these findings (Figure 1A).
 - The clot was macerated with 6- and 8-mm balloons, revealing a waist at the clotted portion (Figure 1B). 6 mg tissue plasminogen activator (tPA) was instilled and trapped into the fistula by balloon insufflation for 6 minutes. The balloon was then taken down.
 - Using the "IRANI" technique, the collateral vessels were suture ligated with a 3-0 Vicryl utilizing an 18-gauge coaxial needle (Figure 1C-E). A 10 mm balloon and cleaner device were then used to further macerate the thrombus.
 - Venogram demonstrated patency of the fistula following intervention (Figure 1F).
- The patient was discharged without complication and seen 2 weeks later for a follow-up fistulogram to assess for patency.
 - Fistulogram demonstrated patency of the fistula as well as two small collateral vessels (Figure 2A).
 - Reflux brachial arteriogram demonstrated absence of previously ligated collaterals (Figure 2B).

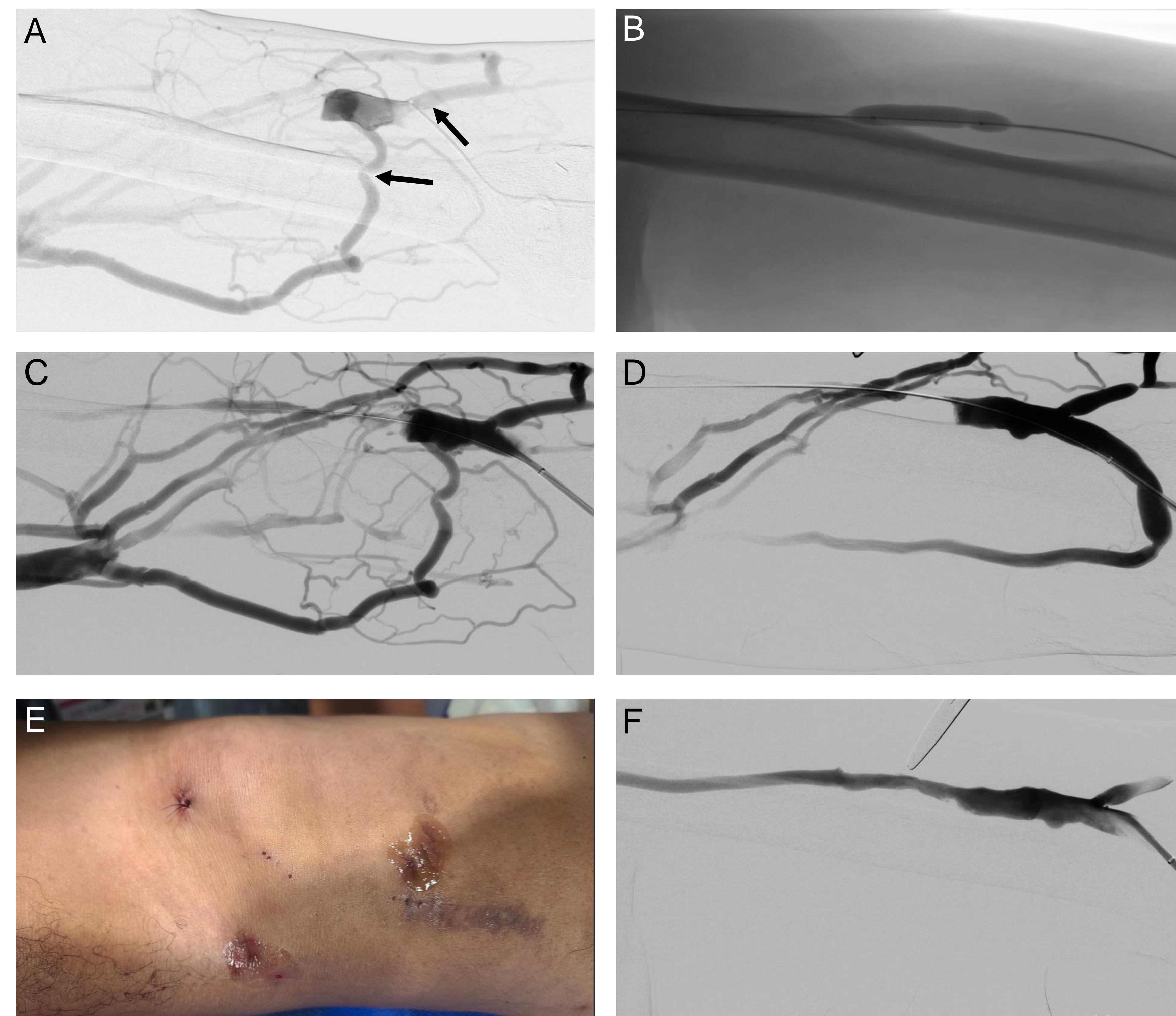


Figure 1: (A) Fistulogram revealed thrombosis of the fistula in an abrupt cutoff fashion with two large venous collaterals (arrows). (B) The clot was macerated with 6- and 8-mm balloons, revealing a waist at the clotted portion. (C, D) Using the "IRANI" technique, the collateral vessels were suture ligated resulting in absent flow through the proximal and significant narrowing of the distal collaterals. (E) Vicryl sutures were cut at the skin, and skin glue was applied to the dermatotomies. (F) Completion venogram demonstrated good flow.

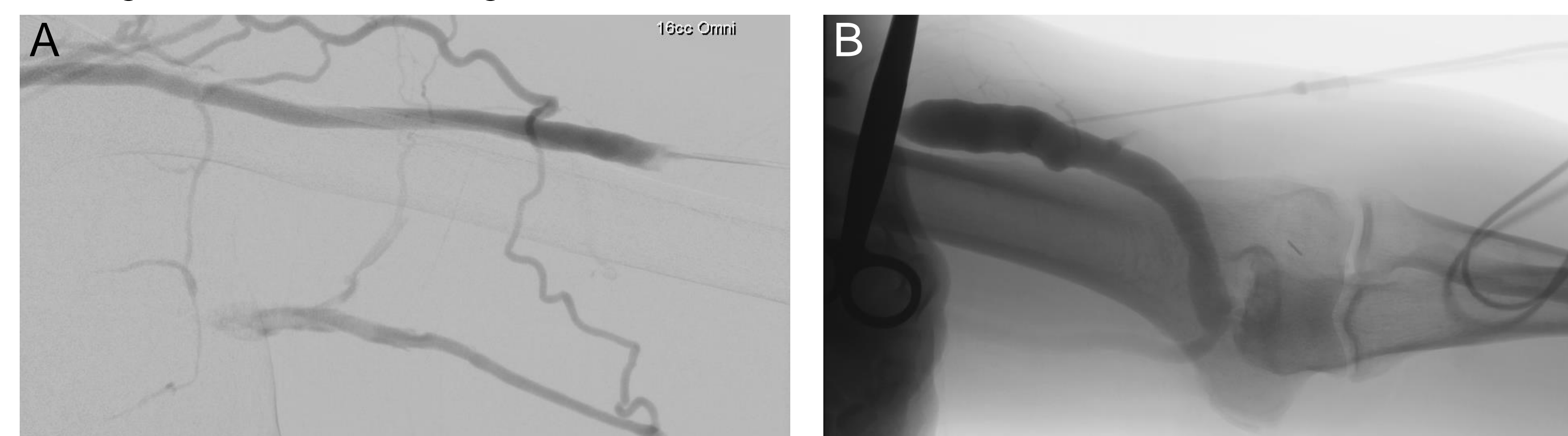
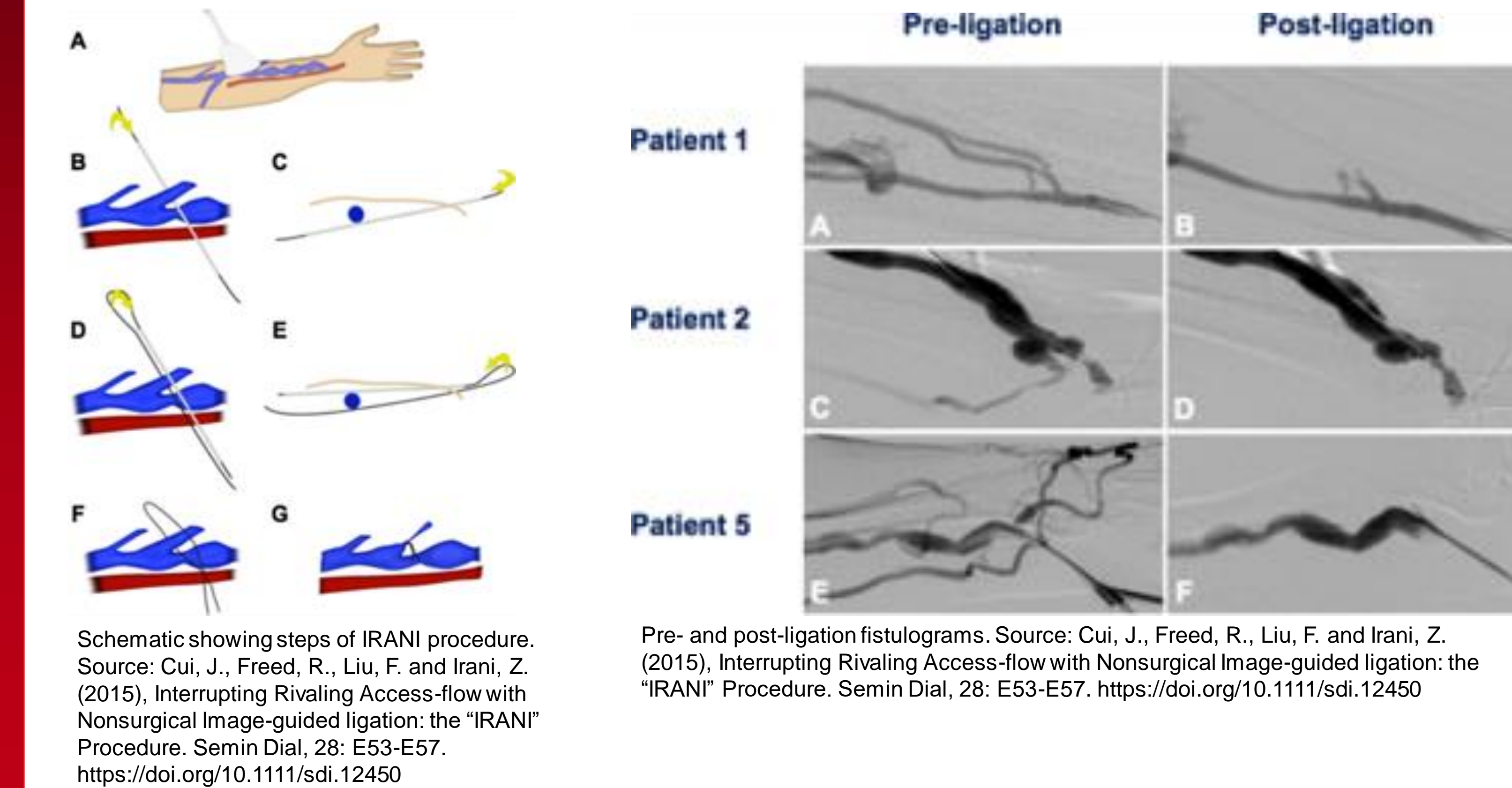


Figure 2: (A) Diagnostic fistulogram demonstrated patency of the fistula and two small collateral vessels. (B) A reflux brachial arteriogram demonstrated absent flow through the previously ligated collateral vessels.



Conclusions

- Conventional approaches with suture ligation and coil embolization can be expensive and time-consuming.
 - Increased operating room costs and technical challenges when attempting to cannulate accessory veins.
- The IRANI procedure is a minimally invasive technique which offers:
 - Increased safety for reaching deeper accessory veins.
 - Decreased infection risk.
 - Cheaper materials.
 - The ability to be performed safely in the outpatient setting.

References

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