Can Steal Syndrome be Prevented at Initial Fistula Construction?

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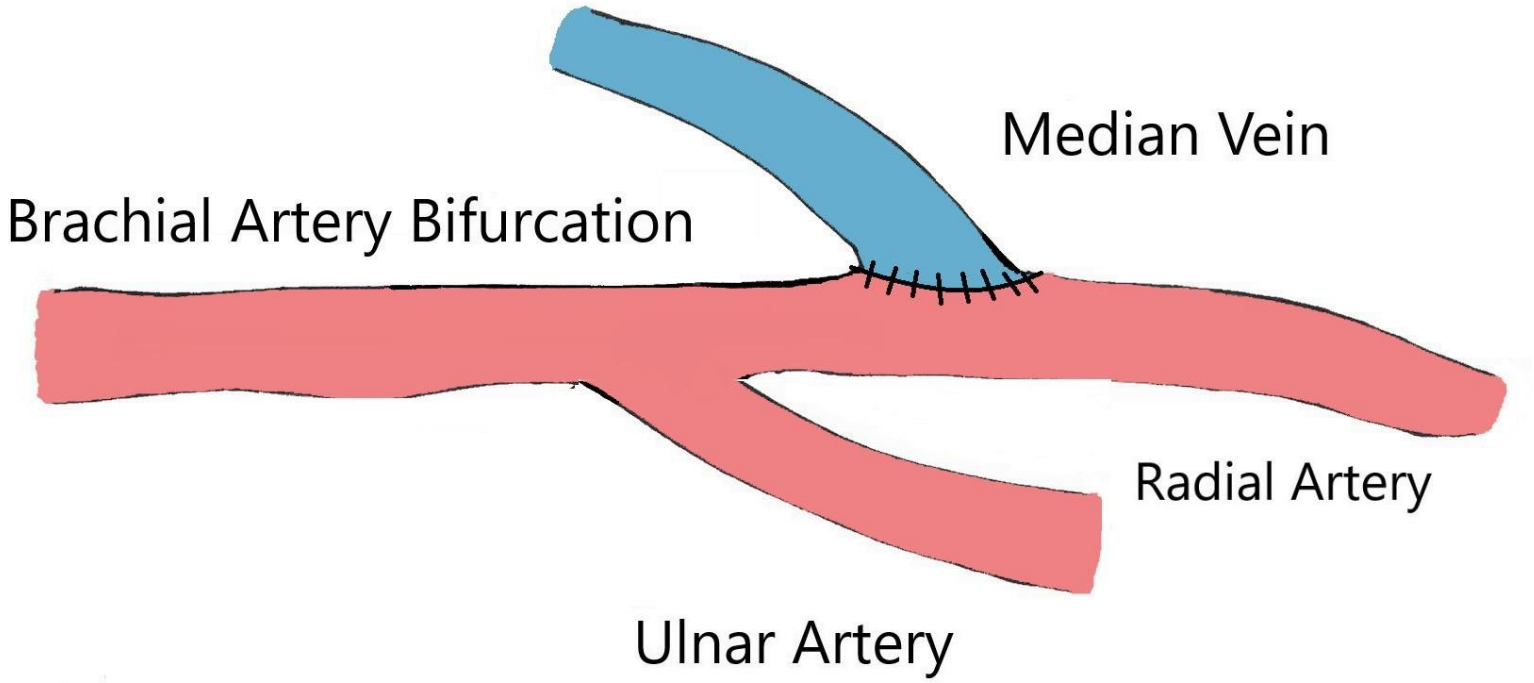
Background

- To avoid steal syndrome in patients with severe peripheral arterial disease (PAD) may be difficult.
- Access surgeons are frequently faced with evaluating patients for arteriovenous access (AVA) who are at high risk for developing steal syndrome. These included
  - diabetic with profound atherosclerotic PAD involving the brachial, ulnar, and radial arteries.
  - a history of a previous vascular access ligation due to hand ischemia with ulceration, pain, loss of function, or even amputation.
  - Palpable distal pulses are absent and ultrasound shows heavily calcified brachial and ulnar, and radial arteries.
- Several strategies have been proposed to avoid steal syndrome.

Jennings WC, Brown RE, Blebea J, et al. J Vasc Surg 2013;58:1305-9.
Jennings WC, Brown RE, Ruiz C. J Vasc Surg 2011;54:554-8.

1. Selecting the radial/ulnar artery for access inflow are examples of strategies we commonly use to lower the risk of steal syndrome



adapted from Ehsan O, Bhattacharya D, Derwish A, Al-khaffaf H. Eur J Vasc Endovasc Surg 2005;29:324-7.

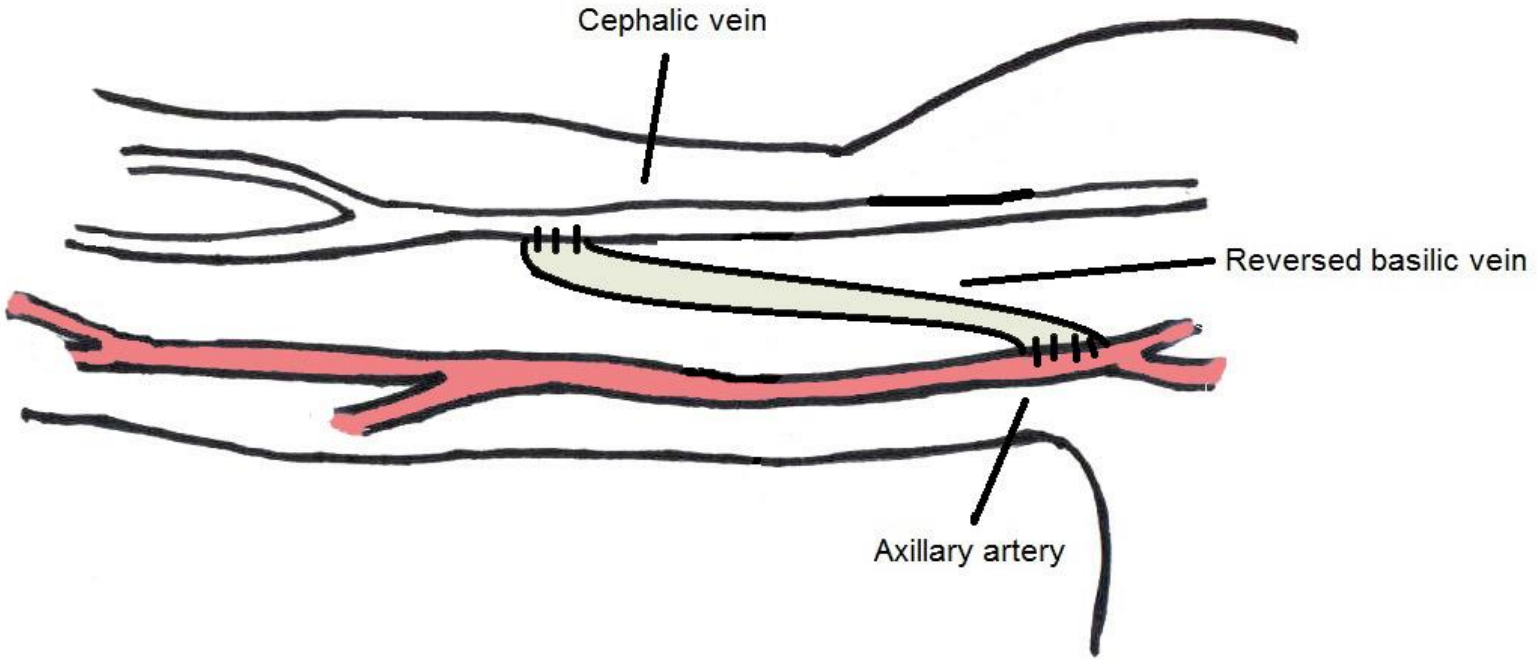
2. Proximal arterial inflow (PAI)

- Vascular access inflow i.e. axillary artery from a much larger and compliant proximal artery in addition to the added length of the outflow conduit are factors in the success of proximalization for treatment of steal syndrome.[1]

- Based on this success, Jennings was applied this technique for prevention steal syndrome.[2]

1. Zanow J, Kruger U, Scholz H. J Vasc Surg 2006;43:1216-21.
2. Jennings WC, Brown RE, Ruiz C. J Vasc Surg 2011;54:554-8.

2.1 An axillary artery end-to-side anastomosis supplied arteriovenous fistula inflow and a reversed basilic vein transposition completed access outflow to the cephalic vein



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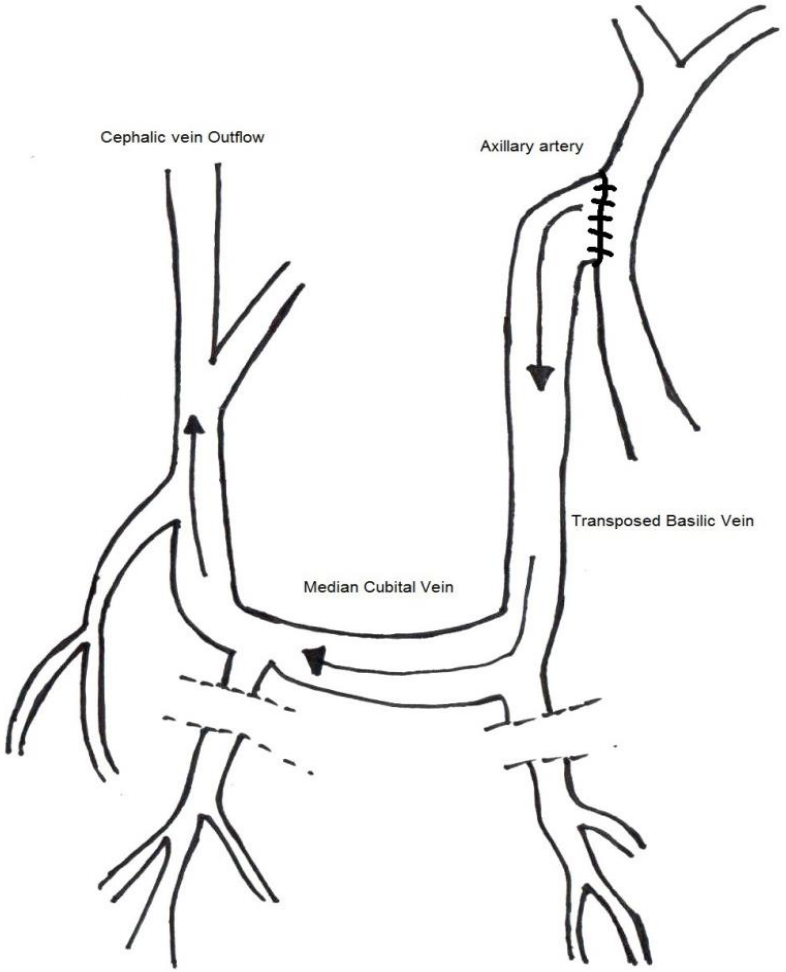
2.2 Axillary artery inflow arteriovenous fistula (AVF) basilic vein transpositions. This technique had venous outflow through the cephalic vein via the median cubital vein.



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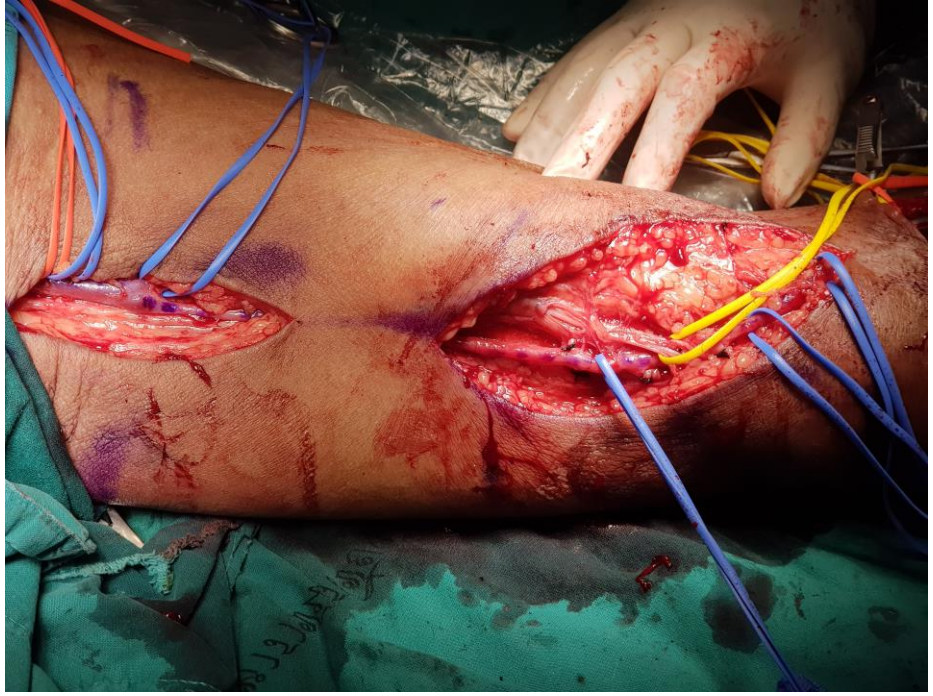
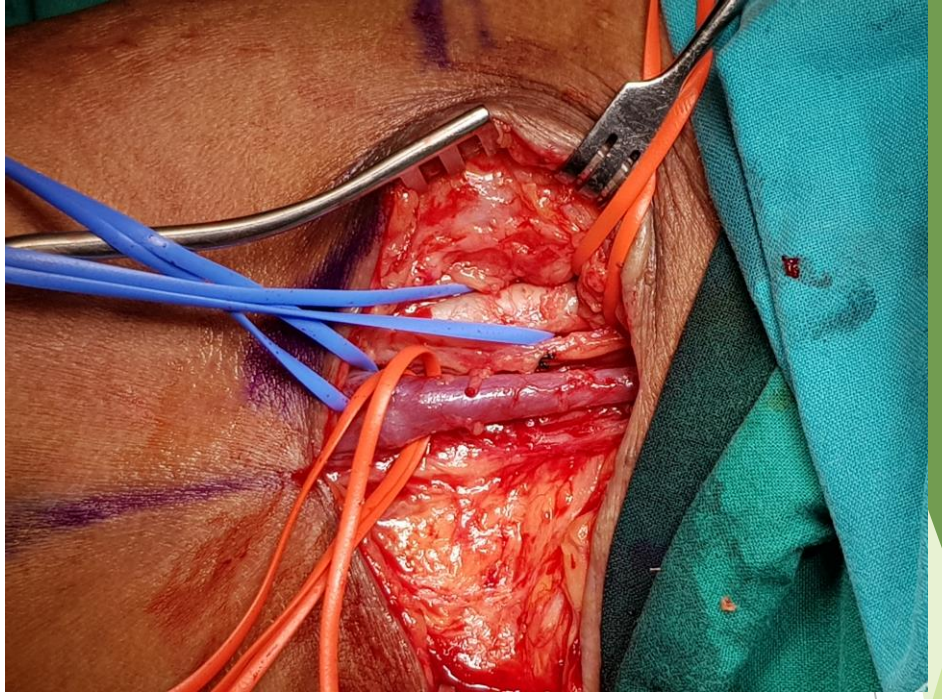
Case A 60 years old man with left brachiocephalic AVF for 3 years. Then he had gangrene of left hand, fever and bleb of skin. The gangrenous finger was amputated and open debridement together with AVF ligation.

2 months later, what is the next option for AV access? He had fair arm vein and radial pulse is +1. Then we tried to performed proximal radiocephalic AVF but it failed because of severe calcified of the proximal radial artery.

Ultrasound finding of proximal radial artery



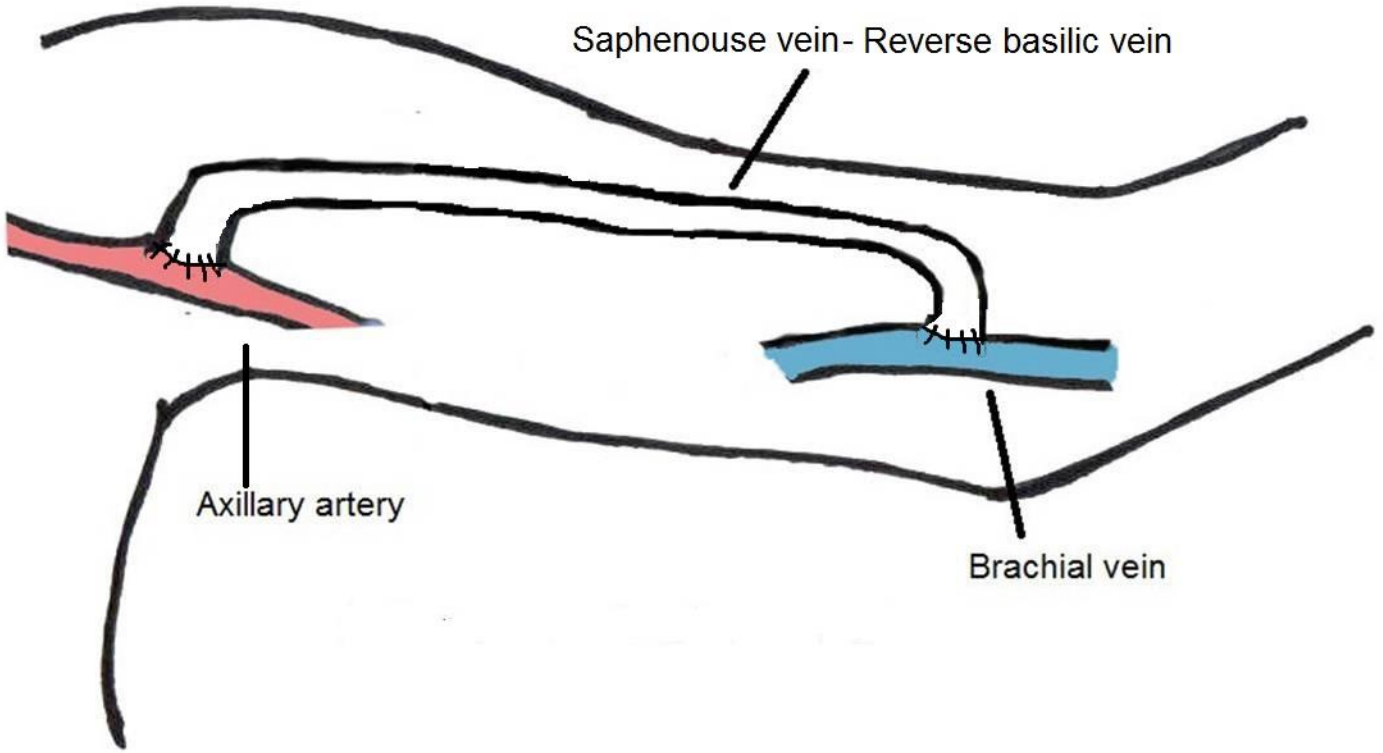


Digital brachial index = 0.53 (after operation)
(high risk of steal Digital brachial index <0.45)

Goff CD, Sato DT, Bloch PH, et al. Ann Vasc Surg 2000;14:138-44.

Tynan-cuisine GS, Berman SS. Eur J Vasc Endovasc Surg 2006;32:309-15.

2.3 a reverse basilica vein/ saphenous vein translocation arteriovenous fistula (AVF) with proximal arterial inflow from the axillary artery. Outflow was established by an end-to-side anastomosis to a distal arm brachial vein.



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- Creating proximal radiocephalic AVF or a basilic vein transposition for vascular access utilizing axillary artery inflow is a good choice for patients with severe peripheral arterial disease. This technique offers a high patency rate and the prevention of steal syndrome.

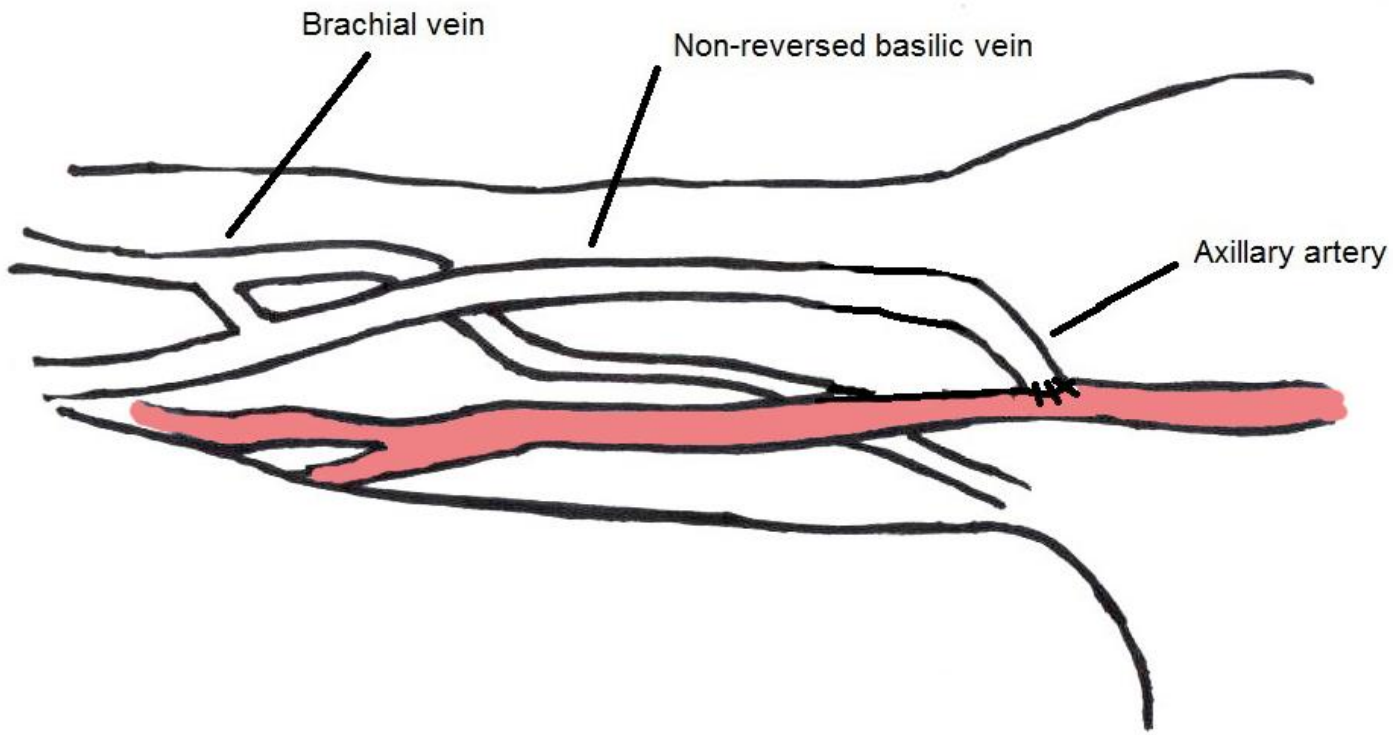
- Especially retrograde basilic vein outflow through the median basilic and median cephalic vein is related with the reasonable outcome and is the recommended configuration.

Thank you for your attention

- 32 upper arm autogenous fistulæ were formed using the ‘extension technique’ in patients at high-risk for developing steal syndrome i.e. diabetics
- patency, adequacy of needling and absence of steal symptoms over a mean follow-up of 12.5 months.
- Only 1 patient (3.1%) developed steal syndrome. On investigation, this patient was found to have very low bifurcation and the fistula formed in brachial artery distal to the origin of a posterior branch (large). Symptoms improved with revision of the fistula.

Ehsan O, Bhattacharya D, Derwish A, Al-khaffaf H. Eur J Vasc Endovasc Surg 2005;29:324-7.

2.3 Retrograde flow through the mobilized basilic vein was established with a valvulotome before the axillary artery end-to-side anastomosis was constructed. Outflow was preserved through collateral veins into the brachial veins. The transposition was completed by superficializing the basilic vein within a narrow longitudinal flap created along the anterior margin of the incision.



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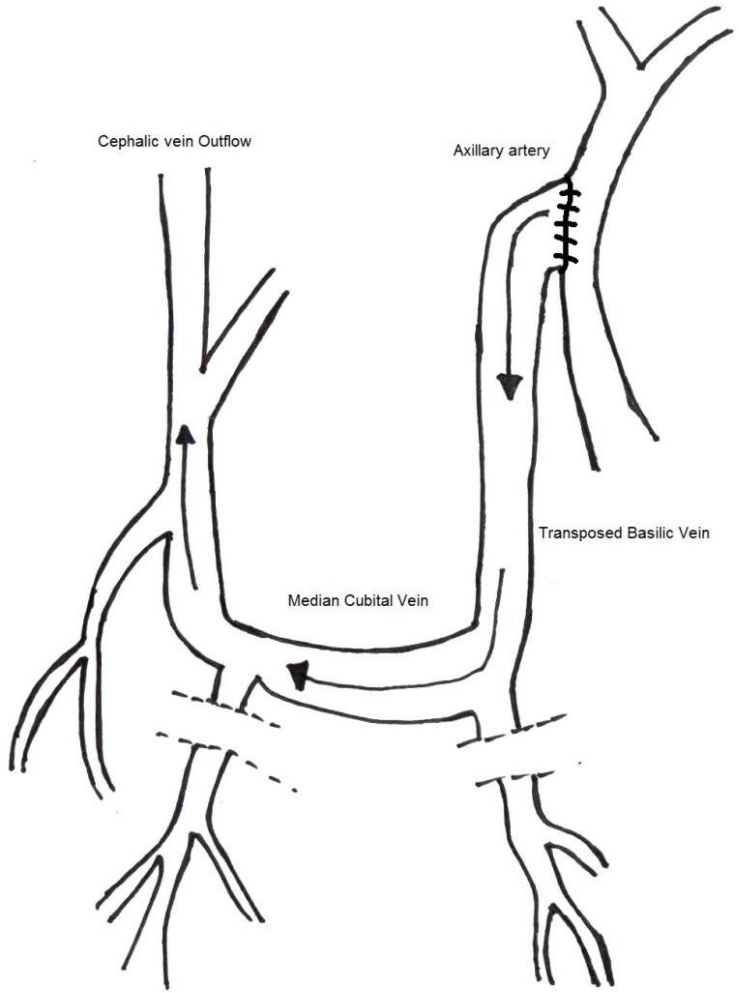
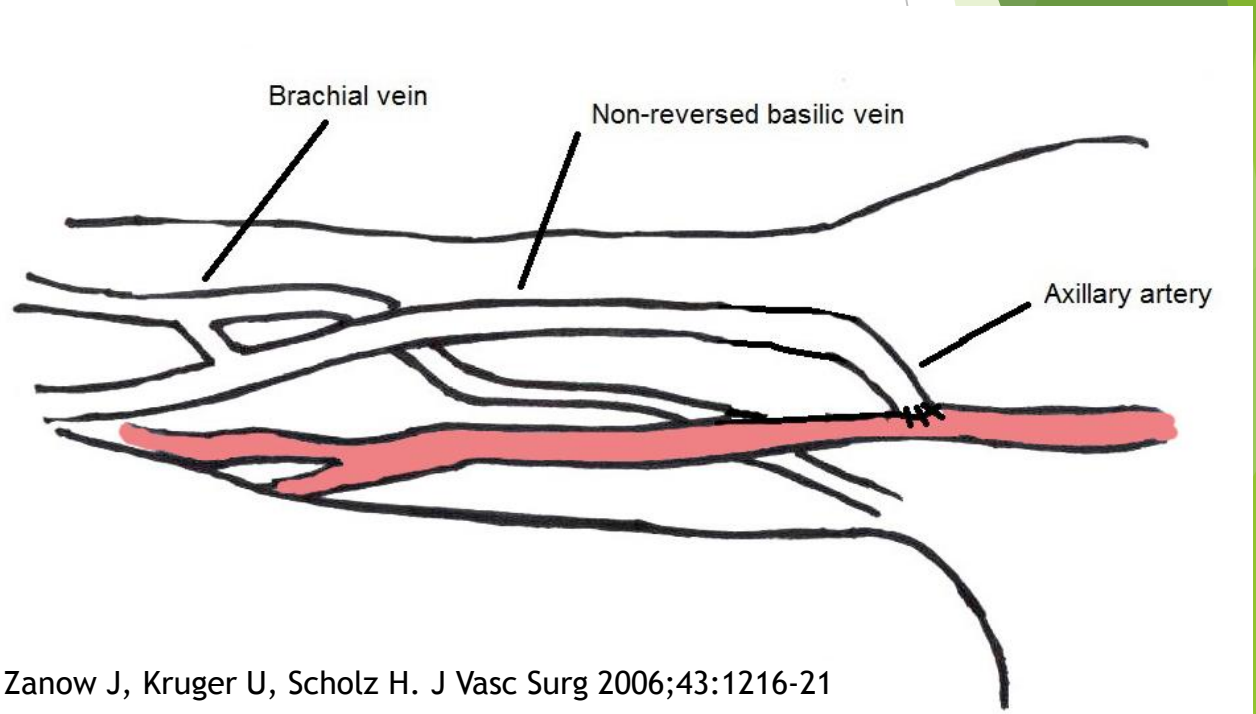
Proximal artery inflow
Jennings has reported a series of 30 patients.

Type 1



Type 2



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Patients comorbidities

Patient comorbidities	Number of patients (N=30),N(%)
Diabetes	25(83)
Previous access operations	21(70)
Hypertension	21(70)
Stroke	4(13)
Heart disease	15(50)
Previous amputation	12(40)
History of access-related hand ischemia	11(37)
Obesity	10(33)

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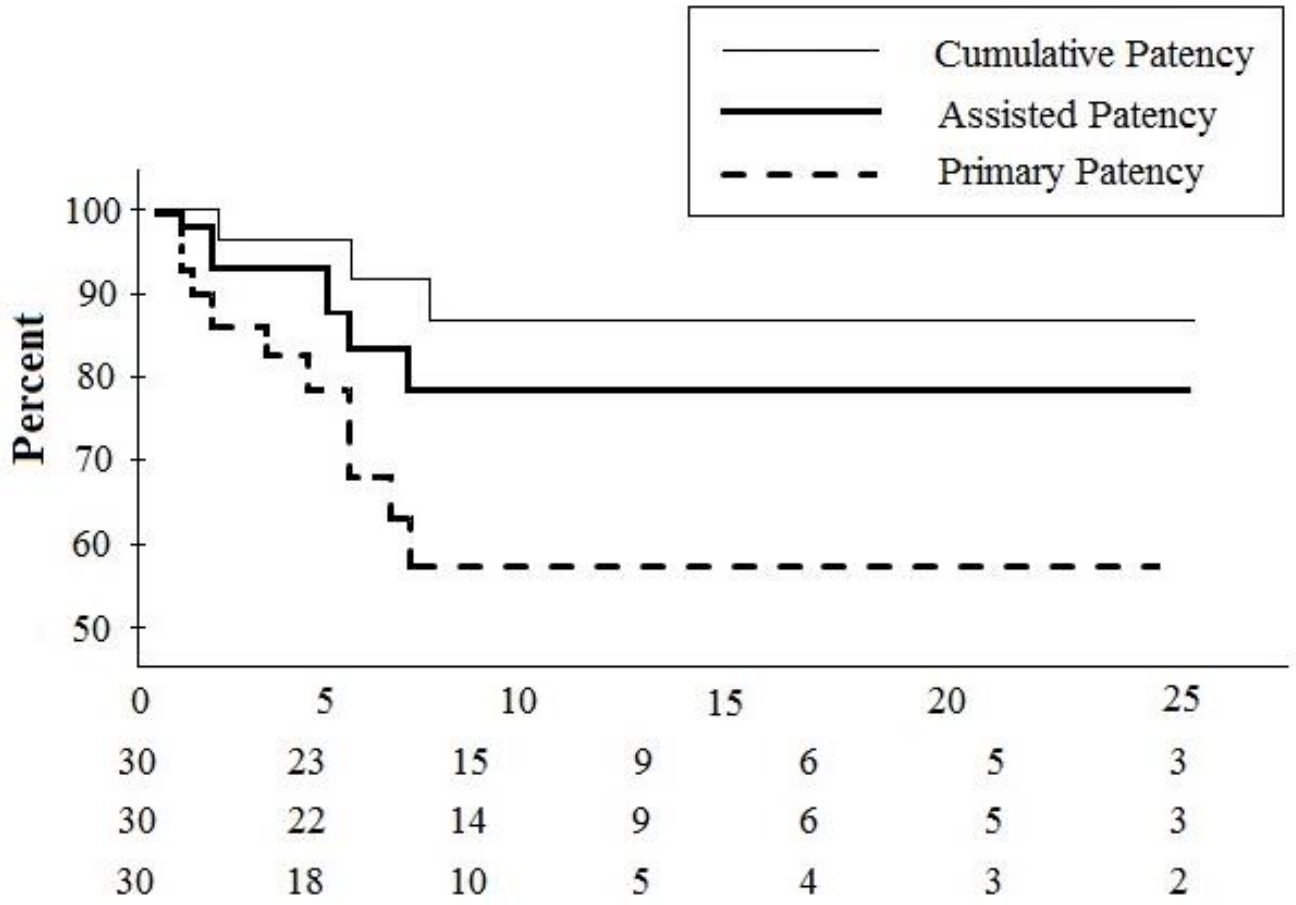
Kaplan-Meier analysis for patency of axillary artery inflow arteriovenous fistulas (AVFs).



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Complications

	Type I (N=12), %	Type II (N=18), %	Total (N=30), %
Patients developing steal	0	0	0
syndrome	8.3	77	85.3
Intervention required	0	38	38
Postoperative arm edema	0	16	16
Access failure			

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