

The Deep AVF: What are the Options?

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Disclosures:
"Nothing to disclose."

- Over 100 million adults in the United States are estimated to have a body mass index (BMI) > 30 kg/m²35% of the United States' adult population.
- Obesity in the incident ESRD population has also increasedat a rate roughly twice that seen in the total United States population.

<http://www.cdc.gov/obesity/data/adult.html>

[Kramer HJ, Saranathan A, Luke A, Durazo-Arvizu RA, Guichan C, Hou S, Cooper R.](#) Increasing body mass index and obesity in the incident ESRD population. J Am Soc Nephrol. 2006 May;17(5):1453-9.

Obesity makes vascular access more challenging .

- Fewer AVFs created
- More dysfunctional AVFs
- More complex operations for functional access

-Allon M et al. Factors associated with the prevalence of arteriovenous fistulas in hemodialysis patients in the HEMO Study. *Kidney International* (2000) 58, 2178-2185.
-Kats M. Impact of obesity on arteriovenous fistula outcomes in dialysis patients. *Kidney Int.* 2007 Jan;71(1):39-43. Epub 2006 Sep 27.

- The maximum recommended cannulation depth is 6 mm, a common problem for establishing a functional autogenous access in obese patients.
- Although obesity does not prevent creation of successful AVFs,obesity results higher access failure rates.

-National Kidney Foundation-K/DOQI Clinical Practice Guidelines for Vascular Access: update 2000. *Am J Kidney Dis.* 2001 Jan;37, S137-81.
-Fistula First: National Vascular Access Improvement Initiative
-Weyed W, [Krajewska M](#), [Letachowicz W](#), et al. Obesity is not an obstacle for successful autogenous arteriovenous fistula creation in haemodialysis. [Nephrol Dial Transplant.](#) 2008 Apr; 23(4):1318-22. Epub 2007 Oct 23.

AVF Access:

- ✓ Fewer complications
- ✓ Better overall survival
- ✓ Improved cost profile

Fistula > Graft > Catheter

AVF options in obese patients

- Lipectomy
- Superficialization
- Transposition / Translocation
- Liposuction
- Venous Window Cannulation Guide

Lipectomy vs Elevation procedures

- *Lipectomy* is preferred when the cephalic vein is a relatively straight conduit.
- *Elevation* is preferred when the outflow vein has not only increased in diameter but has also elongated and become tortuous.

These procedures are most often completed in two stages, approximately 4-6 weeks following primary AVF construction.

Lipectomy in the arm

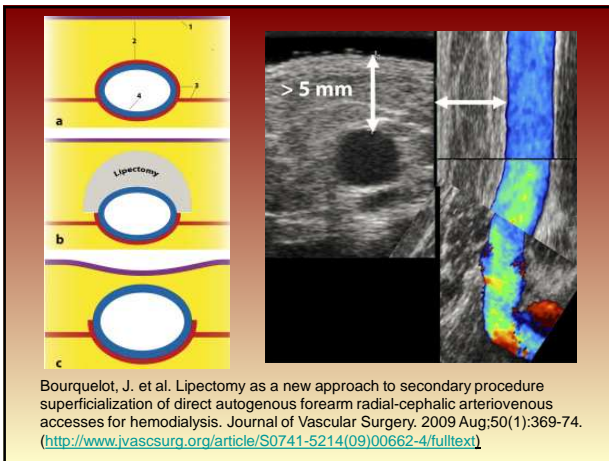


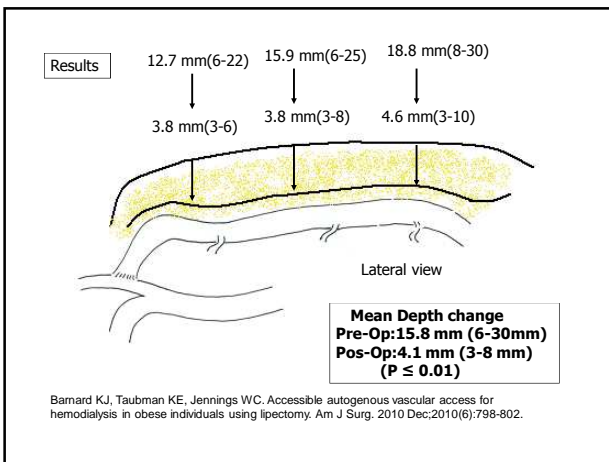
Barnard KJ, Taubman KE, Jennings WC. Accessible autogenous vascular access for hemodialysis in obese individuals using lipectomy. Am J Surg. 2010 Dec;2010(6):798-802.

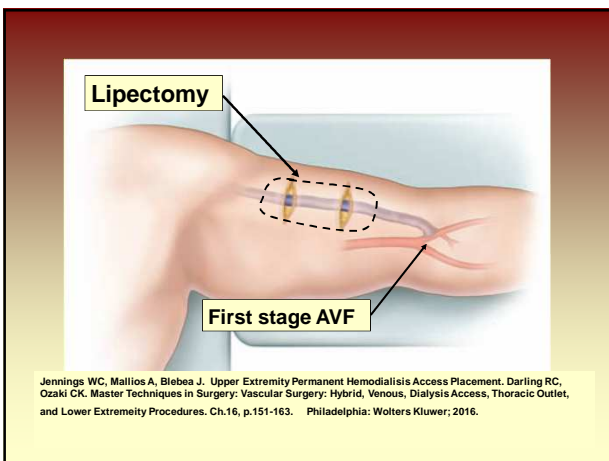
Forearm lipectomy

Bourquelot, J. et al. Lipectomy as a new approach to secondary procedure superficialization of direct autogenous forearm radial-cephalic arteriovenous accesses for hemodialysis. Journal of Vascular Surgery. 2009 Aug;50(1):369-74.

Lipectomy

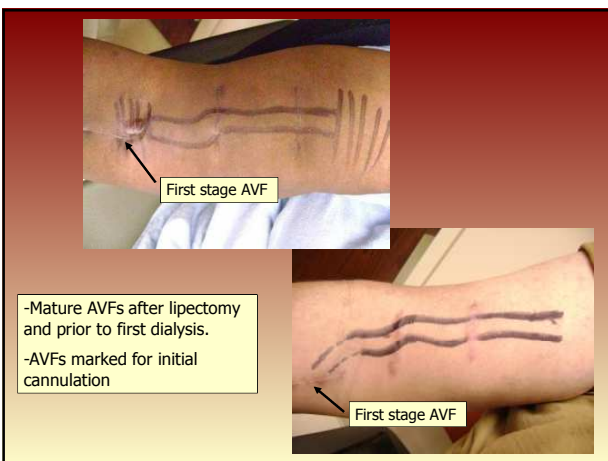




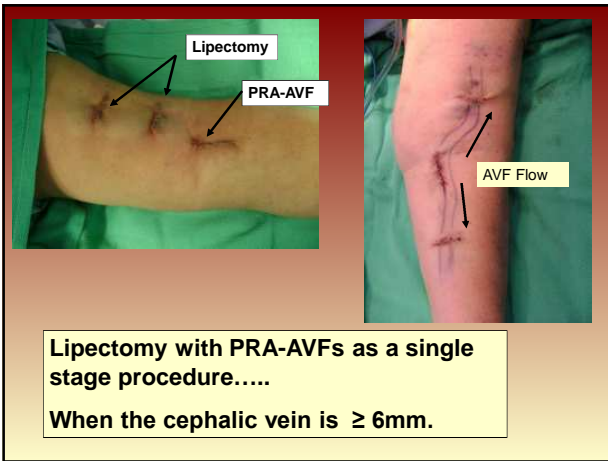


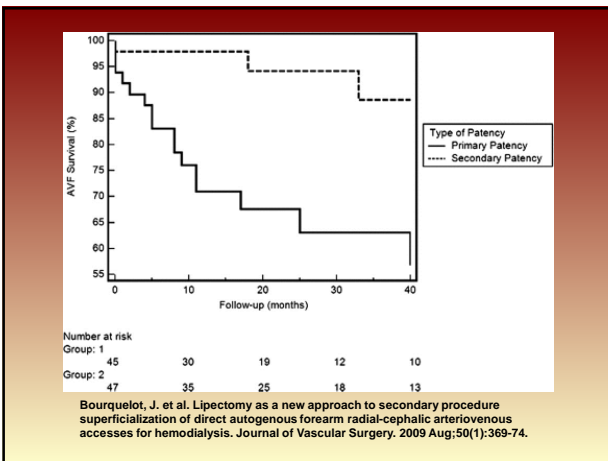


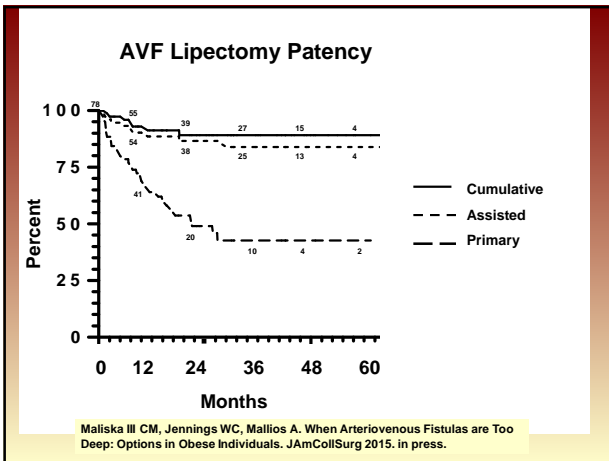




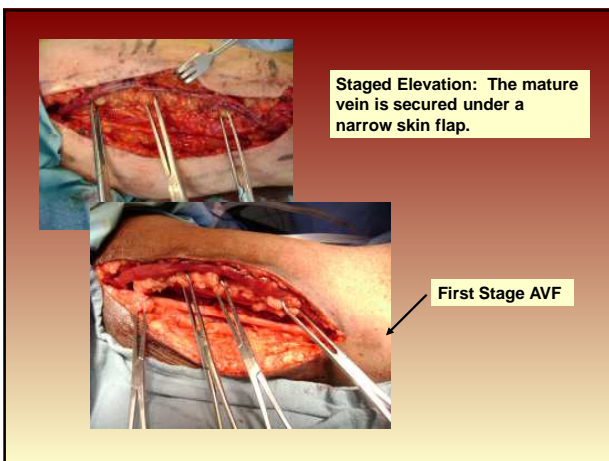


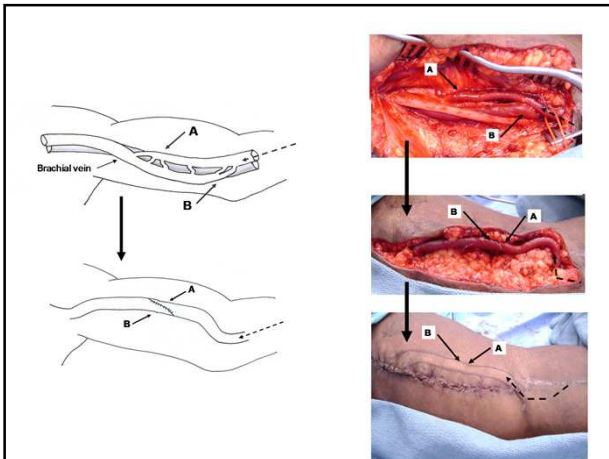












Minimal invasive harvest for transpositions

The block features four images. Top left: A large, open surgical incision on the arm, crossed out with a large 'X'. Top right: A photograph of a patient's arm with a small, closed incision. Bottom left: A photograph of a patient's arm with a small, closed incision. Bottom right: A photograph of a surgical procedure being performed on an arm. Below the images, the text reads: "Fewer wound complications" and "Shorter time to cannulation".

The block shows two photographs of a surgical procedure on the arm. The left photo shows the incision and vein exposure. The right photo shows the vein being manipulated. Below the photos are two anatomical diagrams. The top diagram is labeled "Deeply situated superficial vein" and shows the vein's position relative to the "Inserting layer superficial fascia", "Deep fascia", and "Inflow artery". The bottom diagram is labeled "Subdermally tunnelled superficialized vein" and shows the vein being tunneled under the skin. Below the diagrams, the text reads: "Minimally Invasive Superficialization Technique (MIST)...Shenoy, et al."



Obesity + severe peripheral vascular disease:
.....Axillary artery inflow AVF (Reverse flow)



Targeted area for liposuction.

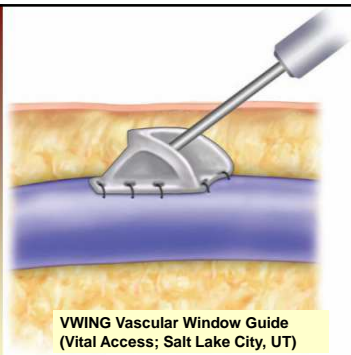
Previous (first stage) AVF

Liposuction over a Shielded Arteriovenous Fistula for Hemodialysis Access Maturation. Daniela A. Ochoa, MD, Robert E. Mitchell, MD, William C. Jennings, MD. Journal of Vascular Access, 2010.





Figure 3.
Lateral arm view post-liposuction. Arrows indicate site of mature cephalic vein, now just 2-4 mm deep.

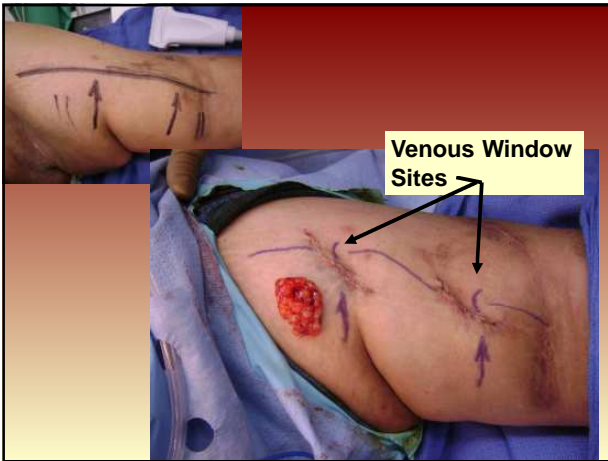


VWING Vascular Window Guide
(Vital Access; Salt Lake City, UT)

Jennings WC, Mallios A, Blebea J. Upper Extremity Permanent Hemodialysis Access Placement. Darling RC, Ozaki CK. *Master Techniques in Surgery: Vascular Surgery: Hybrid, Venous, Dialysis Access, Thoracic Outlet, and Lower Extremity Procedures*. Ch.16, p.151-163. Philadelphia: Wolters Kluwer; 2016.

Jennings WC, Galt SW, Shenoy S, Wang S, Ladenheim ED, Glickman MH, Kathuria P, Brown BJ. The Venous Window Needle Guide, a hemodialysis cannulation device for salvage of un cannulatable arteriovenous fistulas. *J Vasc Surg*. 2014 Oct;60(4):1024-32.





Vital Access® VWING™ Vascular Needle Guide

Worldwide VWING infection rate to date:

INFECTION RATES (per patient year)	Catheter (USRDS)	AV Fistula (USRDS)	VWING SAVE & 18mo Rate	VWING Overall Reported Infection Rate ³
Infection of Access	1.45	0.18	0.018	0.012 ¹
Sepsis	2.32	0.52	0.018	0.002 ²

1 - Seven reported events over 595 patient years
2 - One reported event over 595 patient years
3 - Estimated from clinical trial reports and post-market surveillance

DaVita VWING patients:
 Implanted in 95 DaVita clinics by 52 surgeons in 16 states.
 (31% of all VWING patients in DaVita clinics).

Data courtesy M Crawford, Vital Access

When Arteriovenous Fistulas are Too Deep: Options in Obese Individuals

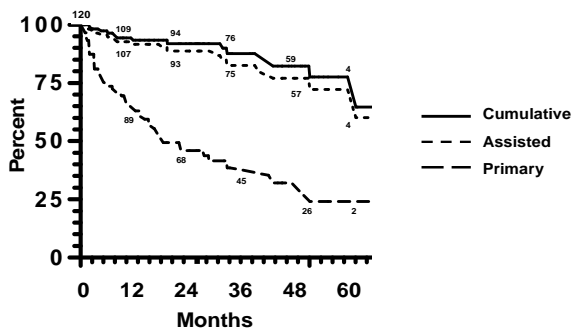
Study Design:
 Consecutive vascular access patients where the planned venous outflow cannulation segments were too deep, requiring an additional surgical procedures to establish functional access.
 These additional procedures included lipectomy, outflow elevation, cephalic transposition, liposuction, or an implantable cannulation guide.

Maliska III CM, Jennings WC, Mallios A. When Arteriovenous Fistulas are Too Deep: Options in Obese Individuals. JAmCollSurg 2015. in press.

Results: During the study period 1874 consecutive new patients had an autogenous vascular access constructed.

- 120 patients required an additional procedure due to the depth of cannulation sites.
- Ninety-nine (83%) were females, 85 (71%) were diabetic, and 53 (45%) had previous access operations.
- BMI: 25.4-62.8 kg/m² (mean 40.8 kg/m²)
- Age range: 27-81 years (mean 54 years)
- Follow-up: 1-101 months (mean=25 months).

Deep AVF Patency



Results:

- The most common additional procedure performed was a lipectomy (n=78) with one year primary and cumulative patency rates of 78% and 97% and two year rates of 69% and 91%, respectively.
- Primary and cumulative patency rates for all patients were 63% and 93% at one year and 46% and 91% after two years, respectively.

Conclusions: A variety of surgical options were found to be successful in establishing a functional autogenous vascular access for individuals where cannulation sites were simply too deep. Cumulative AVF patency was 93% at one year and 91% after two years.

