

# **What vascular access for which patient : obesity**

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# Introduction

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**Obese**

**BMI > 30 kg/m<sup>2</sup>**

**Overweight**

**BMI 25.0–29.9 kg/m<sup>2</sup>**

**Normal weight**

**BMI 18.5–24.9 kg/m<sup>2</sup>**

**Critical vein depth > 6 mm**

**Is the strategy of creation of AVF different in obese patients ?**

**What are the options to increase use of autologous veins ?**

**Role of prosthetic grafts**

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# Introduction

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**Kats. Kidney International 2007**

**Lower prevalence of AVF among obese hemodialysis patients**

	<b>AVF</b>	<b>Graft</b>
<b>N patients</b>	<b>183</b>	<b>205</b>
<b>Obese</b>		
yes	<b>54 (30%)</b>	<b>60 (29%)</b>
no	<b>129 (70%)</b>	<b>145 (71%)</b>

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# Introduction

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**Lower prevalence of AVF among obese hemodialysis patients**

**Plausible explanations :**

- 1) AVF are less likely to be placed in obese patients (diameter, quality, depth....) !
- 2) AVF in obese are more likely to have primary failure !
- 3) AVF in obese may be more likely to have secondary failure !

**NO evidence in the literature supporting these statements**

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# Introduction

## Kats. Kidney International 2007

“Frequency of fistula placement was similar in obese and non-obese patients when vascular mapping was employed “

**Table 3 | Preoperative vascular diameters in obese and non-obese patients, sorted by fistula location**

	Obese patients	Non-obese patients	P-value
<i>Forearm fistula</i>			
Artery diameter	$0.26 \pm 0.04$	$0.26 \pm 0.04$	0.98
Vein diameter	$0.31 \pm 0.05$	$0.31 \pm 0.04$	0.83
<i>Upper arm fistula</i>			
Artery diameter	$0.48 \pm 0.08$	$0.49 \pm 0.09$	0.88
Vein diameter	$0.44 \pm 0.11$	$0.41 \pm 0.09$	0.24

Successful initial use and primary failure rate of new fistulas was very similar between obese and non-obese patients

**Table 4 | Initial fistula outcomes**

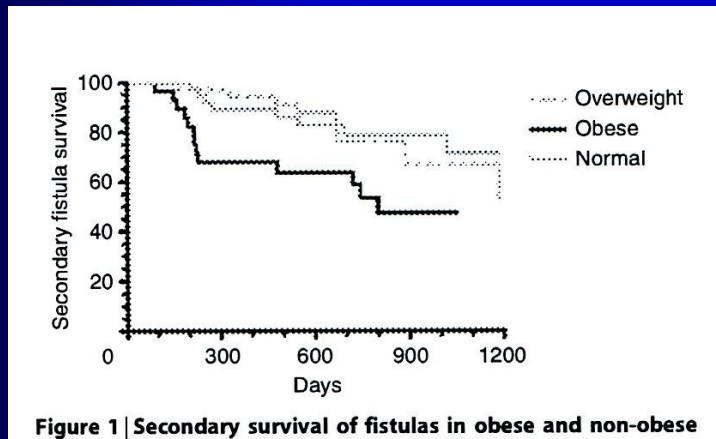
	Obese	Non-obese
Total number	54	129
Successful use for dialysis ( $\geq 1$ month)	29 (54%)	76 (59%)
<i>Primary failure</i>	25 (46%)	53 (41%)
Technical failure	5	7
Early thrombosis	14	20
Failure to mature	6	25
Steal	0	1

No difference in outcomes between groups,  $P=0.45$ .

# Introduction

## Kats. Kidney International 2007

Secondary failure rate of fistulas is higher among obese patients.



	Obese	Non-obese
1 years	68%	92%
2 years	58%	78%
3 years	47%	70%

**Why might fistulas failure be more likely in obese patients?**

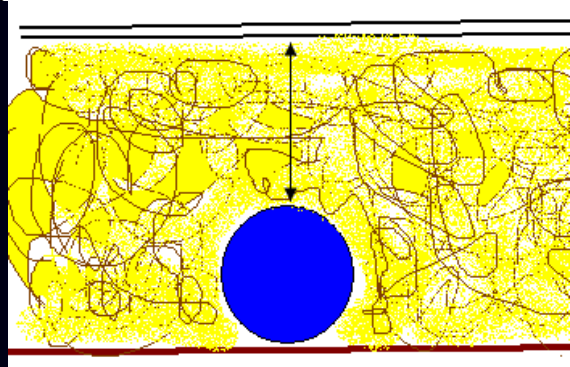
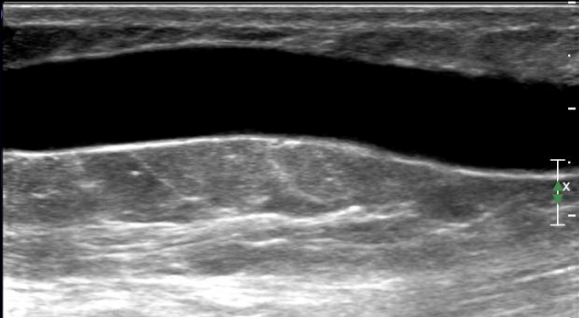
- smaller vessel	unlikely
- need of vein transposition	plausible
- needle infiltration during cannulation	unlikely
- hypercoagulable state, myointimal hyperplasia	plausible

**Obesity : the only significant factor predicting secondary AVF failure**

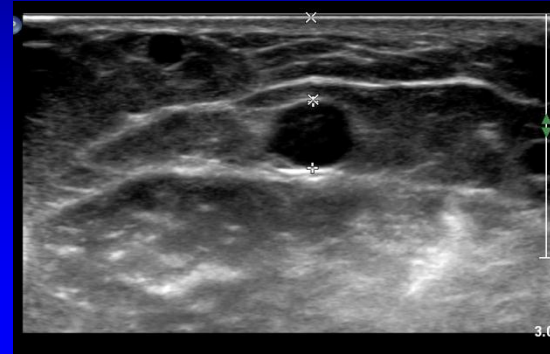
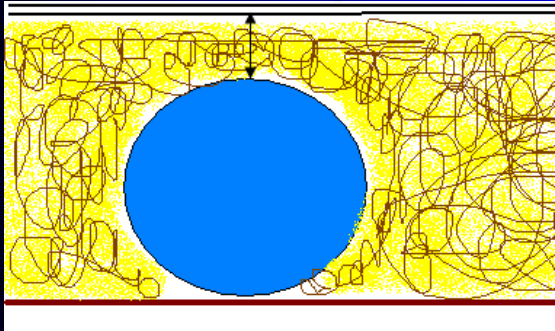


# Characteristics of vein

Is in obese the vein “always” too deep for cannulation ?



outside the superficialis fascia



Inside the superficialis fascia

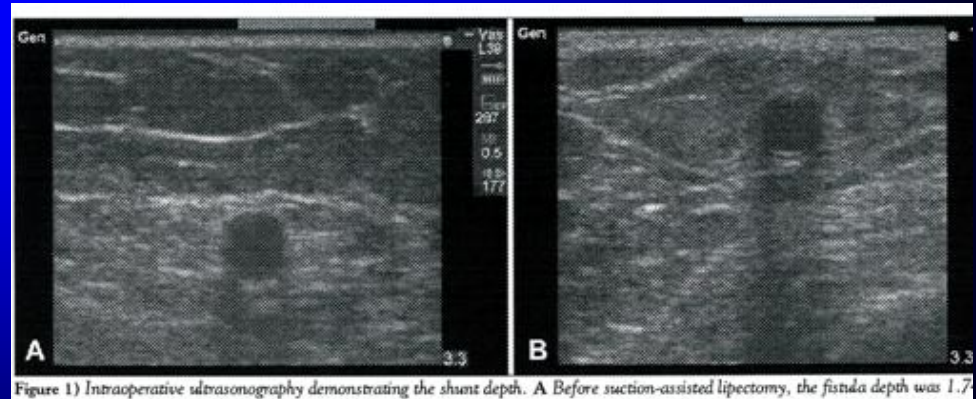


Figure 1) Intraoperative ultrasonography demonstrating the shunt depth. A Before suction-assisted lipectomy, the fistula depth was 1.7

Before

after liposuction

# AVF location and need for superficialization

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## Kats. Kidney International 2007

	Obese	Non-obese
<b>N patients</b>	<b>54</b>	<b>129</b>
<b>AVF location</b>		
forearm	29 (54%)	68 (53%)
upper arm	25 (46%)	61 (47%)
<b>Vein transposition</b>		
yes	8 (15%)	14 (11%)
no	46 (85%)	115 (89%)

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# Options to facilitate cannulation

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## Second-stage intervention

### Superficialization or elevation of the vein

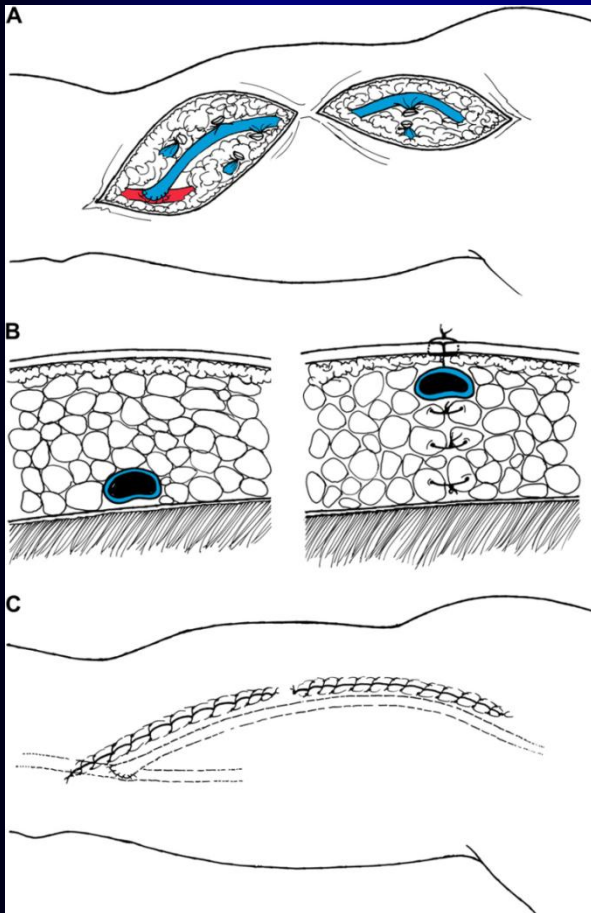
tunneled transposition  
elevated transposition

### Removal of the excessive fat +++

lipectomy  
liposuction  
minimally invasive liposuction or  
suction assisted lipectomy

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# Elevated transposition



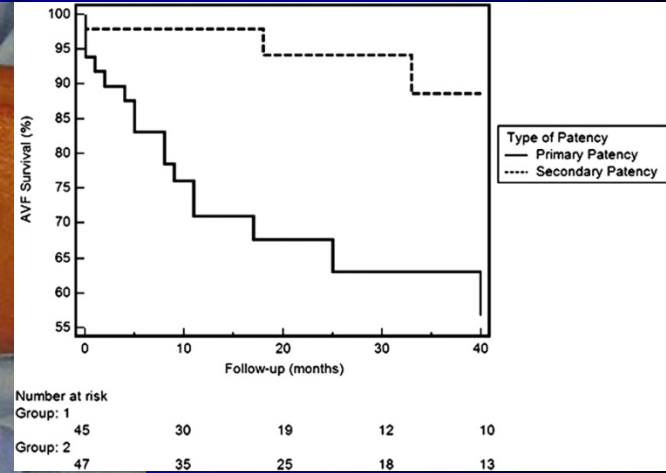
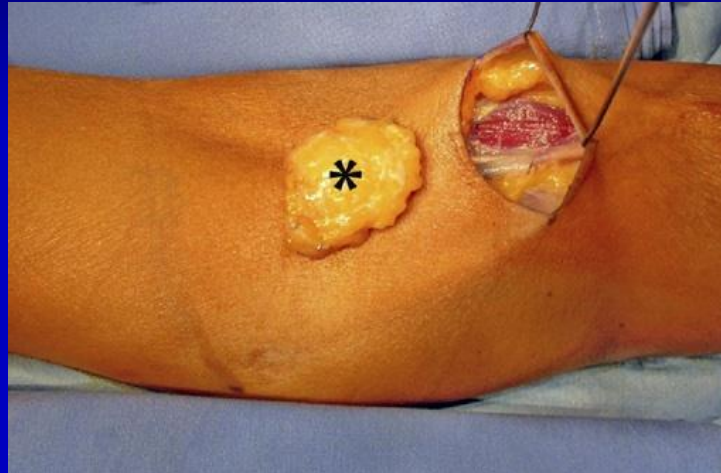
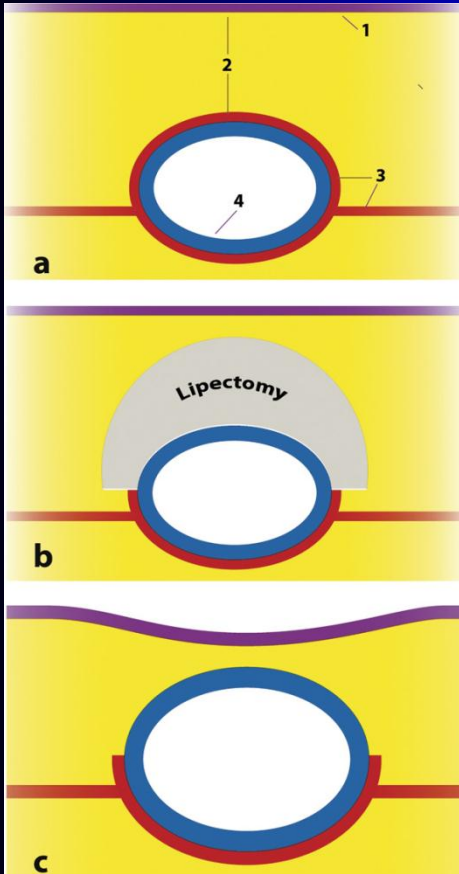
arm swelling, wound infection,  
hematoma, skin necrosis 10%

Problems with hypertrophic scars (black) and  
fibrotic tissues around the vein

difficulties in cannulation  
development of stenosis

# Surgical lipectomy

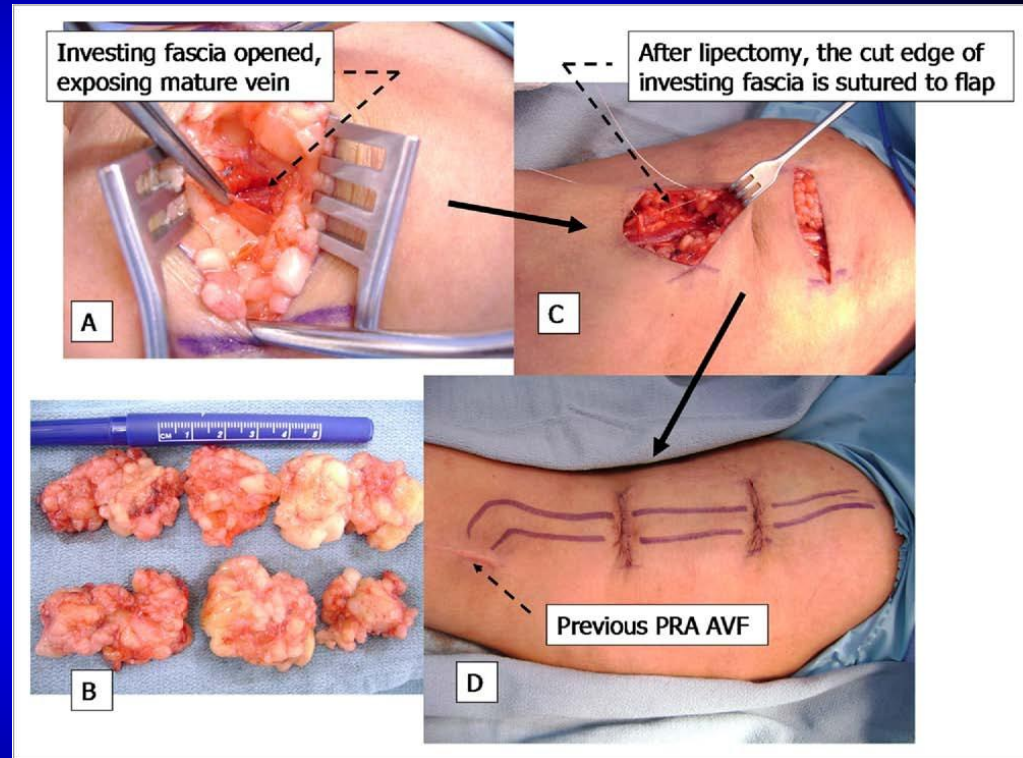
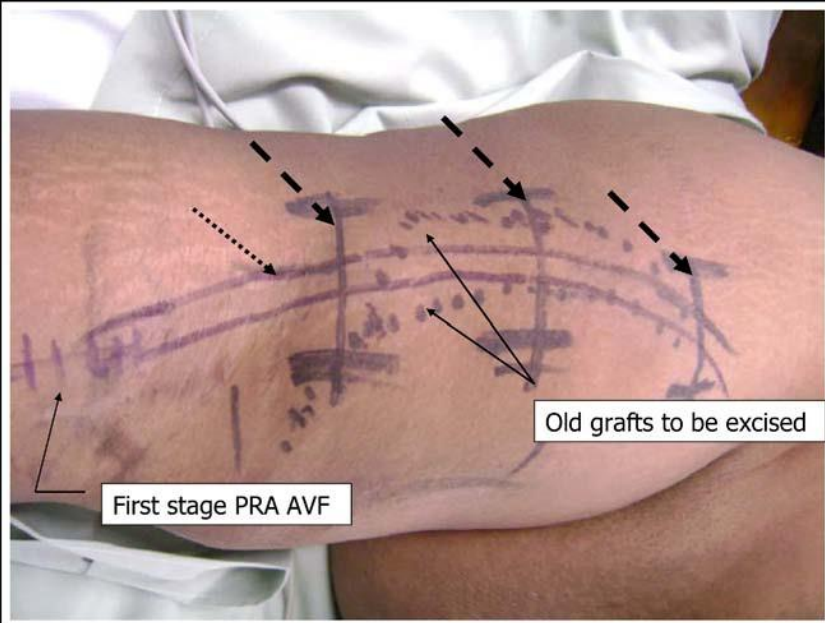
Bourquelot. J Vasc Surg 2009



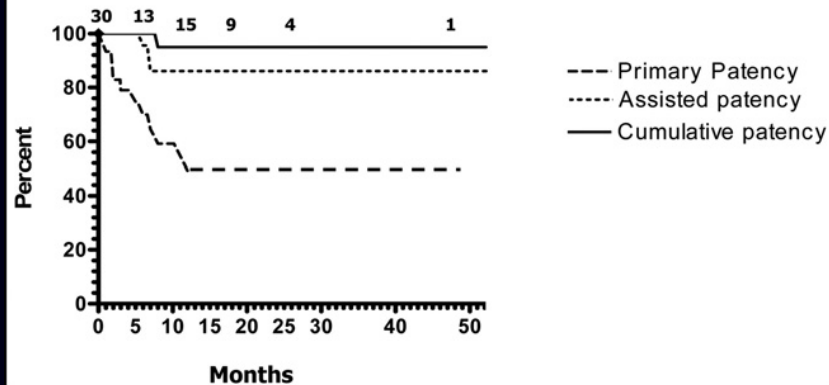


# Surgical lipectomy

Barnard. Am J of Surg 2010

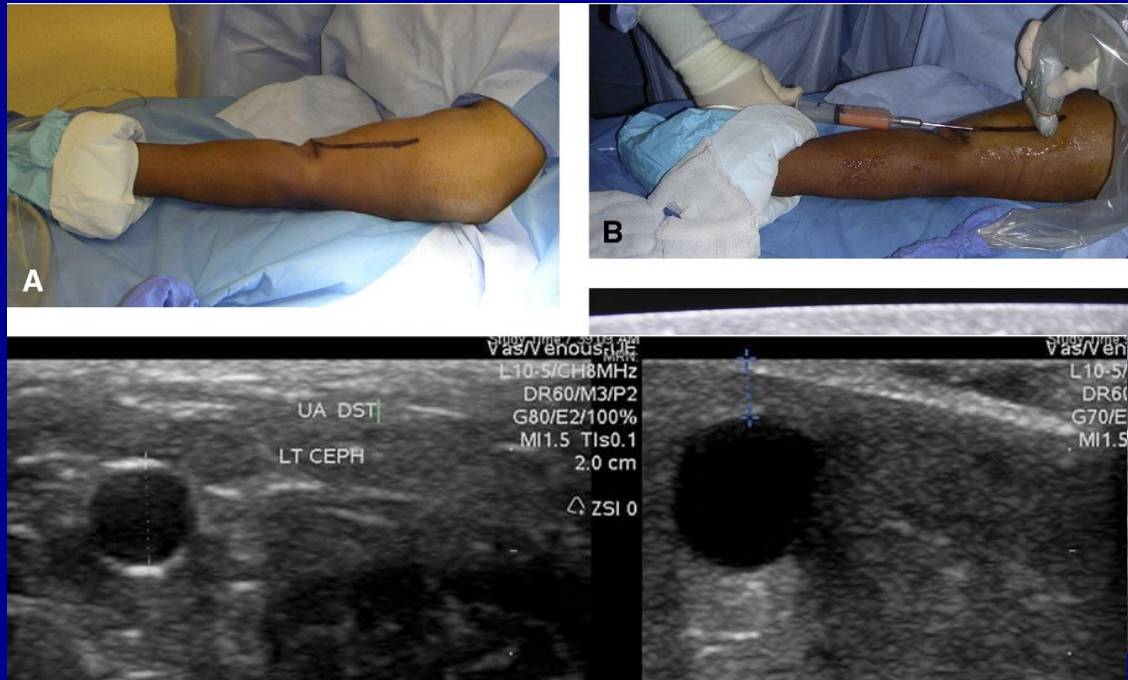


**Lipectomy AVF Patency**



# Minimally invasive liposuction +++

Causey. J Vasc Surg 2010



## Technical description of upper extremity liposuction superficialization

- subcutaneous tumescence
- stab incision proximal to the antecubital fossa.
- 2 mm adipose suction cannula under ultrasound guidance
- suction lipectomy in a radial fashion above the fistula

# Minimally invasive liposuction +++

Causey. J Vasc Surg 2010

Krochmal. Can J Plast Surg 2010

Difficult to access arteriovenous fistula secondary to adipose tissue

Ultrasound visualization of the arteriovenous fistula and overlying skin and adipose tissue

1 Subcutaneous tumescence using 30 mL of 1% lidocaine with 1:100,000 epinephrine

2 Ultrasound guided liposuction of adipose tissue overlying arteriovenous fistula

1. 1 week physical exam and ultrasound
2. 4-6 week follow up (ensure an easily palpable fistula)
3. Cannulation for dialysis

**Tumescence : Klein's solution : local anesthetic + adrenaline**

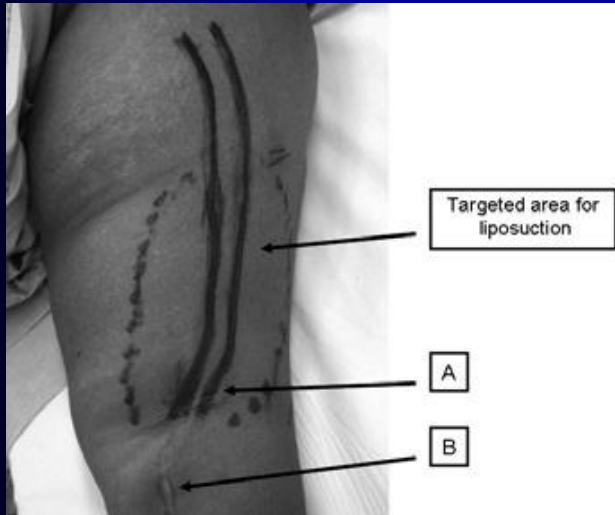
**3 mm-5 mm liposuction cannulas**

**300-500 ml of fat removed**

**Intra-operative ultrasound**

# Liposuction with endoscopic dissection

Ochoa. J Vasc access 2010



**A small transverse incision**



**Endoscopic dissection of the anterior wall of the AVF outflow vein using the device as a protective shield during liposuction**

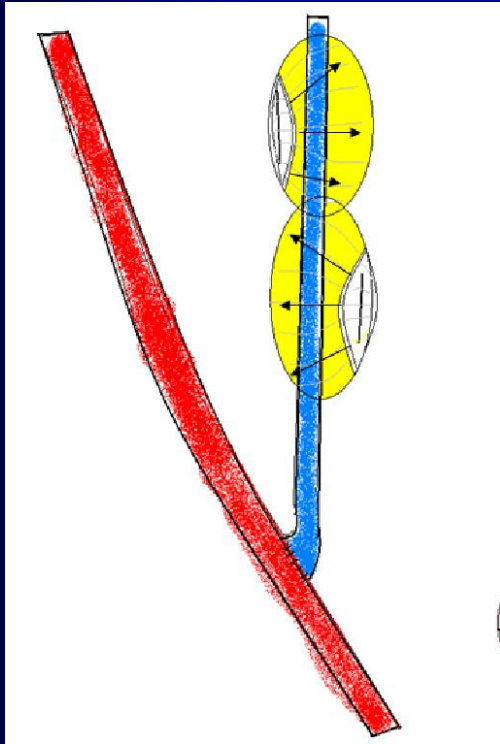


# Our experience

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## Surgical lipo-aspiration

19 cases



Skip incisions away  
from the vein  
Lipectomy + Liposuction



Spatula  
Suction cannula



# Our experience

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## Minimally invasive liposuction

2 cases



Ultrasound-guided tumescence



Liposuction



Ultrasound-guided liposuction

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# Our experience

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**Period : 2006-2012**

<b>21 procedures :</b>	<b>surgical lipo-aspiration</b>	<b>19</b>
<b>(18 patients)</b>	<b>minimally invasive liposuction</b>	<b>2</b>

<b>2 surgical lipo-aspirations</b>	<b>1</b>
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<b>2 surgical lipo-aspirations + 1 min. invasive liposuction</b>	<b>1</b>
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**16 females , 2 males**

**9 brachio-cephalic, 9 radio-cephalic**

**BMI : mean 35,85 Kg/m<sup>2</sup> (51-20 Kg/m<sup>2</sup>)**

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# Our experience

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**Mean preop vein depth :10.3mm (5-25 mm)**

**Mean postop vein depth: 5.3mm (2-15 mm)**

**13 AVF easily cannulatable**

**5 AVF « difficult » to cannulate**

## **Early complications**

**3 hematomas : no surgical drainage**

**2 skin Infection : 1 surgical drainage**

**1 discomfort along the vein**

**1 stenosis**

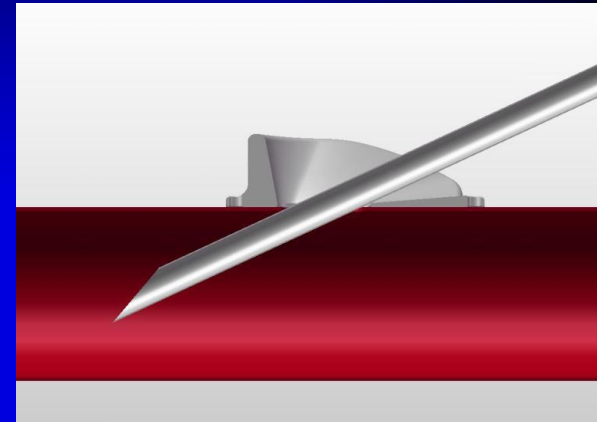
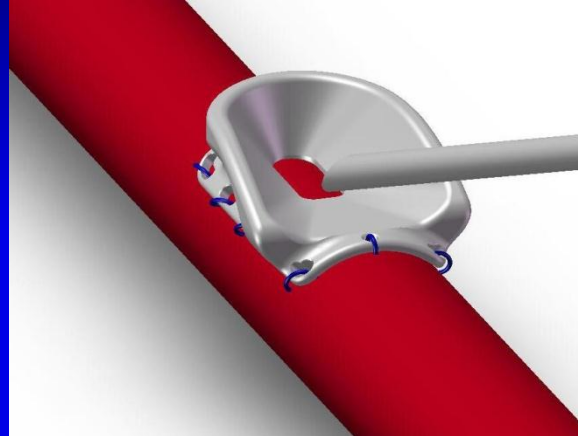
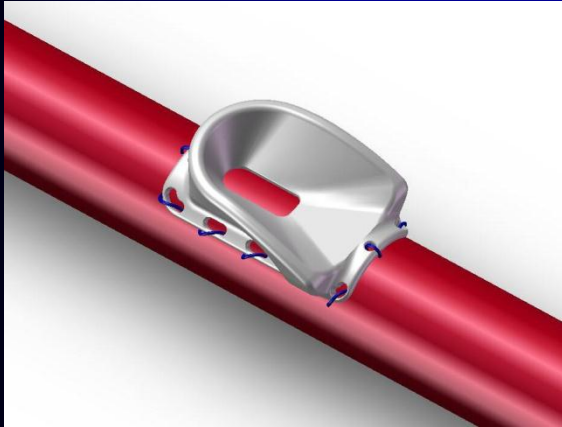
**No thrombosis**

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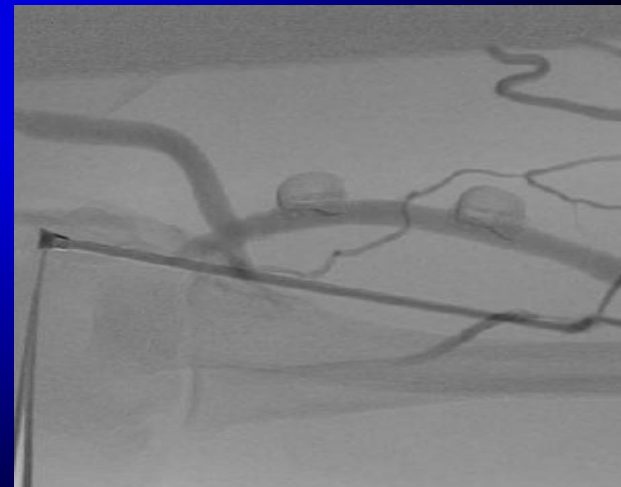
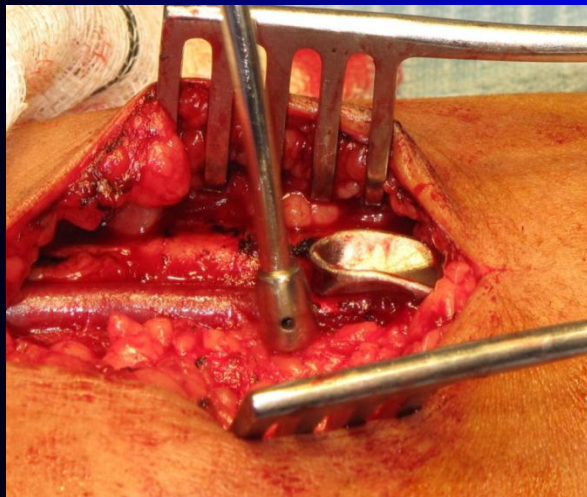


# The Venous Window Needle Guide Vital Access Inc.

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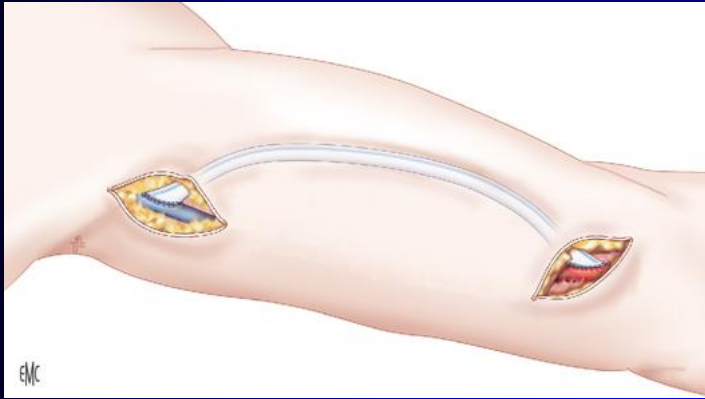


## Surgically Implantable Subcutaneous Titanium Needle Guide



# Role of prosthetic graft

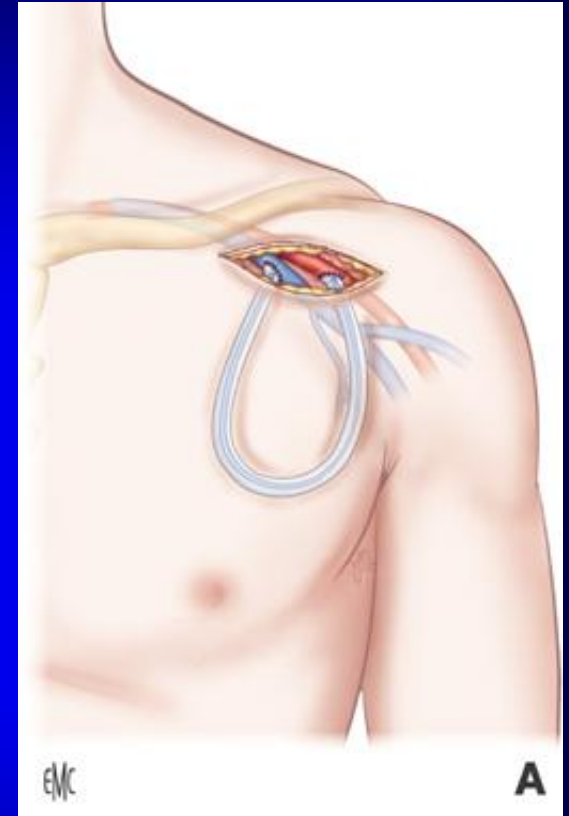
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**Cryopreserved arterial  
homograft**

**Flixene graft**

**HeRO (Hemodialysis reliable  
Outflow) vascular access device**



**Chest wall AV graft loop**

# Conclusions

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**Strategy of creation of AVF in obese patients is similar to non-obese**

**Variety of options for improving cannulation**

**Minimally invasive liposuction under tumescence and ultrasound guidance : technique of choice**

**Flixene graft and cryopreserved arterial homograft are a valuable alternative**

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# Thank you !

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