

CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE  
CONTROVERSIES & UPDATES  
IN VASCULAR SURGERY



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# Use of the Elastic Exsanguination Tourniquet in Hemodialysis Access Surgery

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## Disclosure

Speaker name:

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- I have the following potential conflicts of interest to report:
  - Consulting
  - Employment in industry
  - Shareholder in a healthcare company
  - Owner of a healthcare company
  - Other(s)
- I do not have any potential conflict of interest

# Arterial Tourniquets

- Arterial tourniquets apply pressure on a limb that is sufficient to collapse the artery(ies) and block the arterial blood supply to the limb.
- Tourniquets have been in use in military and emergency medicine for hundreds of years.
- They were introduced to orthopedic surgery in 1873 by Dr. Frederic von Esmarch.
- Inflatable cuff tourniquets were adopted for orthopedics by Dr. Cushing.



*Esmarch Bandage  
& Tourniquet*



*Tourniquet*

# Types of tourniquets

All tourniquets are made to apply radial pressure on the circumference of the limb. There are three general types of tourniquets:

1. The inflatable or pneumatic cuff such as used for non-invasive blood pressure measuring (Cushing)
2. The wrapped elastic or non-elastic band such as used in military and emergency medicine and by some surgeons during orthopedic surgery (Esmarch)
3. The rolling elastic ring (HemaClear®)



# Development of the Elastic Exsanguination Tourniquet

- Method Patented 1987 Noam Gavriely MD
- Various elastic sleeve tested (materials, length, thickness, radius)



First prototypes made of rubber sleeve  
only

# Development of HemaClear

- Although the prototypes made of rubber sleeve only showed some results on upper extremities, they failed to achieve their purpose on lower extremities.
- Development of separate constricting element (silicone ring) was required.



# The Elastic Exsanguination Tourniquet (HemaClear<sup>®</sup>)

- We describe the use of this ultra narrow elastic tourniquet. It consists of a calibrated silicone ring wrapped around by an elastic sleeve (stockinet) and straps with handles that are used during the application
- It is not pneumatic
- It is much narrower than a standard pneumatic tourniquet



# Use of Pneumatic Tourniquet in Vascular Surgery

Preventative haemostasis with inflatable  
tourniquet for microsurgical distal arteriovenous  
fistulas for haemodialysis. (Bourquelot 1993 )



# Why a Tourniquet?

- Dialysis access operations can be bloody.
  - High blood flow in the extremity
  - Venous hypertension
  - Abnormal hemostasis
- Blood transfusions increase sensitization to alloantigens (Panel Reactive Antibody Level)
  - Need to avoid blood transfusions in dialysis patients.
  - Increased waiting time for renal transplantation

# First Report of Elastic Exsanguination Tourniquet in Hemodialysis Access Surgery

- First report (Ladenheim 2011) 27 cases

Forearm	
Brachiocephalic fistula	8
Brachiobasilic (stage 1)	4
Removal infected graft	1
Radiocephalic Fistula	4
Upper Arm	
Brachiobasilic (Stage 2)	6
Removal Infected upper arm graft	1

2014: > 250  
vascular cases  
with elastic  
exsanguination  
tourniquet

J Vasc Access 2013; 14(2):116-119

# Upper Arm aneurysm with Exsanguination Tourniquet



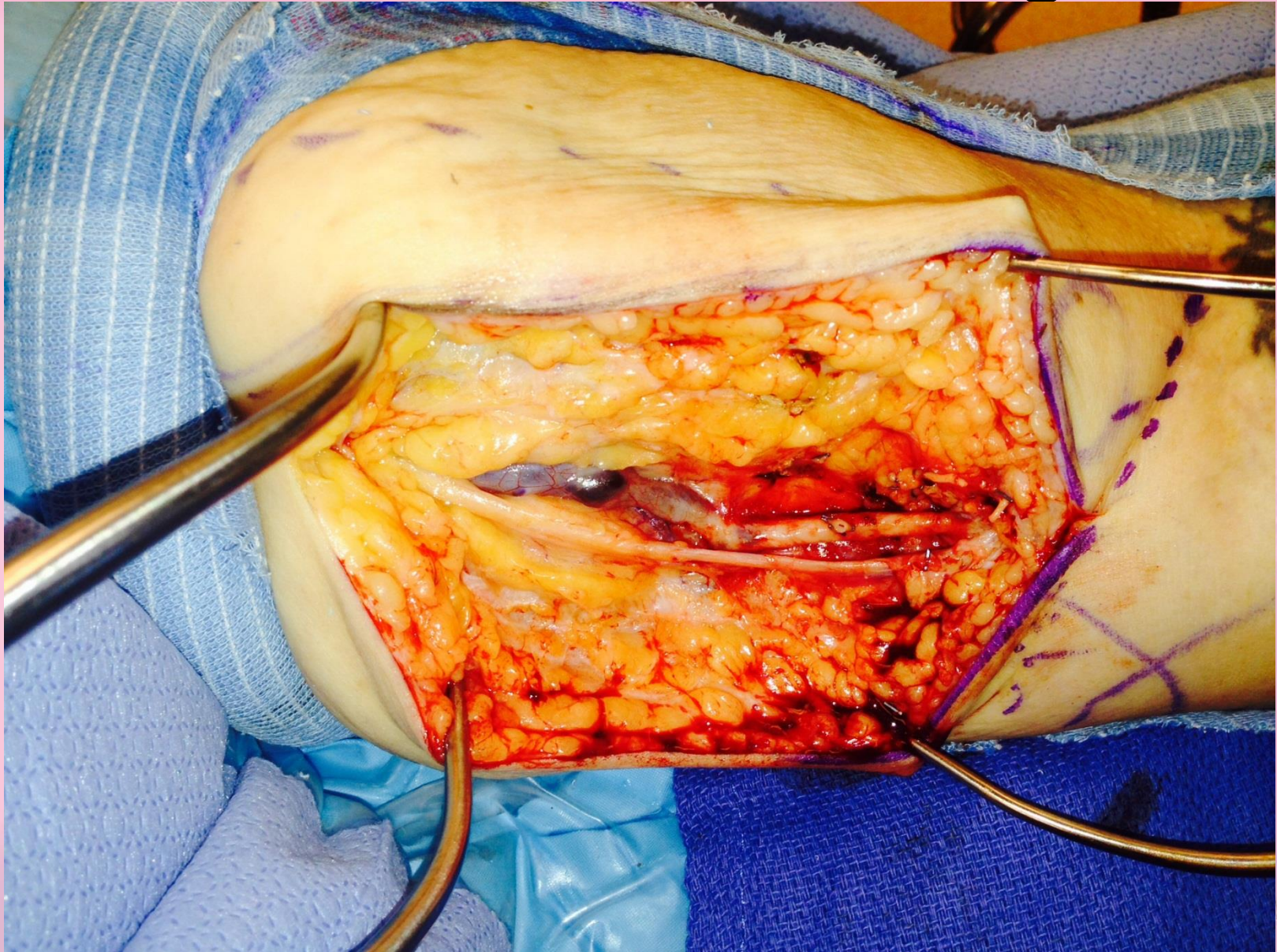
# Brachiobasilic Fistula Stage 2



# Brachiobasilic Fistula Stage 2



# Brachiobasilic Fistula Stage 2



- Lipectomy of Upper arm AV fistulas with tourniquet



# Special Precautions

- Special precautions to avoid twisted veins when doing vein transpositions
- Avoid tourniquet in patients with severely atrophic skin
- Adequate analgesia/anesthesia
- Release tourniquet before closing incision



# Advantages of Surgical Exsanguination Tourniquet

- Very Narrow footprint expands potential for tourniquet control
- Comes in 4 sizes to fit almost any upper or lower limb from 14cm to 85cm
- Less blood loss from AV Access procedures may result in fewer transfusions --less sensitization of potential transplant patients to foreign antigens (Panel Reactive Antibody Level)