
P.Bourquelot, Paris

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# VASCULAR STEAL and ISCHEMIA after vascular access creation

**Disclosure**

Speaker name: Pierre Bourquelot

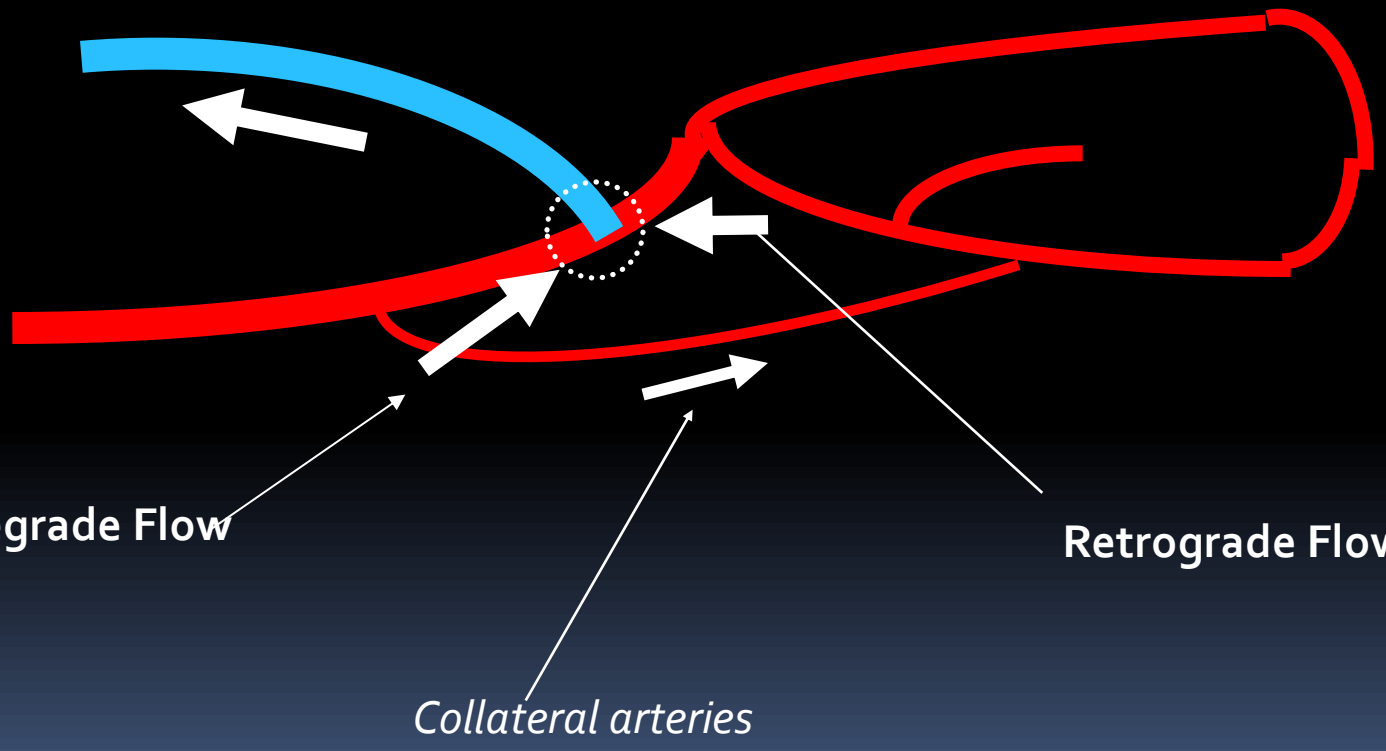
- ☐ I have the following potential conflicts of interest to report:
- ☐ Consulting
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)
- ☒ I do not have any potential conflict of interest

# Before AVF Creation, upper limb ISCHEMIA is unusual

# Ischemia, after AVF creation, results from the association of…

- Steal
  - of the high-pressure arterial flow
    - not only retrograde flow coming from distal artery
    - but also from the proximal artery
  - by the low-pressure vein

# Steal*



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  - by the low-pressure vein

- with Artery pathology
  - Atheroma, Diabetes
  - Previous angioaccess sequellae

Finally, « STEAL » is only responsible for a part of ISCHEMIA, and title of my communication should be modified as:

# HEMODIALYSIS ACCESS-INDUCED DISTAL ISCHEMIA (HAIDI)

# Clinical Grading

1. Cyanosis, mild coldness
2. Pain during dialysis sessions
3. Rest pain or motor dysfunction
4. a- Limited ulceration or necrosis

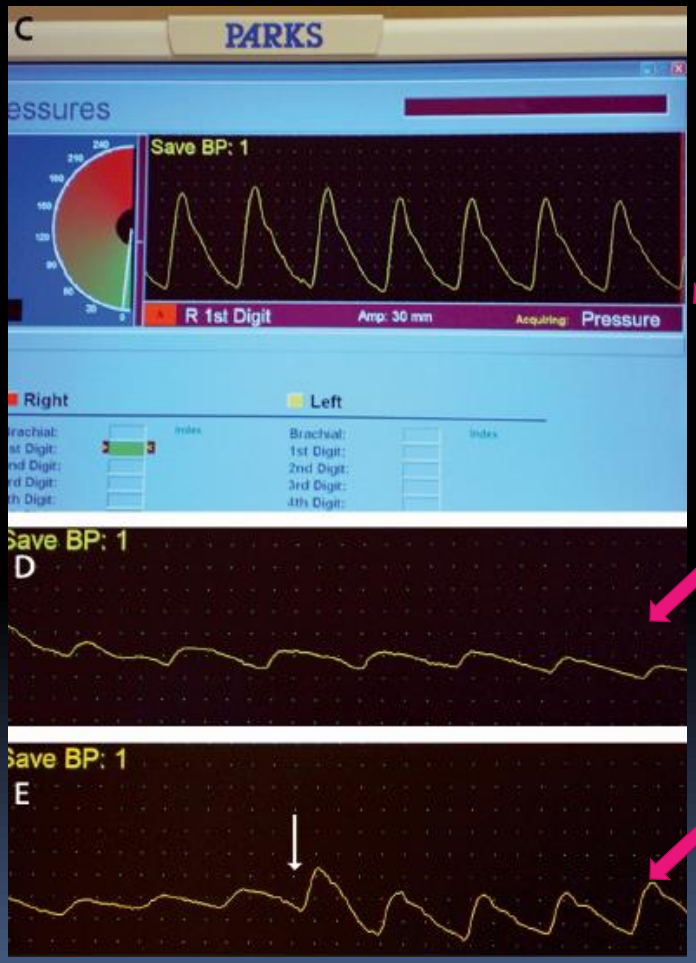
   b- Irreversible tissue loss in the hand

# Duplex: Finger pressure measurements

- Confirms HAIDI
  - Brachial artery digital index < 0.6
  - Digital pressures <50 mmHg

Schanzer 2006, Malik 2008

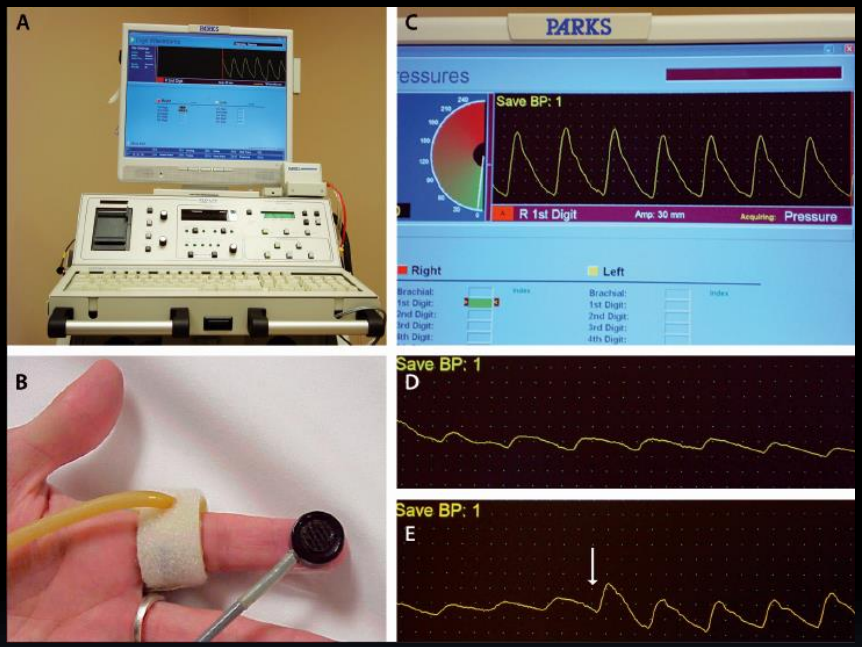
# Duplex: Waveform modifications




- Normal digit waveforms
- HAIDI (without & with AVF compression)
  - severe arterial lesions: PTA, DRIL
  - with predominant steal : Flow Reduction

Schanzer 2006, Malik 2008

# Duplex:




- Not to mention…
  - Artery & Vein Stenoses
  - Directions of flow
  - Flow measurements

Schanzer 2006, Malik 2008

# TREATMENT - ALGORITHM

Grade 1 and 2

Coldness, Cyanosis

Pain during Dialysis

Conservative Trt.

Grade 1 and 2

Coldness, Cyanosis

Pain during Dialysis

Conservative Trt.

Grade 4 b

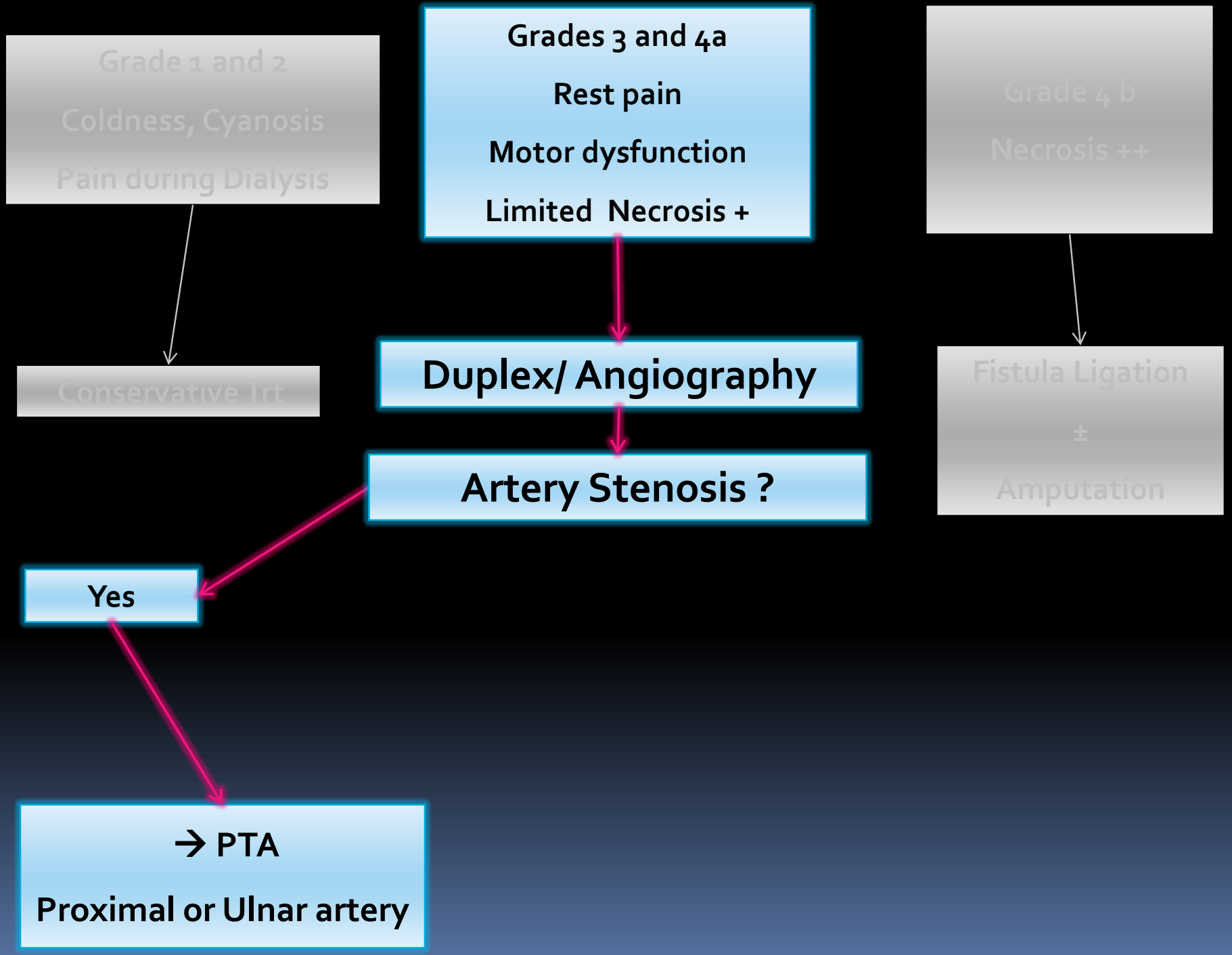
Necrosis ++

Fistula Ligation

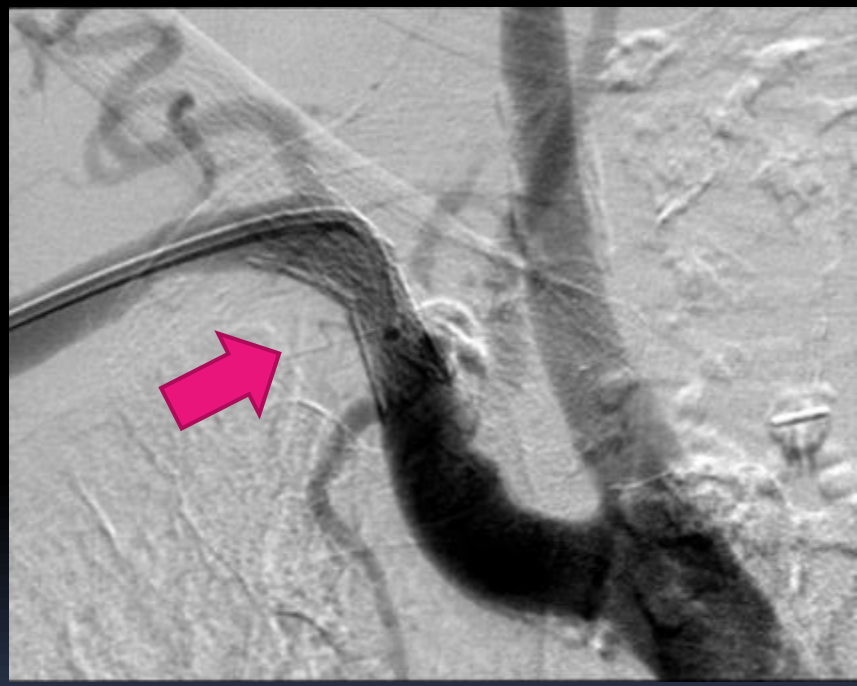
±

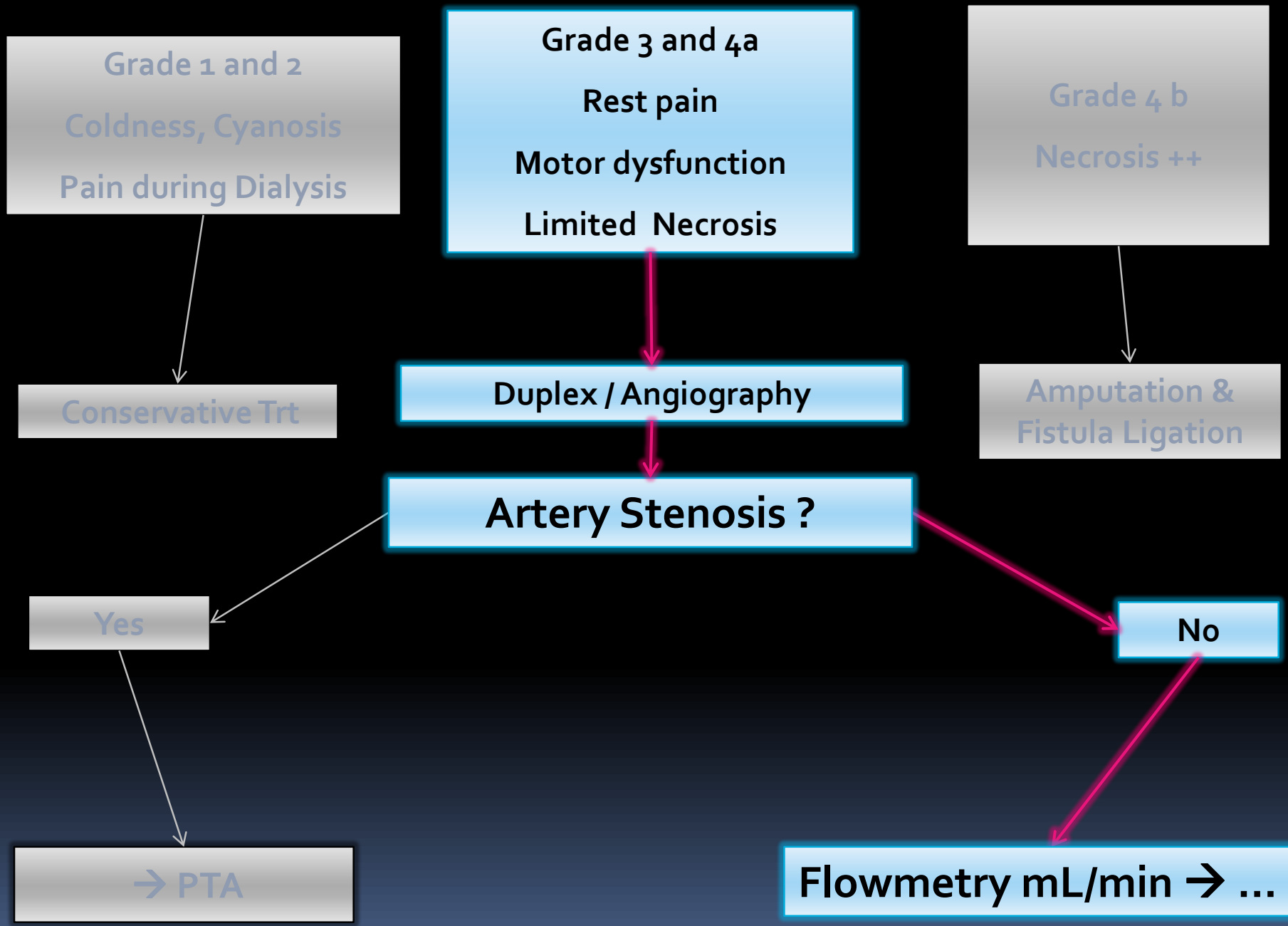
Amputation

# Grade 4b: Ligation + Amputation


Grade 1 and 2
Coldness, Cyanosis
Pain during Dialysis
Grades 3 and 4a
Rest pain
Motor dysfunction
Limited Necrosis +
Grade 4 b
Necrosis ++
Conservative Trt
Duplex/ Angiography
Fistula Ligation
±
Amputation
Artery Stenosis ?
Yes
→ PTA
Proximal or Ulnar artery

# Inflow stenosis: PTA ± Stent




Grade 1 and 2
Coldness, Cyanosis
Pain during Dialysis
Grade 3 and 4a
Rest pain
Motor dysfunction
Limited Necrosis
Grade 4 b
Necrosis ++
Conservative Trt
Duplex / Angiography
Amputation & Fistula Ligation
Artery Stenosis ?
Yes
No
→ PTA
Flowmetry mL/min → …

Low-Flow

(non-matured AVF)

→Fistula Ligation

FLOWMETRY

Low-Flow

→ Ligature FAV

**FLOWMETRY**

**Mild-Flow -> Increasing distal pressure**

1. **Distal AVF : 300 to 600 mL/min**

**→ DRAL (Distal Radial Artery Ligation)**

1. Prox. AVF : 400 to 800 mL/min:

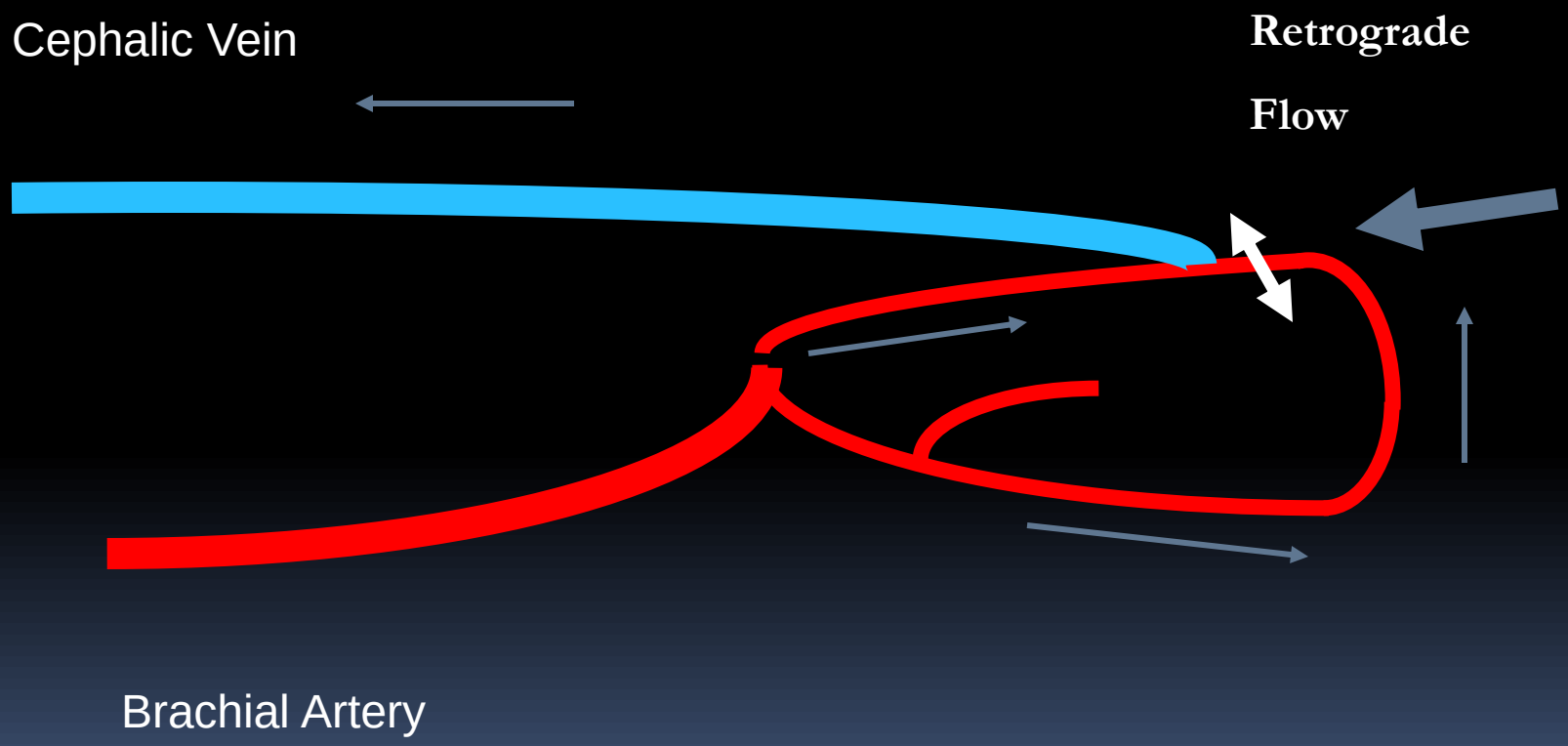
→ DRIL (Distal Revascularization Interval Ligation)

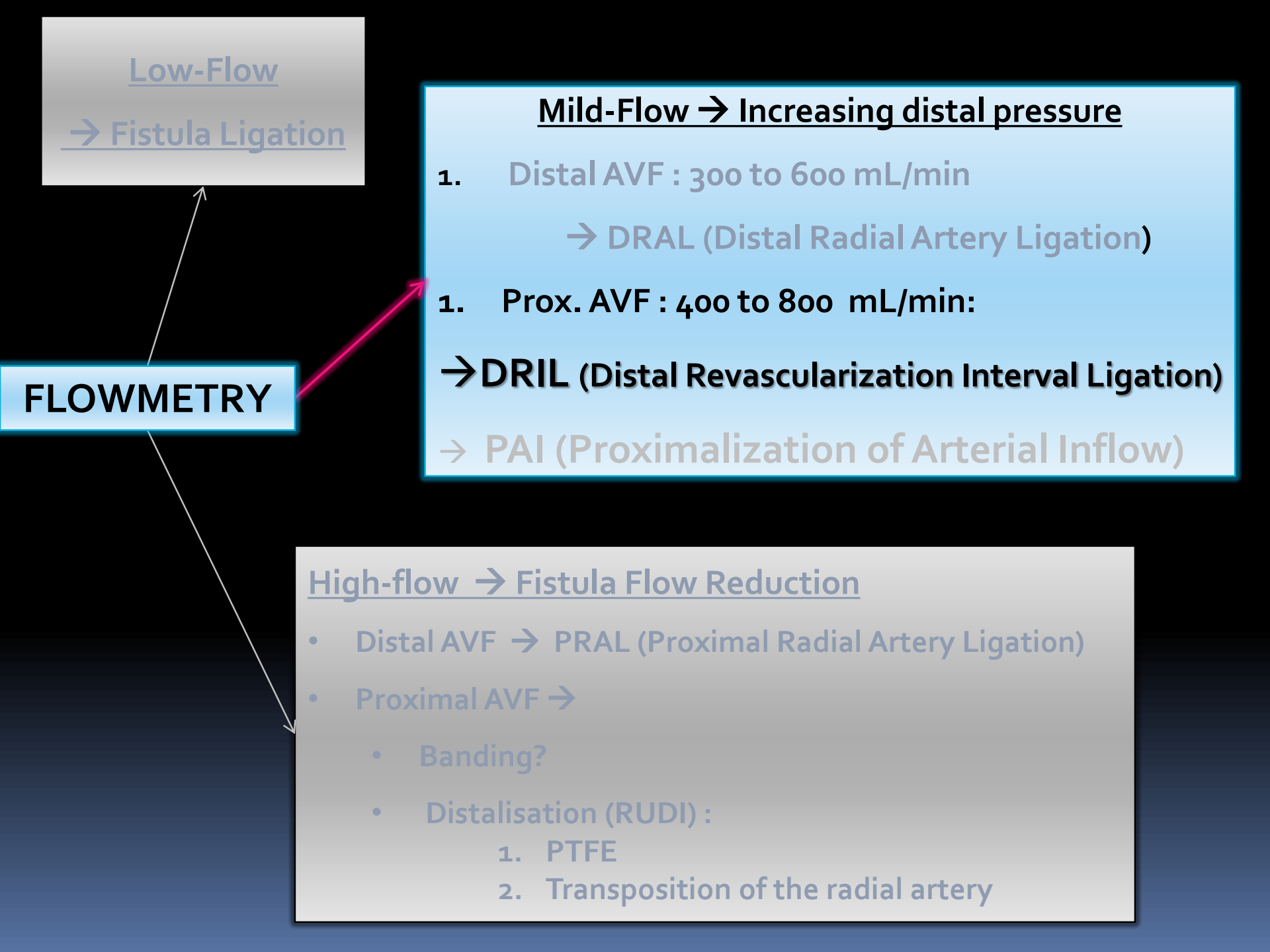
→ PAI (Proximalization of Arterial Inflow)

High-flow → Fistula Flow Reduction

- Distal AVF → PRAL (Proximal Radial Artery Ligation)
- Proximal AVF →
  - Banding ?
  - Distalisation (RUDI) :
    1. PTFE
    2. Transposition of the radial artery

# Distal Radial Artery Ligation (DRAL)




Low-Flow
→ Fistula Ligation
FLOWMETRY
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• Proximal AVF →
• Banding?
• Distalisation (RUDI) :
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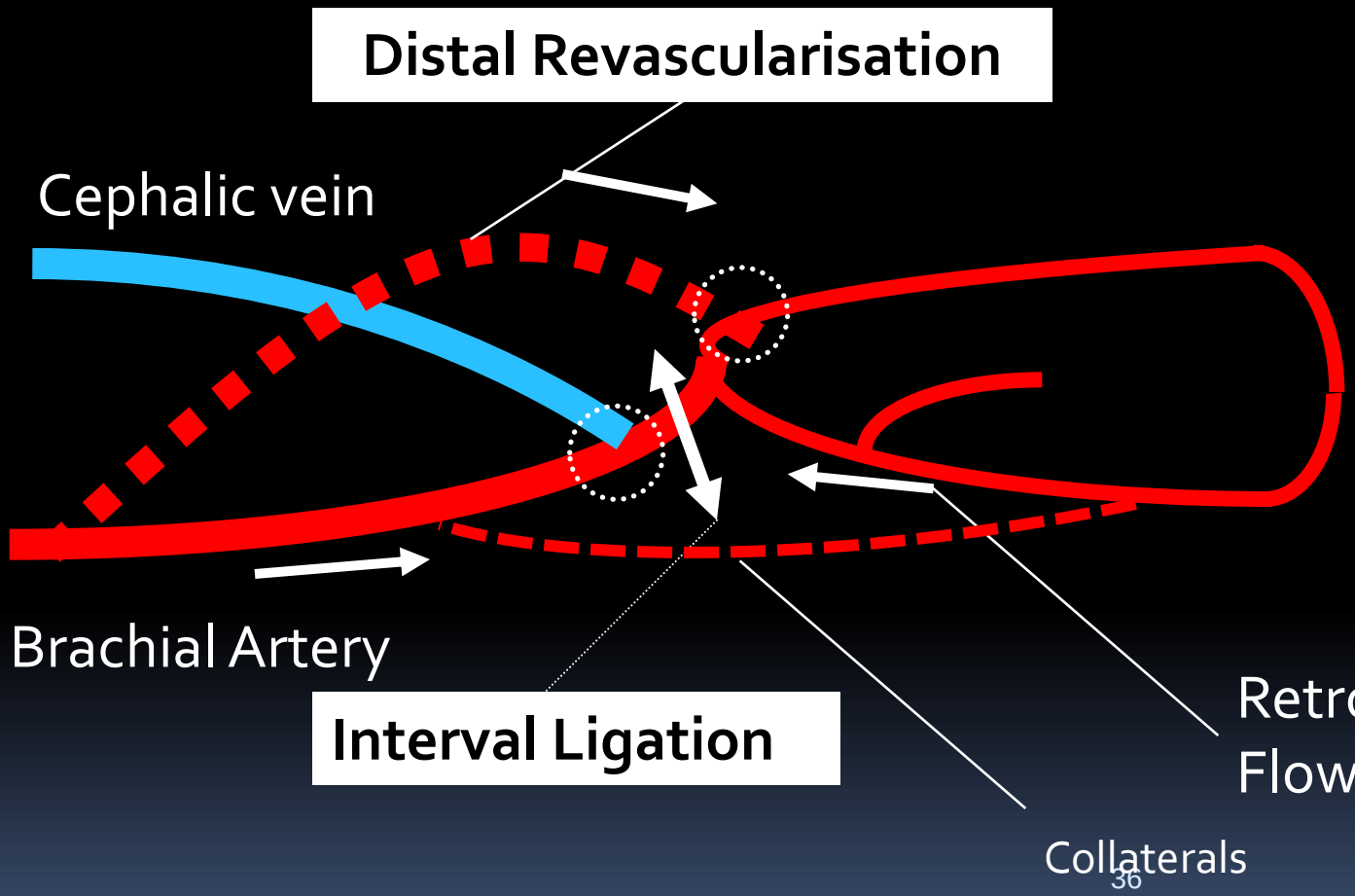
# DRIL*






J Vasc Surg 1988, Schanzer

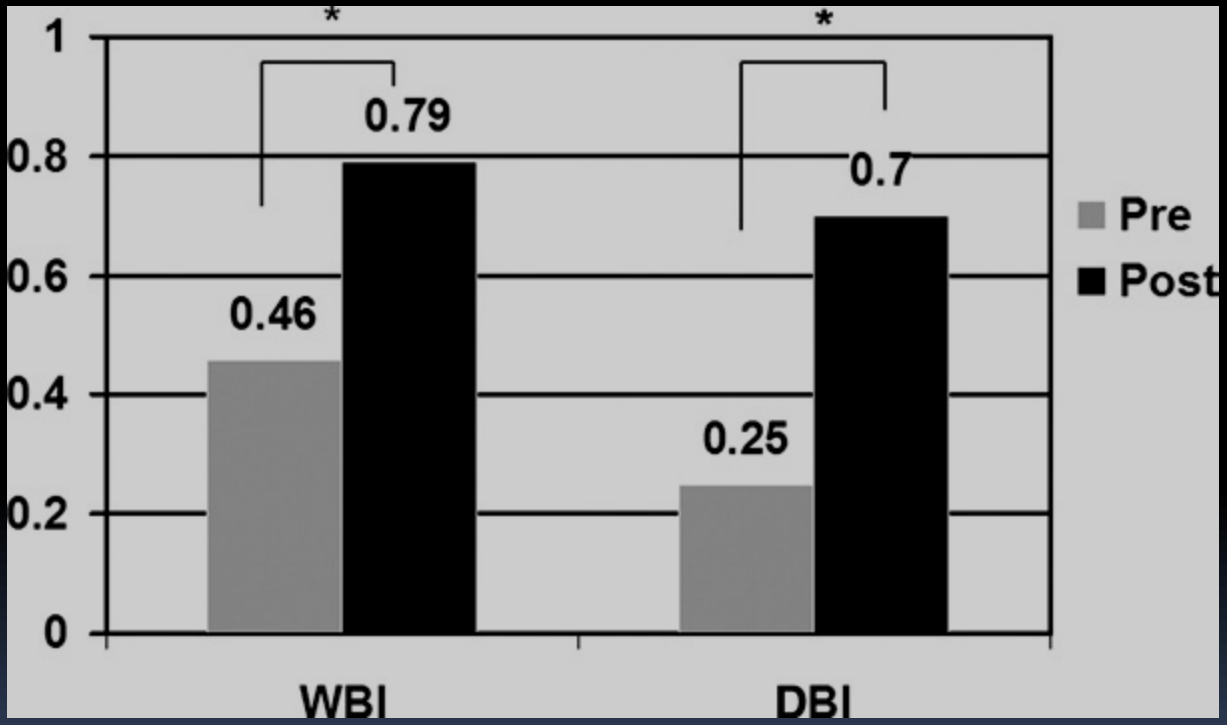
# DRIL

# DRIL Advantages

Since description by Haimov in 1996,

many publications proved that DRIL was a long-term reliable procedure to improve distal perfusion maintaining access patency.

# Wrist/ & Digital/Brachial indices increase after DRIL




J Vasc Surg 2008, Huber

# DRIL - Disadvantages

- Major artery ligatiov
- Suitable saphenous vein is needed
- Time-consuming procedure
- Very few reports at lower limb
- As the reduction in fistula flow is small, the procedure may not be appropriate when high flow is associated with ischemia

Low-Flow

→ Ligature FAV

**FLOWMETRY**

**Mild-Flow → Increasing distal pressure**

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High-flow → Fistula Flow Reduction

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- Proximal AVF →
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  - Distalisation (RUDI) :
    1. PTFE
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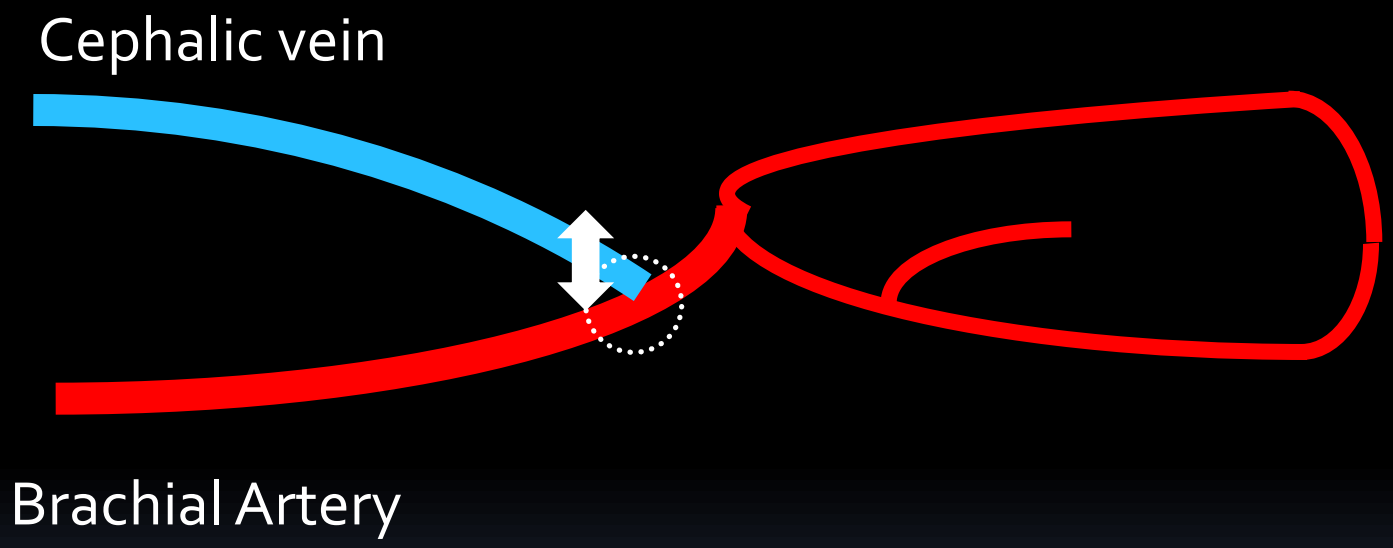
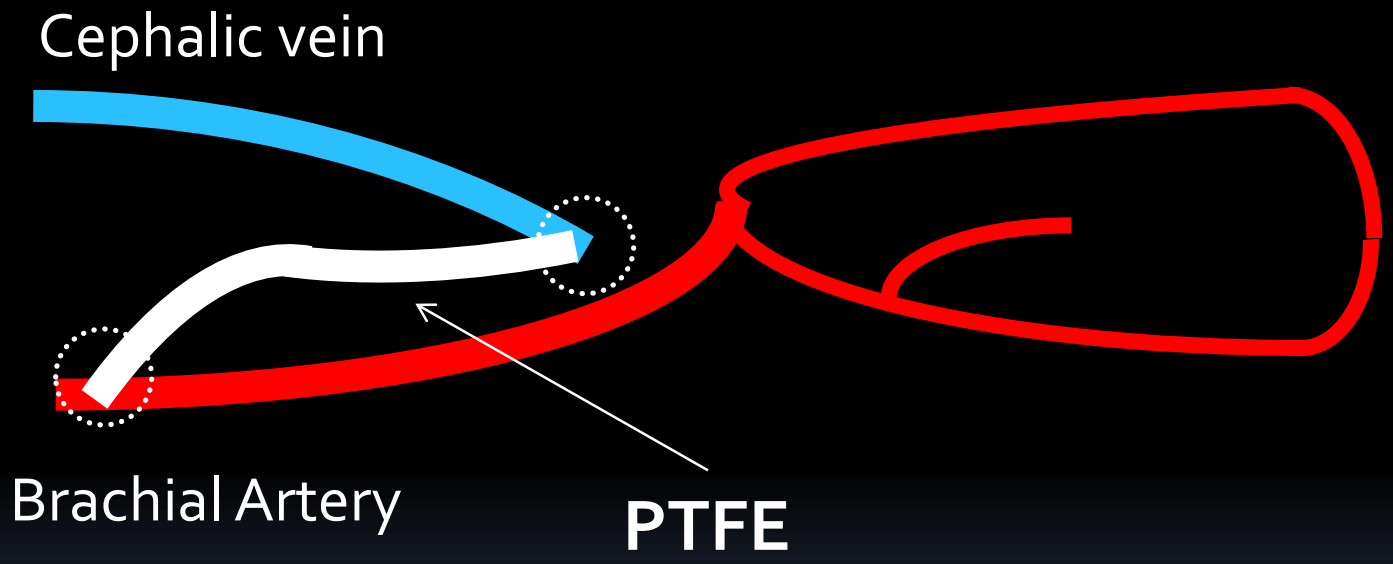
# Proximalisation (PAI)






Zanow, 2006

# Proximalisation (PAI)



# Proximalisation

- Gradman 2004
- Pros:
  - Anastomoses with large vessels
  - Efficacy similar to DRIL for distal ischemia trt
- Cons:
  - Changes autogenous AVP into PTFE access
  - Increases flow access

# Conclusion

- Distal Ischemia = 5 to 10% AVF (elbow ++)
- Induced by Artery lesions and Steal:
  1. PTA
  2. Flow Reduction
  3. DRAL & DRIL (++)
- Access ligation may be necessary and urgent to avoid major amputation.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# THANK YOU FOR YOUR ATTENTION