

# **Controversy:**

## **Cephalic arch stenosis dilatation / surgery**

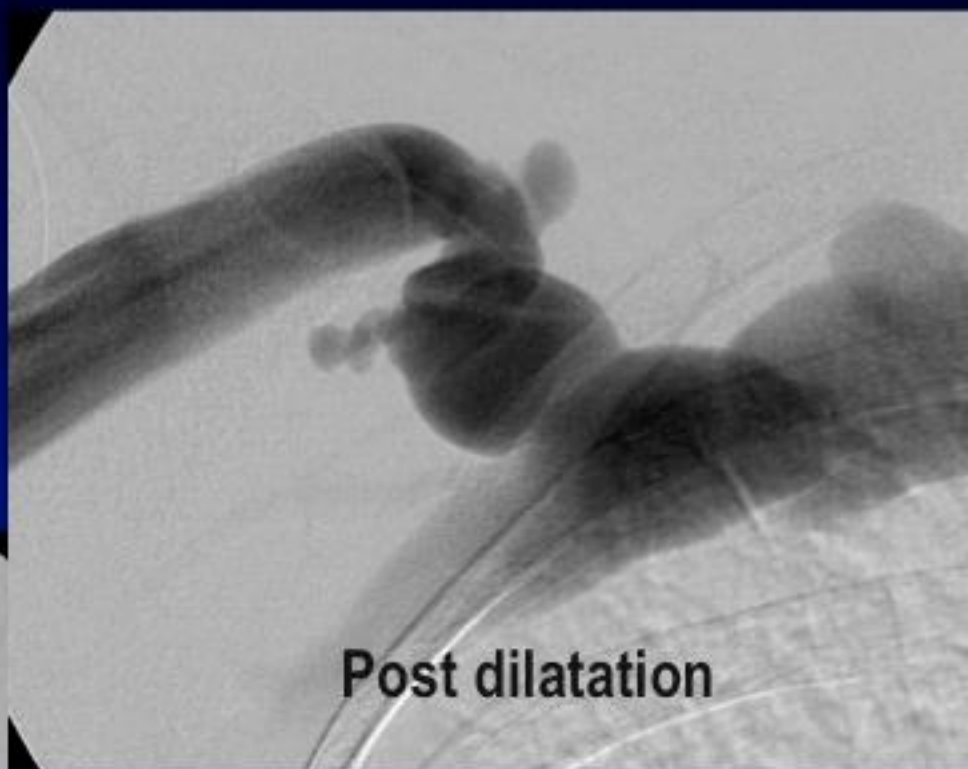
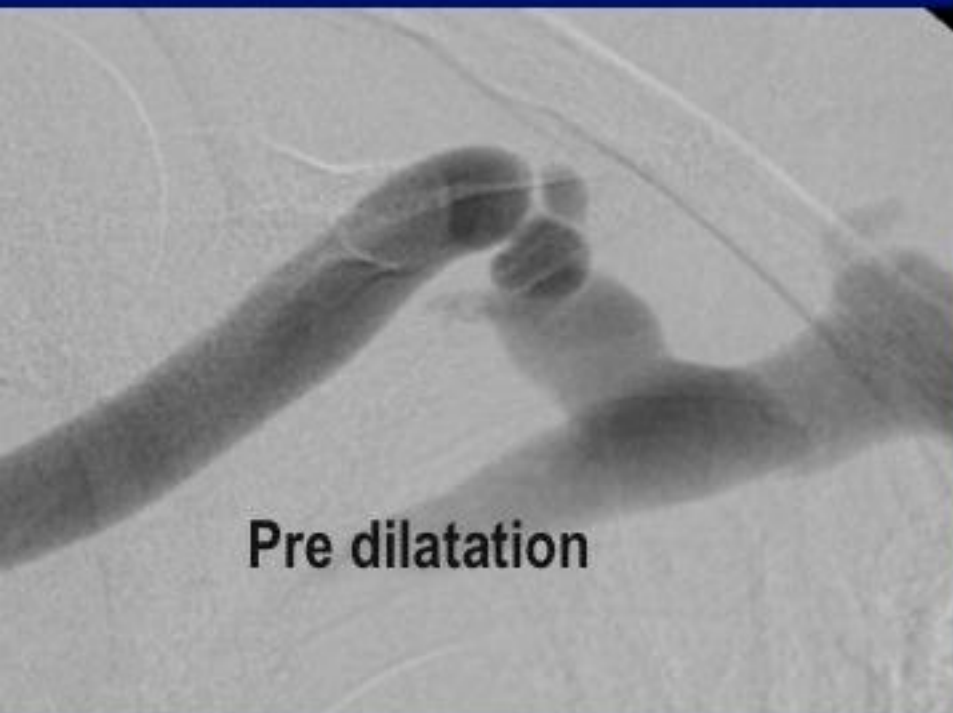
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**Alleray Labrouste Clinic**  
**Paris xv**

**I have no financial relationships to disclose.**

## Indications for stenting

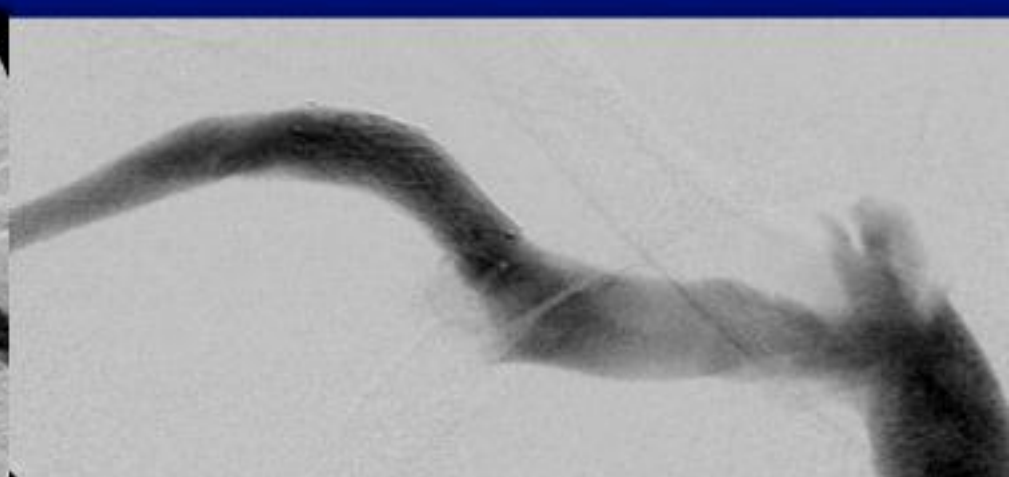
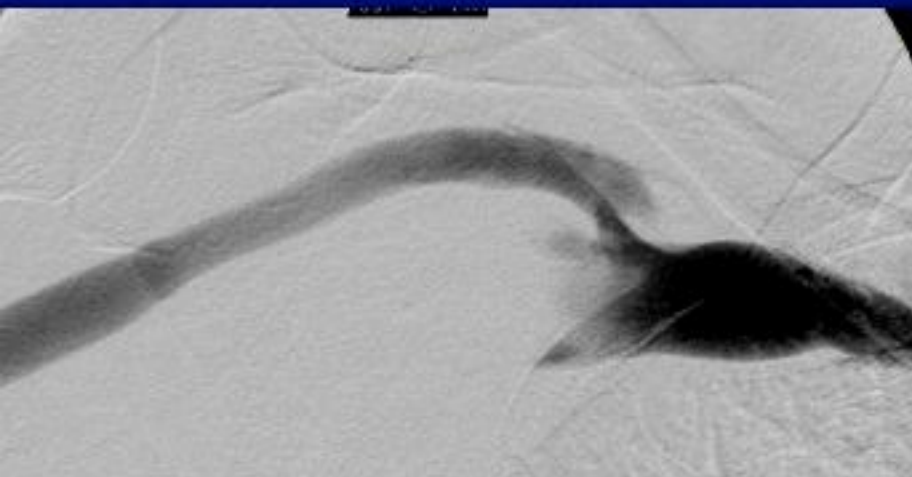
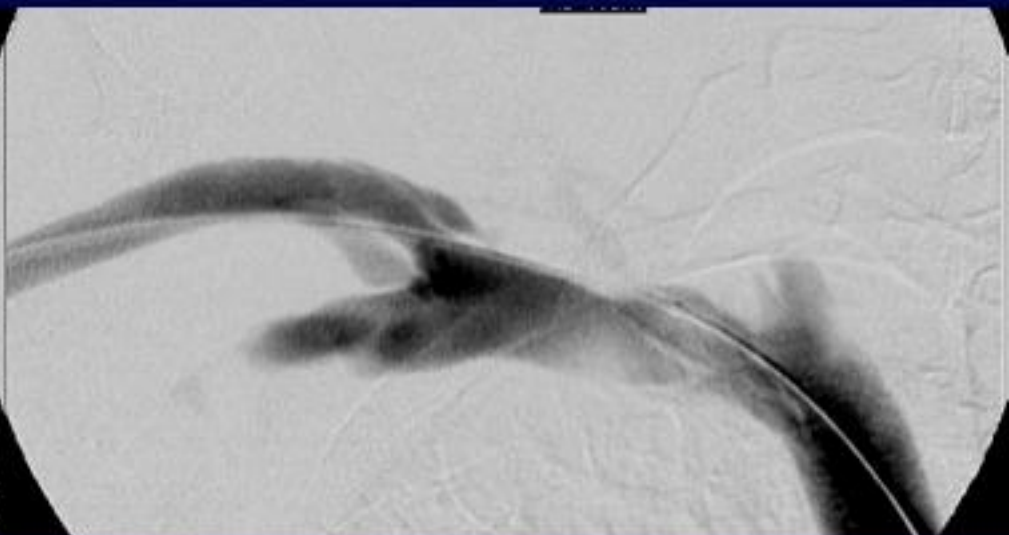
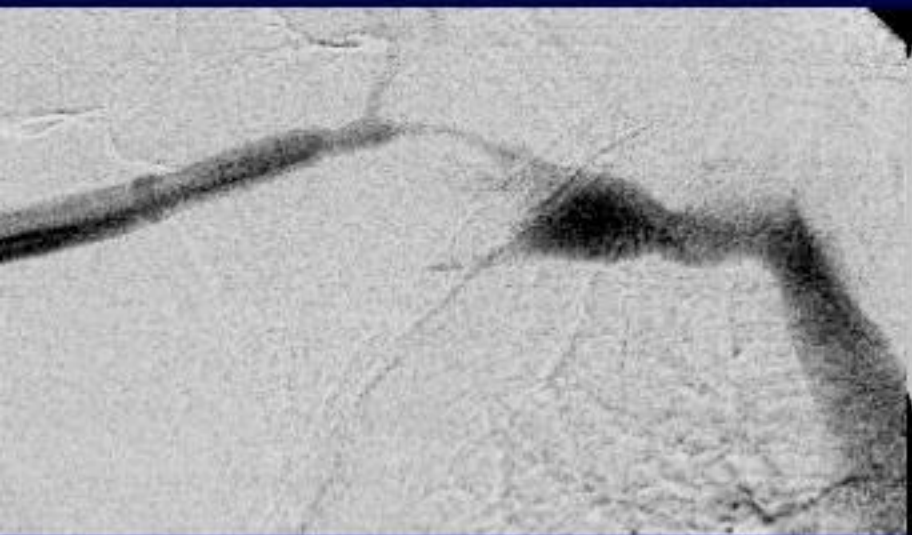
- Indications are very controversial, systematic for some, rare for others, bare stents for some, covered for others
- In our own opinion indications for stenting should be restricted to:
  - Failure of dilatation despite the use of balloon of proper size (at least 1mm larger than the vein) and of prolonged inflations (at least 3 minutes)
  - Rupture uncontrolled despite prolonged (3 minutes) low pressure balloon inflations
  - Recurrent restenoses with span between dilatations < 4 months

## Diaphragm like stenosis





Dissection post angioplasty => stent



## Rules for arch stenting

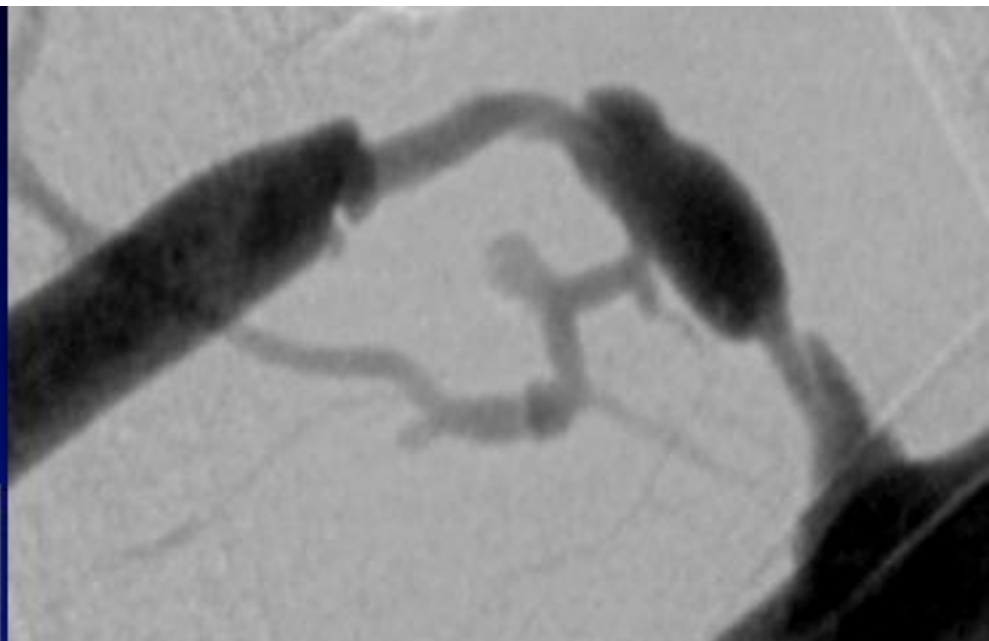
- The arch is a bending area, thus very flexible stents should be used in order to decrease risks of occurrence of instant hyperplasia and of kink at the stent edges
- The stent should be as short as possible: to cover a healthy vein may cause hyperplasia and stenosis at this healthy spot.
- The stent should not protrude in the subclavian vein. Such a protrusion would cause a stenosis of the subclavian precluding the creation of any other access on this limb
- The stent should not end in the curved segment of arch: high risk of stenosis occurrence



# Immediate failure of PTA treated by stenting

After prolonged  
inflation

IM PROLONGEE

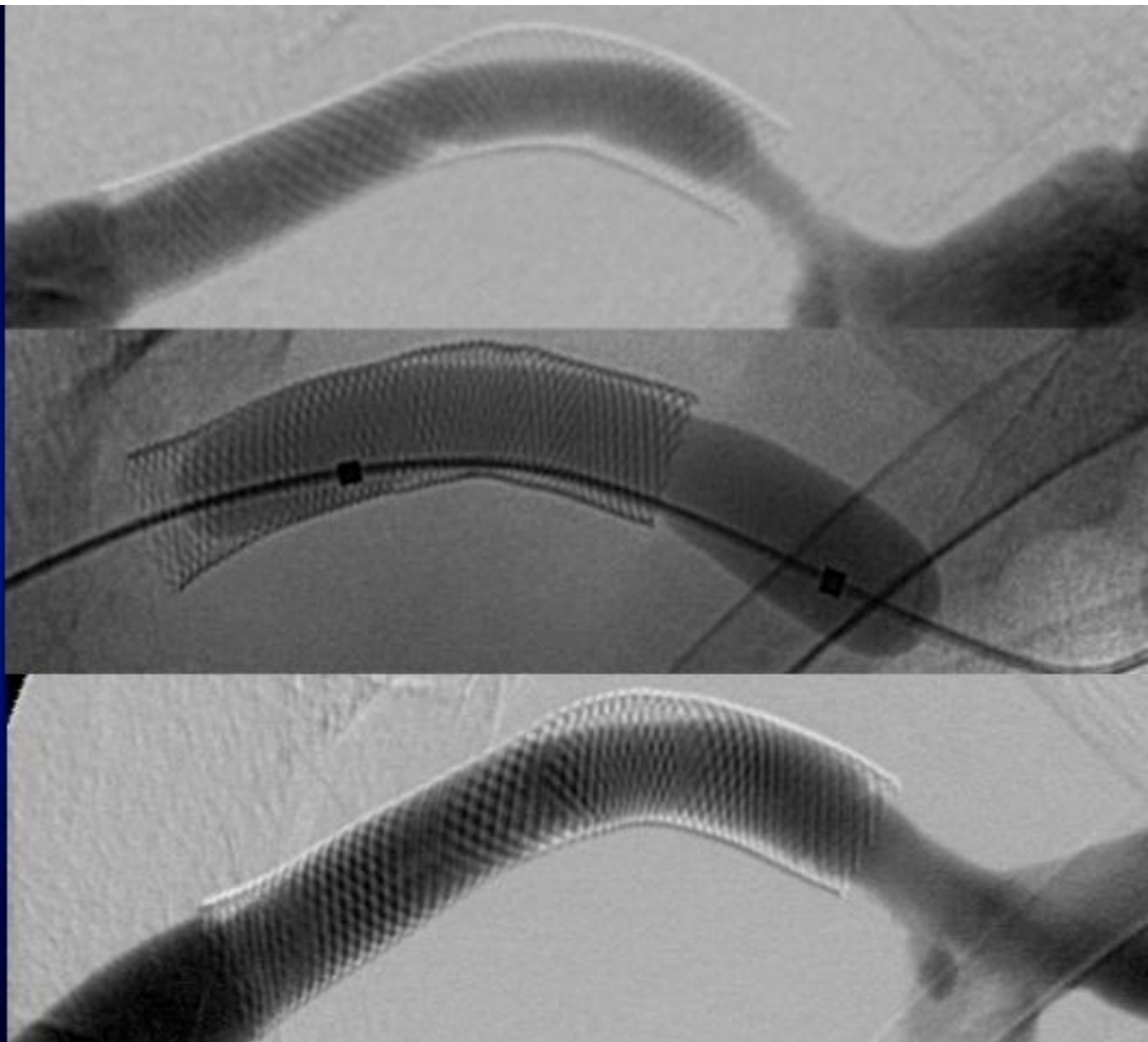


WALLSTENT RP. 8MM.

10 months later  
repeat PTA



20 months  
later new  
restenosis  
treated by  
repeat PTA

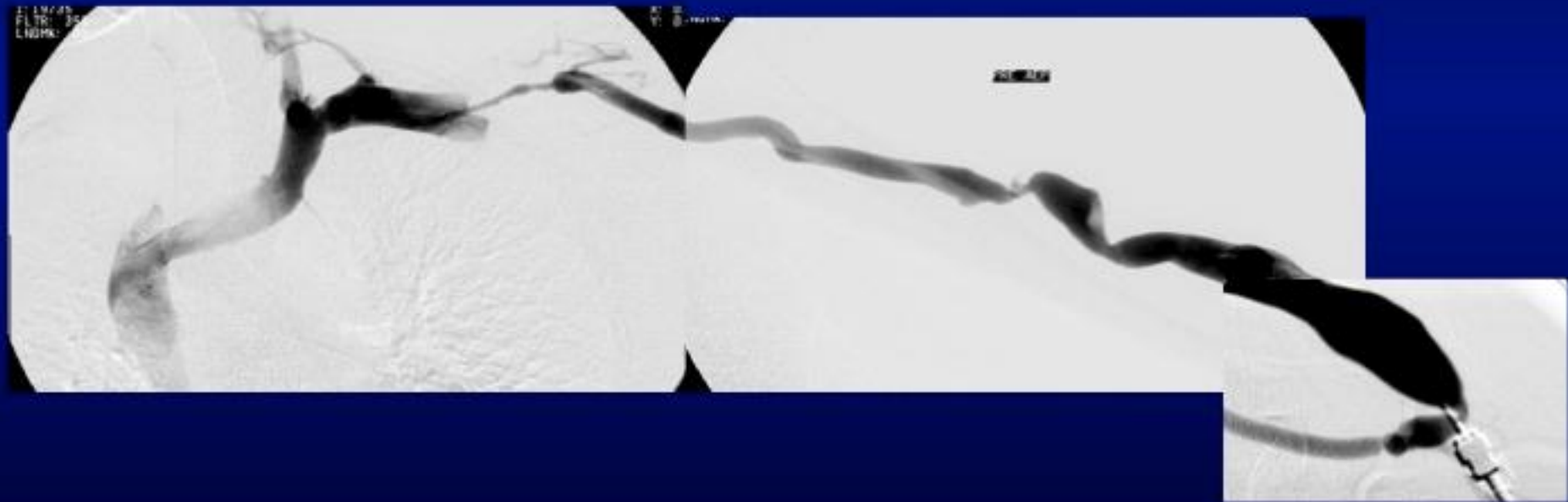




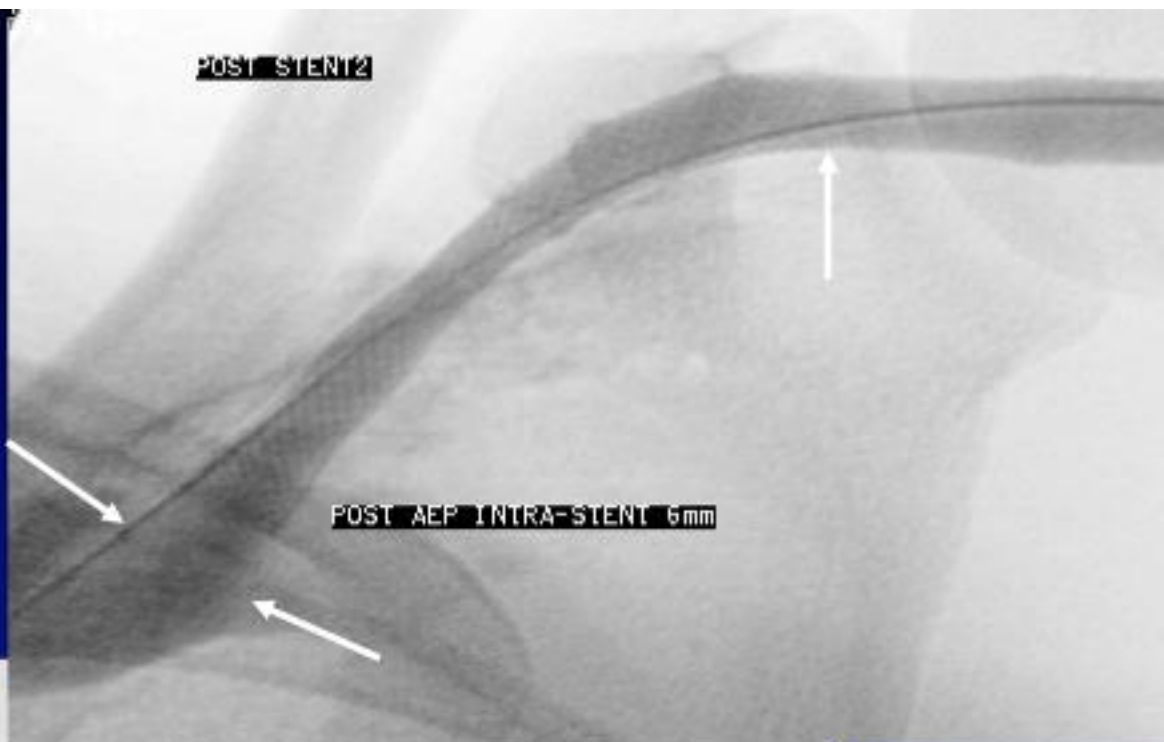
44 year-old woman dialysed for 10 months.  
Brachiocephalic fistula.

Too high venous pressure.

Restenosis 3 months after a first dilatation



PTA + stent The  
stent protrudes in  
the subclavian



First restenosis 3 months after stenting

Subclavian vein stenosis

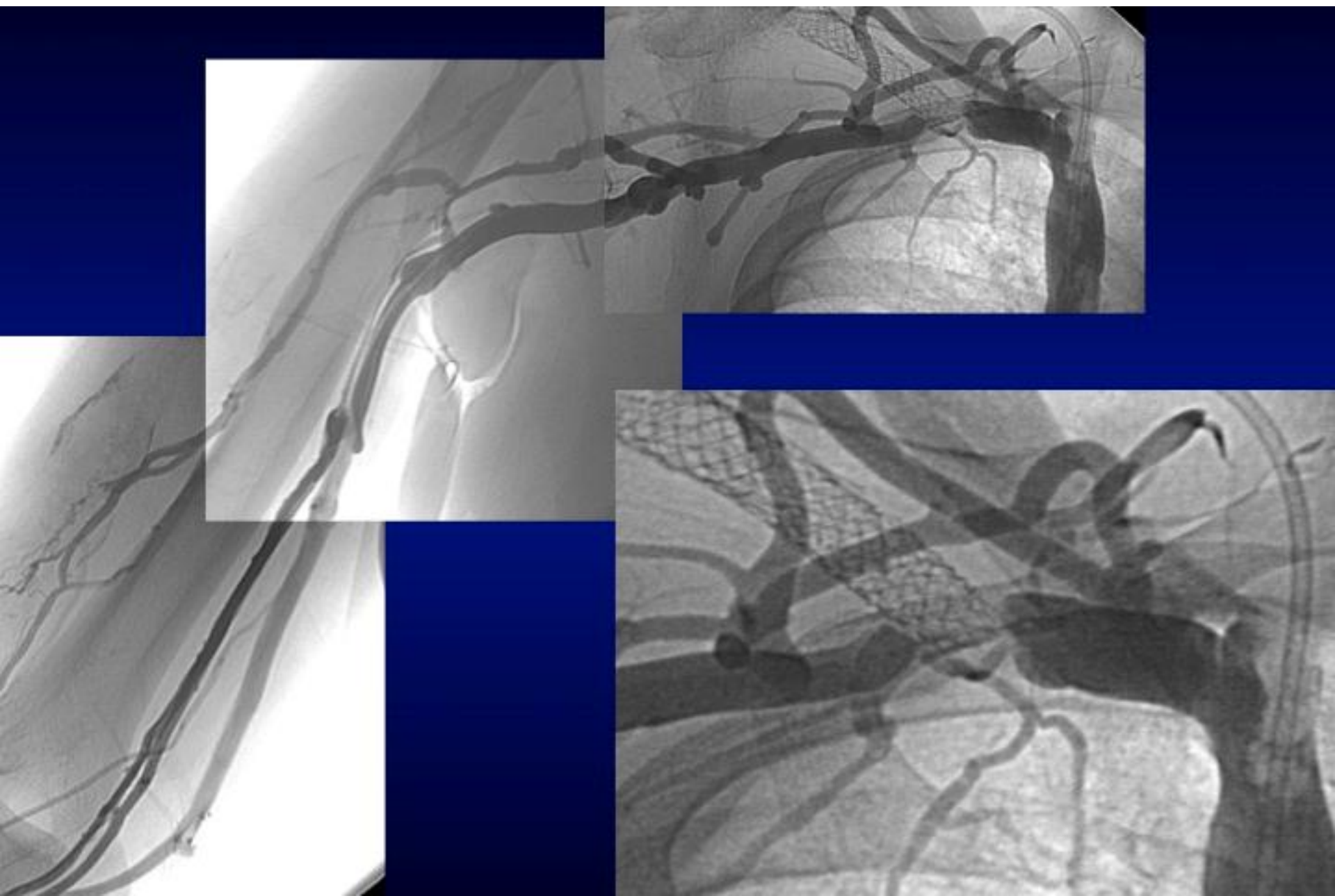
This angiogram shows a significant narrowing (stenosis) of the subclavian vein, indicated by a black arrow. The stenosis is labeled as the 'First restenosis 3 months after stenting'.

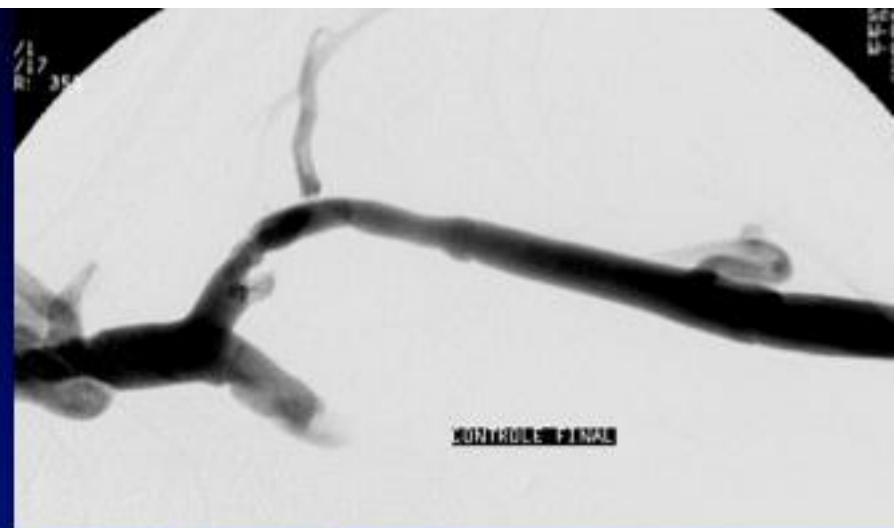
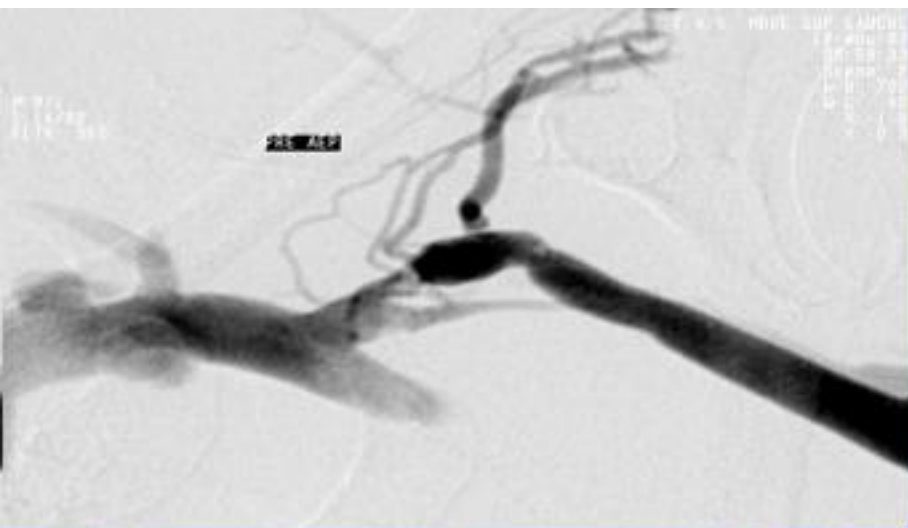


One year post dilatation

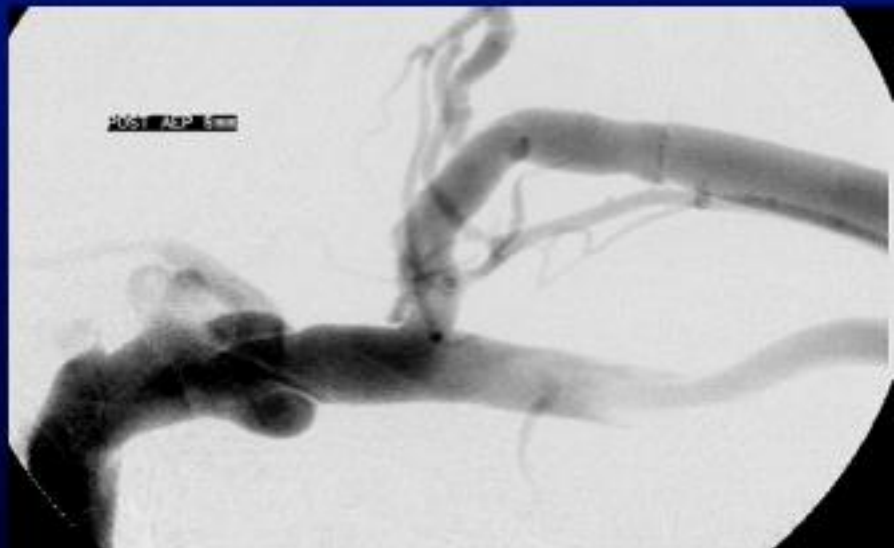
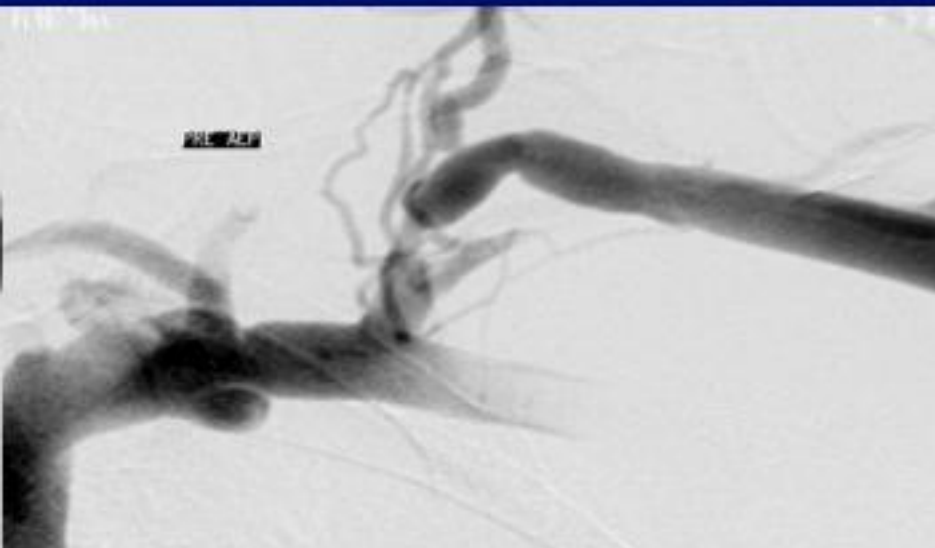
Repeat PTA

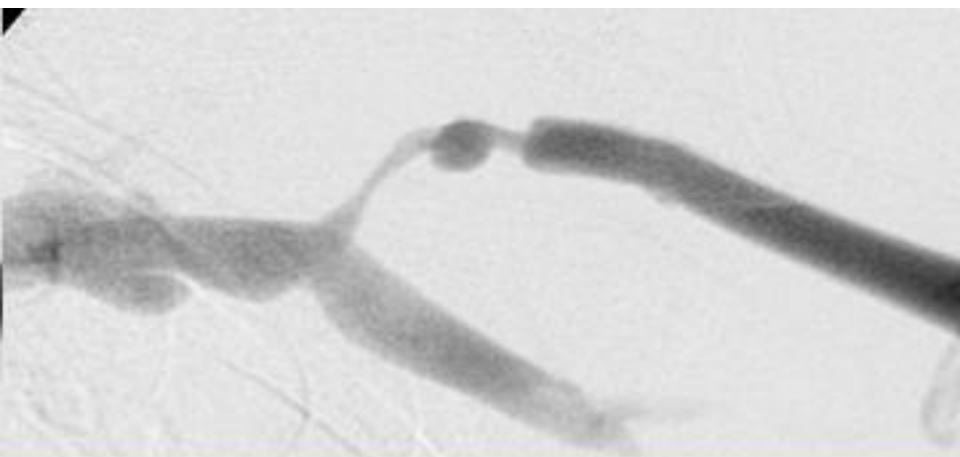




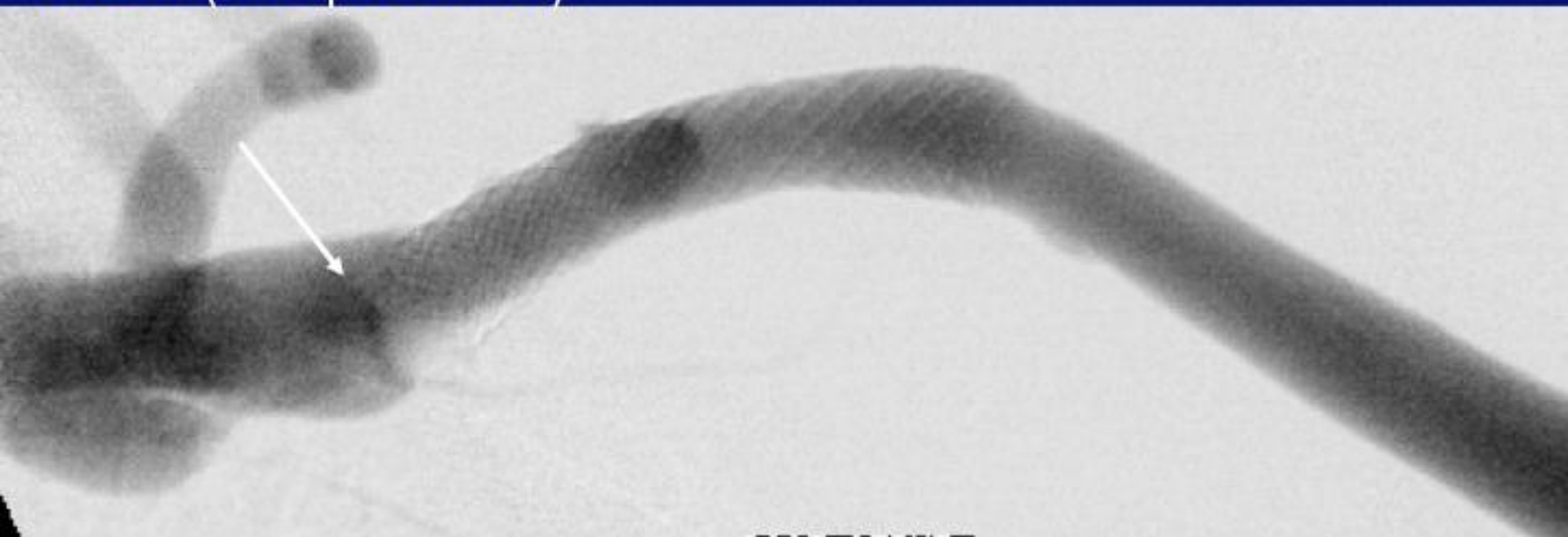


Dilatation of the arch followed 2 months later by a restenosis => repeat dilatation

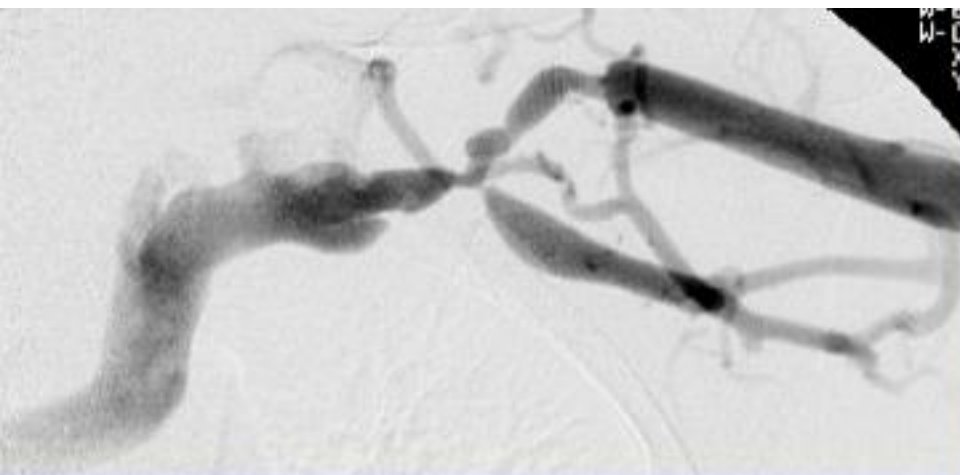




4<sup>th</sup> restenosis 14 months after the first dilatation => implantation of a stent (mild protrusion)







52 months after the 1<sup>st</sup> dilatation, 38 months after stenting 1<sup>st</sup> instent restenosis but subclavian stenosis



## Stenosis by retraction of the subclavian

- Nearly 100% and early (few months) in case of large stent protrusion
- Highly frequent in case of minimal protrusion and occurring later (some months or few years)
- May also occur when a stent does not protrude but rarely and delayed (some years)
- Really exceptional and very late after dilatations without stent implantation



## Bare stent versus covered stent

- Covered stents are much more rigid than bare stents. This major risks
  - Of stenosis occurrence at the stent edges.
  - Of stenosis of the subclavian in case of minimal stent protrusion
  - Of retraction of the subclavian even when the stent is well placed and not protruding in the subclavian
- On the contrary the cover decreases the risks of occurrence of in-stent hyperplasia.
- There is no evidence of better results with covered stents than with bare stents
- Drug eluting stent need to be evaluated



## Bare stent versus covered stent

- In a randomized series of 25 patients with an early restenosis ( $\leq 3$  months) of the cephalic arch D. Shemesh compared bare and covered stent. He showed a significant improvement of short-term restenosis rate with covered stent. However:
  - Dilatation was performed with balloon of the diameter of the vein and not slightly wider
  - Both bare and covered stents used were not the most flexible available
  - Only long balloon ( $\geq 4$  cm) and long covered stent ( $\geq 6$  cm) were used (in order to avoid kink at the stent edges)
  - Stents were placed protruding into the subclavian and the search for related stenosis of this vein was not done



## Follow up after dilatations

- Results of dilatation clearly depend on indications and on technical data such as under dilatation (which is frequent), stents choice or stent misplacement
- Restenoses after dilatation of the cephalic arch
  - Primary patency at 42% at 6 months (D.K. Rajan) (only 29% of isolated stenosis of the arch)
  - Primary patency at 47% at 1 year in an own non published series comparing high pressure balloon with cutting balloons, in which were only included the isolated short stenosis of the arch (<2 cm long)

## Surgical transposition

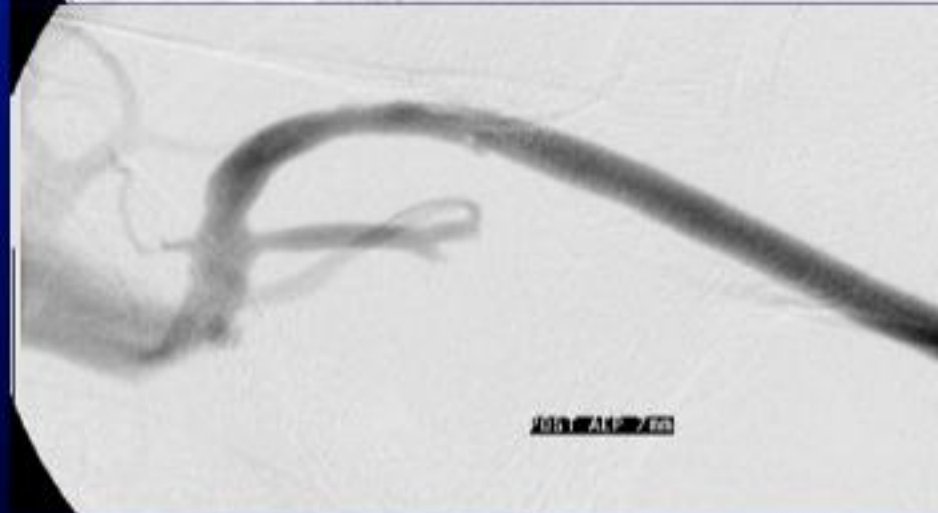
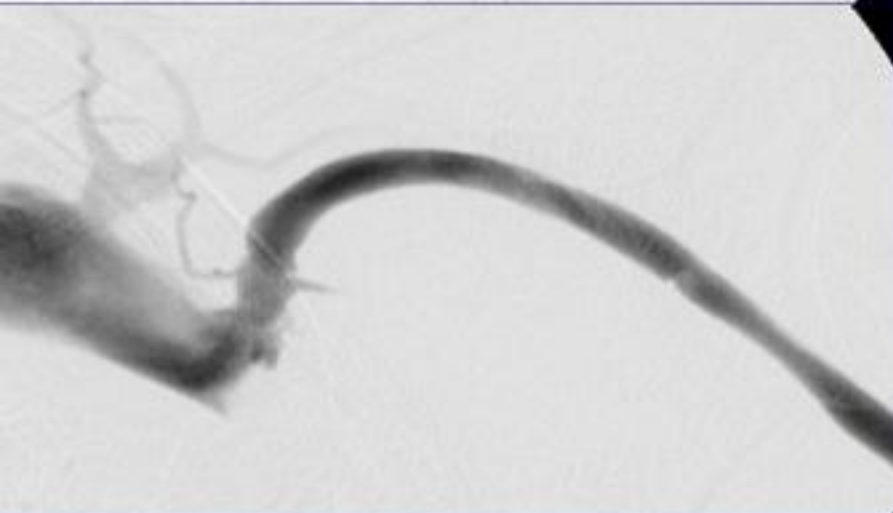
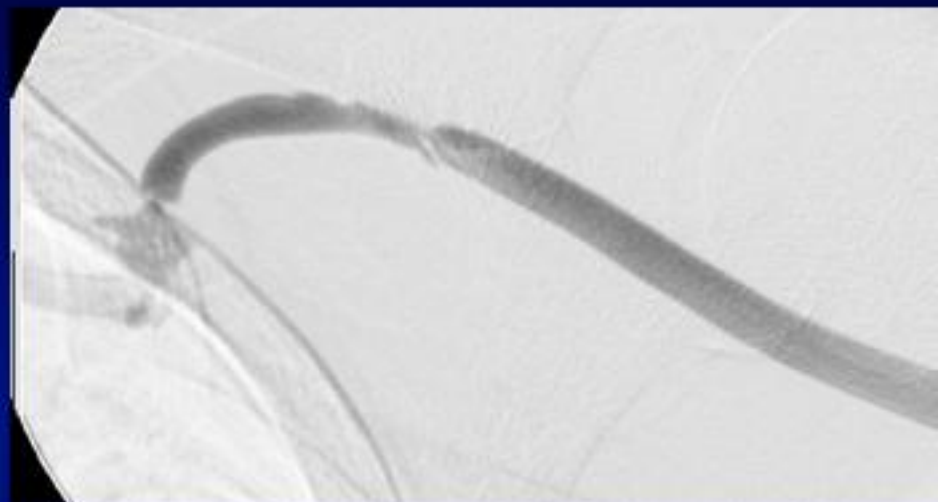
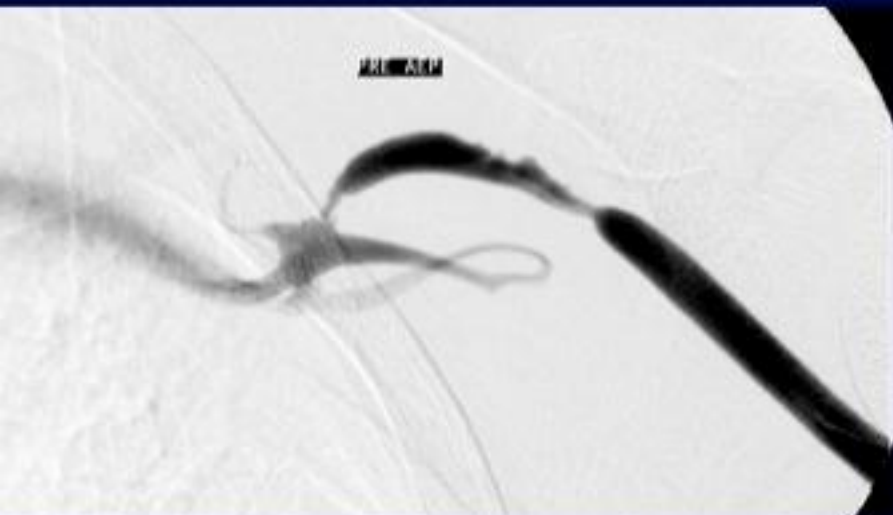
- Surgical transposition
  - Is more invasive than angioplasty
  - Primary patency after surgical transposition is about similar to the one after dilatation because of the occurrence of a stenosis at the venous anastomosis which will require iterative dilatations
  - Such a stenosis precludes creation of another access at the same limb, such as brachiobasilic fistula or brachioaxillary graft. This has serious consequences in these patients with limited possibilities of new access creations

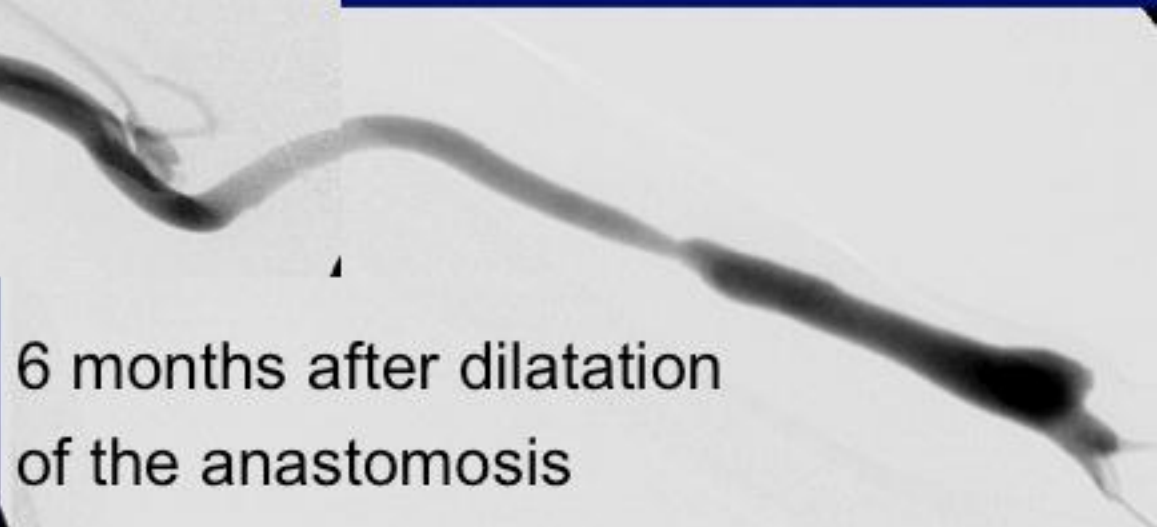
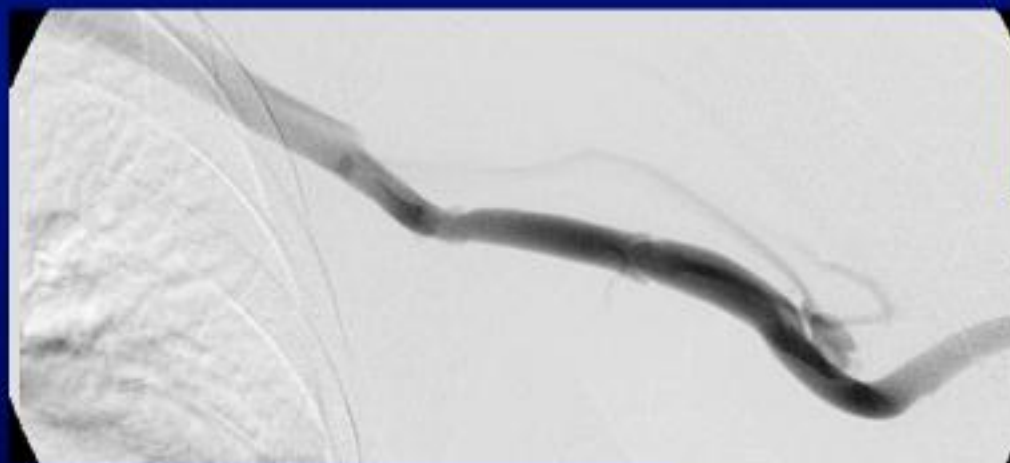
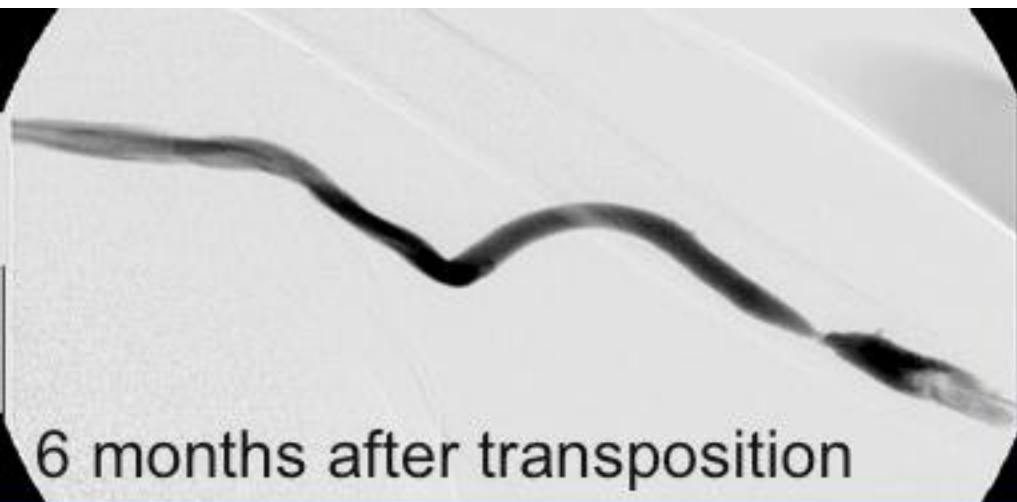


## Surgical transposition

- Surgical transposition of the cephalic vein on a deep vein may be a good option only when:
  - Dilatations fails (iterative dilatation at short span included)
  - The cephalic vein is of good quality
  - The lesions are limited to the arch
  - The flow is not too high
  - The patient does not complain of ischemia
  - The anastomosis on the deep vein will not jeopardize the creation of another access (particularly a brachiobasilic fistula)
- Therefore surgical transposition is nearly never indicated

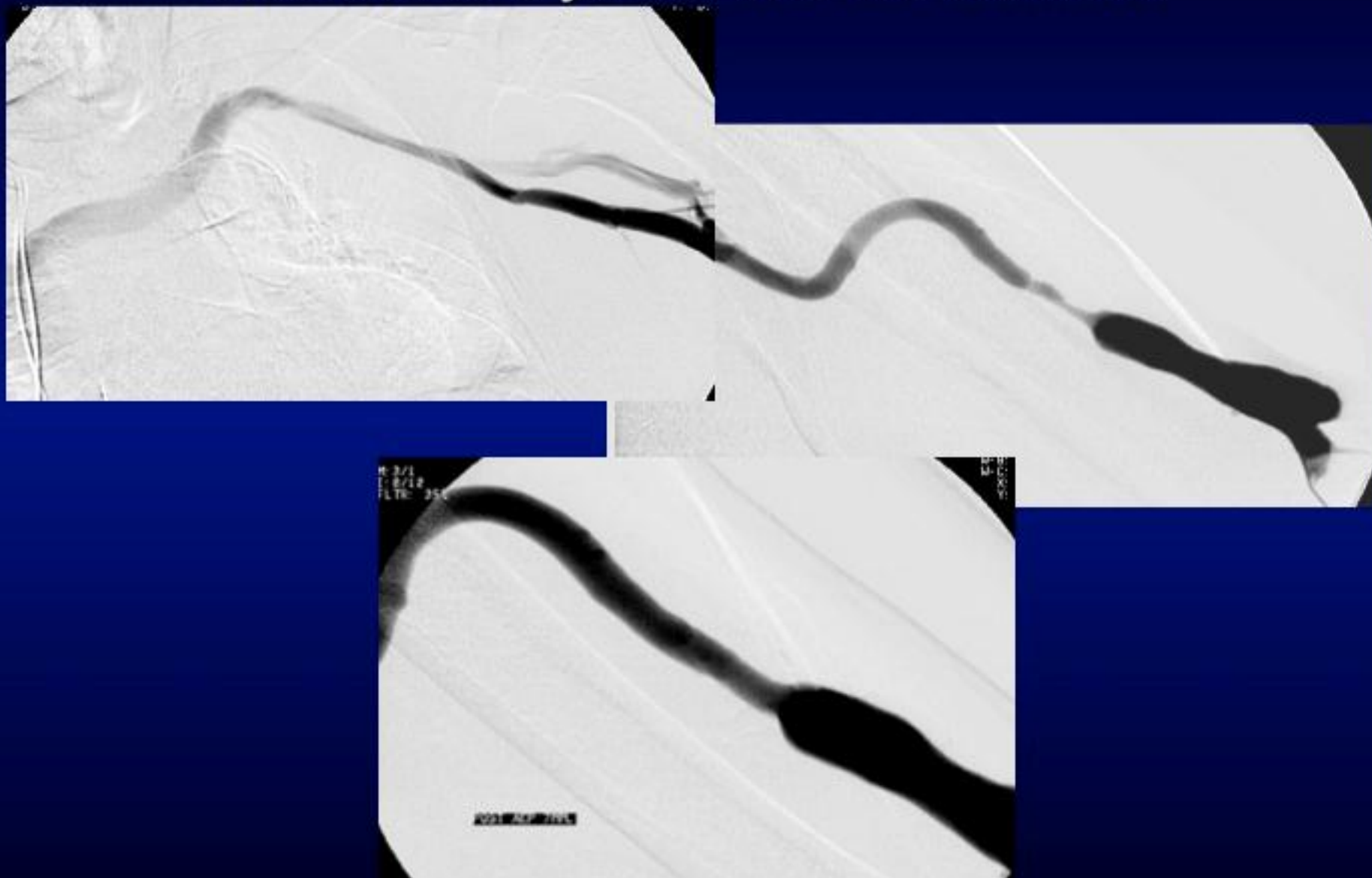
# Iterative restenoses every 3 months







## Restenosis 3 years after the dilatation



## Conclusion 1

- When a patient has a brachiocephalic access usually only few new other accesses can be created.
- When such a precious access dysfunctions it should be salvaged but without precluding the creation of another access. Percutaneous transluminal angioplasty is the only technique doing so.
- Stenting is clearly indicated in few cases such as rupture, immediate failure of dilatation or early iterative restenosis (< 4 months). However in many other cases indications for stenting are very controversial

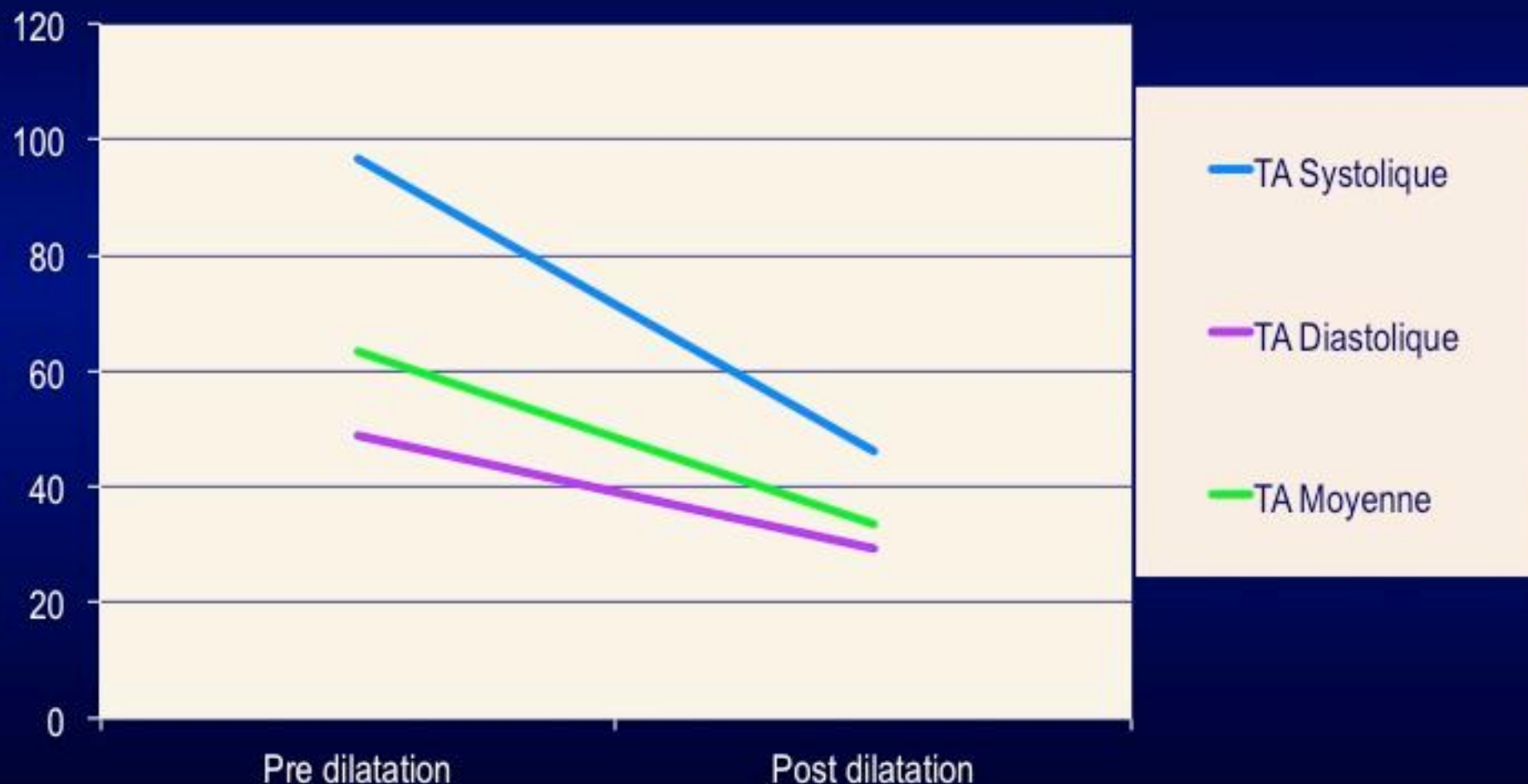


## Conclusion 2

- The technique of the dilatation should be above reproach in order to
  - prolong as much as possible access life
  - increase the interval between restenoses
  - Preserve all possibilities of creation of another access.
- Should be avoided
  - underdilatation
  - stent protrusion in the subclavian
  - kink at the stent ends
  - Use of poorly flexible stents
- The use of covered stent is highly controversial and drug eluting stent should be evaluated



# Intraluminal pressure before and after dilatation in brachiocephalic and brachiobasilic fistulas



## Cephalic arch stenoses

- The cephalic arch is a preferential spot for the occurrence of stenoses. Such stenoses cause a rise in venous pressure which jeopardize the access life causing:
  - Aneurismal venous dilatation with cutaneous thinning
  - Complications at the puncture site: bleeding, false aneurism, spot of skin necrosis
  - Impairment of the dialysis quality
  - Arm pain
  - Acute access thrombosis
- Therefore such stenoses should be treated



## Cephalic arch dilatation: contraindications

- Cardiac failure and flow that is too high.  
Brachiocephalic fistula are high flow fistulas. The dilatation of an arch stenosis will decrease resistances therefore increase access flow
  - Angioplasty should not be done when the access flow is over 1,8 to 2 L/min (or associated to a flow reduction)
  - When access flow is between 1,5 L/min and 1,8 L/min we recommend to measure access flow after the dilatation and to perform an cardiac echography
- Distal ischemia because the dilatation will increase steal thus worsen the ischemia



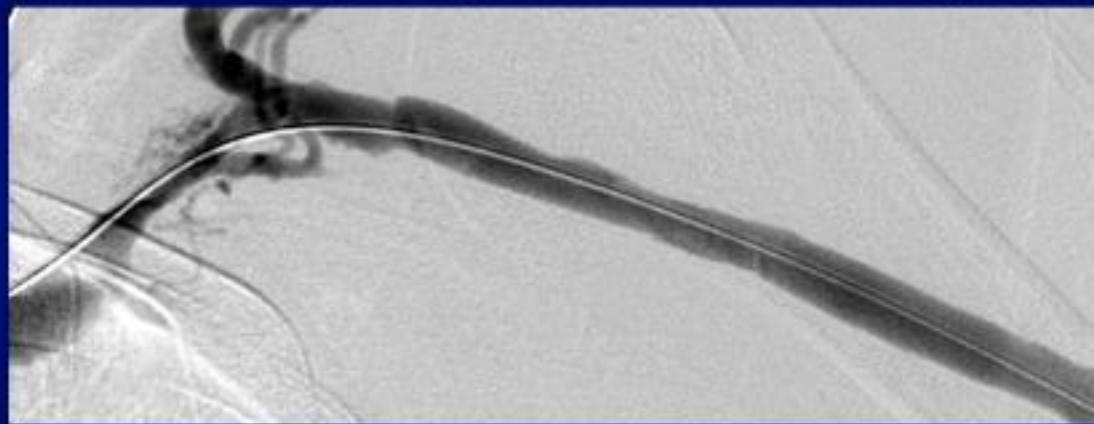
## **Dilatation : immediate results**

- Stenoses of the cephalic arch are sometimes difficult to identify and to evaluate because of vascular superimposition or of their shortness
- Immediate results of their angioplasty are about the same than dilatation of a lesion at another site on the access. Per dilatation ruptures are probably slightly more frequent but they are usually easily treated by prolonged low pressure balloon inflation.  
**The fear of that complication should not lead to underdilate the stenosis**

pre dilatation



after a single one  
minute-inflation  
little rupture



After a 3 minutes low  
pressure balloon  
inflation

