Imaging e tecniche interventistiche nelle vasculiti dei grossi vasi

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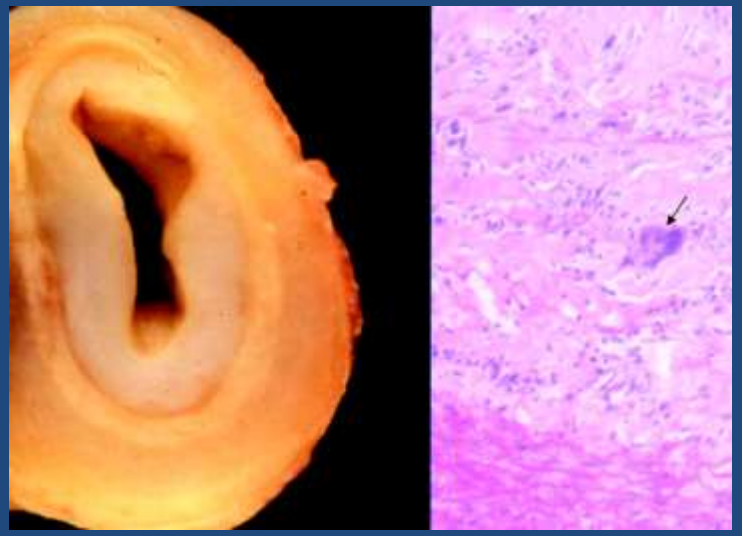
Great vessels arteritis

- Takayasu < 40 ys
- Giant-cell arteritis > 50 ys



Takayasu arteritis

Vessels involved

- Subclavian 93%
- Common carotid 58%
- Abdominal aorta 47%
- Renal 38%
- Aortic arch &root 35%
- Vertebral 35%
- Celiac artery 18%
- Sup mesenteric 18%
- Iliac 17%
- Pulmunary 10%
- Coronary < 10%

Kerr GS et al , Ann Intern Med 1994

Takayasu arteritis

- Predominant in Asia and Latin America
- Extremely rare in white people
- When encontered in Western countries, the abdominal aorta and renal arteries are most frequently affected

Takayasu arteritis invasive treatment

- Relatively few series
- Small cohorts of patients
- Mixed lesions (supraaortic, renals)
- Conflicting results

Br J Surg. 2014 Jan;101(2):43-50. doi: 10.1002/bjs.9372. **37 patients**

Optimizing the outcome of vascular intervention for Takayasu arteritis.

Perera AH[1], Youngstein T, Gibbs RG, Jackson JE, Wolfe JH, Mason JC.

Scand J Rheumatol. 2014;43(2):153-61. doi: 10.3109/03009742.2013.822096. Epub 2013 Oct 18. **65 patients**

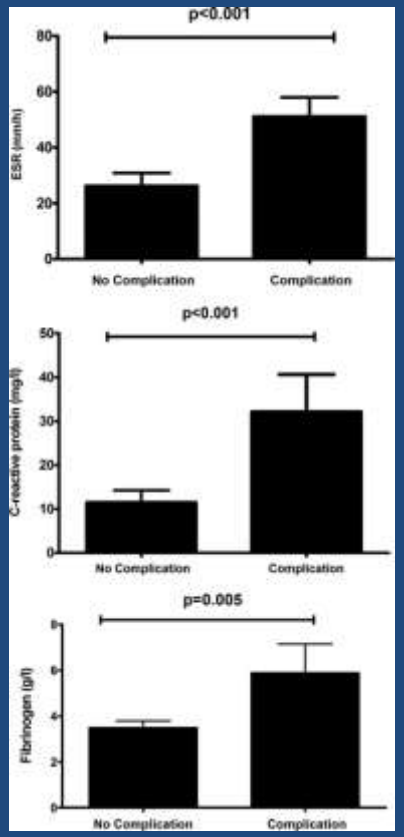
Comparison of outcomes between endovascular treatment and bypass surgery in Takayasu arteritis.

Lee GY[1], Jeon P, Do YS, Sung K, Kim DI, Kim YW, Kim DK.

Takayasu arteritis invasive treatment

- In the chronic stages of TA, one of the principles of treatment is revascularization of the affected organs either by surgery or endovascular interventions
- As a general rule, both endovascular interventions and surgery should be tried only after the suppression of inflammation in the vessel wall
- Post-interventional medical treatment is also recommended

Biological inflammatory parameters at the time of the vascular procedure



Saadoun D et al, Circulation 2012

Open surgery *vs* endovascular therapy for Takayasu disease

- Surgical by-pass has superior patency compared to endovascular therapy (53% vs 12.5% @ 39±44 mos)
- … but has more serious early post-operative complications

Kim YW, et al*, Surgical bypass vs endovascular treatment for patients with supra-aortic arterial occlusive disease due to Takayasu arteritis* . J Vasc Surg 2012

Open surgery for Takayasu disease

- The results of bypass surgery are worse than atherosclerotic occlusive disease
- The presence of long and fibrotic occlusions and the persistence of vessel wall inflammation may reduce the success of surgery

Keser et al, *Management of Takayasu arteritis: a systematic review.* Rheumatology 2013

Surgery better than endovascular therapy 79 patients /166 procedures

	Surgery	Endovascular	*P*
Arterial lesions			
Aorta	17.3%	21%	0.68
Subclavian	18.3%	13.1%	0.11
Renal	5.8%	20.8%	0.006
Carotid	14.4%	6.5%	0.14
Iliac	7.7%	12.9%	0.29
Mesenteric	8.7%	3.2%	0.21
Femoral	6.7%	4.8%	0.75
Coeliac trunk	3.8%	4.8%	1
Axillary	4.8%	1.6%	0.41
Coronary	3.8%	3.2%	1
Humeral	3.8%	1.6%	0.65

Saadoun D et al, *Retrospective analysis of surgery versus endovascular intervention in Takayasu arteritis: a multicenter experience*. Circulation 2012

Surgery better than endovascular therapy

Factors associated with post-procedure complications

	Univariate analysis OR (95% CI)	*p*	Multivariate analysis OR (95% CI)	*p*
Age at diagnosis	0.99 (0.94–1.04)	0.64		
Female	0.62 (0.1–3.62)	0.59		
Geographic origin				
Europe	1			
North Africa	3.15 (0.43–22.85)	0.26		
Cardiovascular risk factors				
Hypercholesterolemia	1			
Hypertension	0.29 (0.06–1.48)	0.14		
Diabetes	0.24 (0.02–3.59)	0.31		
Overweight	1.58 (0.10–4.21)	0.64		
Smoking	0.31 (0.05–1.89)	0.21		
Biological inflammation	**4.99 (1.26–19.77)**	**0.04**	**7.5 (1.4-39.4)**	**0.04**
Treatment				
Surgery	1			
Endovascular repair	**3.45 (1.31-9.10)**	**0.015**	**3.6 (1.2-10.3)**	**0.021**
Corticosteroids	2.45 (0.85–7.06)	0.10		
Immunosuppressants	11.69 (2.8–48.88)	0.001		
Aspirin	4.85 (1.1–21.46)	0.043		
Anticoagulant	30.89 (5.28–180.69)	<0.001		
Statin	3.02 (0.59–15.46)	0.19		

Saadoun D et al, Circulation 2012

Surgery better than endovascular therapy

Factors associated with post-procedure complications

Complications rate
open surgery *vs* endovascular therapy

37.5% vs 50%

Endovascular repair	**3.45 (1.31-9.10)**	**0.015**	**3.6 (1.2-10.3)**	**0.021**
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Saadoun D et al, Circulation 2012

Takayasu arteritis endovascular treatment

- The success rate and outcome of endovascular intervention depend upon the site, length and stage of the arterial stenosis
- Percutaneous transluminal angioplasty (PTA) was widely used for relief of short-segment arterial stenotic lesions, and initial reports revealed excellent results ranging from 81 to 100%
- However, restenosis occurring in up to 77.3% of the procedures in the long term appeared to be a major problem with PTA

Takayasu arteritis endovascular treatment

- In a retrospective study analysing the outcome of endovascular interventions including stent replacements performed in the inactive stage of TA, the restenosis rate was reported as 17% after a mean follow-up period of 23.7 ± 18.4 months

Min P-K et al, *Endovascular therapy combined with immunosuppressive treatment for occlusive arterial disease in patients with Takayasu's arteritis*. J Endovasc Ther 2005

Bare stents vs PTA

- No clear data
- Stents are commonly helpful in arterial dissection after PTA and in elastic recoil
- Despite initial better results stents seem to induce cells proliferation and late aneurysm formation

takayasu arteritis
PTA/stent renal artery

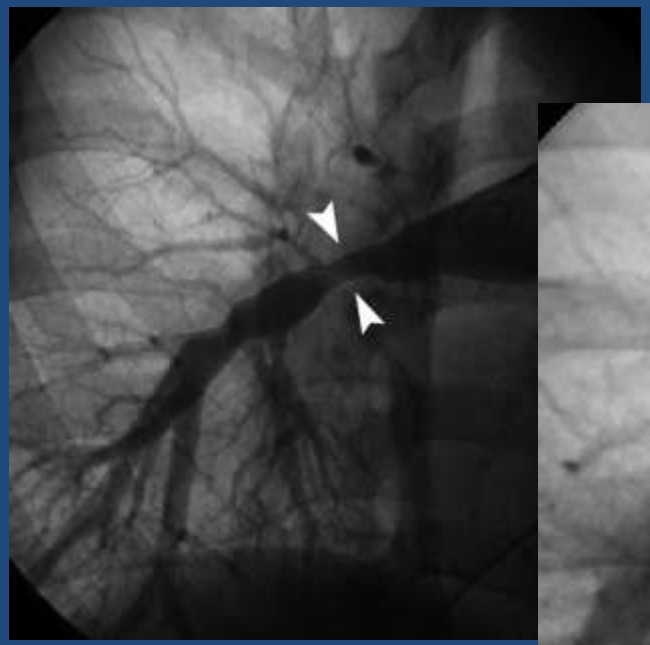
- 16 patients/22 arteries (16 to 58 ys) with RVH
- 13 PTA/9 stent
- Technical success: 95% (21/22)
- Follow-up: 85±41 months
- Restenosis rate: 8% (PTA) and 66% (stent)
- Improvement of hypertension: 87%

Park HS et *al, Long-term results of endovascular treatment in renal artery stenosis from Takayasu arteritis: angioplasty versus stent placement*. Eur J Radiology 2013

23 ys old man renovascular hypertension

Park et al, European J Radiology, 2013

Stent-grafts as an alternative to bare stents



Takayasu arteritis invasive treatment

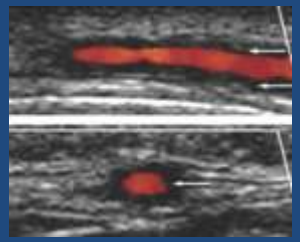
- Stent grafts are better than uncovered metal stents or PTA in terms of occurrence of restenosis in TA patients
- Since the inner layers of the vessel wall derive nutrition from the luminal blood flow, placement of a stent graft may disturb luminal blood flow, leading to a decrease in chronic inflammation and less severe fibrotic reaction on the luminal side, with a lower incidence of restenosis
- With conventional bare stents, mio-intimal proliferation can result in invasion and in-growth of the vessel wall into the stent

Qureshi Maet al. *Endovascular management of patients with Takayasu arteritis: stents versus stent Grafts*. Semin Vasc Surg 2011

PTA vs stent vs stent-graft

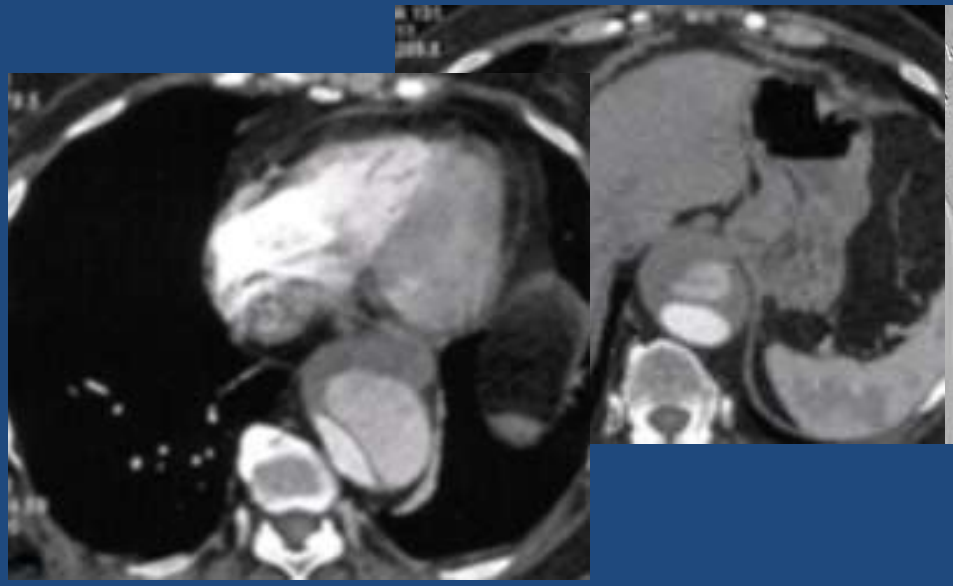
- Conflicting results/small series
- Some agreement that:
  - Long term patency rate of PTA may be limited (better in inactive phase)
  - Stent may induce higher risk of restenosis and possibly late aneurysm formation
  - Covered stent may represent a more durable alternative

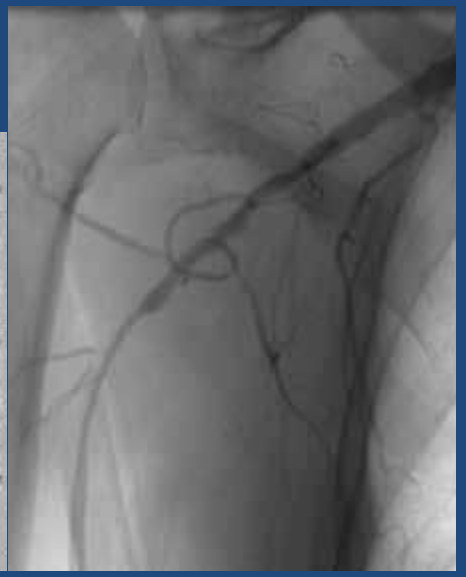
Double antiaggregation?
Drug-eluting balloons?



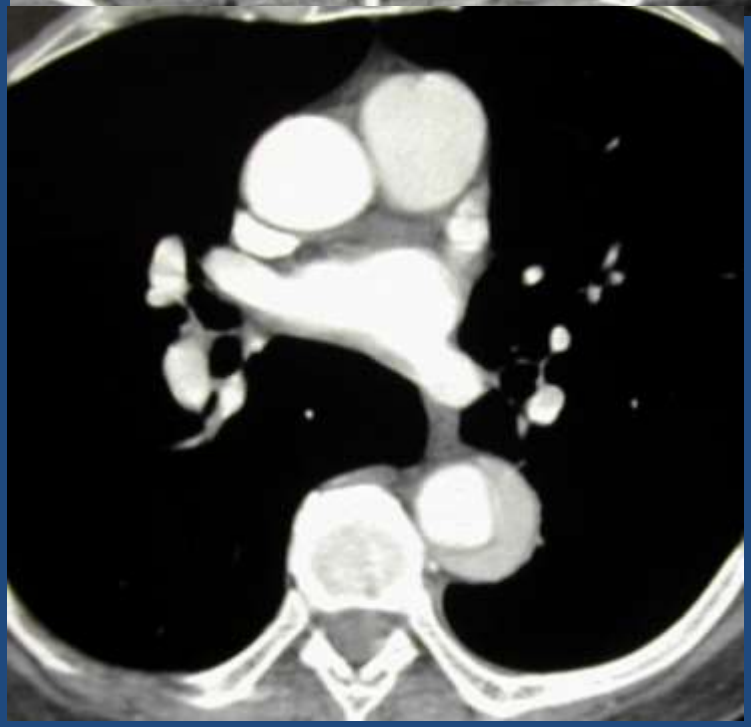
Giant-cell arteritis

- Supra-aortic vessels (subclavian and axillary artery)
- Thoracic and abdominal aorta

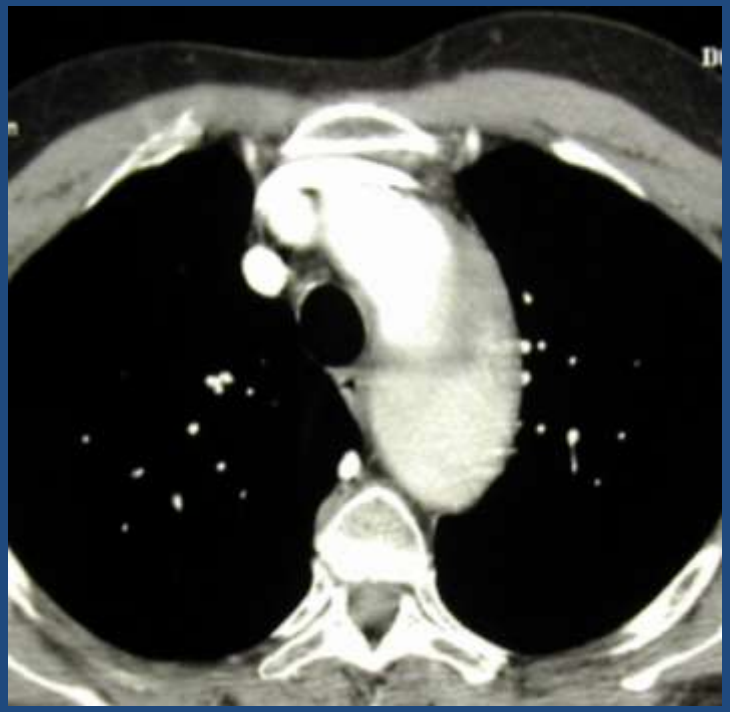


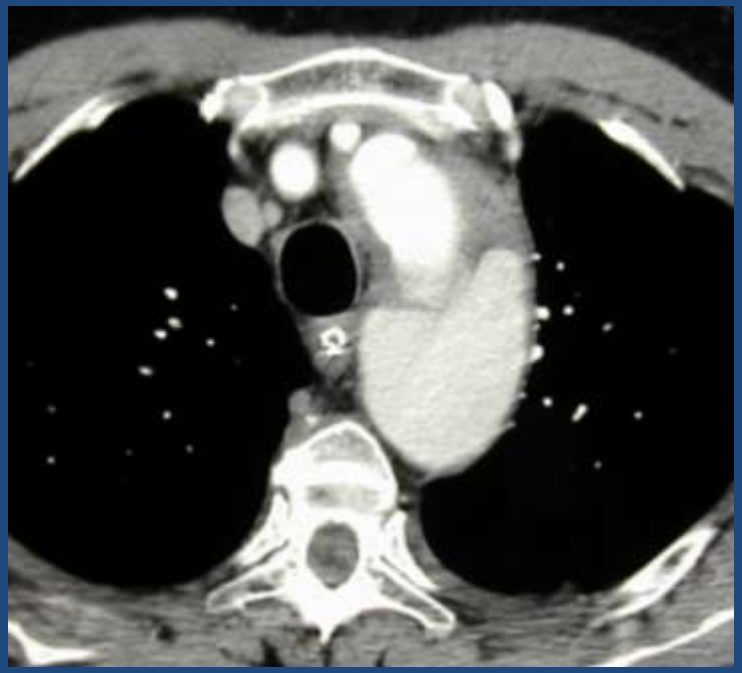


Salvarani C et al, *Polymyalgia rheumatica and giant-cell arteritis*. N Engl J Med 2002



57 ys male
GCA
CT at admission

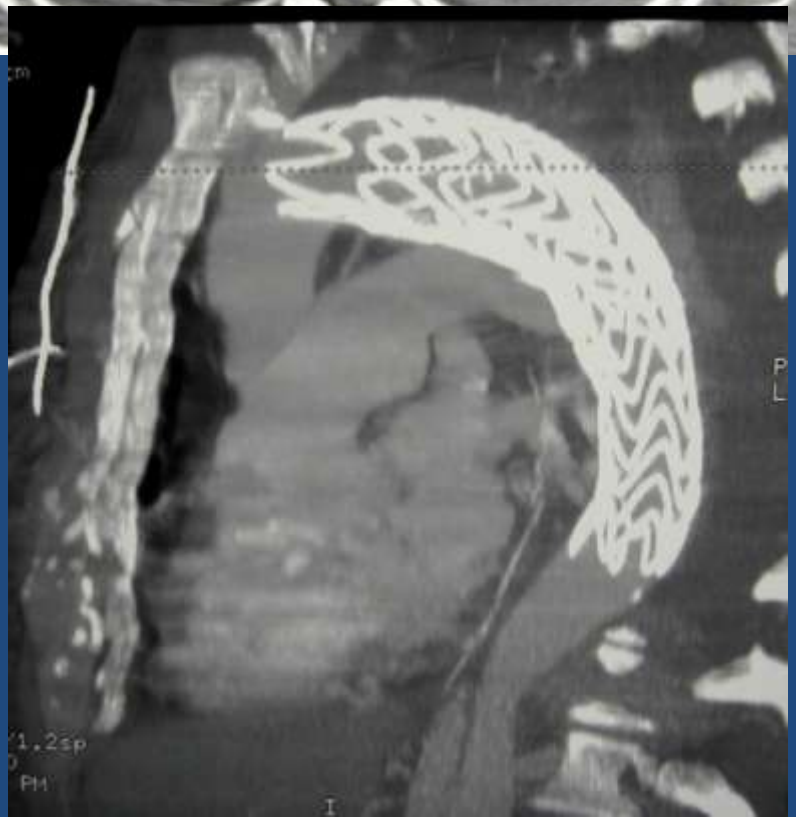




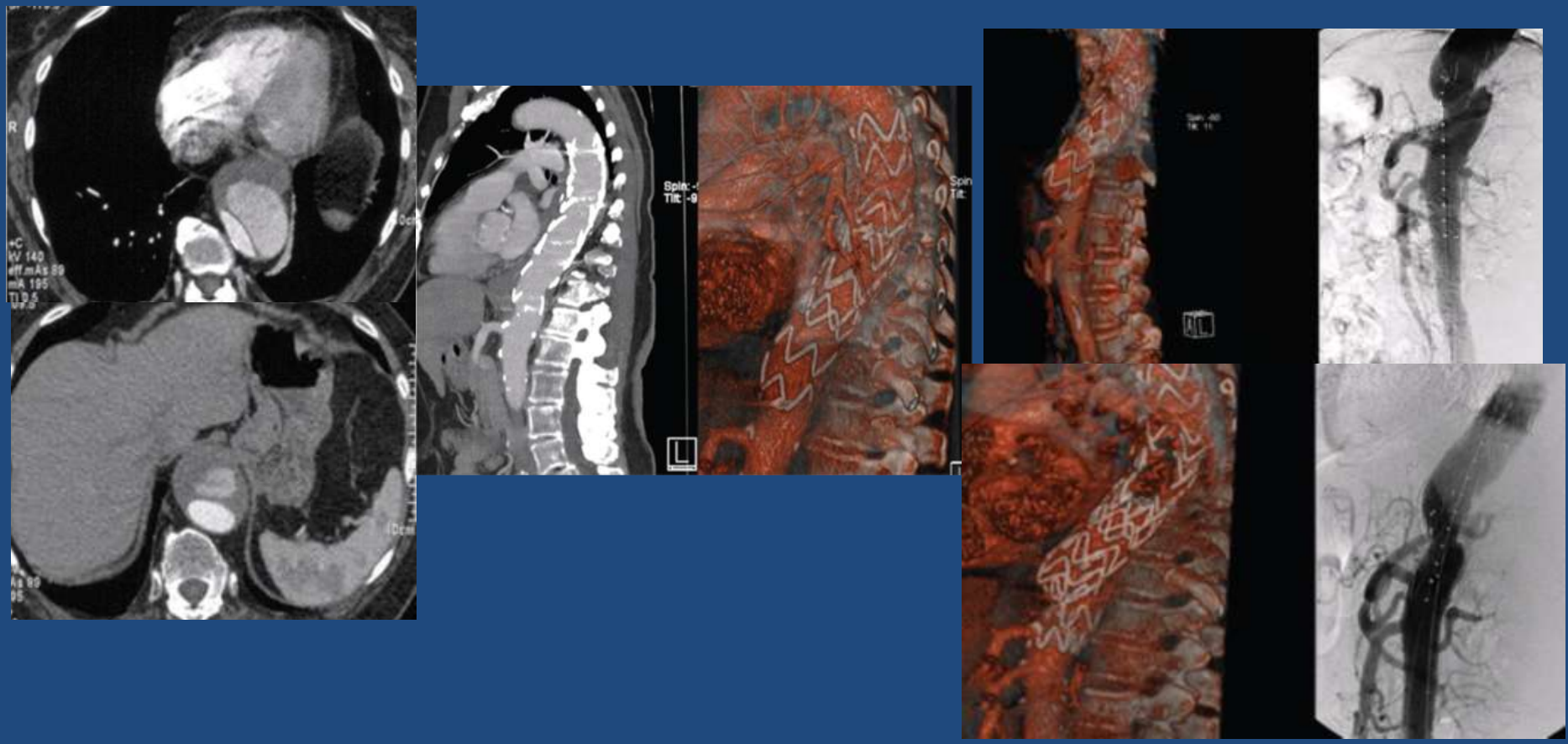
2 days later


36.9cm


21 ott



TA type B dissection in GCA unusual outcome



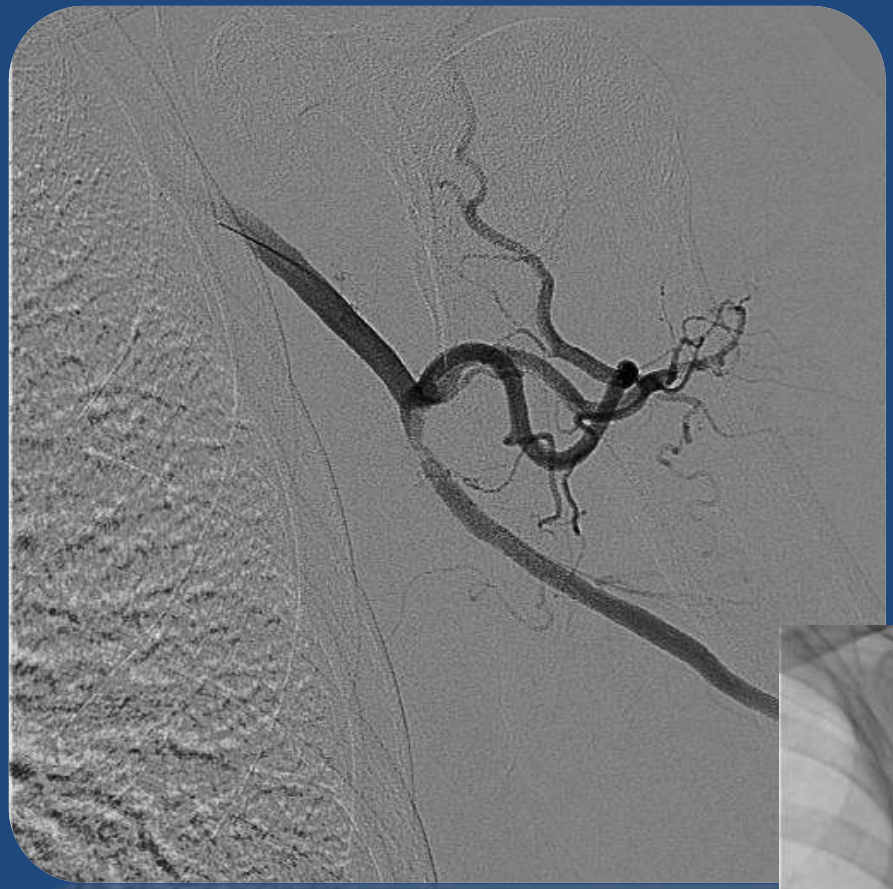
Porcu P et al, Interactive CardioVascular and Thoracic Surgery 2009

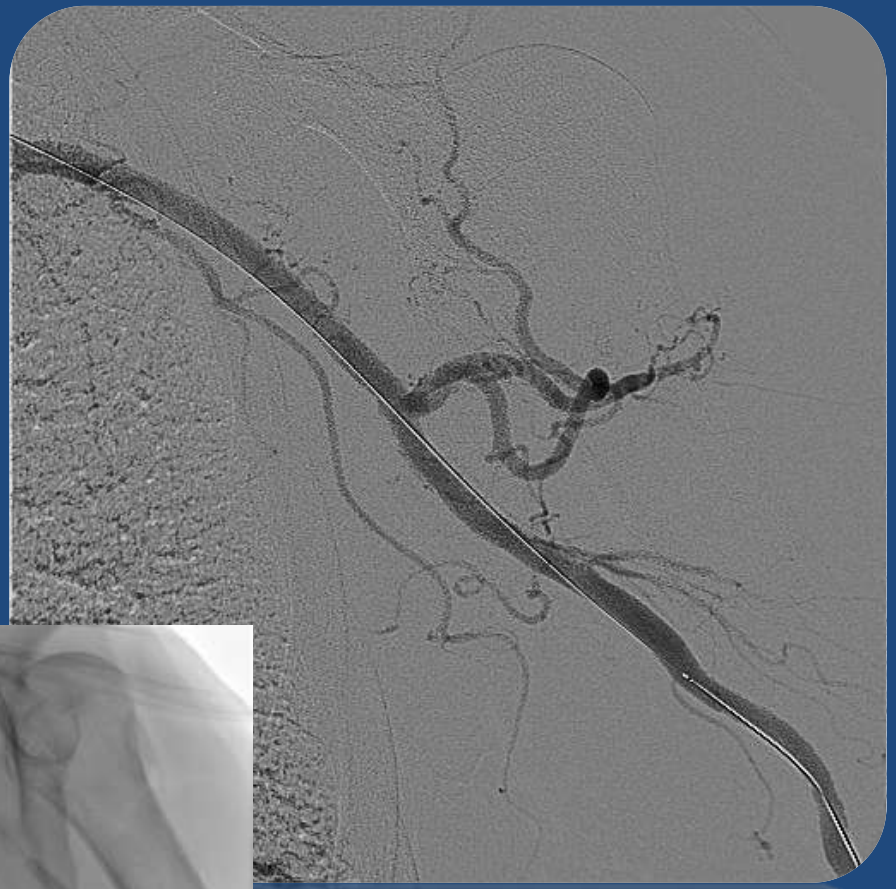
Giant-cell arteritis subclavian-axillary artery involvement

- Revascularization of upper extremity arterial occlusions and stenoses related to GCA is rarely necessary due to the robust development of collateral vessels and improvement in symptoms with medical therapy
- Therefore, there are few reports of successful percutaneous transluminal angioplasty (PTA) of upper extremity vessels in the setting of GCA in the cardiovascular literature
- PTA has been shown to be an effective and safe treatment in patients with GCA and is the procedure of choice for upper extremity arterial lesions in GCA patients who are refractory to medical management.

Both M et al. *Balloon angioplasty of arteries of the upper extremities in patients with extracranial giant-cell arteritis*. Ann Rheum Dis. 2006

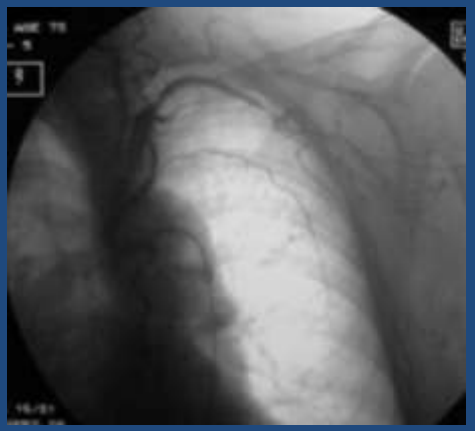
Subclavian-axillary stenosis critical ischemia



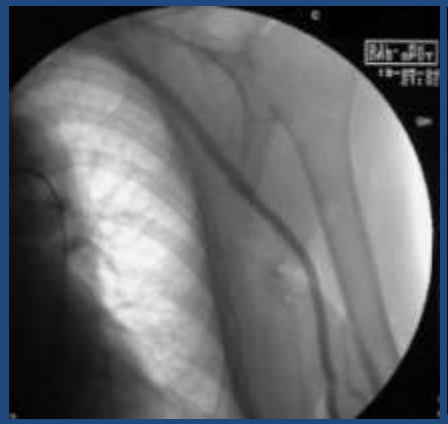


Subclavian-axillary stenosis critical ischemia

Giant-cell arteritis
Endovascular therapy *vs* open surgery






De Franciscis S et al, *Combined medical, surgical and endovascular treatment of a giant-cell arteritis case, manifesting as upper limbs acute ischemia.* Int J of Surgery 2011

A ‘’new pathology’’ for the interventionalist

Vasculitis associated with chronic inflammatory or autoimmune conditions

- Rheumatoid arthritis
- Sarcoidosis
- Systemic lupus erythematosus
- Behçet disease
- Cogan syndrome
- HLA-B27 associated spondyloarthropaties
- Crohn’s disease
- Relapsing polychondritis
- IgG4-related disease

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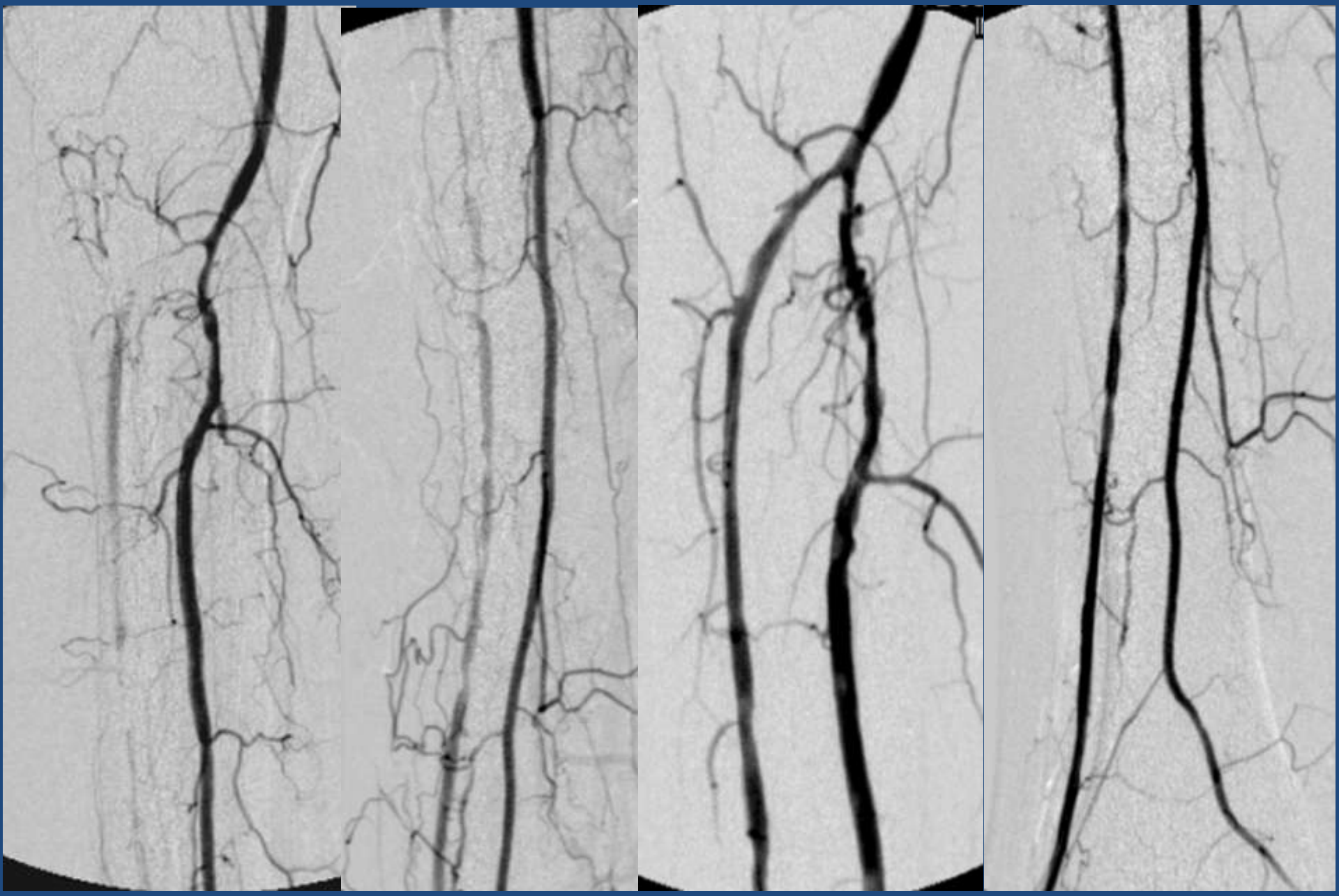
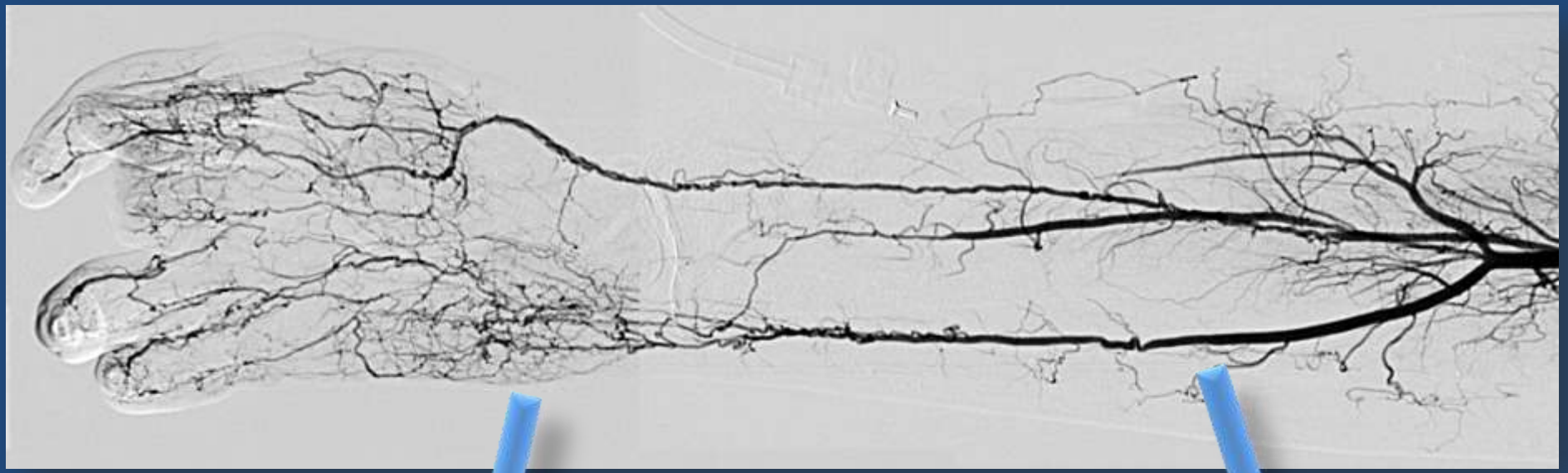
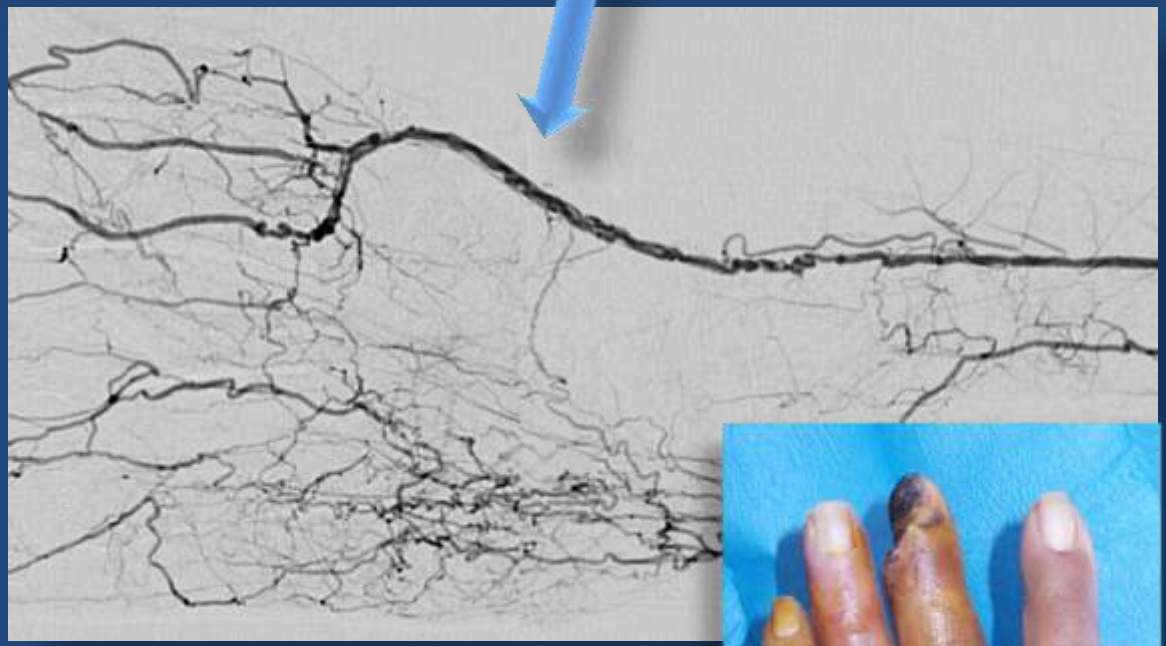
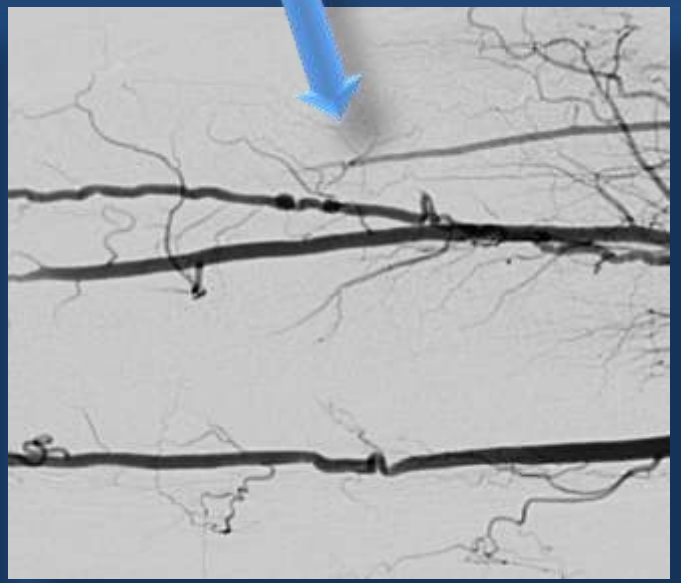


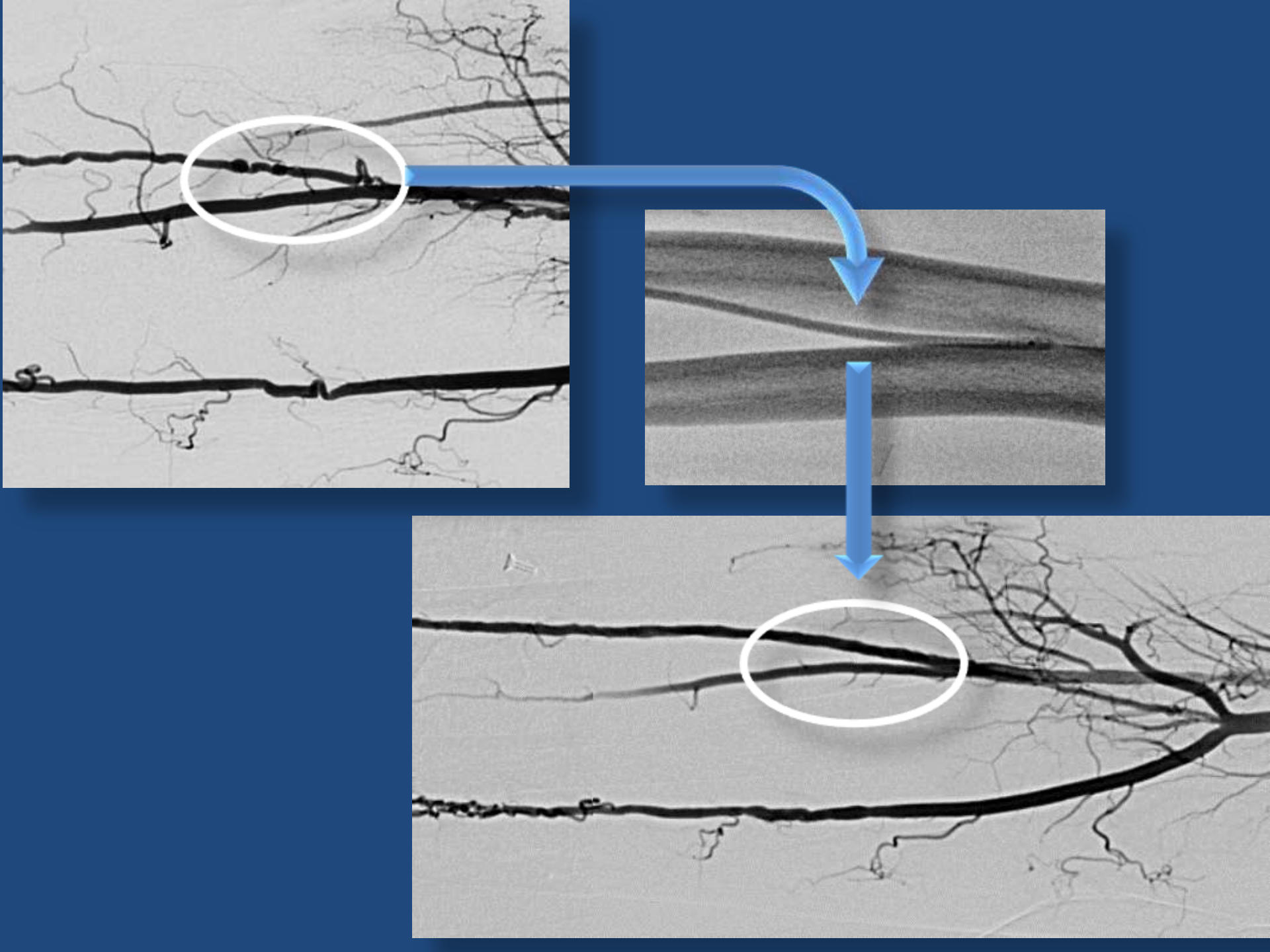
Arteritis below the knee/elbow

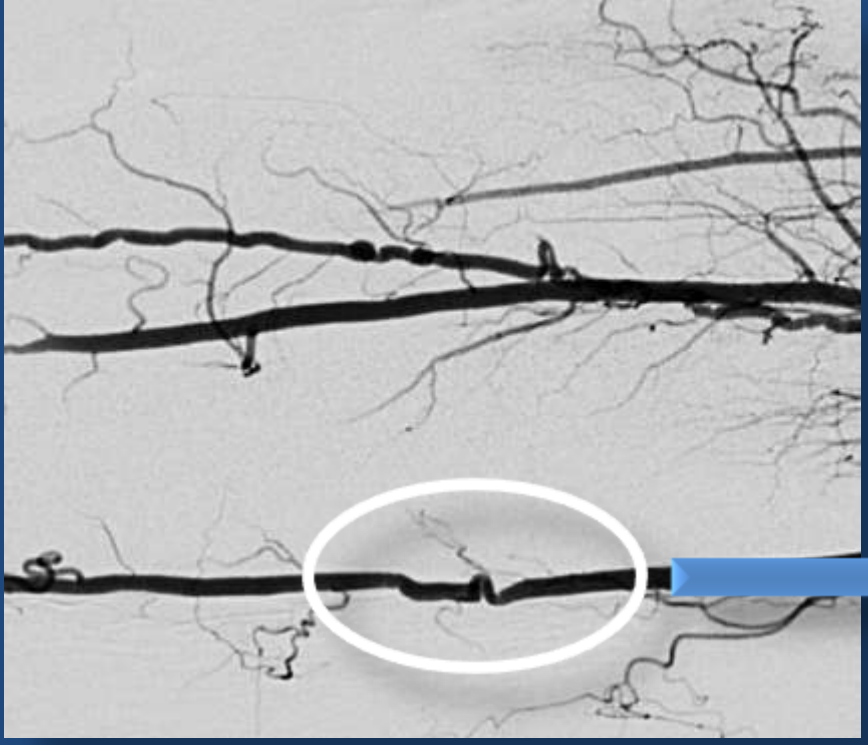
- Technical improvements (materials)
- Improvement in expertise
- Better medical therapy (cardiovascular disease)
- Longer life expectancy
- Long lasting corticosteroid therapy

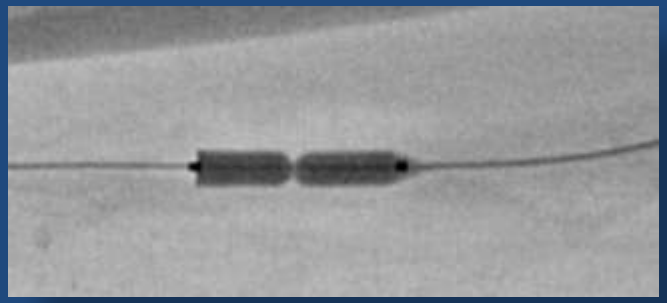




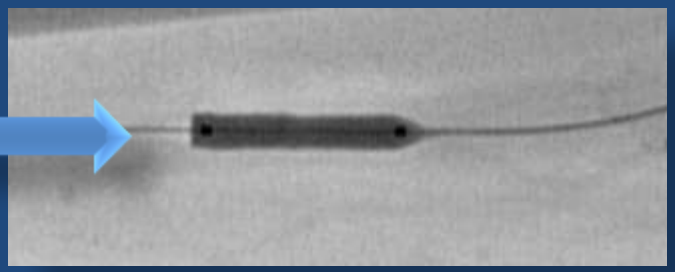




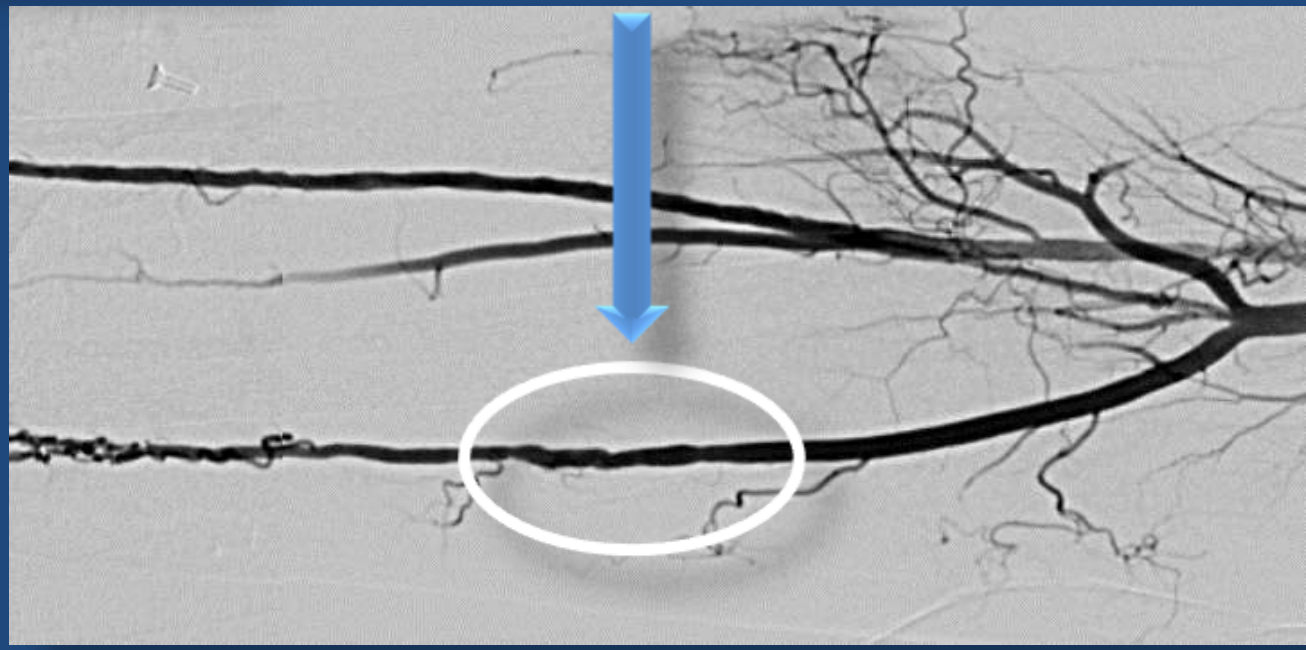


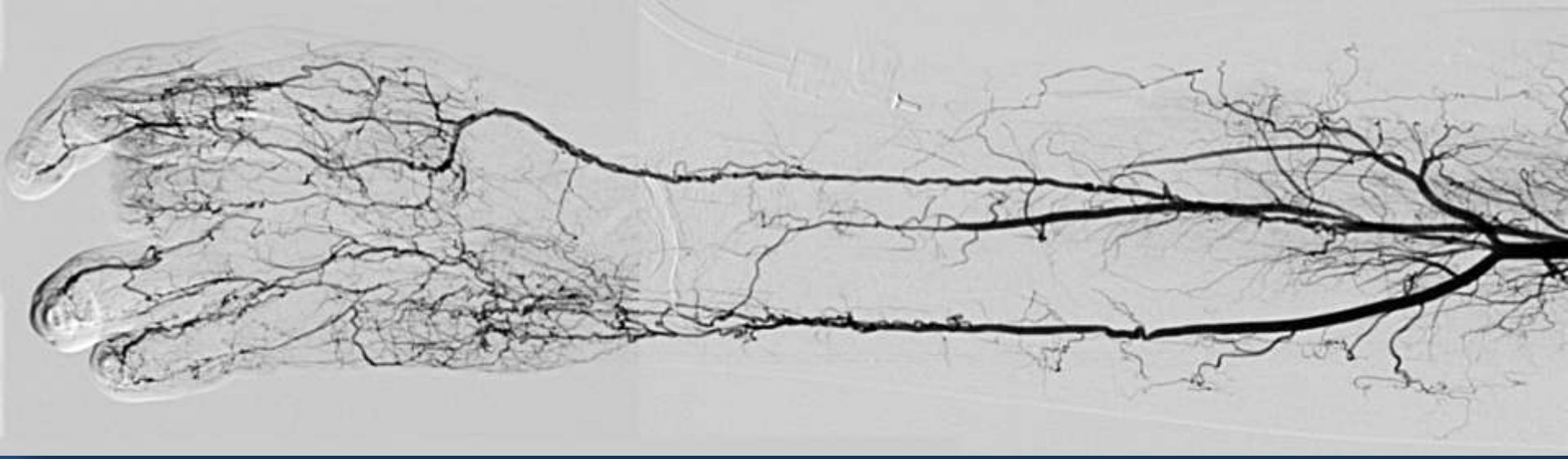


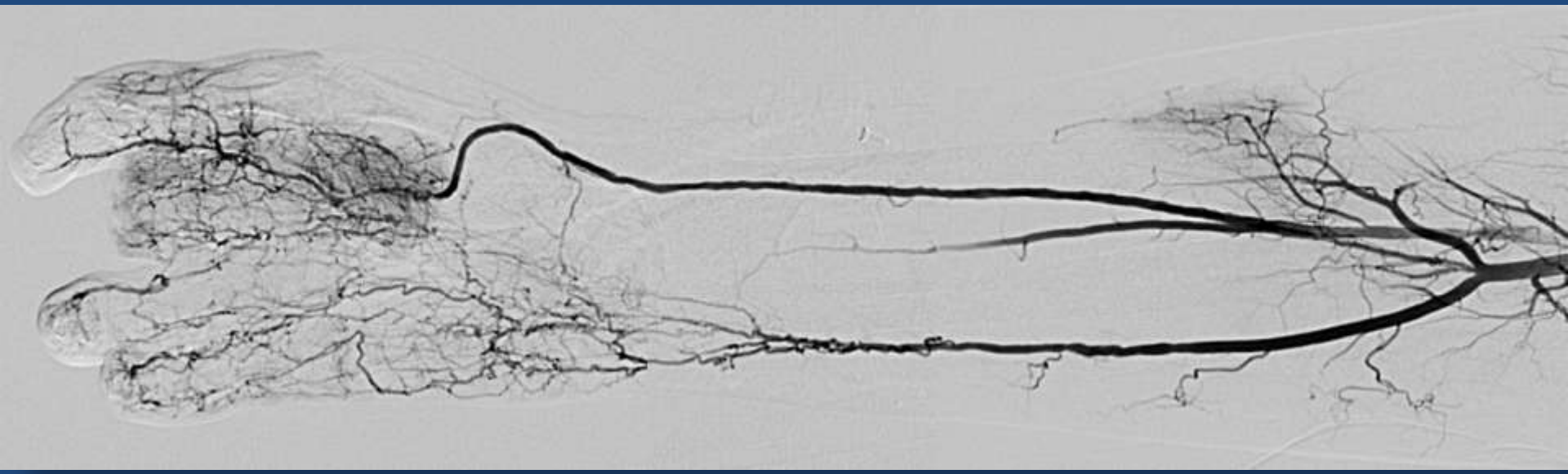
10 atm

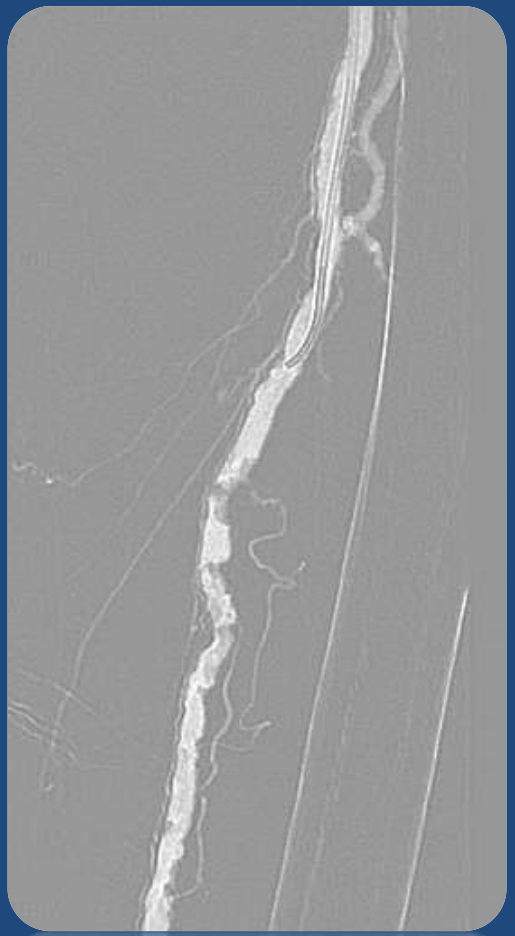


16 atm









Conclusions I
Great vessels arteritis

- Reports in literature are frequently anectodal
- If possible, only cold lesions should be treated
- In thoracic and abdominal aortic disease ‘’endovascular-first’’ strategy is preferable
- In non-aortic disease the choice between open surgery and endovascular therapy should balance risks and benefits

Conclusions II
Associated vasculitis

- A relatively new and challenging pathology for interventionalists
- Higher rate of technical failure
- Higher risk of complications