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How to treat hypertension after CoA repair

"Stay out of stenting"

Mario Carminati
Pediatric and Adult Congenital Cardiology
IRCCS Policlinico San Donato

How to treat hypertension after CoA repair

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Mario! I decided to put you in a debate....
on treatment of recoarctation....
You will be against stenting!

Gregor! What the hell!
You know I am a fan
of stenting aortic arch!...


Who will be my antagonist?

Darren Berman

Wow! it is going to be tough!
I will try to do my best....

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- ✓Coarctation of the aorta is the fifth most common congenital heart defect, accounting for 6–8% of live births with congenital heart disease.
- ✓Early-to-mid-term outcomes of patients with aortic coarctation are excellent, with early mortality rates as low as 2%.
- ✓Approximately 30% of coarctation patients will be hypertensive by adolescence despite early surgery and more recent reports observe that about 60% of adults after correction of aortic coarctation in childhood are hypertensive

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Most studies report resting blood pressure, but it is well established that a significant number of coarctation repair patients with normal resting blood pressure have an exaggerated blood pressure response to exercise which precedes the onset of overt hypertension

Criteria for hypertensive exercise response: peak systolic blood pressure higher than 220 mmHg in men and higher than 190 mmHg in women, peak diastolic blood pressure higher than 90 mmHg, or an increase in diastolic blood pressure greater than 10 mmHg.

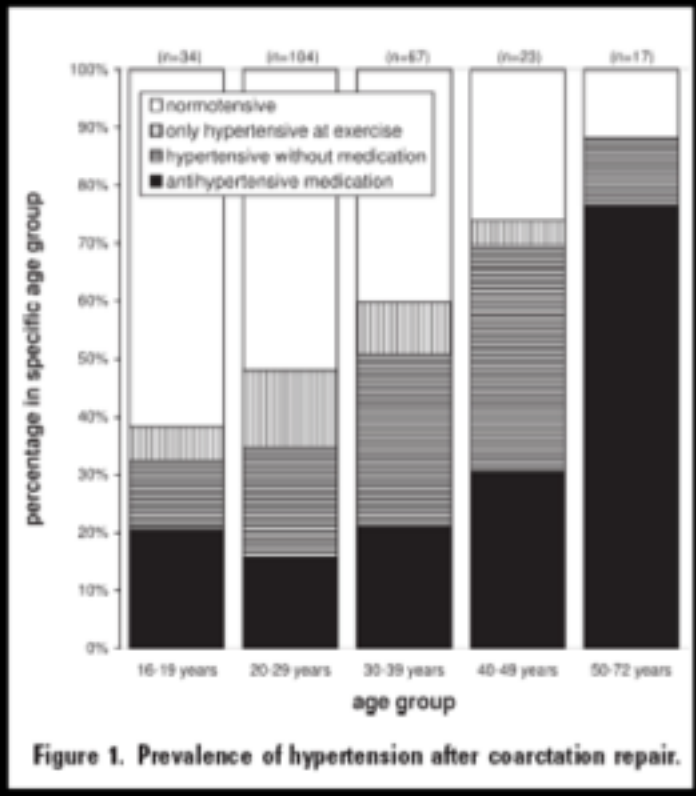

Figure 1. Prevalence of hypertension after coarctation repair.

Hager et al. J Thorac Cardiovasc Surg.2007

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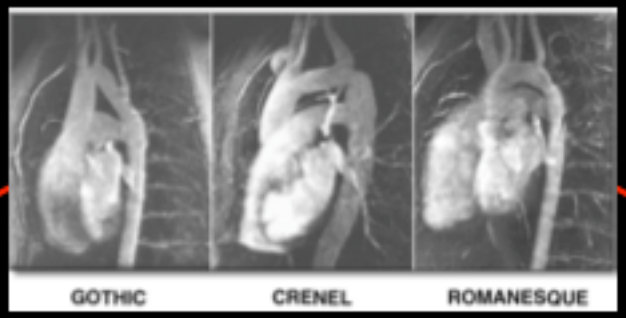
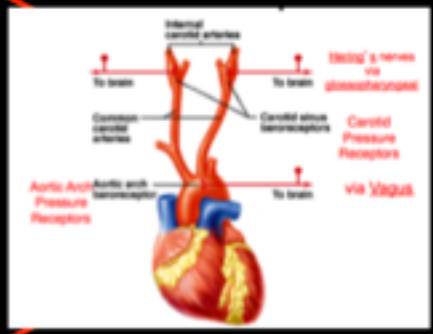
Relationship between aortic arch shape and blood pressure response after coarctation repair
Arch Mal Coeur Vaiss. 2005 Jul-Aug

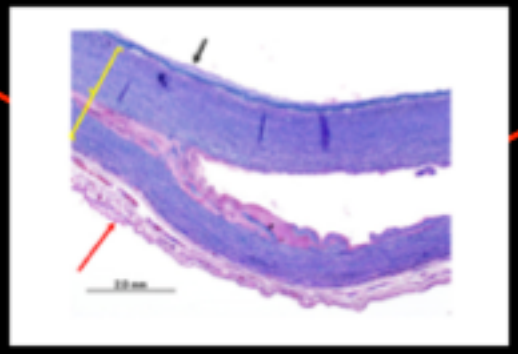


Vreind et al. Amsterdam,
Eur J Appl Physiol 2005

The mechanisms underlying arterial hypertension in corrected coarctation patients are not fully understood.



Vascular reactivity – baroceptor reflex
Radke et al Germany, Heart 2014



Intrinsic abnormalities of the aortic wall
Mascherbauer et al Amsterdam, Heart 2014

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Clinical research

Late systemic hypertension and aortic arch geometry after successful repair of coarctation of the aorta

Phalla Ou[a,c], Damien Bonnet[a,b,*], Louis Auriacombe[a], Elisa Pedroni[a], Fanny Balleux[d], Daniel Sidi[a], Elie Mousseaux[c,d]

[a] Cardiologie Pédiatrique, Department of Pediatrics, Hôpital Necker-Enfants Malades, AP-HP, 149, rue de Sèvres, 75015 Paris, France
[b] INSERM ED016, Faculté de Médecine Necker-Enfants Malades, Paris, France
[c] INSERM U494, Faculté de Médecine Pitié Salpétrière, Paris, France
[d] Service de Radiologie, Hôpital Européen Georges Pompidou, AP-HP, Paris, France

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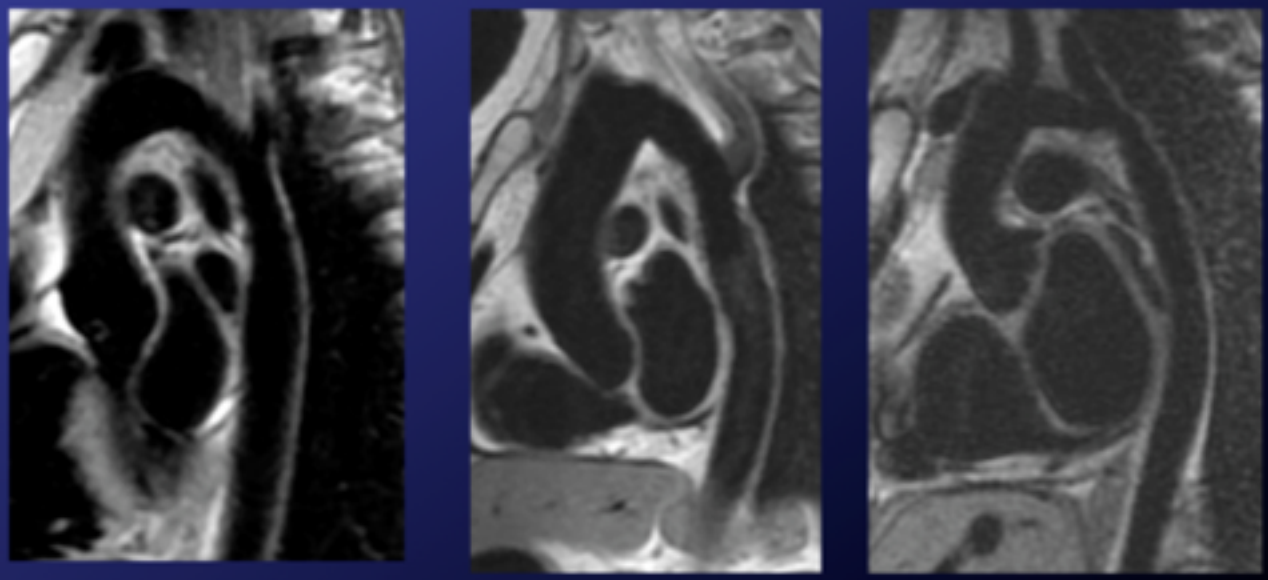
Aortic arch geometry



Romanesque | Gothic | Crenel

Coarctation Long-term Assessment (COALA): Significance of arterial hypertension in a cohort of 404 patients up to 27 years after surgical repair of isolated coarctation of the aorta, even in the absence of restenosis and prosthetic material

Alfred Hager, MD,[a] Simone Kanz, MD,[a] Harald Kaemmerer, MD, VMD, FESC,[a] Christian Schreiber, MD,[b] and John Hess, MD, FESC[a]

Hager et al. J Thorac Cardiovasc Surg.2007; 134: 738-745

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55% pts without re-stenosis were hypertensive

TABLE E1. Prevalence of hypertension according to the residual brachial–ankle blood pressure difference in the long-term follow-up after surgical coarctation repair

	brachial–ankle blood pressure difference		
	<0 mm Hg	0-20 mm Hg	>20 mm Hg
No. of patients			
With antihypertensive drug treatment	24 (22%)	33 (24%)	10 (36%)
Hypertensive without drug treatment	22 (20%)	33 (24%)	8 (29%)
Hypertensive only at exercise	8 (7%)	15 (11%)	3 (11%)
Normotensive	56 (51%)	54 (40%)	7 (25%)
Total	110 (100%)	135 (100%)	28 (100%)

Hager et al. J Thorac Cardiovasc Surg.2007

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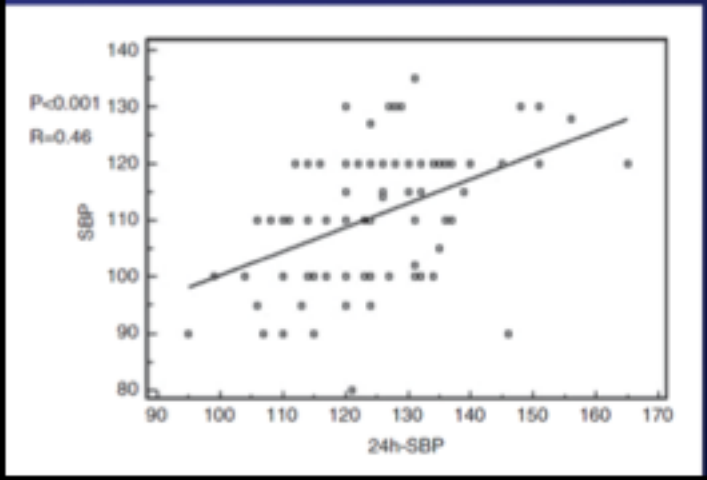
Masked hypertension in young patients after successful aortic coarctation repair….

MH consists of an elevated daytime or awake ambulatory blood pressure (BP) in the presence of a normal BP on conventional measurement at the office.

MH occurred in 45% of AoC patients after optimal surgical or percutaneous treatment in neonatal or more advanced age.



MH is associated with abnormal left ventricle geometry and function

Di Salvo et al. Naples, J Hum Hypert 2011

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Persistent hypertension (post Coarctation repair) with “mild” recoarctation

Difficulty in controlling hypertension with medical treatment

Is relieving “mild” residual obstruction effective in relieving hypertension?

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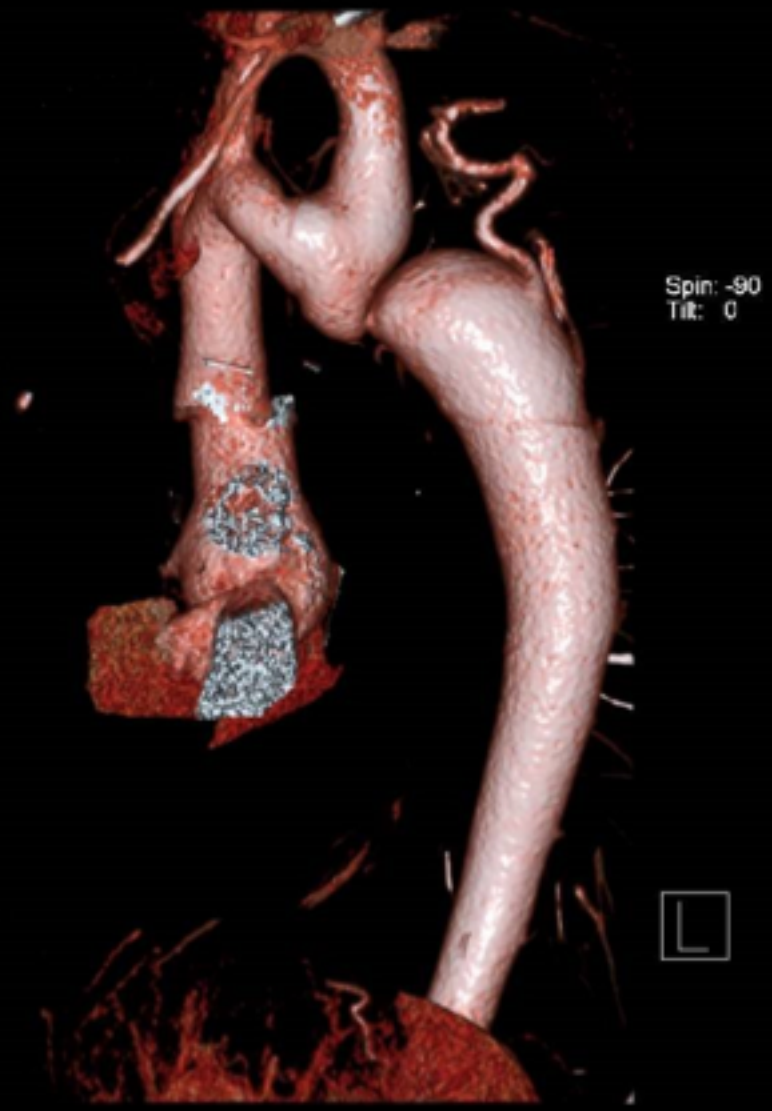
Age: 18 yrs

Weight: 60 Kg; **Height** 170 cm

Since 12 yrs of life: systemic arterial hypertension

CT Scan: severe aortic coarctation+ tortuous aortic arch

Hemodynamic assessment:
peak to peak gradient: 70 mmHg



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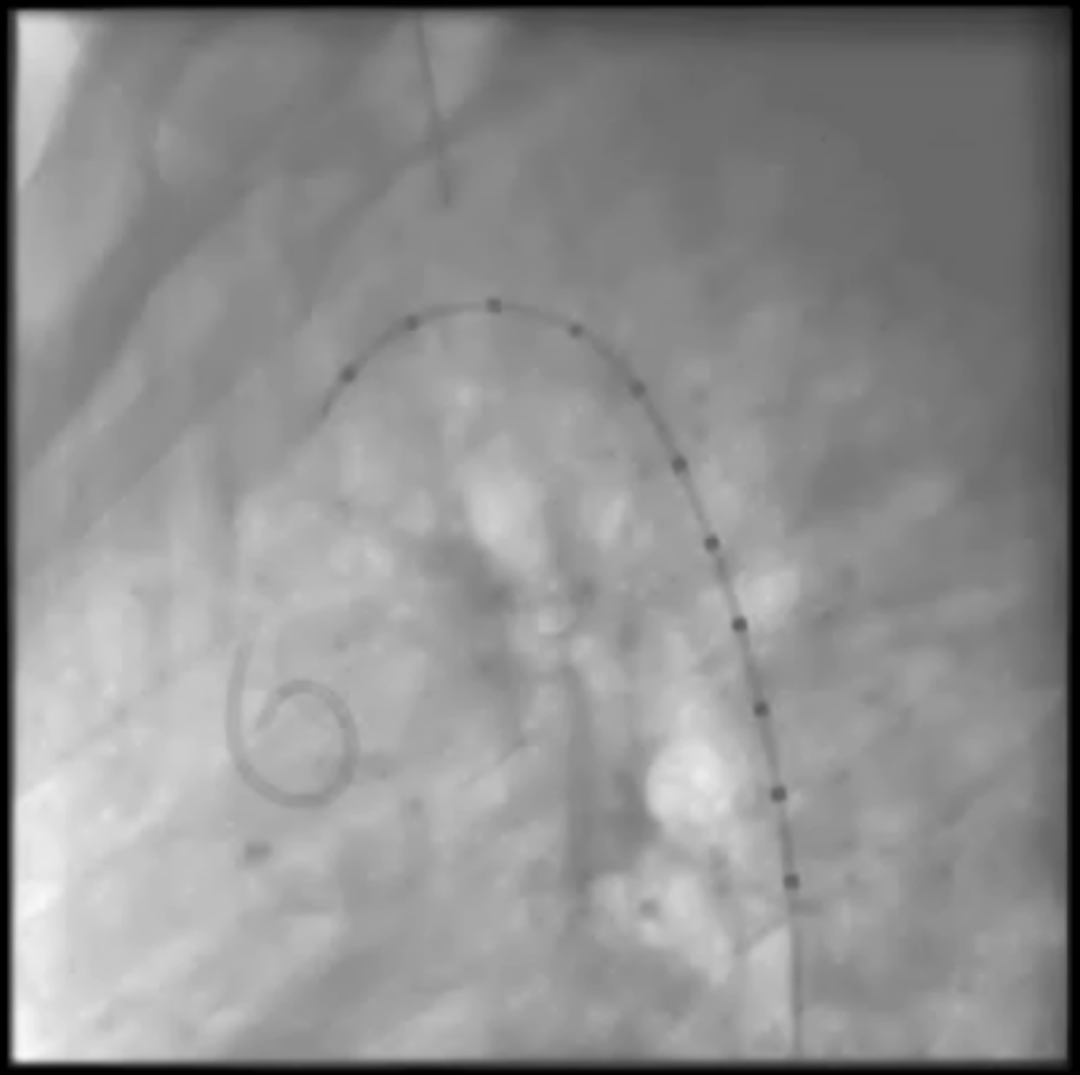

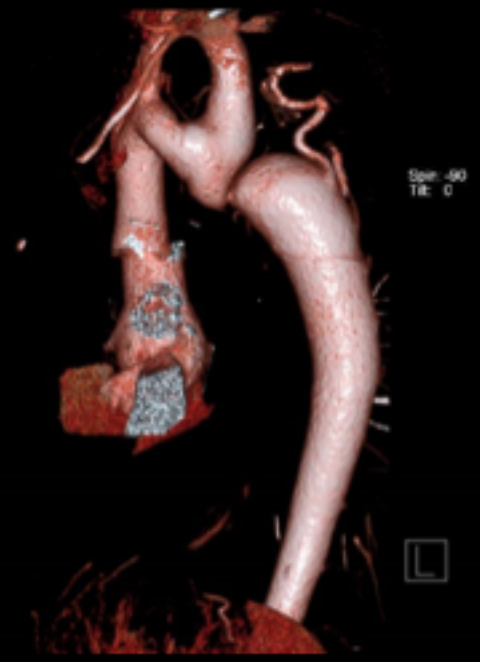

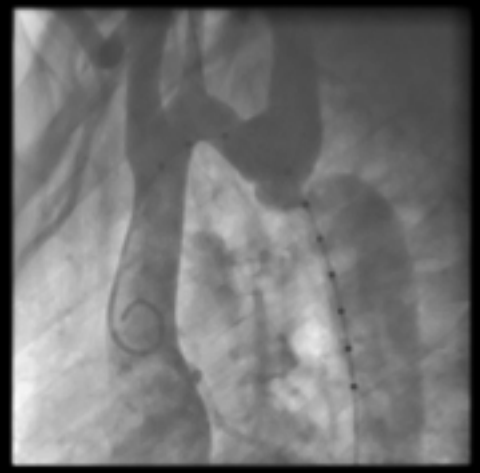

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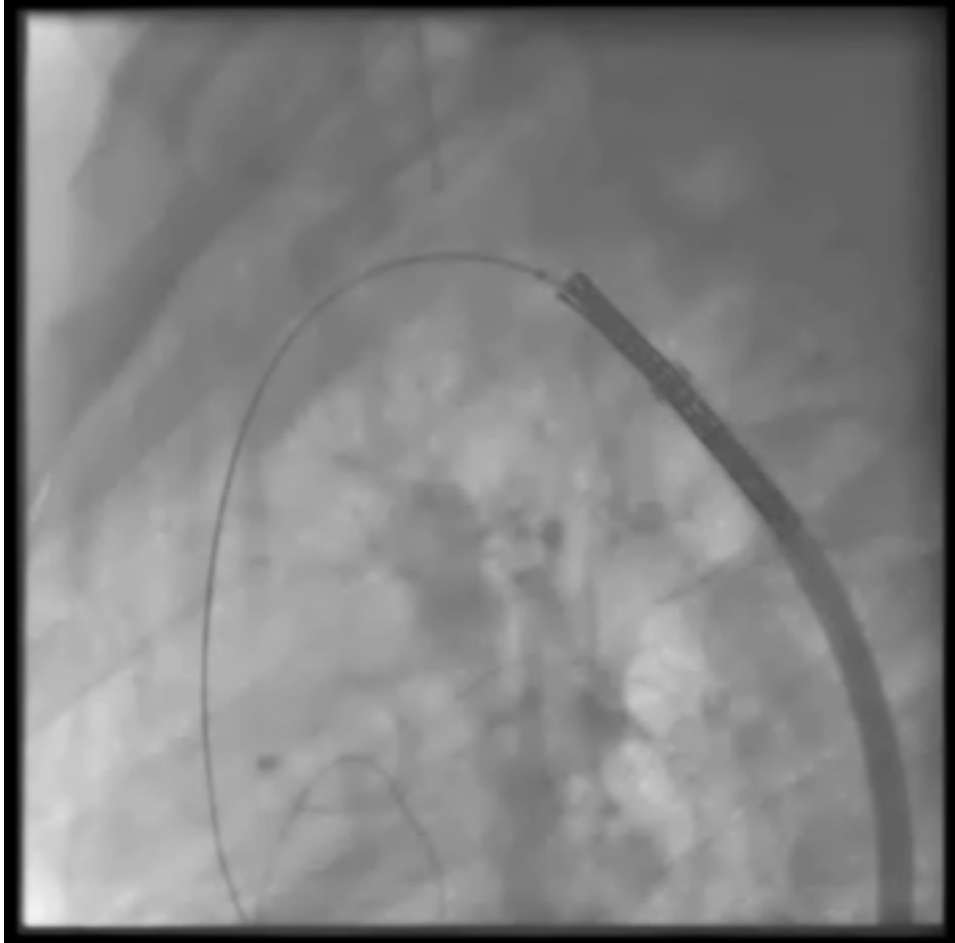

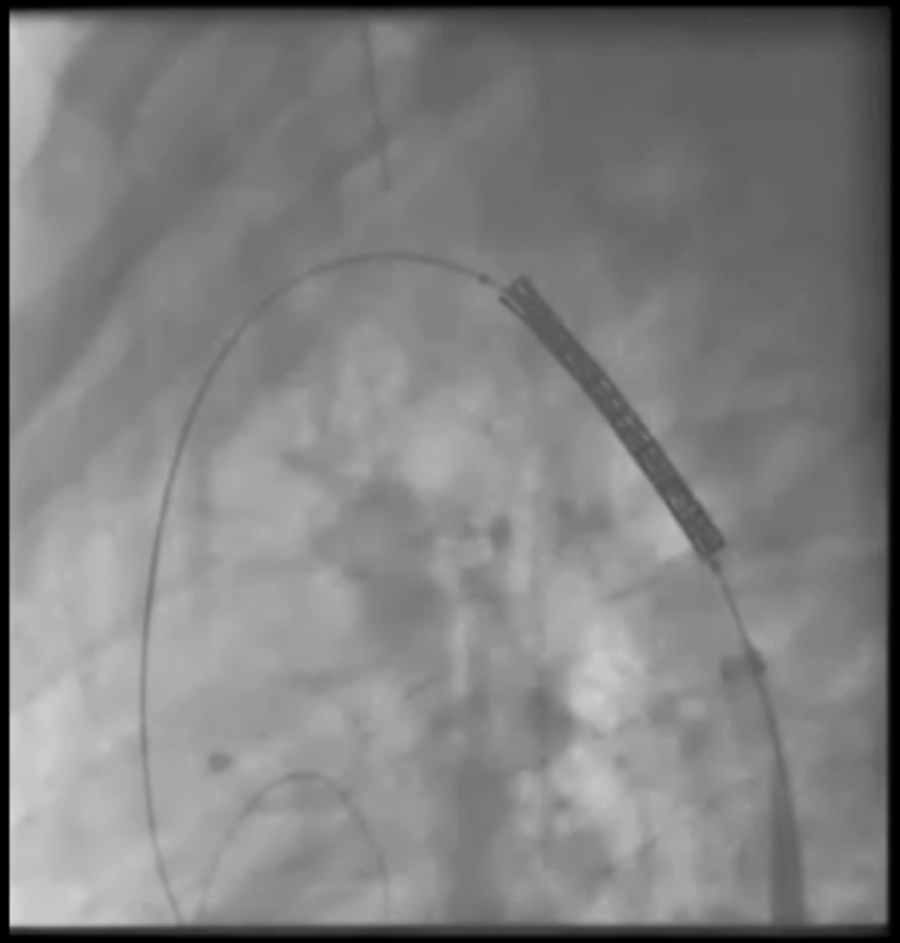

CP Covered stent 45 mm on Cristal Balloon 18x50 mm

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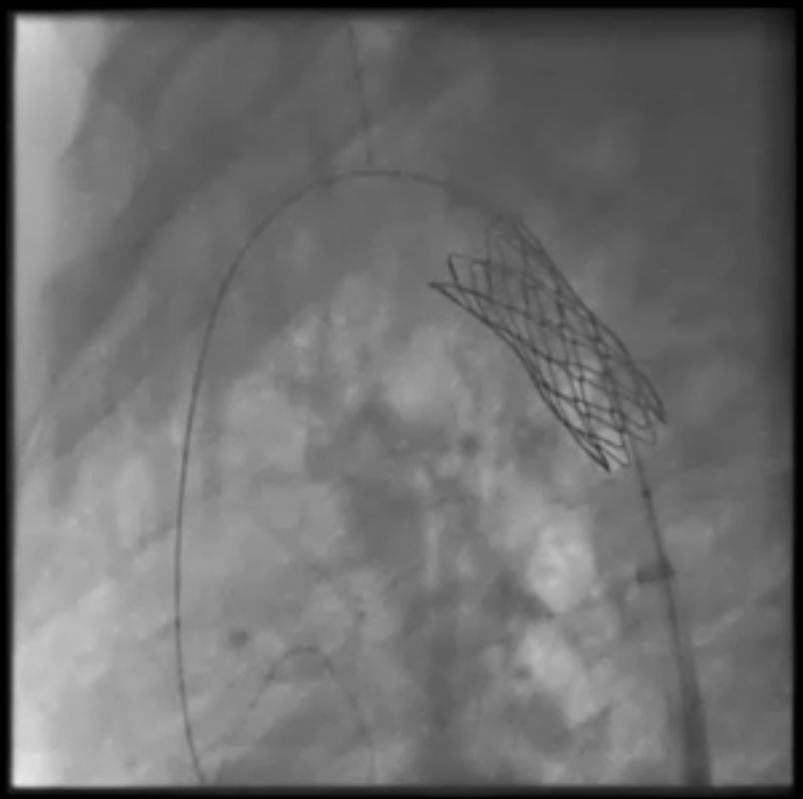

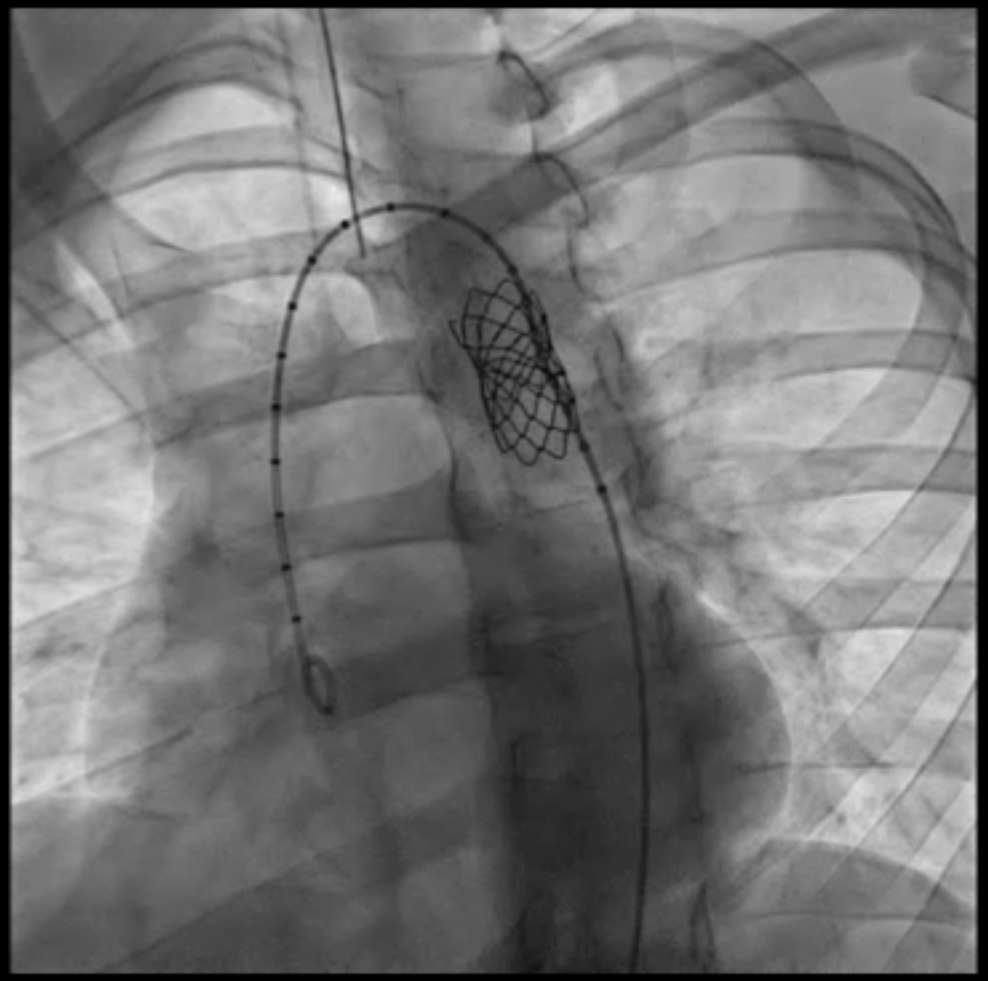

Final result: no significant residual gradient (< 10 mmHg)

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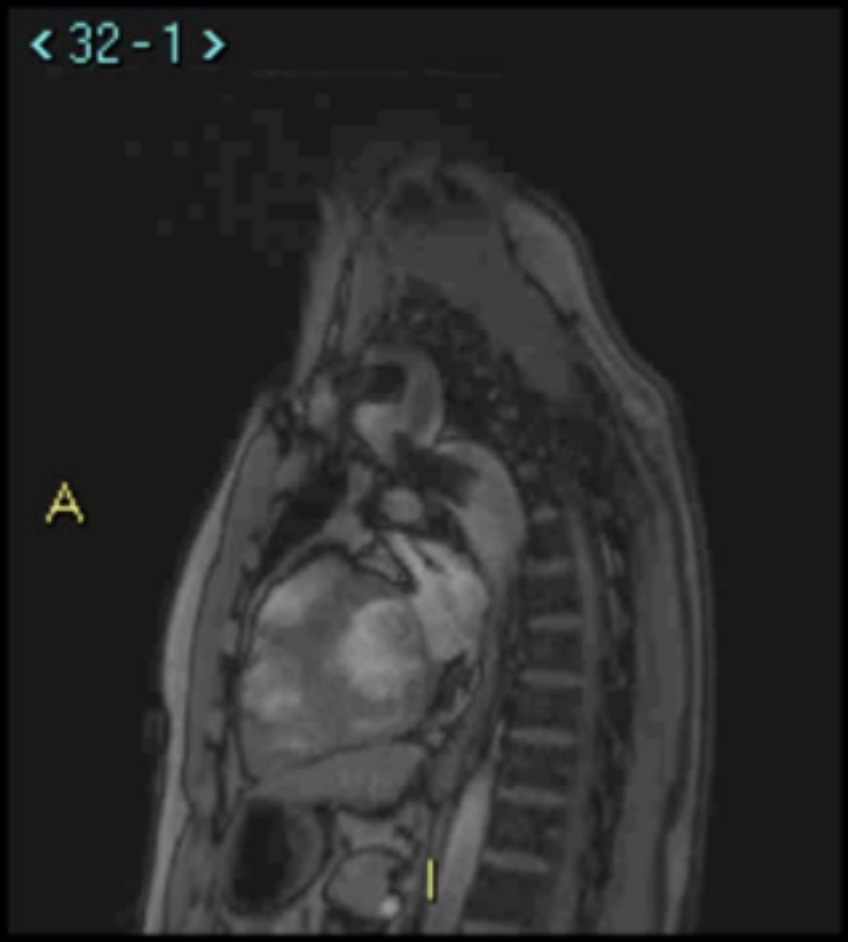
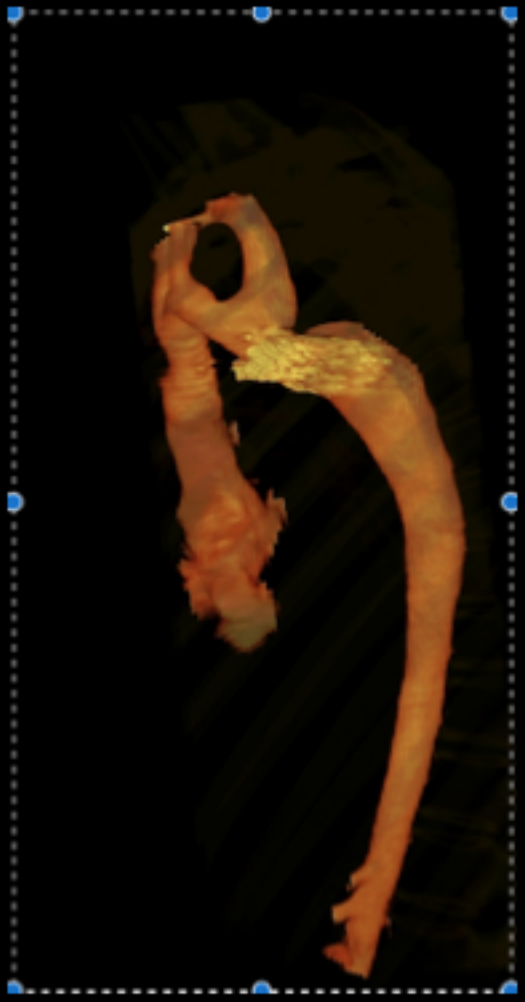
Follow up: 4 yrs after stenting

Clinical condition: residual systemic hypertension





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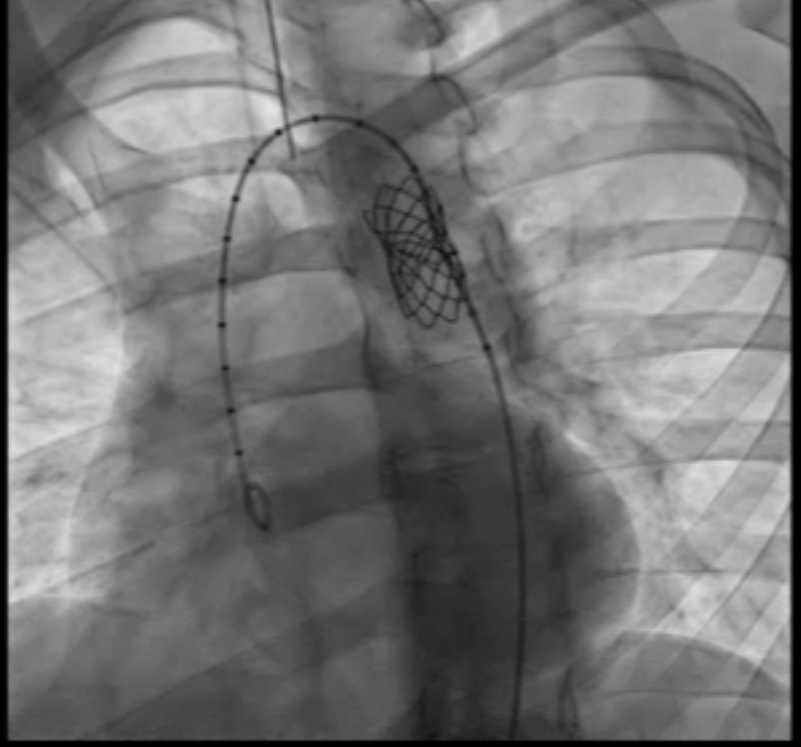

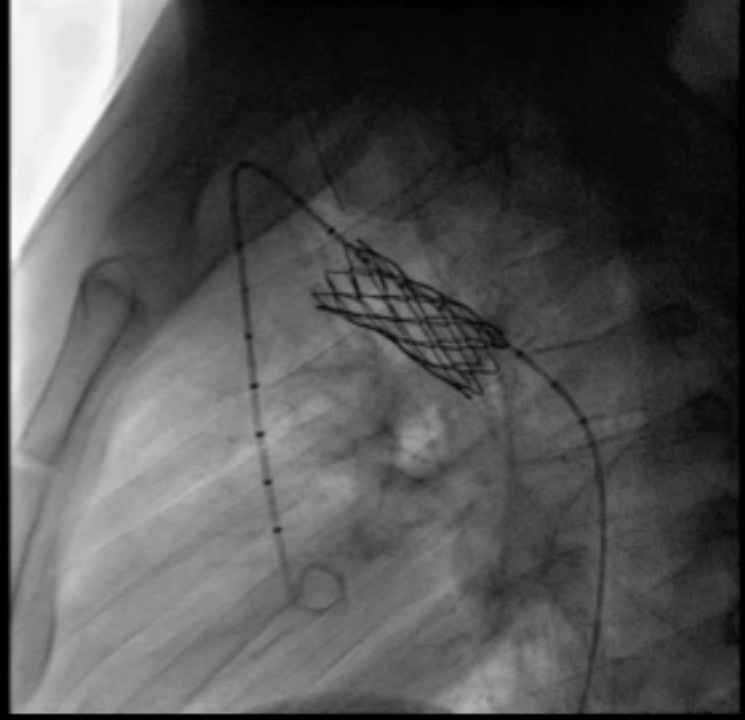

Hemodynamic assessment: Grad peak to peak Asc Ao/Proximal arch: 10 mmHg
Grad peak to peak Aortic Arch-Desc Ao: 5 mmHg
Grad peak to peak intrastent: <10 mmHg

medical treatment should be the best choice
as opposed to any additional interventional procedure

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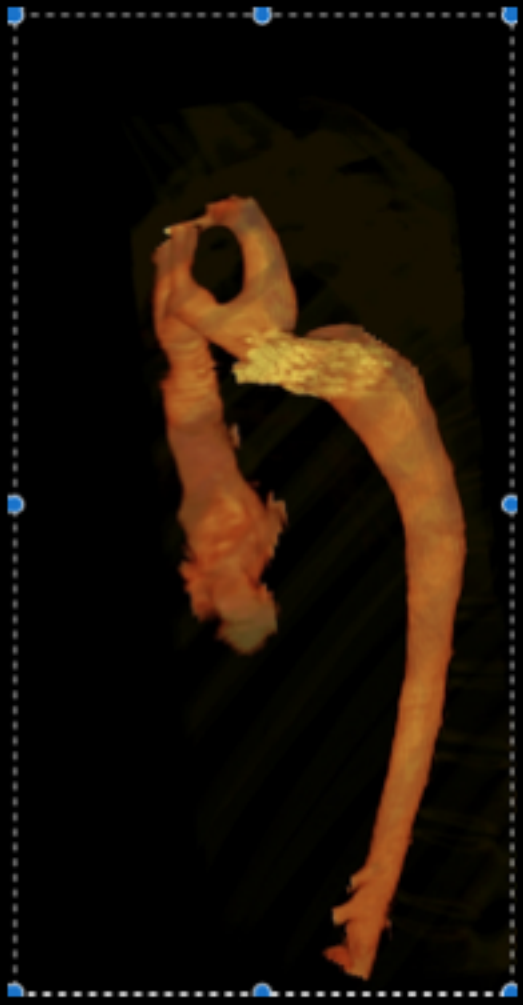
Need to make a "balance" between:

Complex anatomy unfavorable for stenting

and

Uncertain effectiveness of risky stenting procedure



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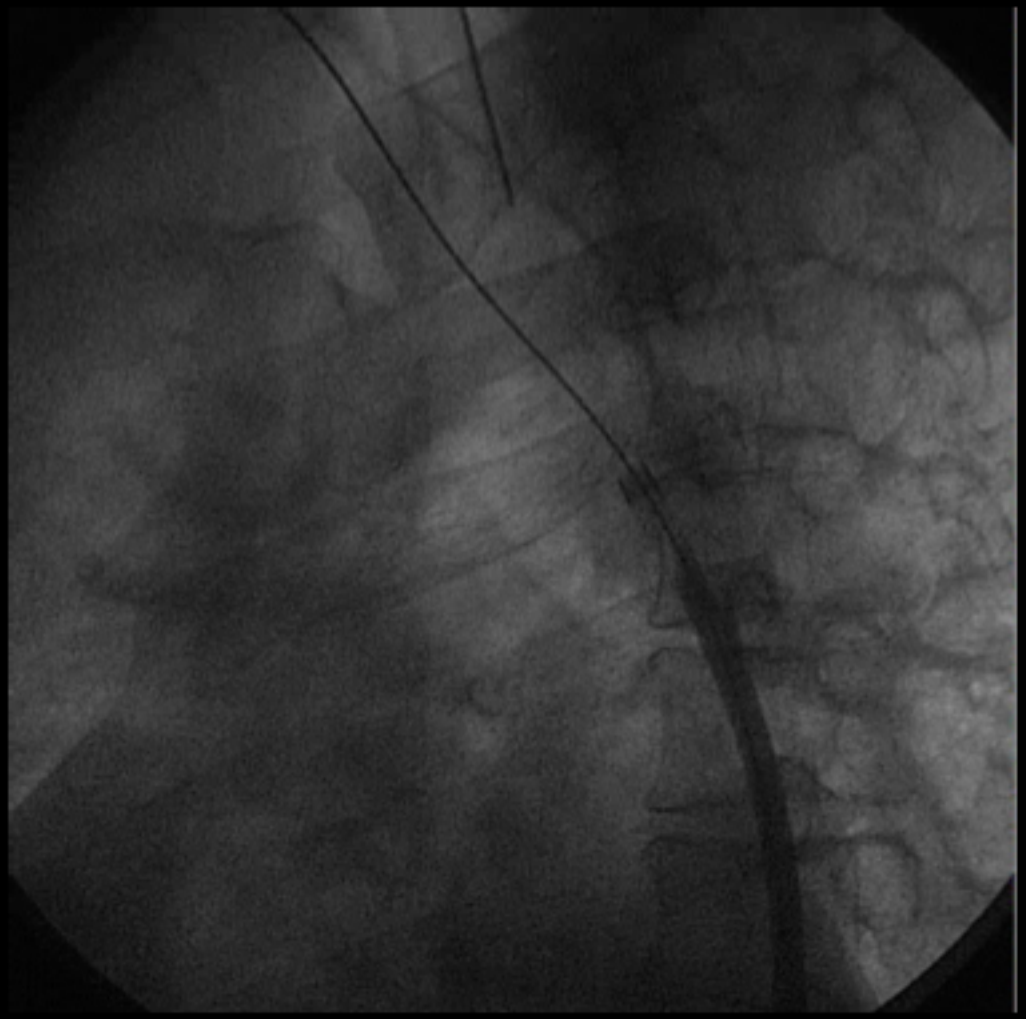
Diagnosis: Recoarctation

Age: 50 years

Previous surgery at 10 y.: end to end anastomosis

Clinical status: moderate hypertension (triple medications)

Hemodynamic assessment:
peak to peak gradient: 30 mmHg



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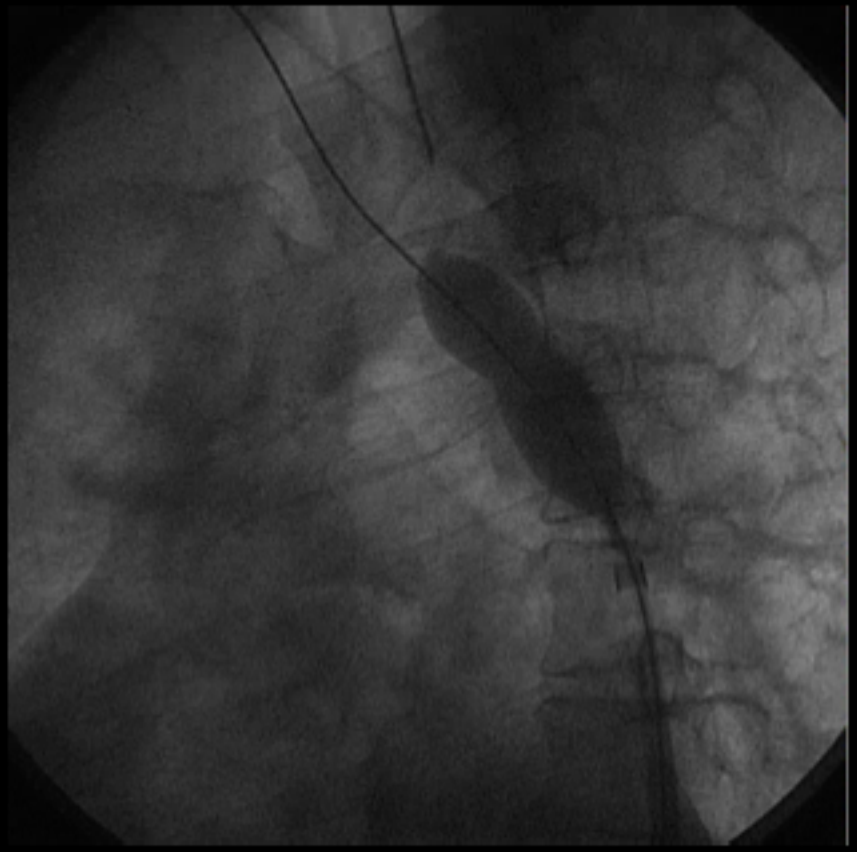
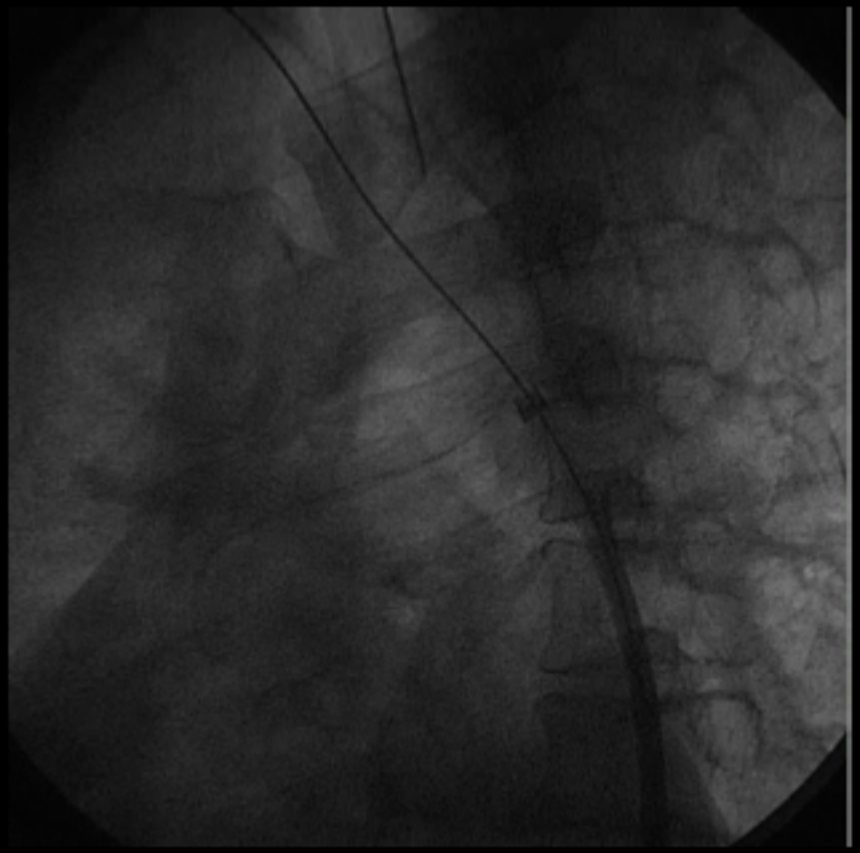


Balloon dilation



Angio post-balloon: unchanged

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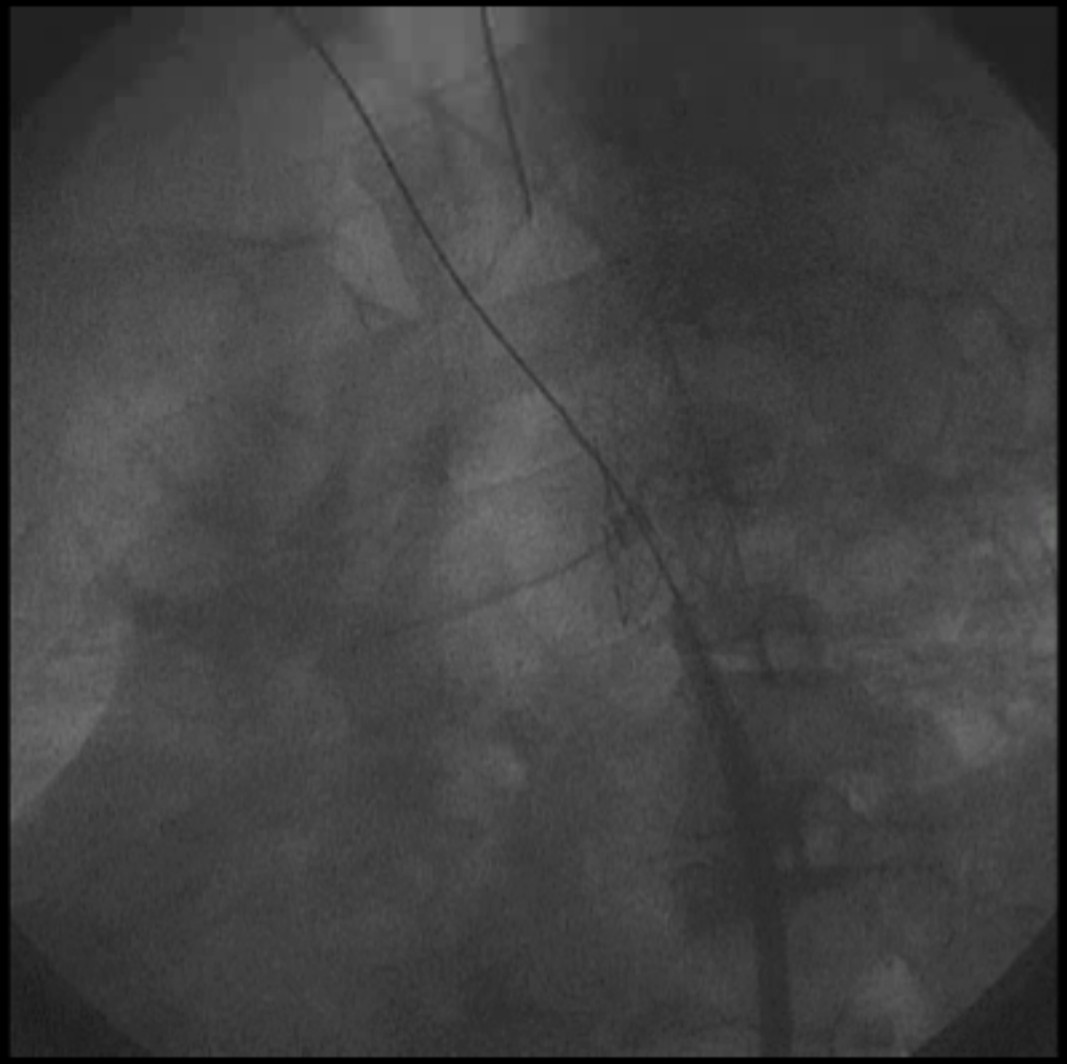
Bare metal stent implantation



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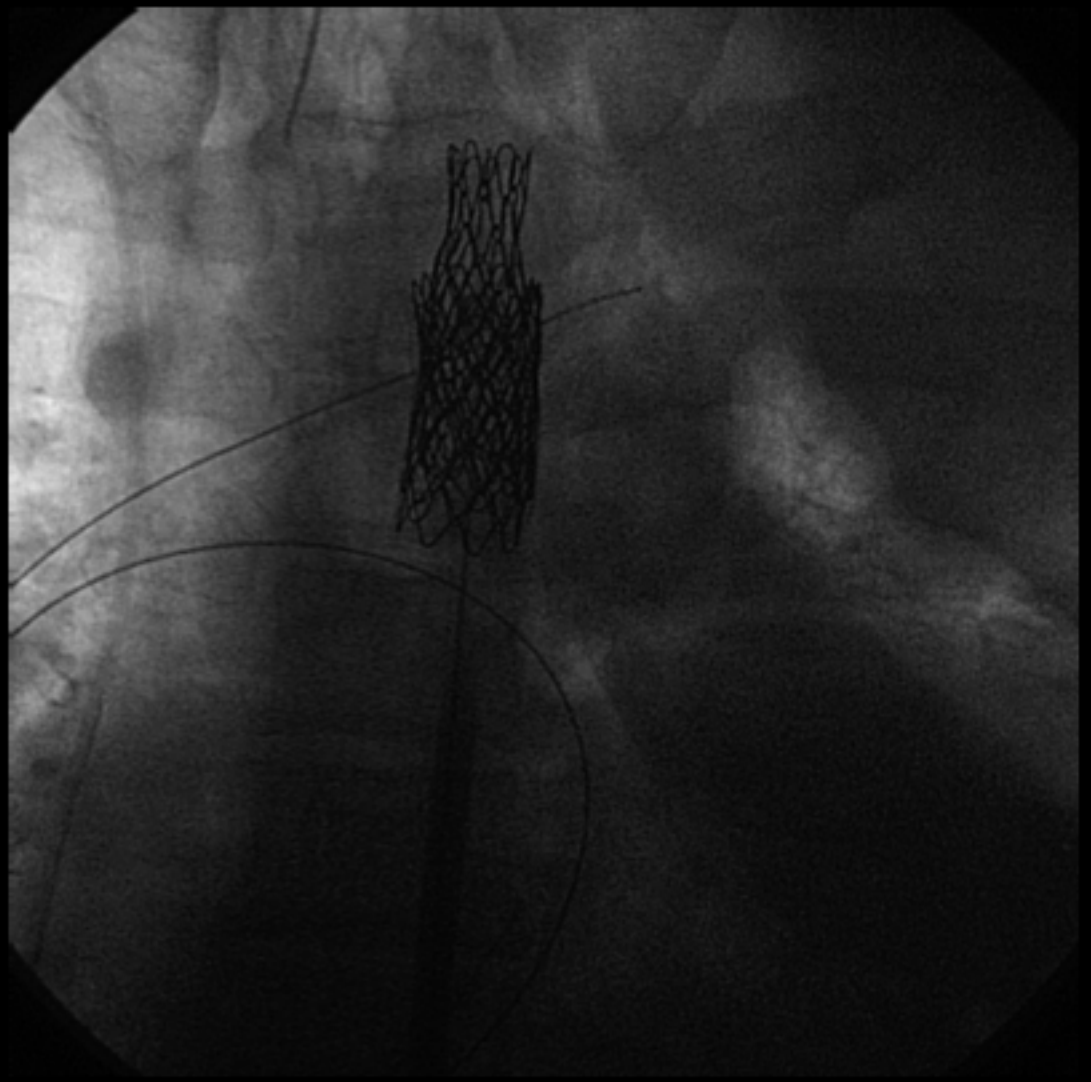
Covered stent implantation, surgery



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How to treat hypertension after CoA repair:

without the evidence

of severe anatomic obstruction…….

“Stay out of stenting”

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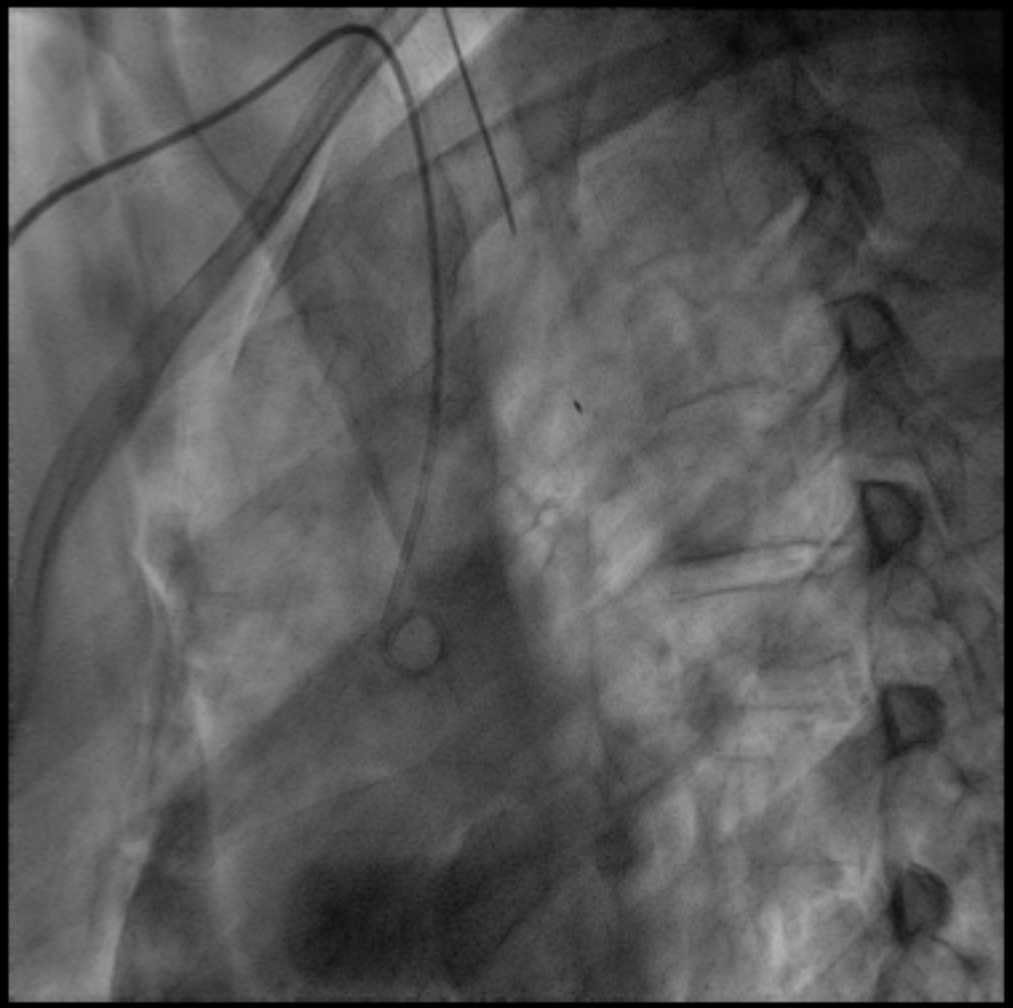
Diagnosis: Recoarctation

Age: 17years

Previous surgery at 3 days: subclavian flap, then balloon angioplasty at 3 years.

Clinical status: moderate hypertension. very intense sport activity

Hemodynamic assessment:
peak to peak gradient: 35 mmHg + aneurysm



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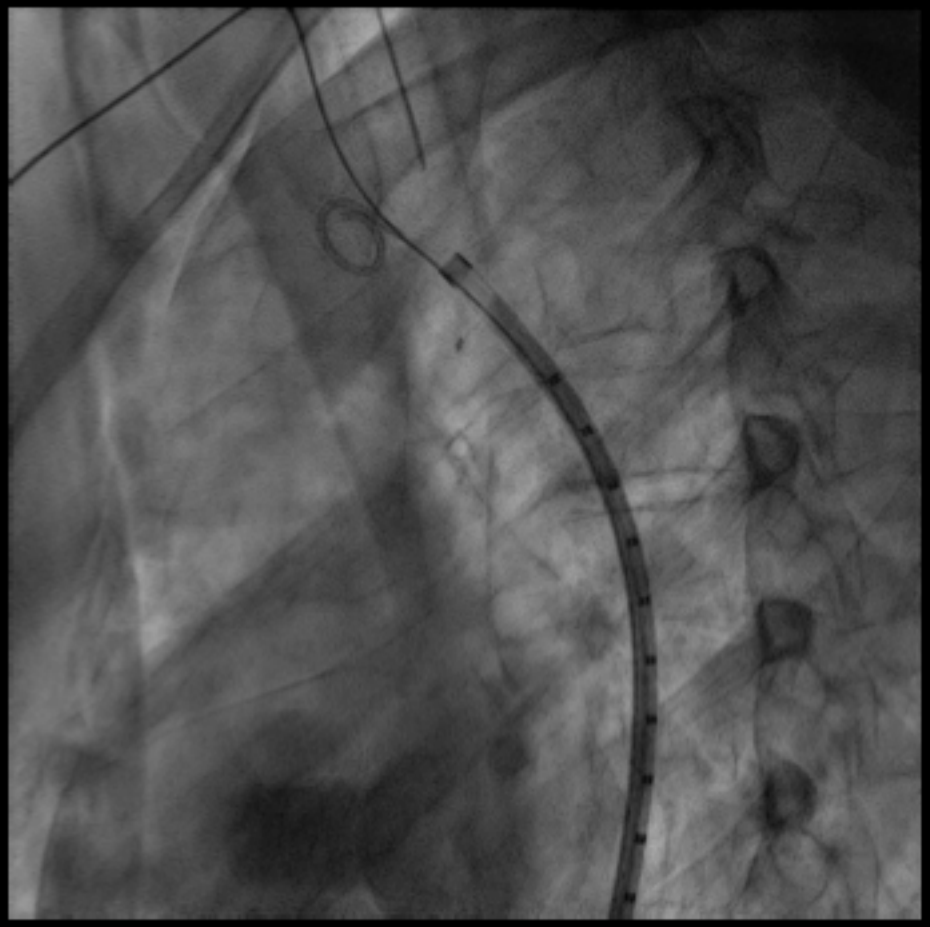
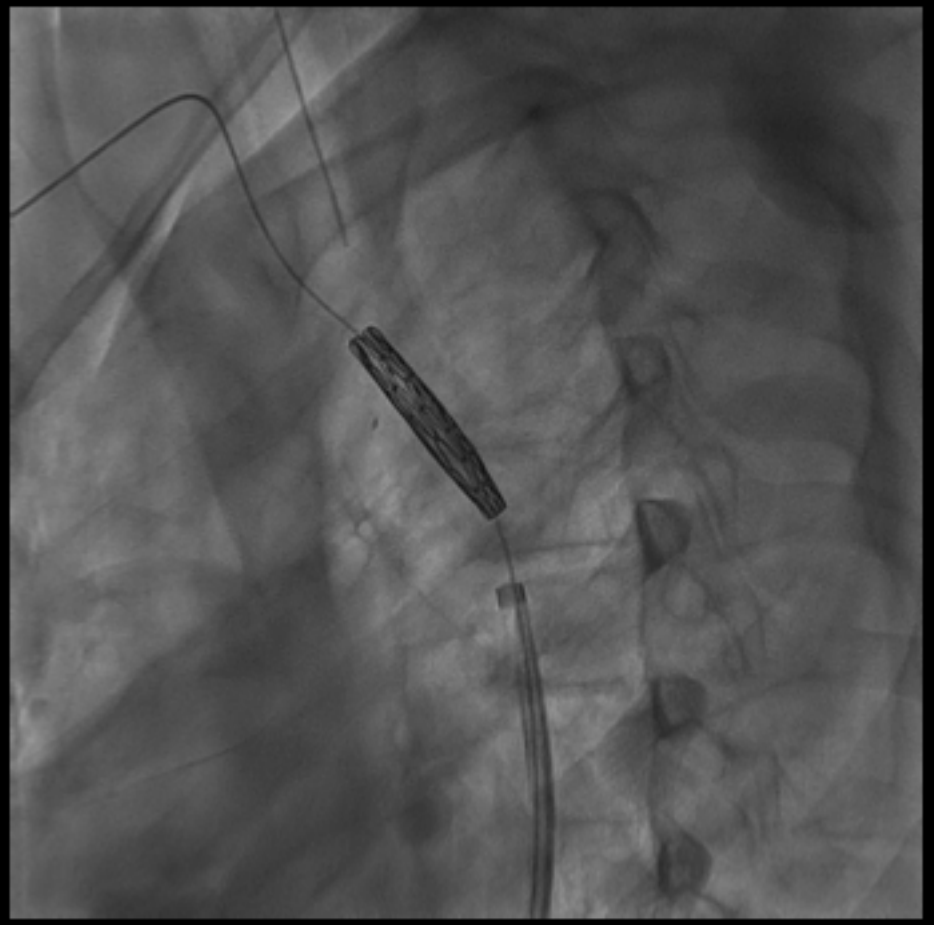
CP covered stent





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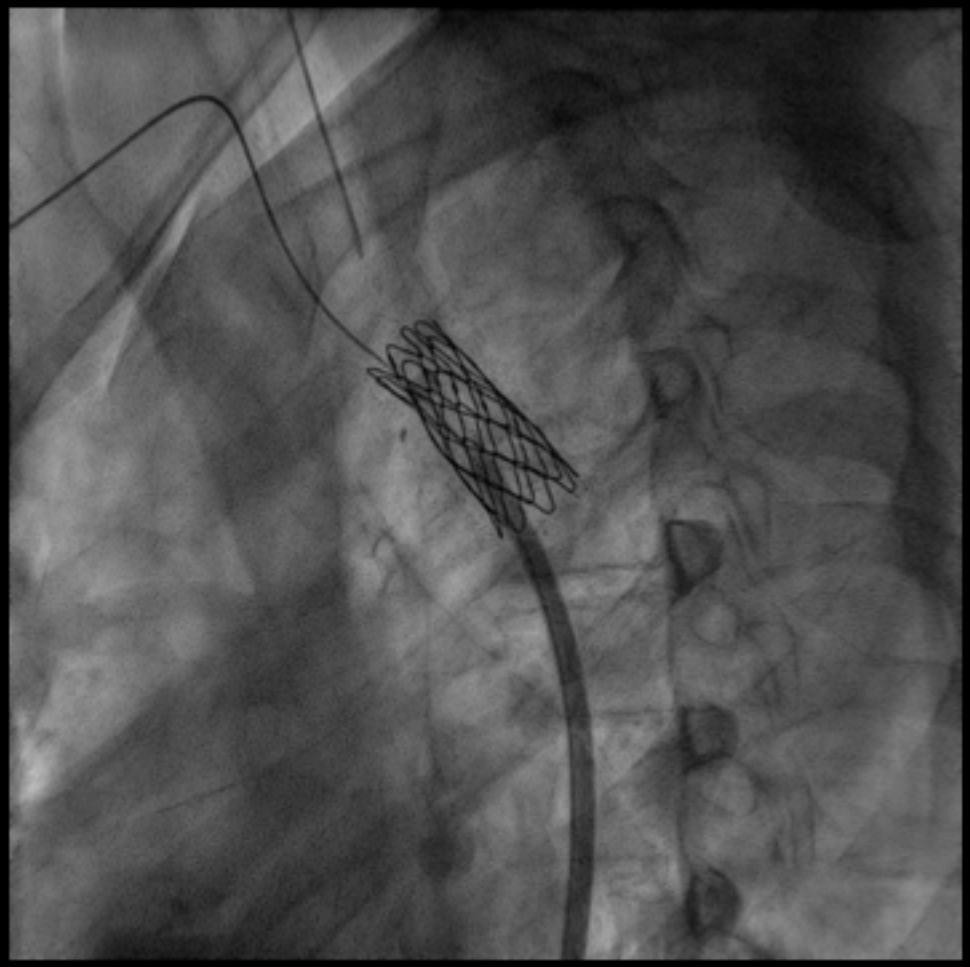
CP covered stent - no residual gradient
Aneurysm disappeared

Aneurysm disappeared



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How to treat hypertension after CoA repair:

“Stay out of stenting”
(in cases of isolated mild residual obstruction)

…or… if you decide to implant a stent, use covered stent as much as you can!

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Thank you!

Mario Carminati