Retrograde Ascending Hematoma

ASCENDING AORTA

Critical Issues in Aortic Endografting 2012

Thursday, May 24, 2012

Michael D. Dake, M.D.
Thelma and Henry Doelger Professor
Department of Cardiothoracic Surgery
Stanford University School of Medicine
Falk Cardiovascular Research Center

Michael Dake, MD

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THORACIC AORTIC DISSECTION

Who and When to Manage with TEVAR

- Complicated acute type B
- DeBakey type IIID (PIT in descending)
- Sub-acute type B with rapidly expanding FL
- Chronic type B with FL aneurysm

- Awaiting further evidence: uncomplicated acute, sub-acute, chronic type B; acute type A

Classification of Aortic Dissection: Based on Involvement of the Ascending Aorta

DeBakey I II III

Stanford A B

62% 38%

Dissecting Aneurysm of the Descending Aorta

Improved Surgical Results in 91 Patients

George J. Reul, Jr., MD; Denton A. Cooley, MD; Grady L. Hallman, MD; Sitaram B. Reddy, MD; E. Ross Kyger III, MD; Don C. Wukasch, MD

PATIENTS AND METHODS

We have classified dissecting aneurysms originating in the descending thoracic aorta (type III or descending arch) into four subtypes (Fig 1). The subtypes have the same site of origin, that is, distal to the left subclavian artery, but vary according to extension of the dissection: type III-A extends to the midthoracic aorta (Fig 2); type III-B extends to the level of the diaphragm (Fig 3); in type III-C the dissecting aneurysm and false channel extend below the diaphragm (Fig 4); type III-D is a retrograde extension into the ascending aorta with antegrade dissection below the diaphragm (Fig 5). The surgical management of each of these lesions is different, as is the prognosis and the importance of early surgical intervention.

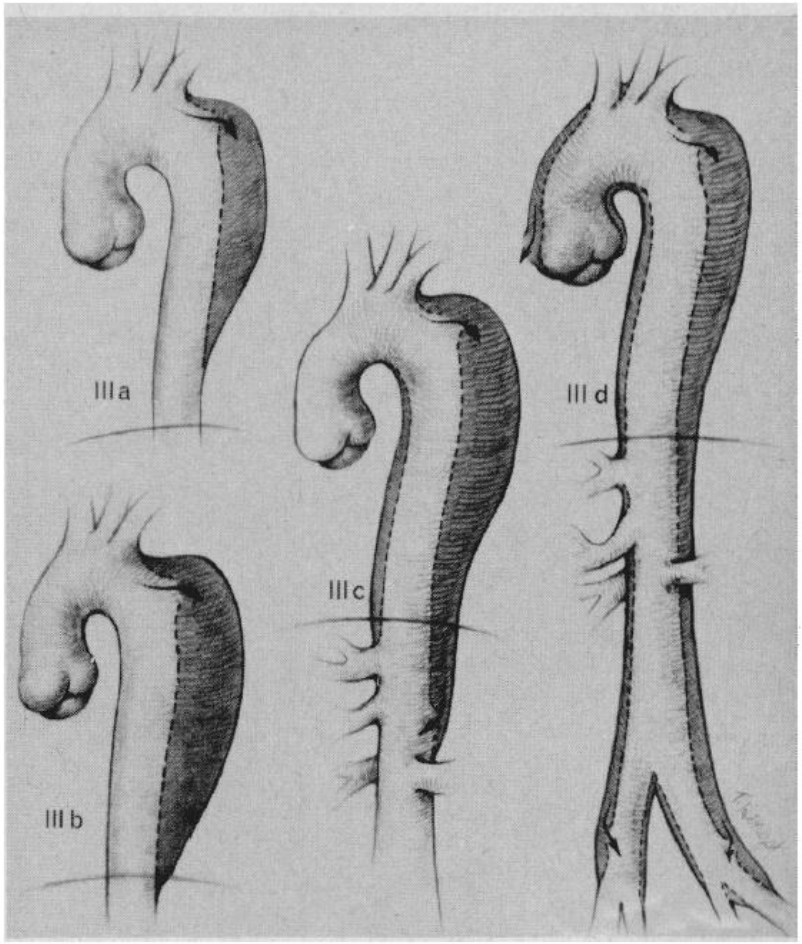

Fig 1.—Subtypes of type III dissection of thoracic aorta. All have initiation of dissecting process at or below subclavian artery. Subtypes are according to extent of dissection, either retrograde or antegrade.

THORACIC AORTIC DISSECTION

Who and When to Manage with TEVAR

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TYPE A AORTIC DISSECTION

Management Considerations

1. Retrograde dissection from PIT in descending aorta (DeBakey type IIID). Can exist WITH or WITHOUT evidence of tear, flow in ascending aorta – i.e., blind sac with thrombus
2. Traditional Therapy: open surgical replacement of ascending aorta +/- valve repair
3. Alternative Therapy -- prohibitive surgical risk
   A. Endograft Placement
      - Anatomy suitable for S/G
      - Appropriate device available
   B. Medical Management
      - Anatomy unsuitable for S/G

Figure 1 ◆ A 73-year-old woman suffered from an acute type A with retrograde dissection (**A**) complicated by severe static stenosis involving the right renal artery (**B**, thin arrow indicates the true lumen of the right renal artery, thick arrow indicates the false lumen). (**C**) Aortography showing the primary entry tear (arrow) 3 cm from the left subclavian artery; this type A with retrograde dissection resulted from antegrade and retrograde dissections from an entry tear located in the proximal DTA. (**D**) Aortography after complete exclusion of the primary entry tear using a low-profile 12-F modular stent-graft. (**E**,**F**) CT images 1 year after stent-grafting at the same levels as **A** and **B**; complete resolution of the false lumen is evident throughout the aorta. Note the expansion of the right renal artery (arrow in **F**), which had the static stenosis before treatment.

Thoracic Endovascular Aortic Repair for Retrograde Type A Aortic Dissection with an Entry Tear in the Descending Aorta

Chang Shu, MD, PhD, Tun Wang, MD, PhD, Quan-ming Li, MD, PhD, Ming Li, MD, PhD, Xiao-hua Jiang, MD, Ming-yao Luo, MD, PhD, and Xin Li, MD, PhD

ABSTRACT

Purpose: To report the immediate and follow-up outcome of thoracic endovascular aortic repair (TEVAR) in highly selected patients with retrograde type A aortic dissection (RAAD) and an entry tear in the descending aorta.

Materials and Methods: TEVAR was performed in 17 patients with RAAD and an entry tear in the descending aorta. None of the patients had severe aortic regurgitation, cardiac tamponade, coronary artery involvement, or brain ischemia. The false lumen in the ascending aorta was patent in nine patients. Two patients had acute malperfusion of the branched artery. Computed tomography (CT) was performed 14 days, 3 months, and 6 months after the intervention and annually thereafter.

Results: All procedures were technically successful, with complete coverage of the entry tear and complete thrombosis of the false lumen in the ascending aorta. All patients survived through the follow-up period (25.7 months ± 17.2). TEVAR resulted in thrombosis of the false lumen, reabsorption of the false lumen thrombus, and enlargement of the true lumen. The mean maximal diameter of the ascending aorta and the false lumen in the ascending aorta significantly decreased after TEVAR. At the distal edge of the stent graft, the mean diameter of the descending aorta and the false lumen markedly decreased after TEVAR. Complete thrombosis of the false lumen was observed at the distal edge of the stent graft in 16 (94.1%) patients and at the diaphragmatic level in 9 (52.9%) patients.

Conclusions: TEVAR for RAAD with an entry tear in the descending aorta is a safe and effective technique in highly selected patients.

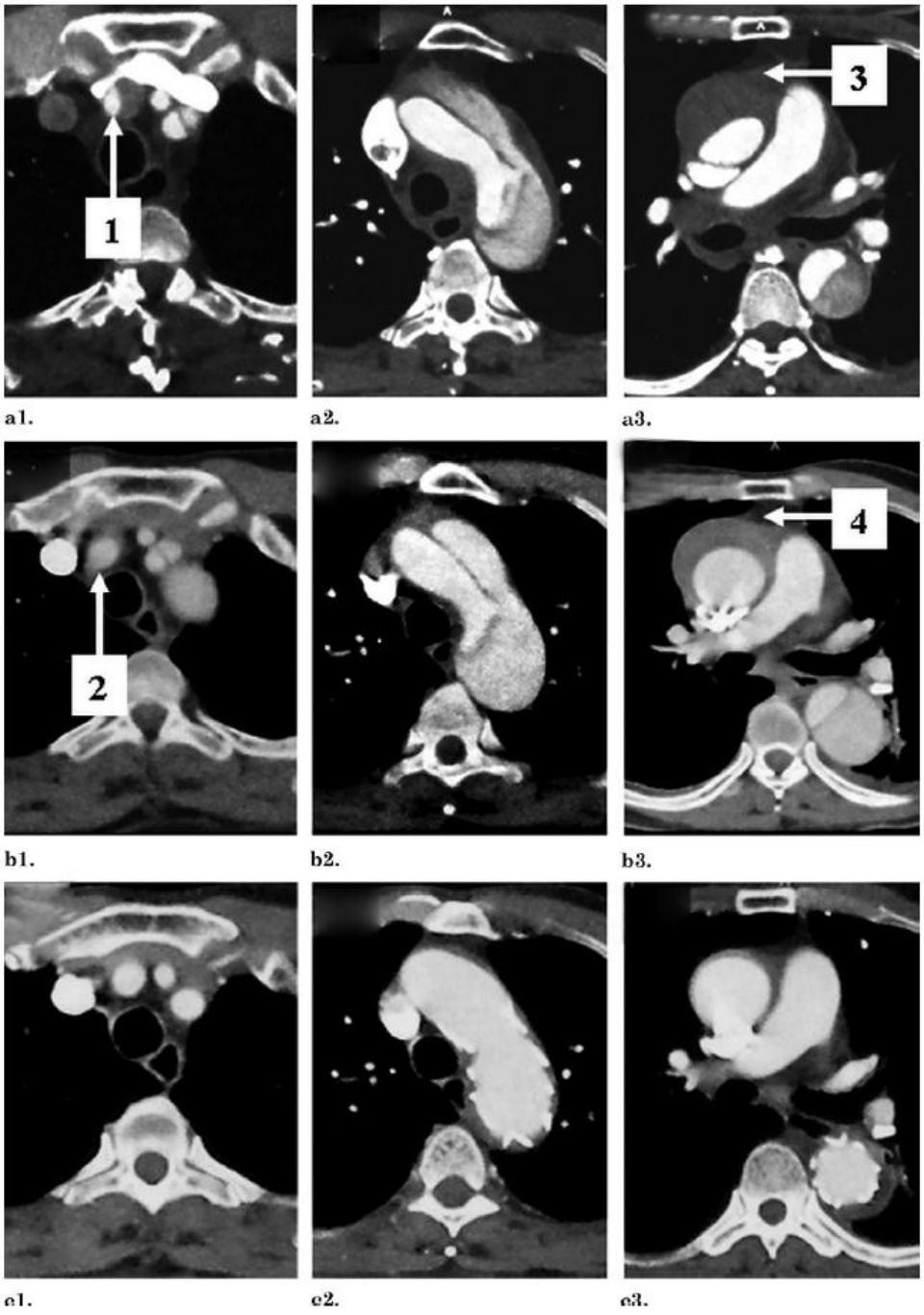
J Vasc Interv Radiol 2012; 23:453-60

Department of Cardiothoracic Surgery, Stanford University School of Medicine

CT imaging on admission;

after 2 weeks of conservative therapy,

13 months after TEVAR



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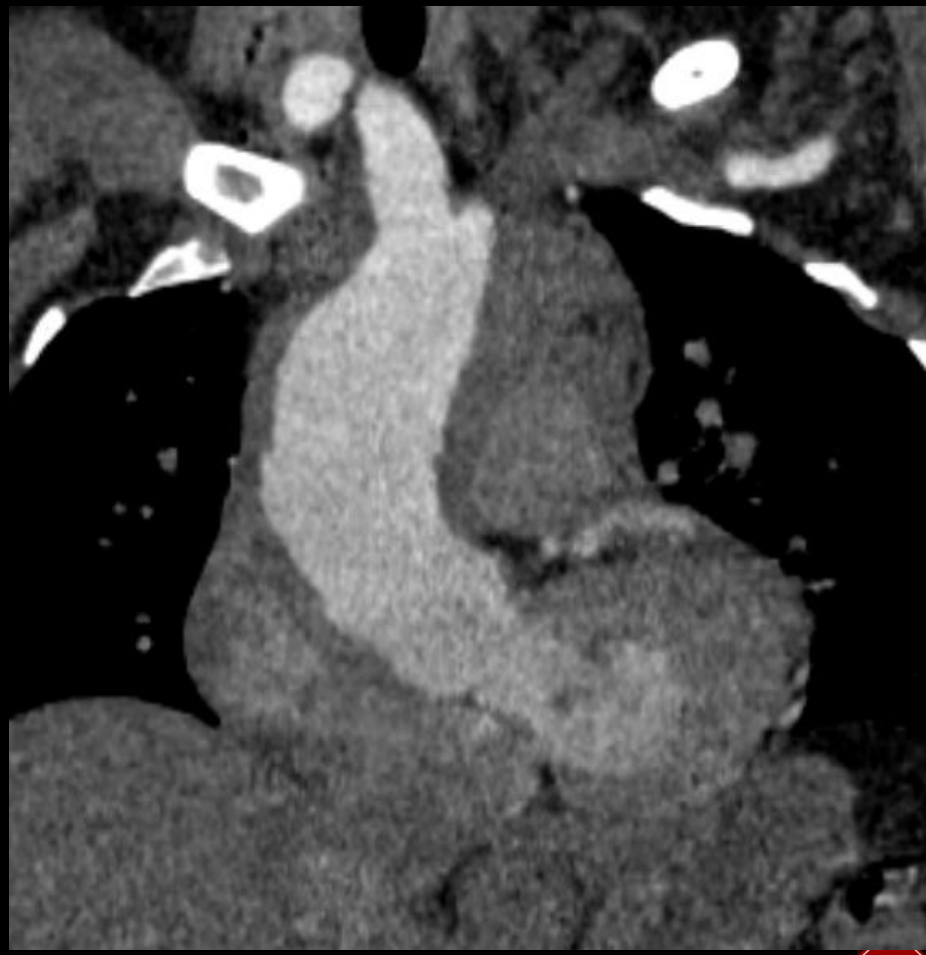
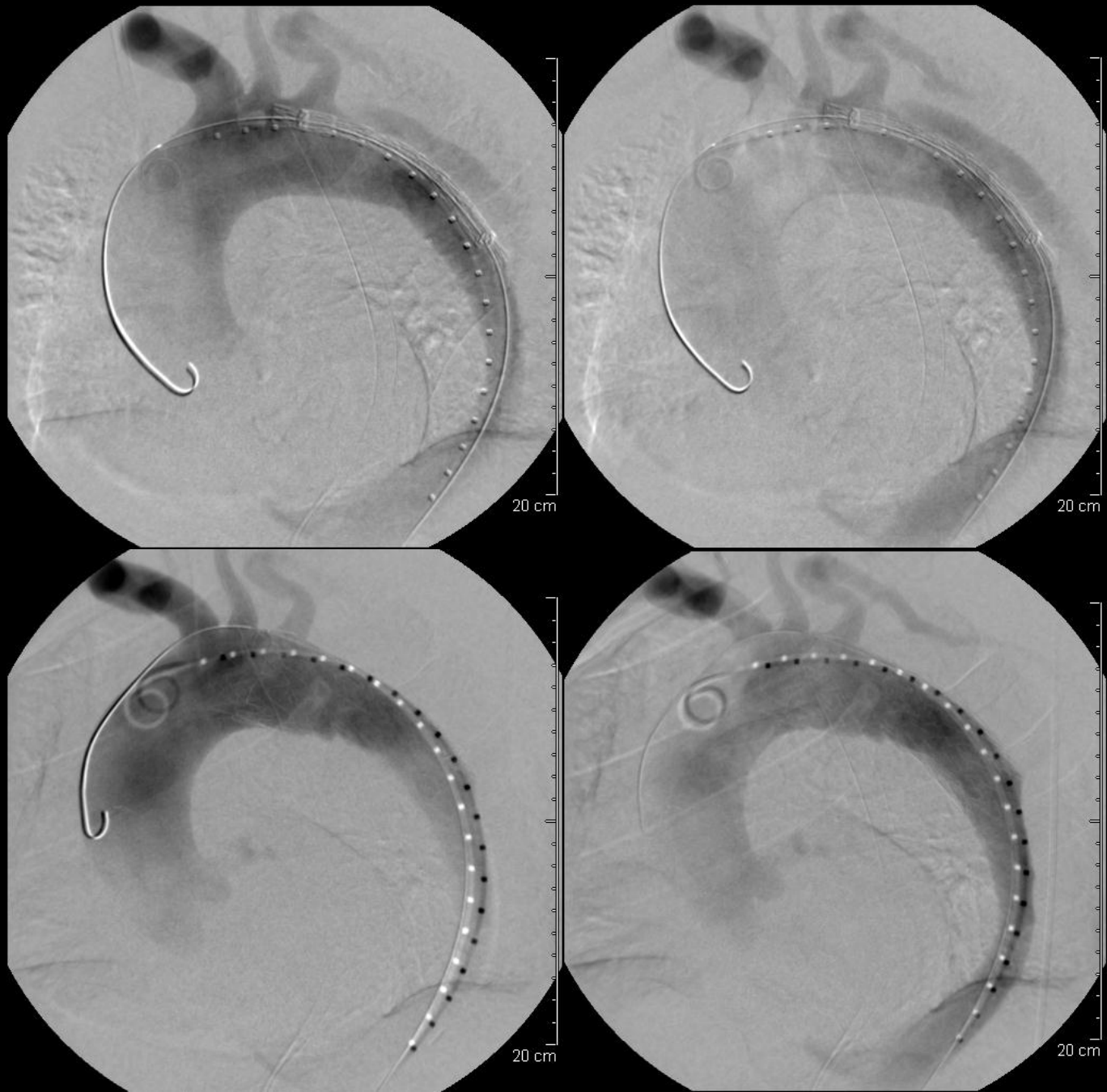
70-year-old Woman with Acute Dissection and Pericardial Fluid

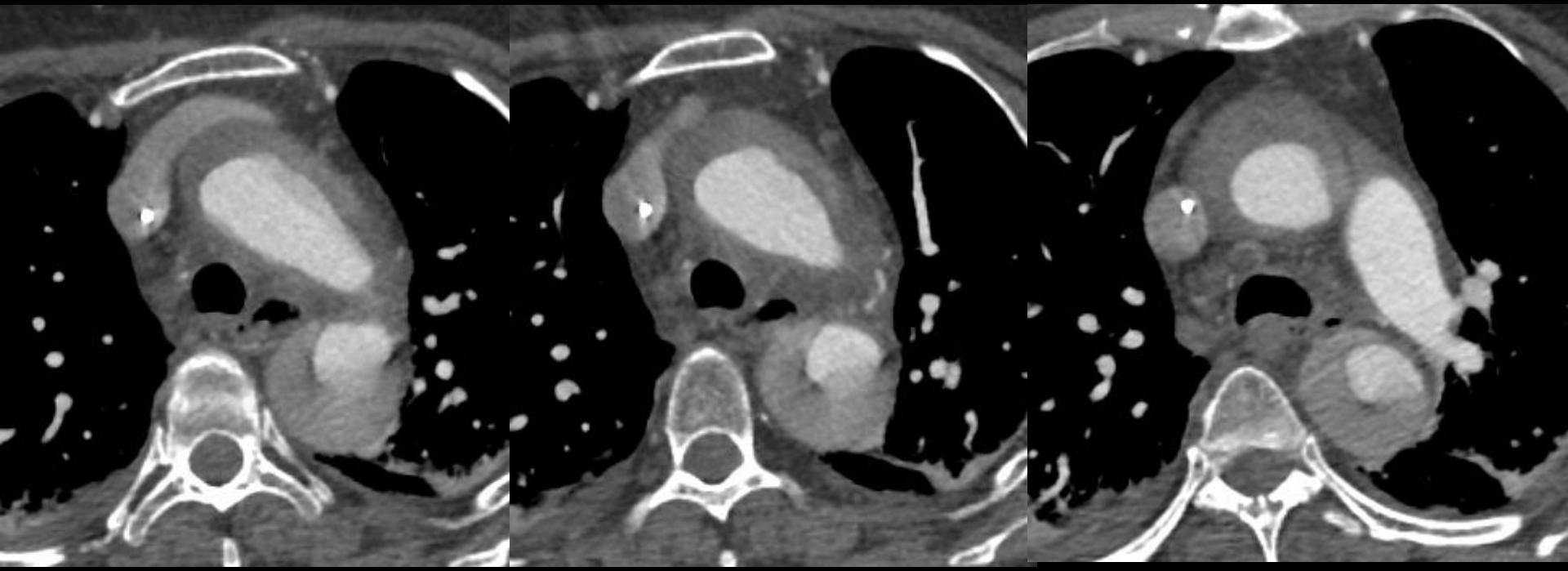


Pre and Post Stent-Graft



CTA: Pre and 1 Week Post Stent-Graft

63 y/o F with history of HTN, COPD, and smoking, is transferred from OSH with recent acute onset of chest and back pain



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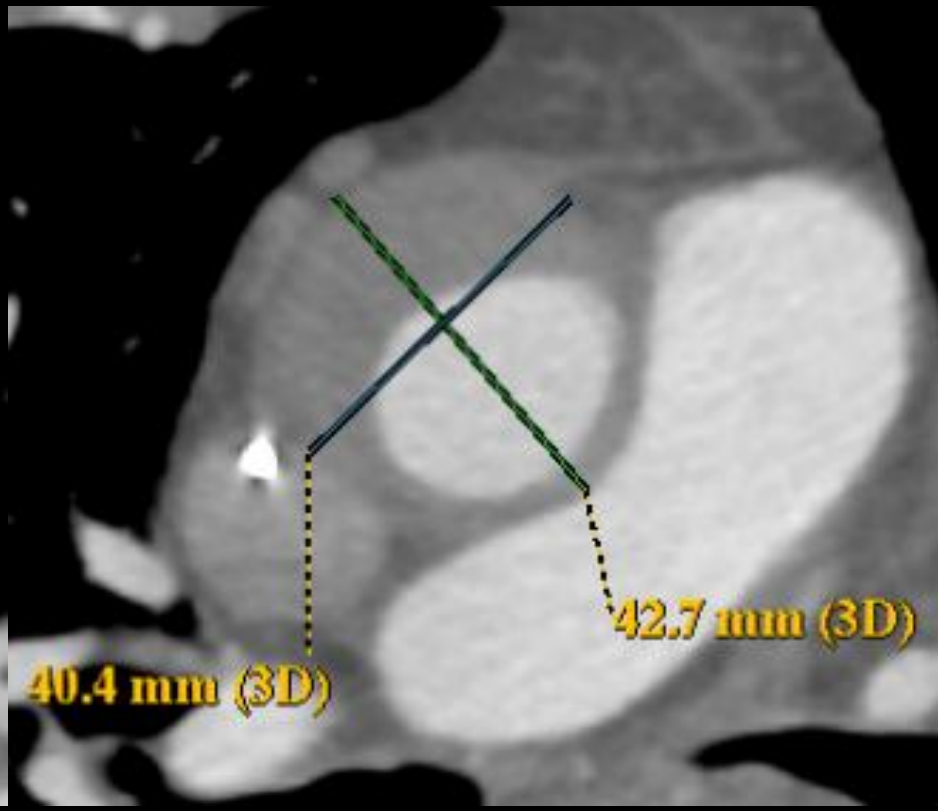
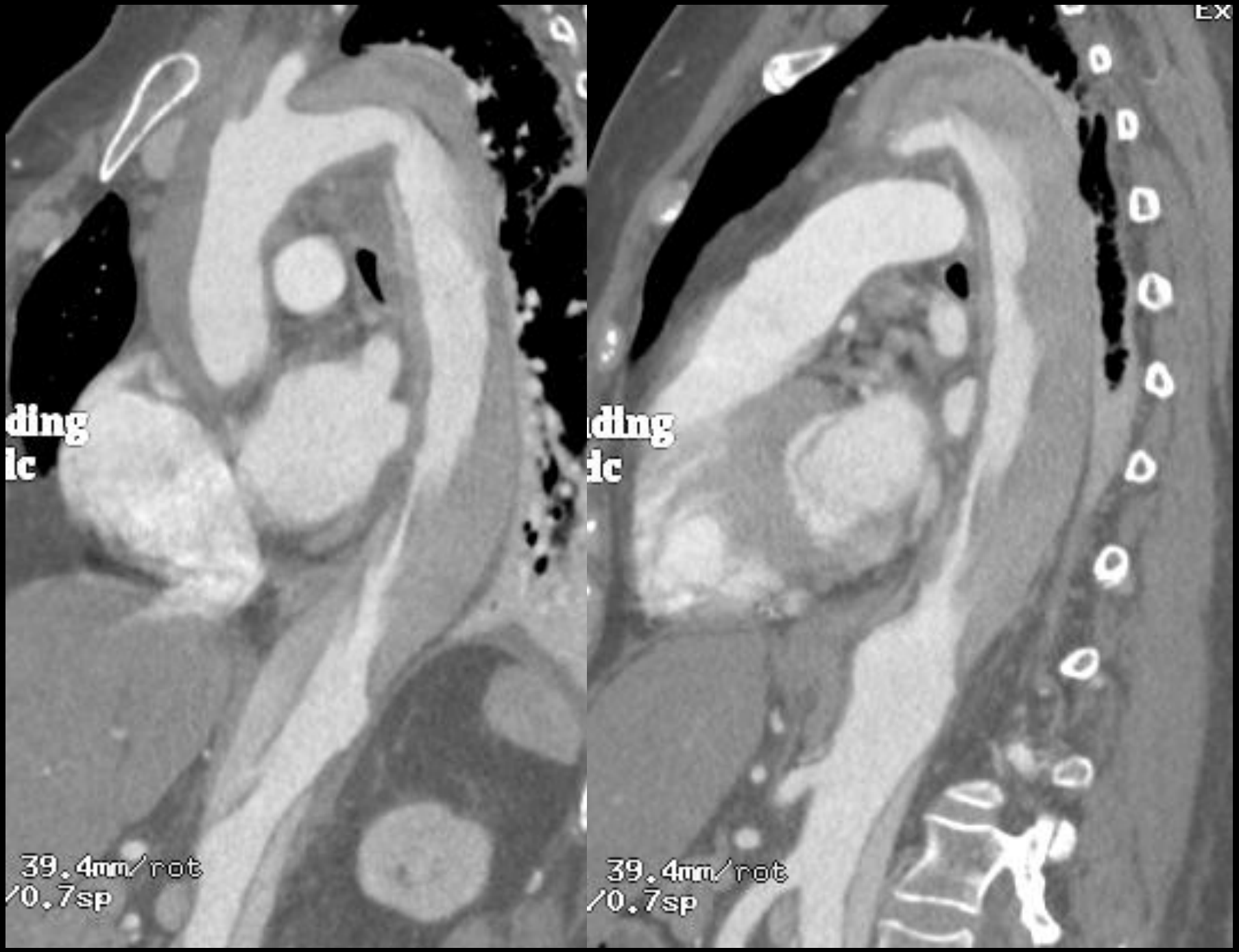
24.0 mm (3D)


40.4 mm (3D)
42.7 mm (3D)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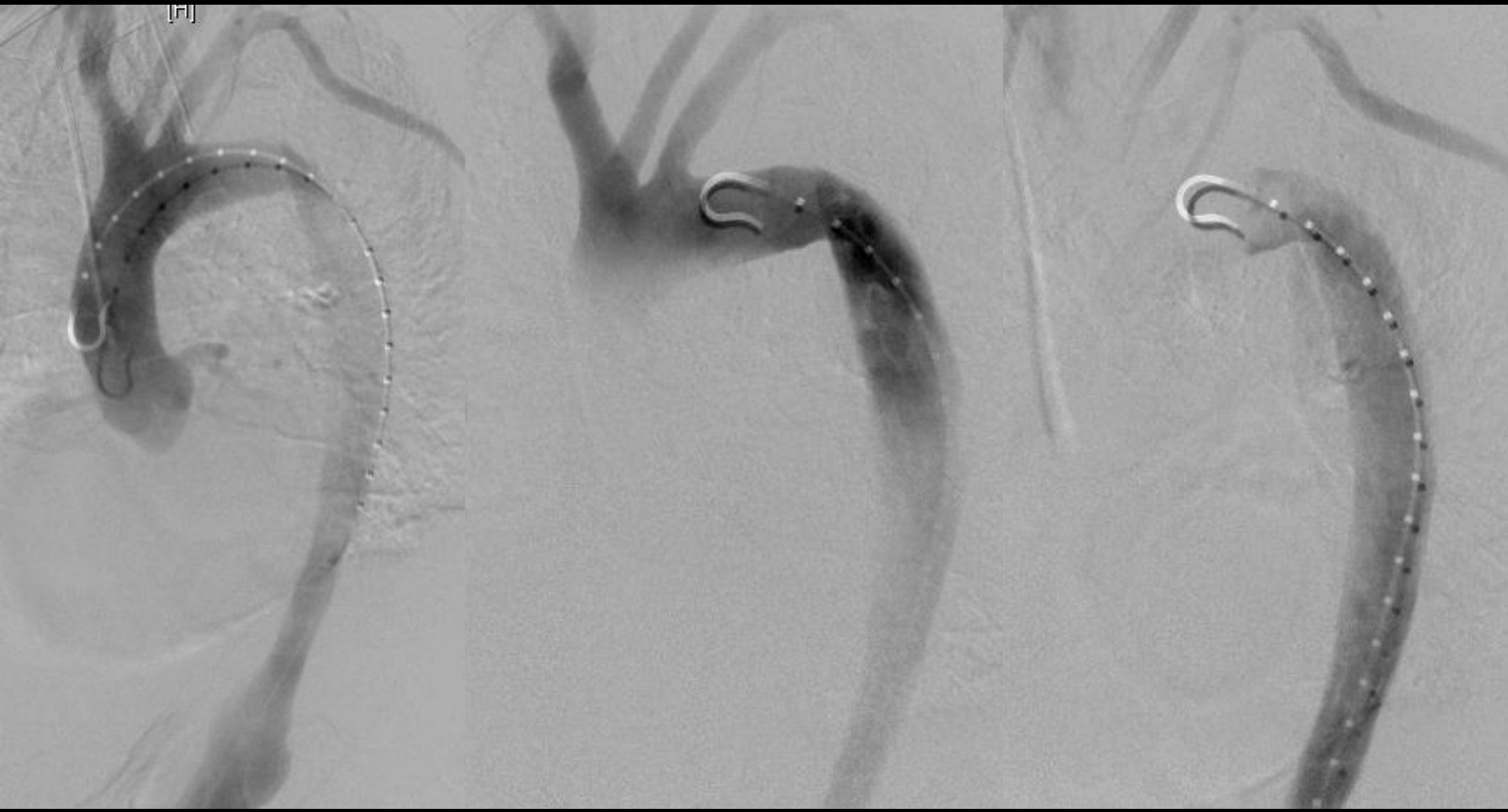
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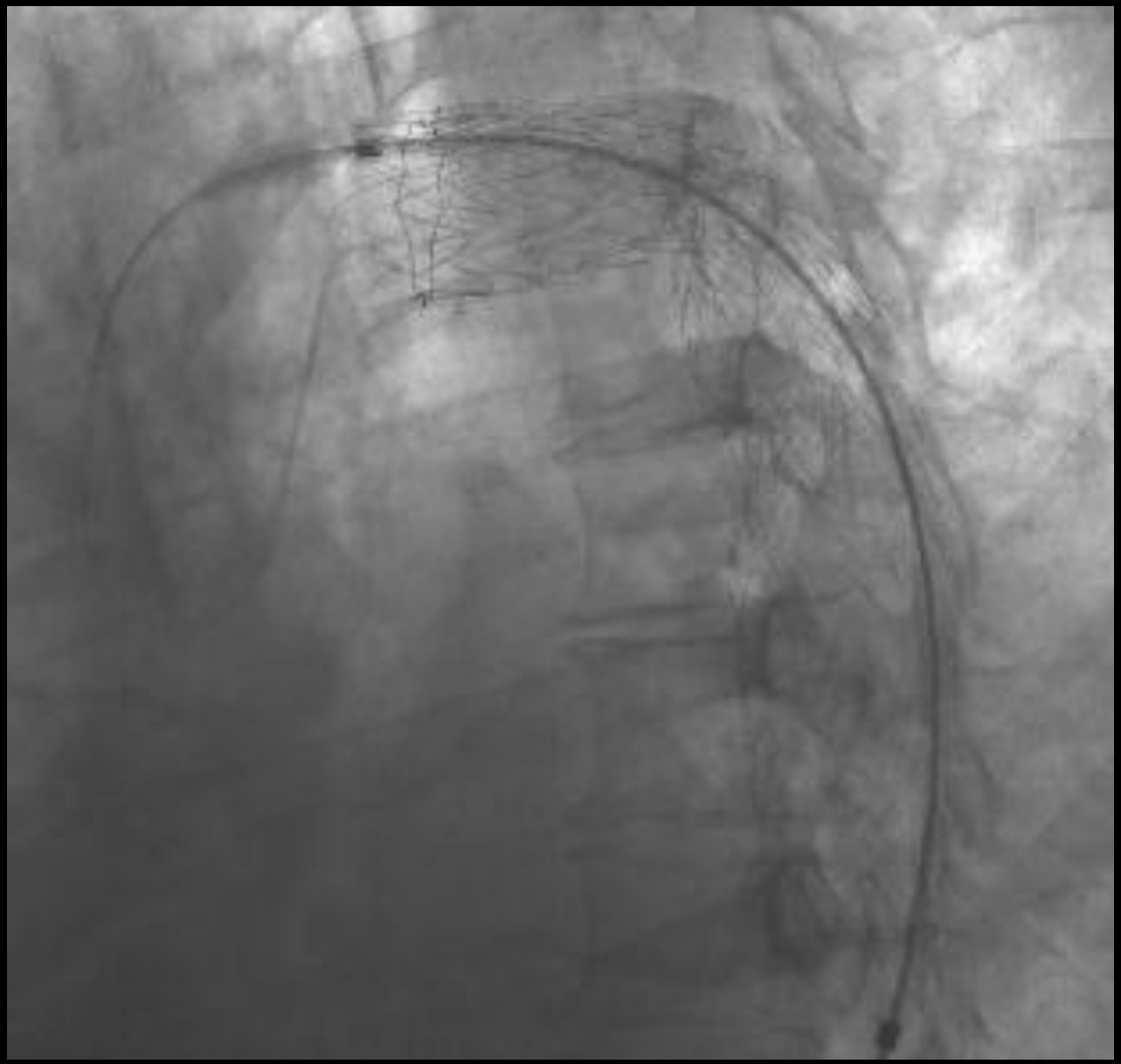
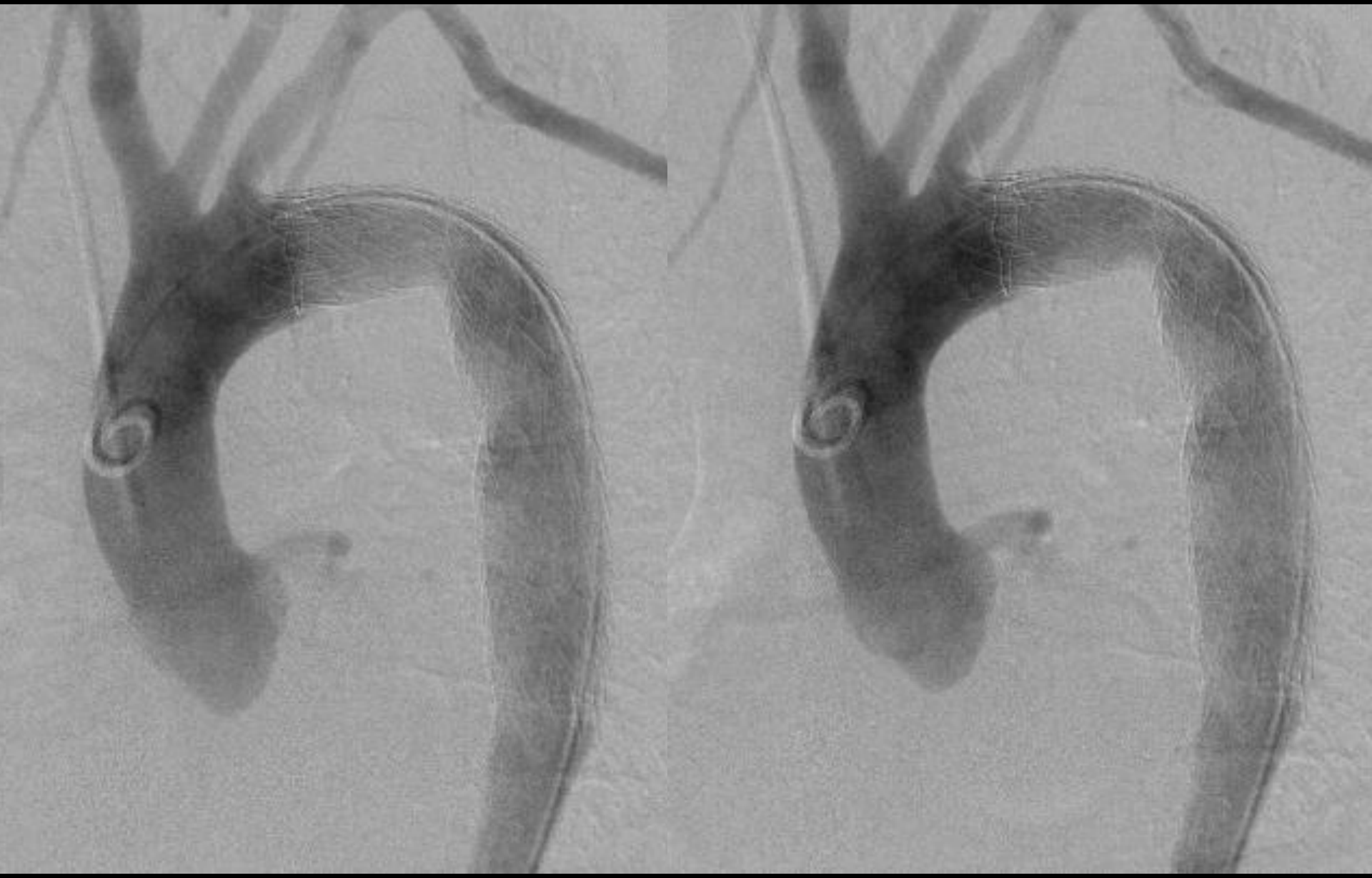
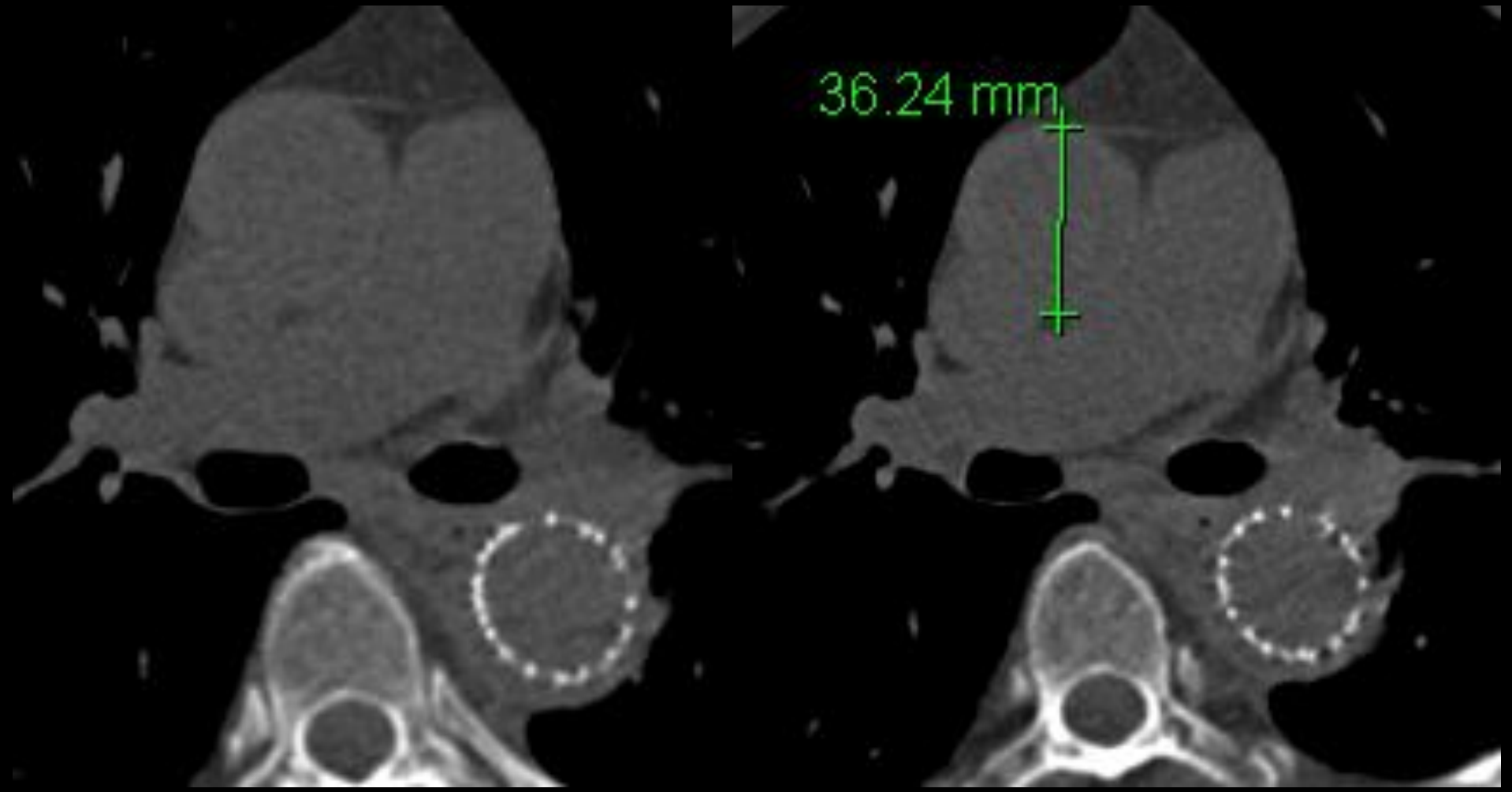
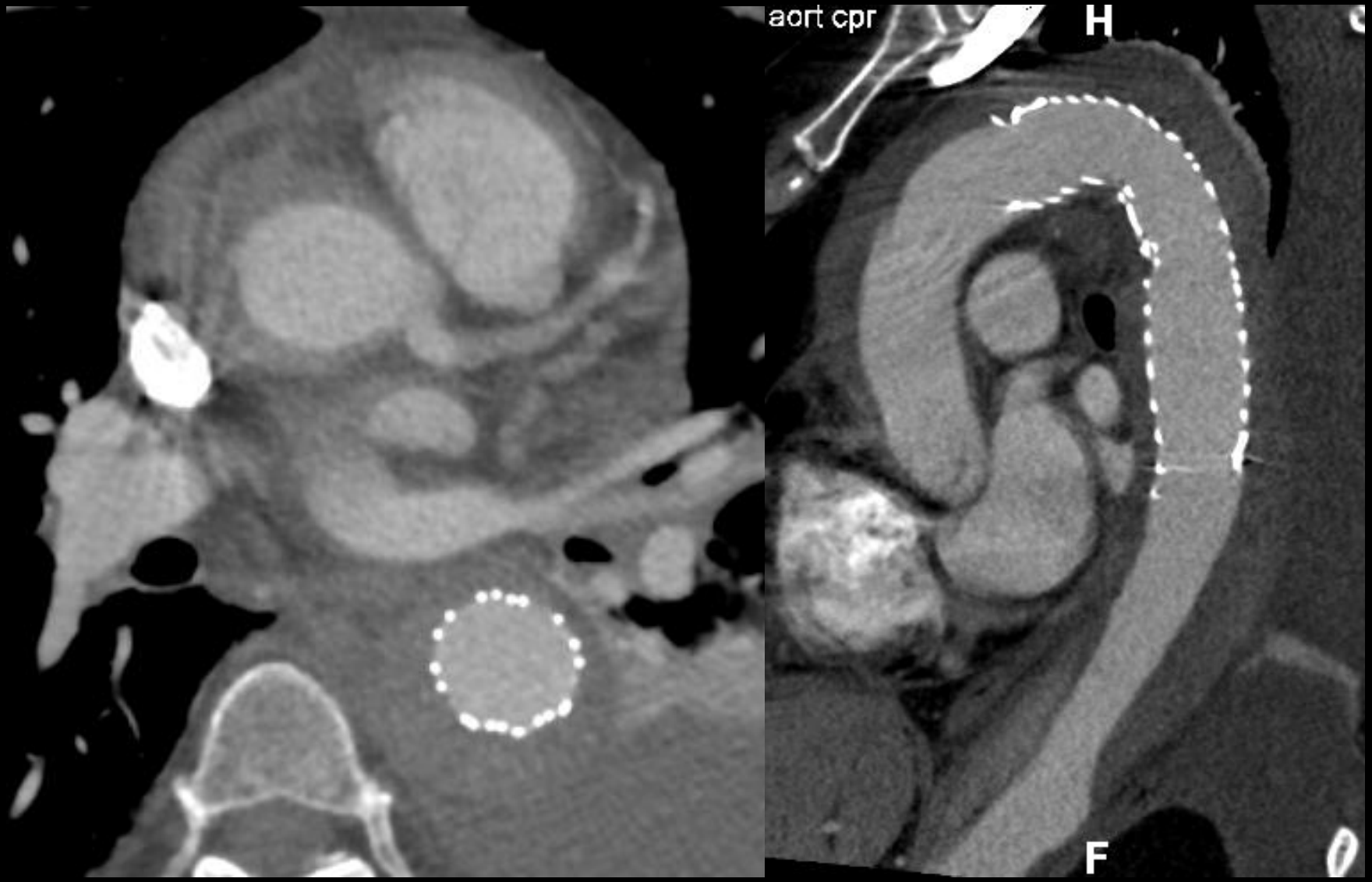





36.24 mm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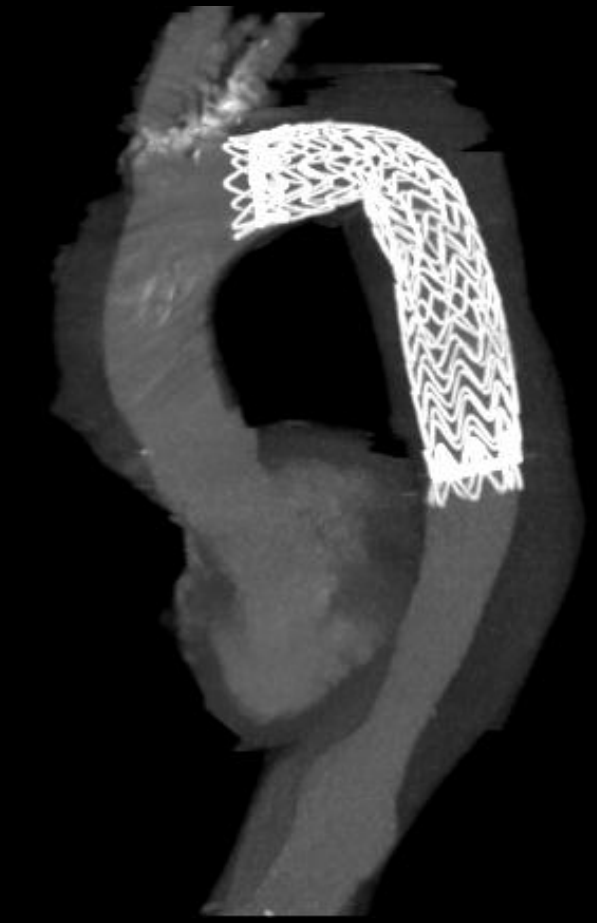
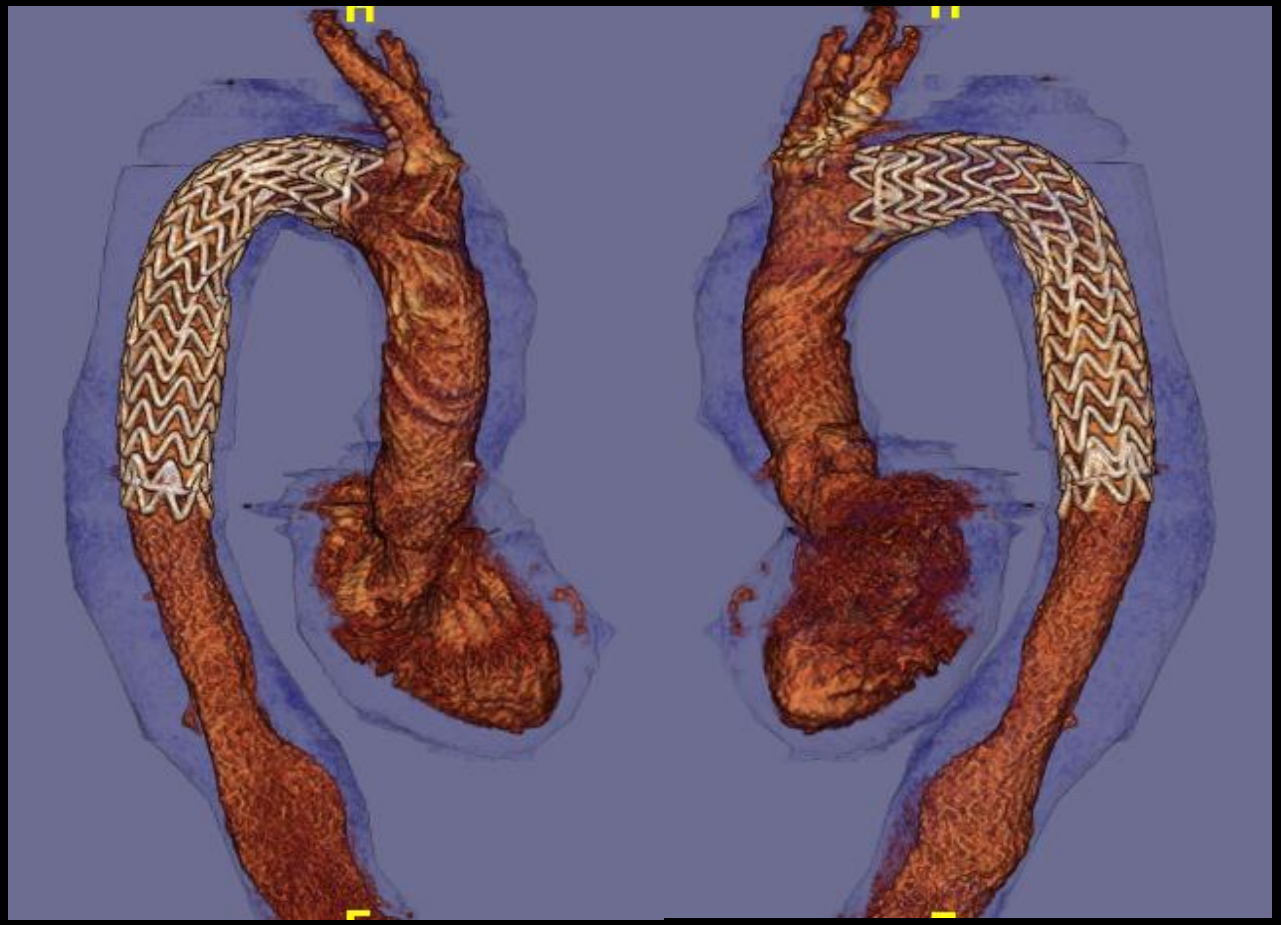
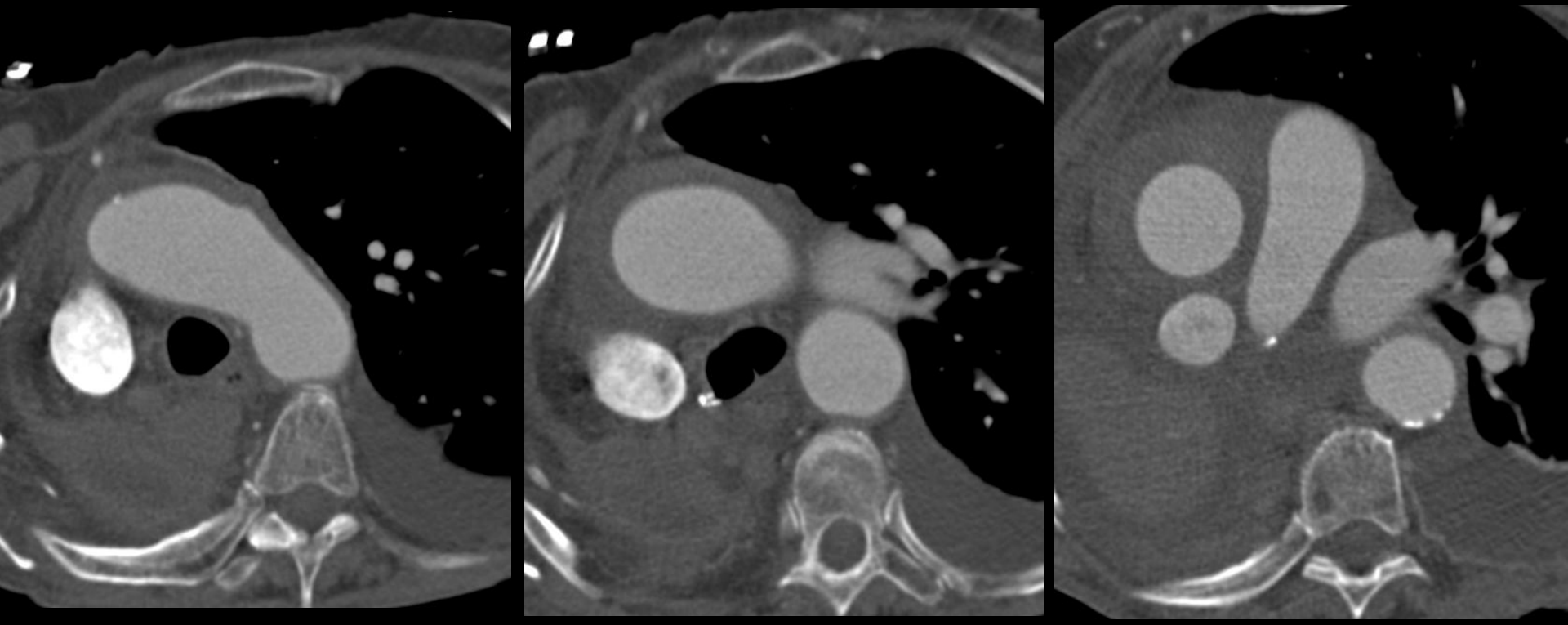
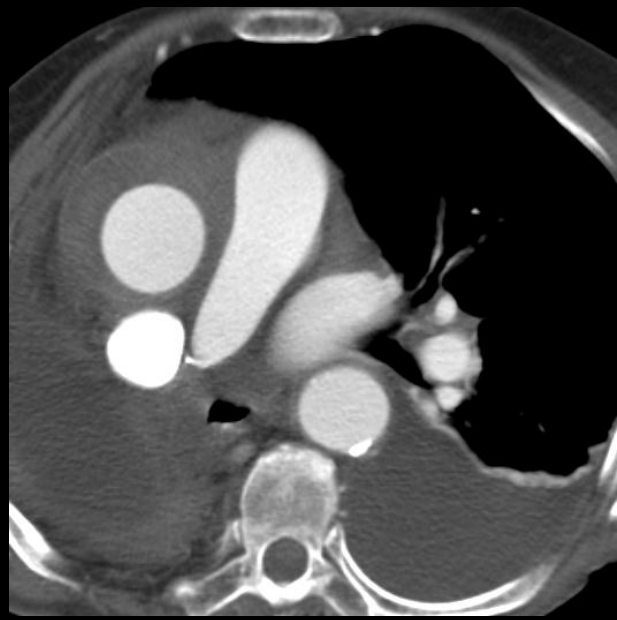




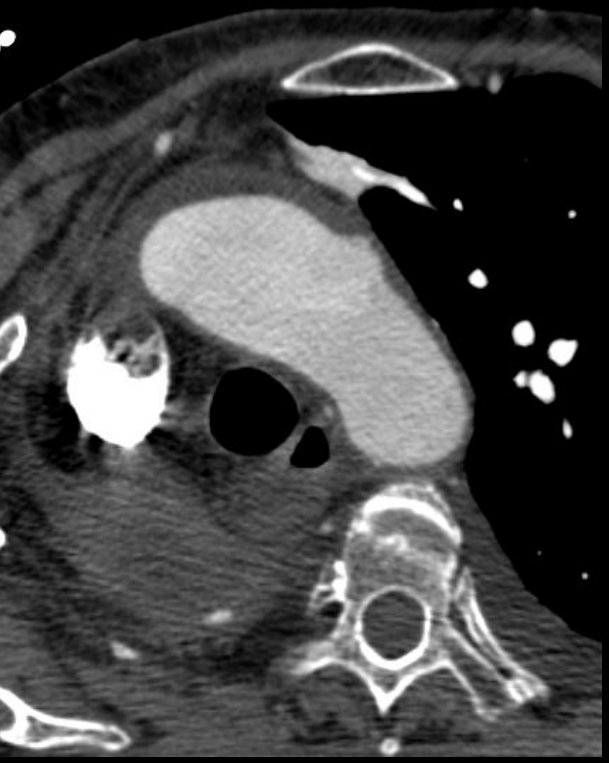
73-year-old Woman with Hypertension, Chest Pain and Type A IMH

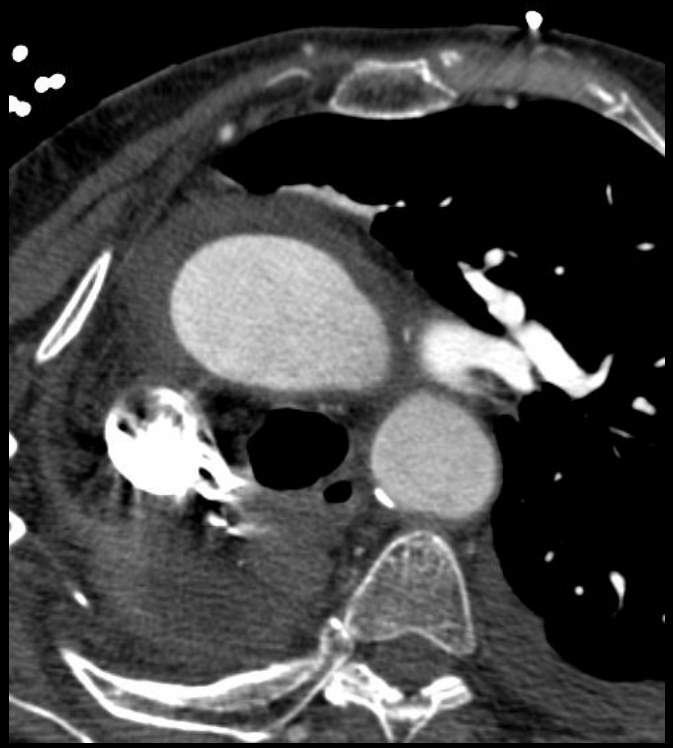


3 Days after Onset of Symptoms There Is a Modest Decrease in Peri-aortic Fluid; O/W No Change

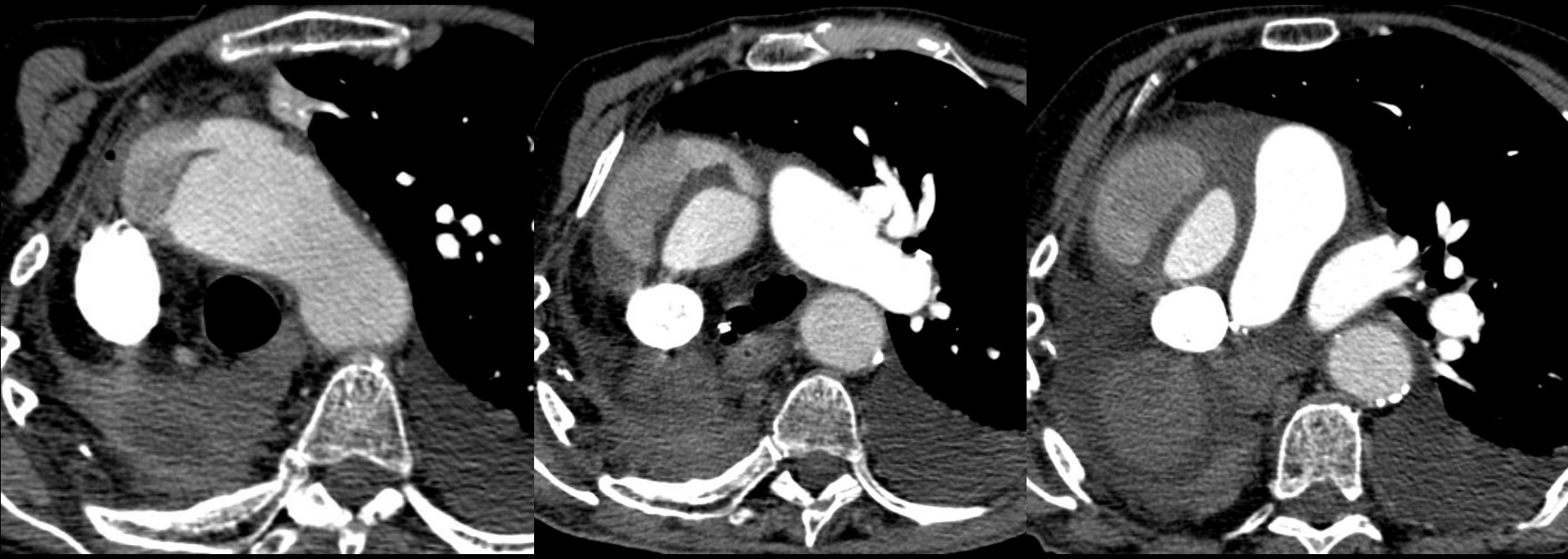


5 Days after Onset: Less Pleural Fluid; IMH without Major Change

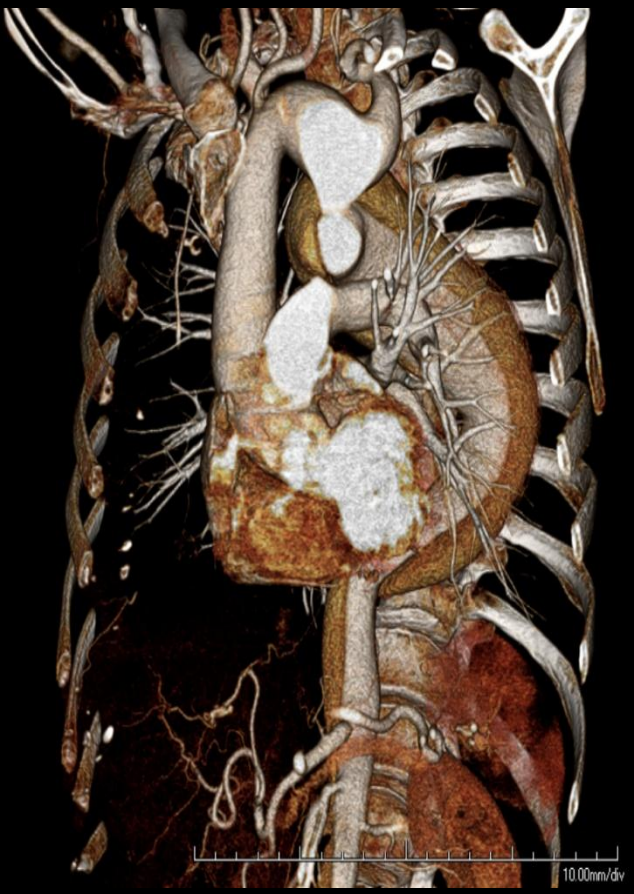


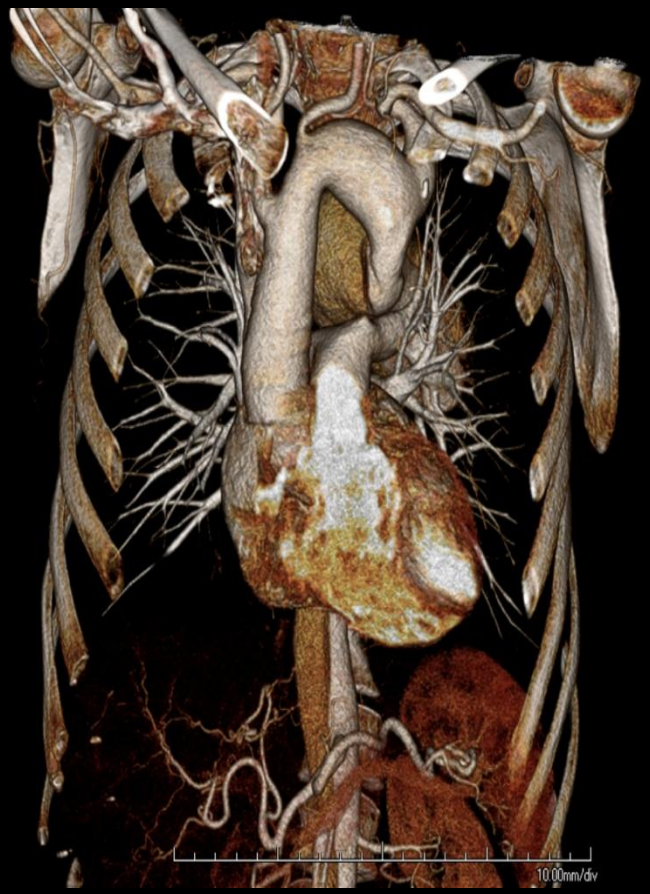


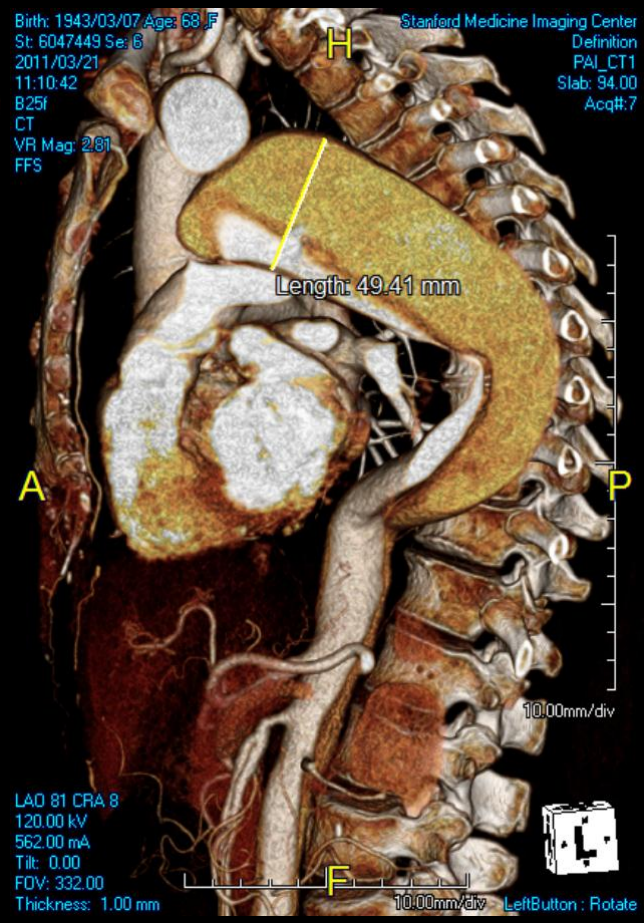
13 Days after Presentation New Communication Evident with Evolution to Type A Dissection

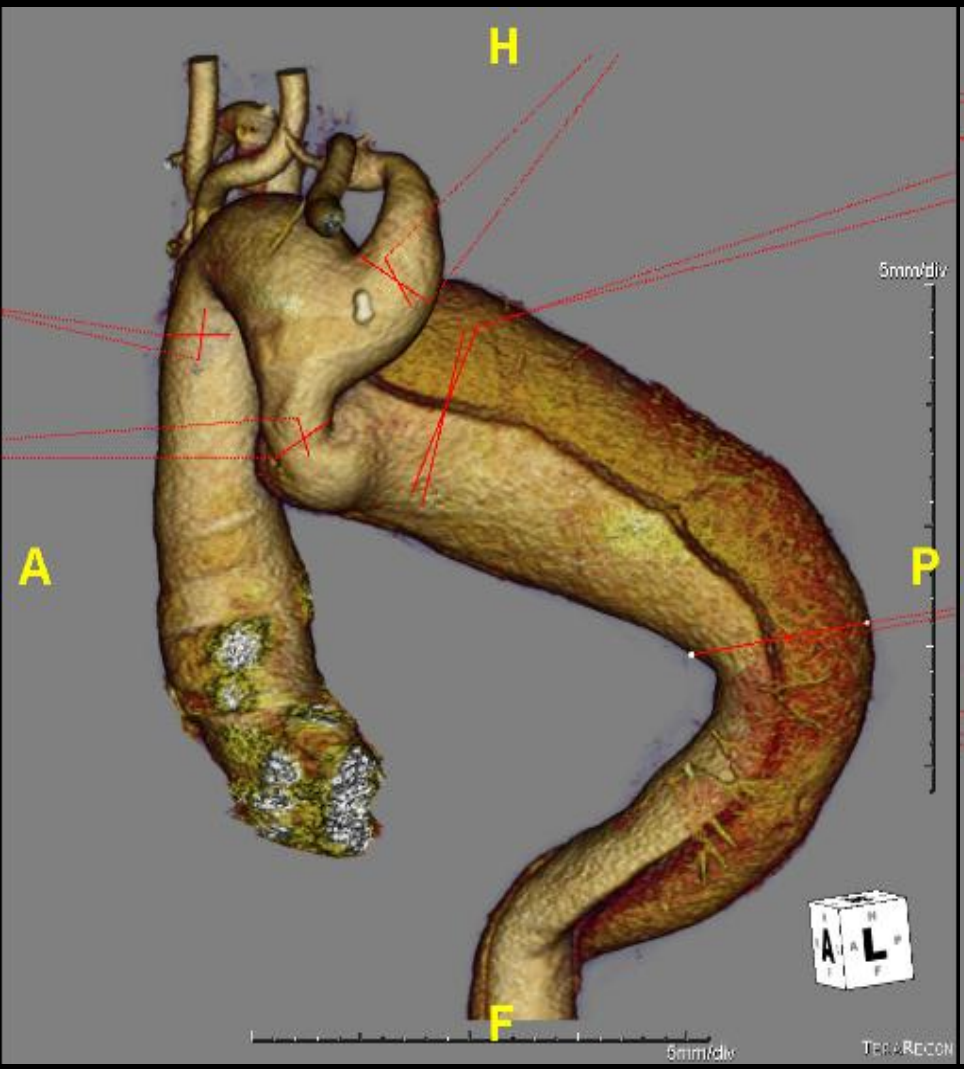


Chronic type B dissection with FL aneurysm





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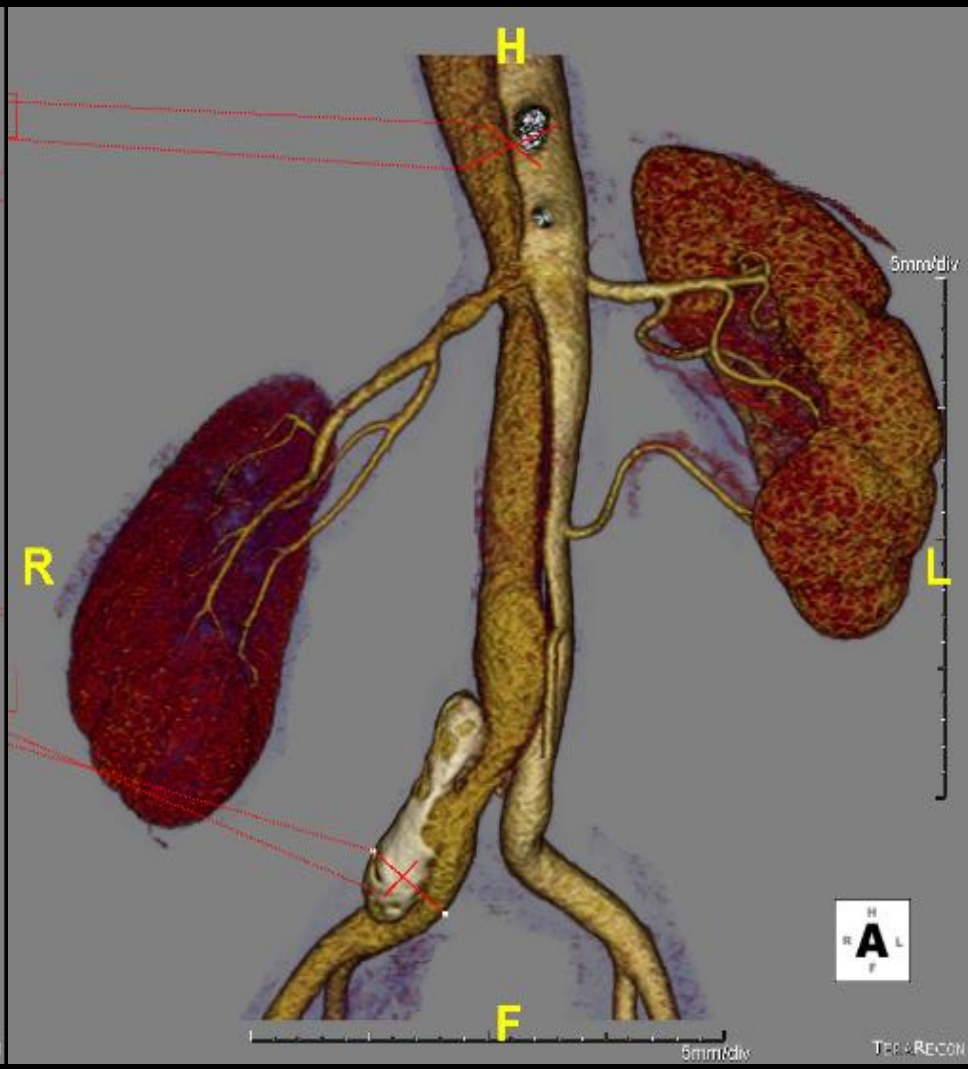
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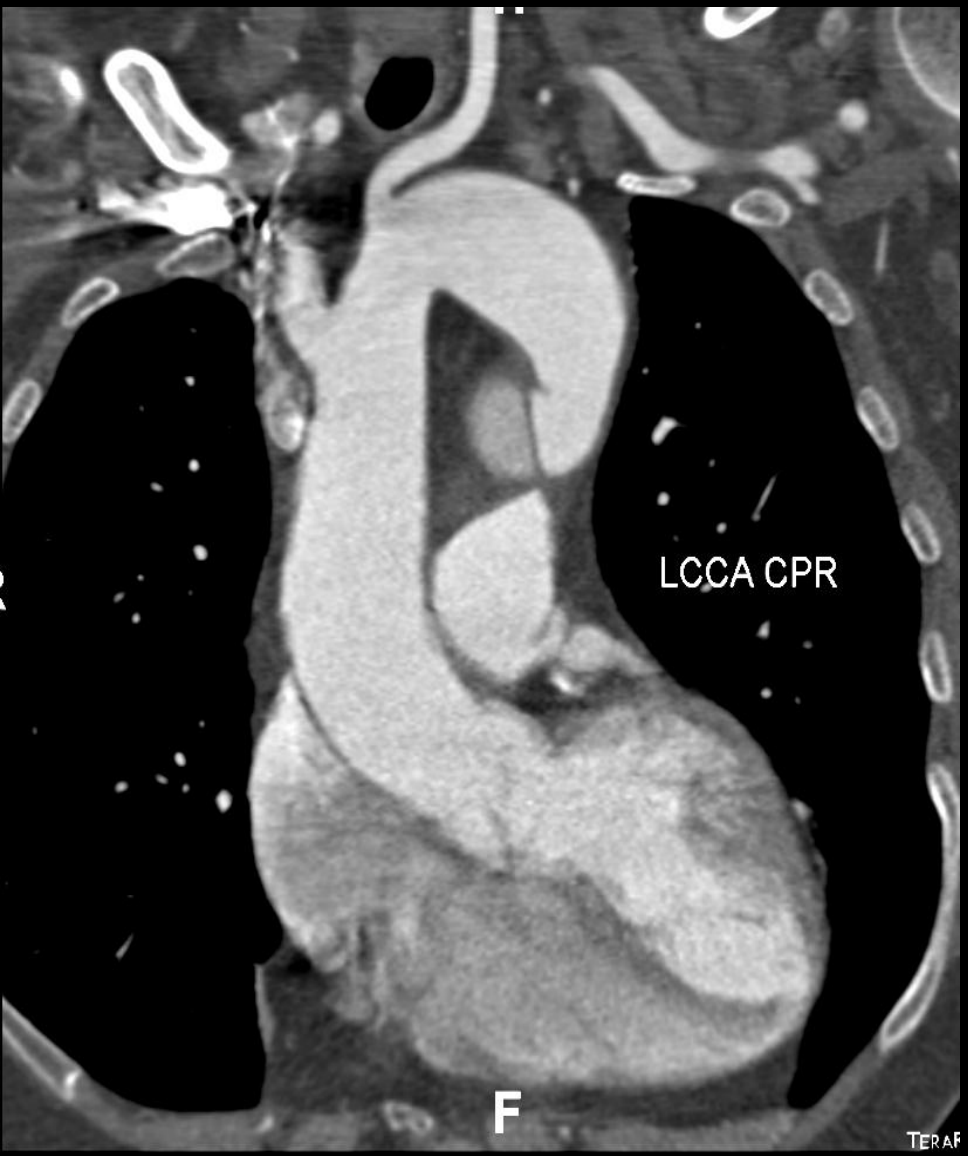
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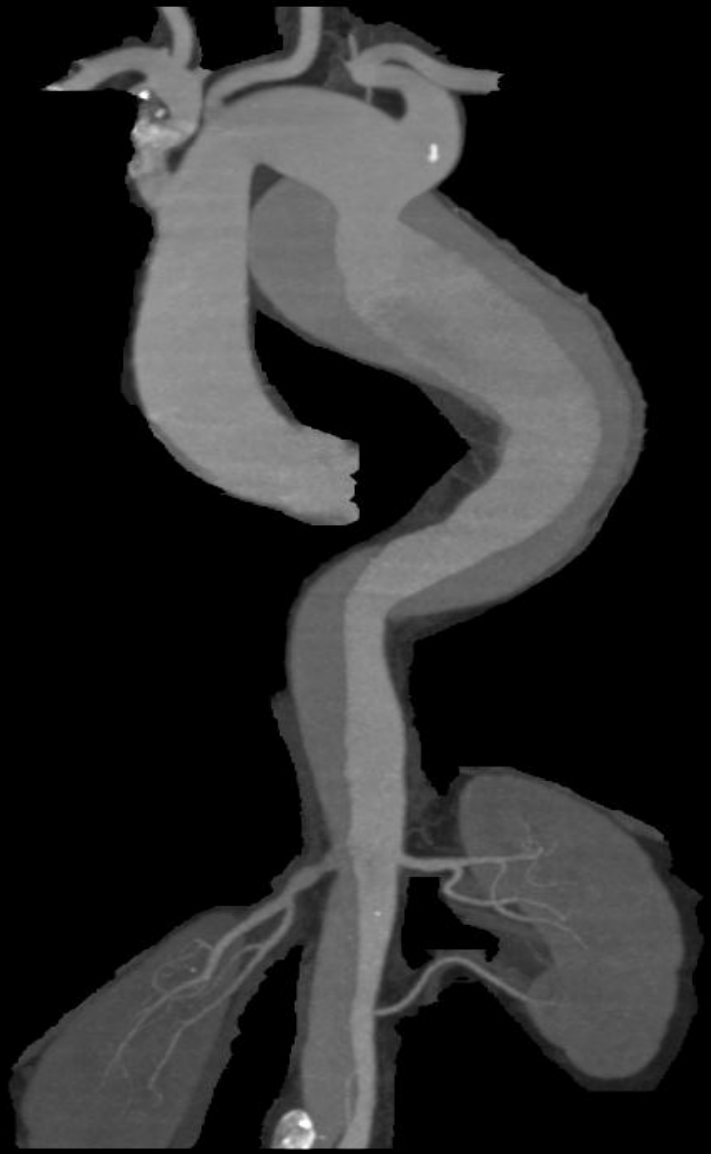
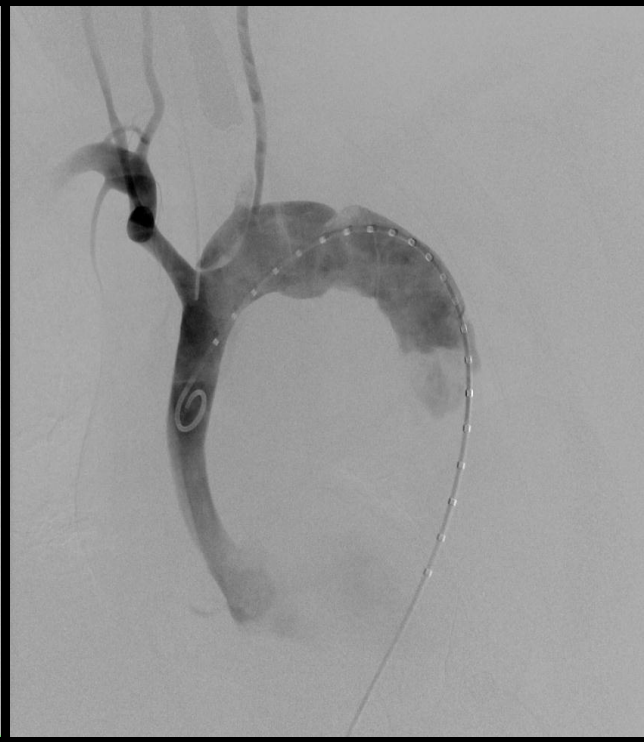


New intra-op tear in arch between LCA and proximal anastamosis of descending graft





Retrograde dissection into LCA and root



TEE with large ascending FL and AI


Se:3
Im:312 (F1/1)
[H]
[R]
IODINE
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Se:3
Im:315 (F1/1)
[H]
[R]
IODINE
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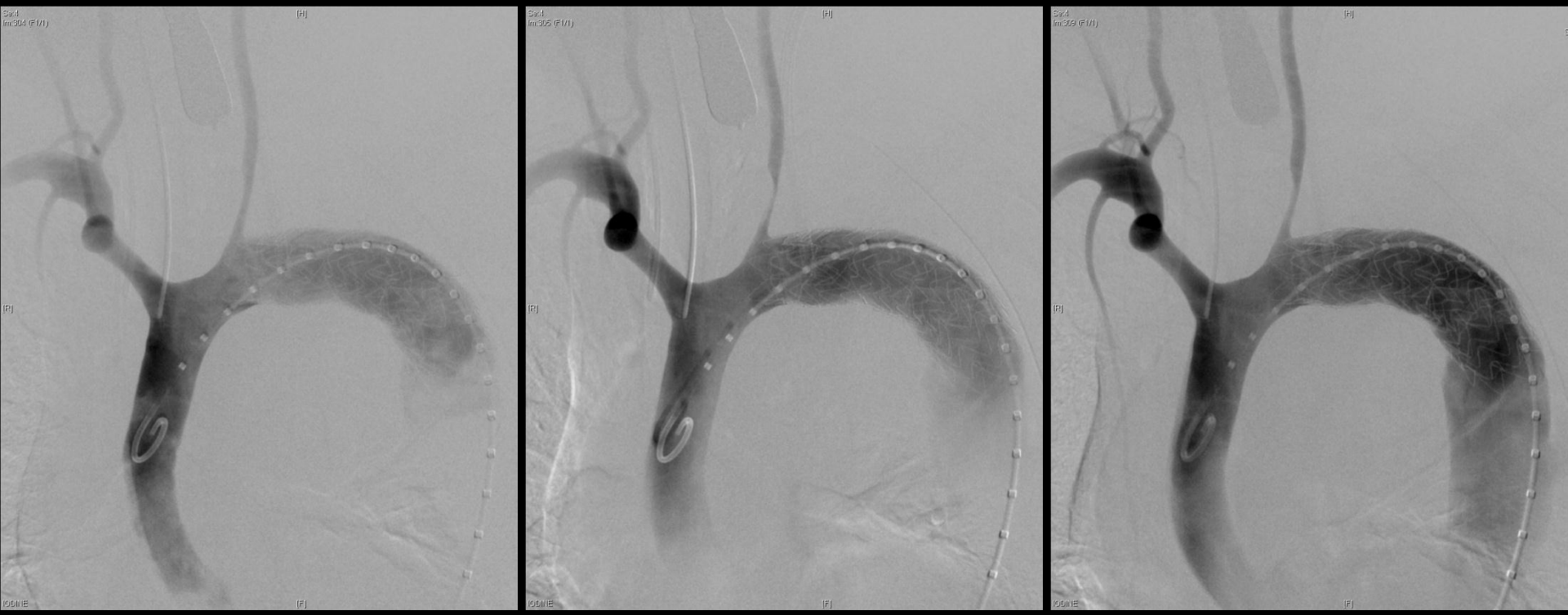
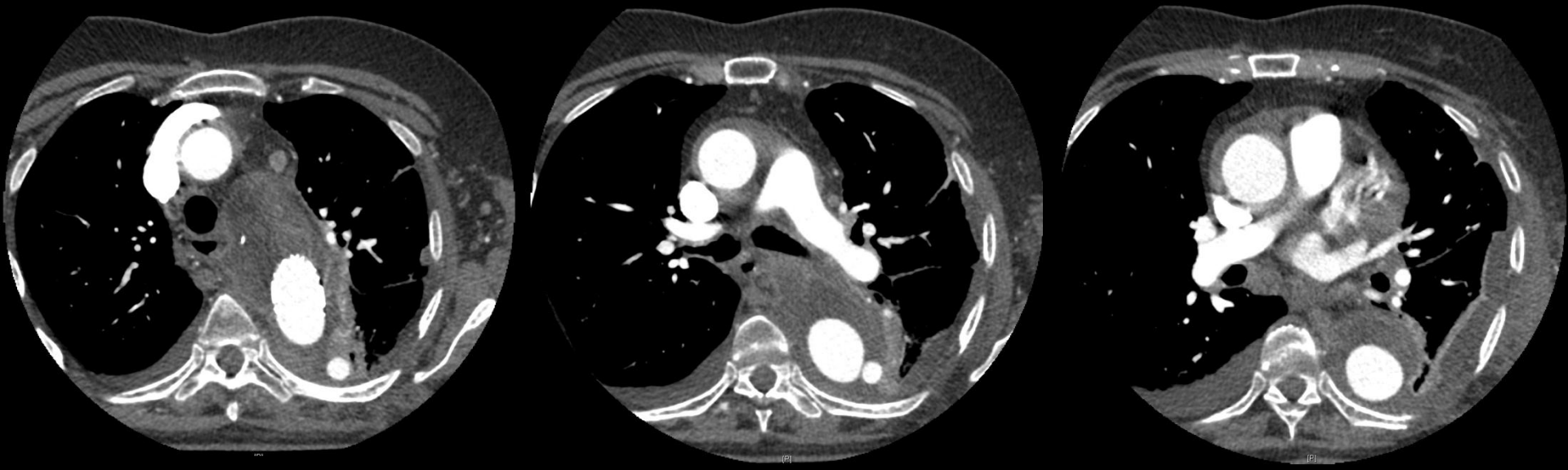
Aortogram post TEVAR (26mm TAG) from LCA into 22mm graft; TEE no flow in asc ao



7 days post procedure

7 days post procedure




Angle: 36.0
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DFOV 34.2 cm
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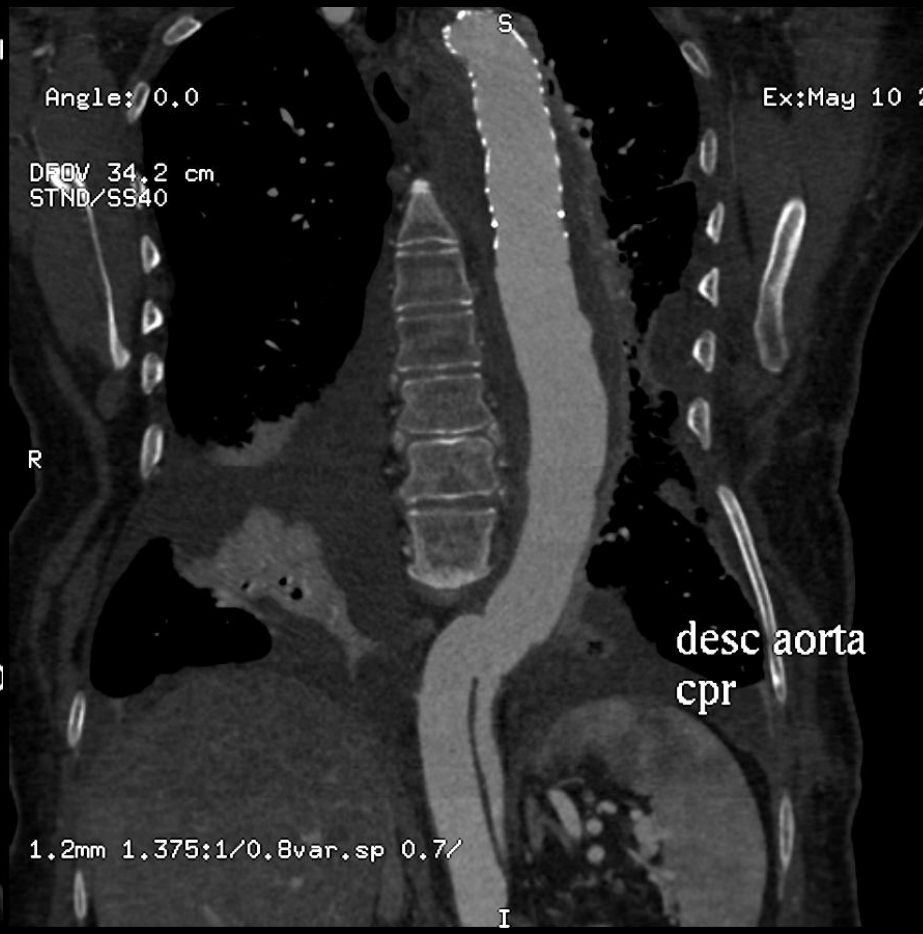
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Angle: 0.0
Ex:May 10 201
DFOV 34.2 cm
STND/SS40
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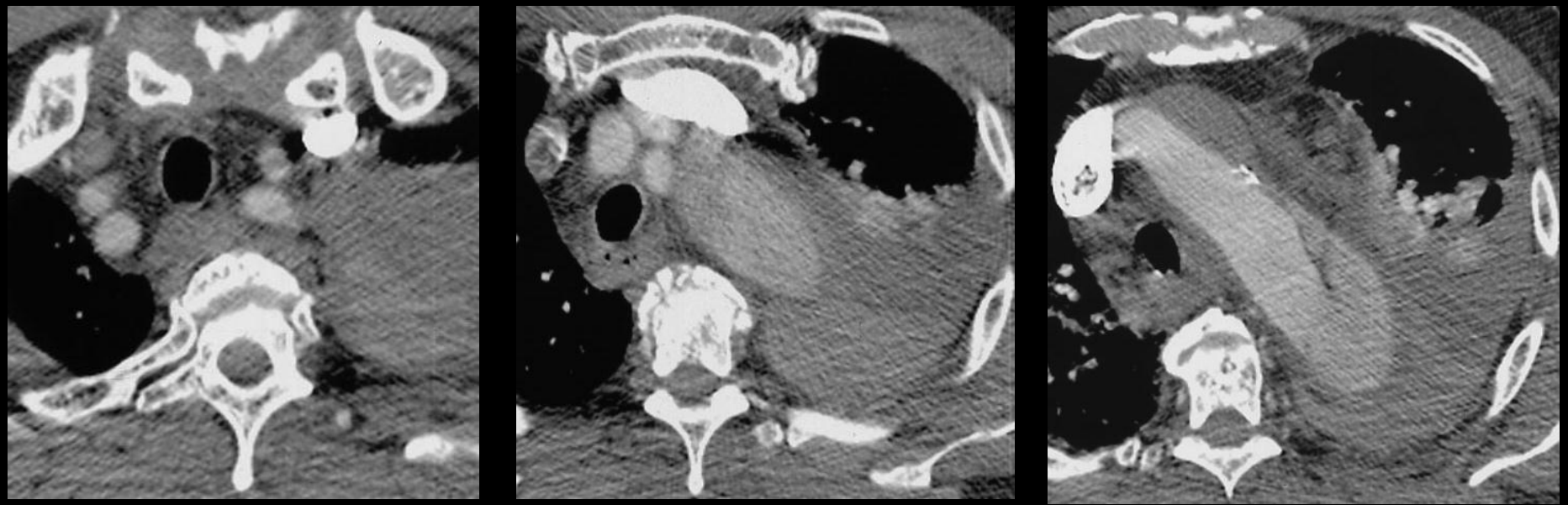
cpr
1.2mm 1.375:1/0.8var.sp 0.7/
I

74-year-old man with acute back pain and shock



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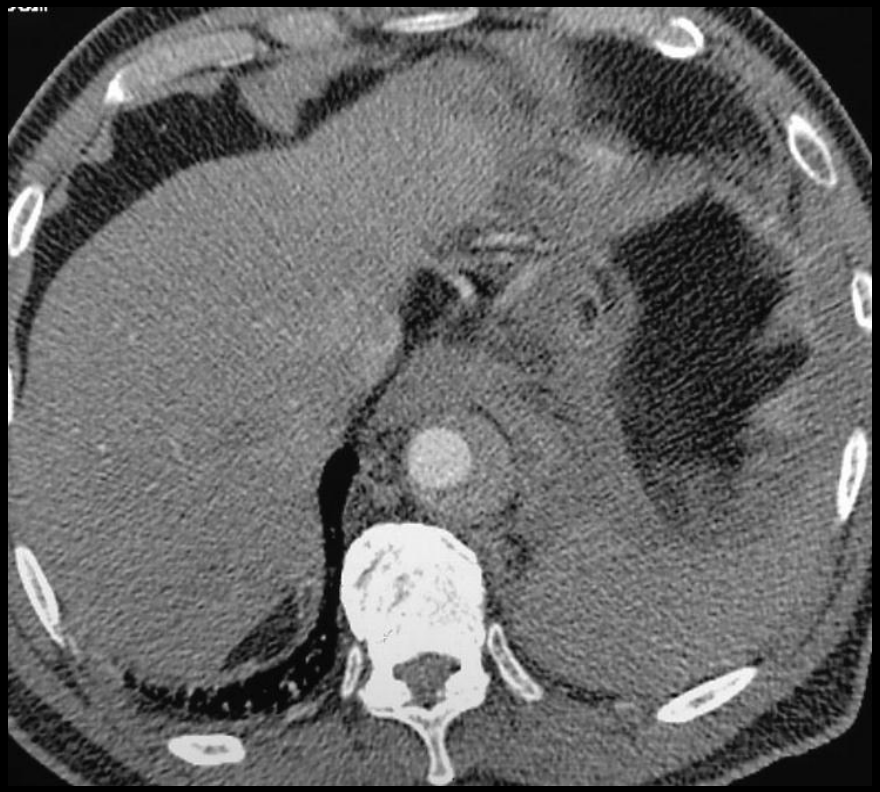
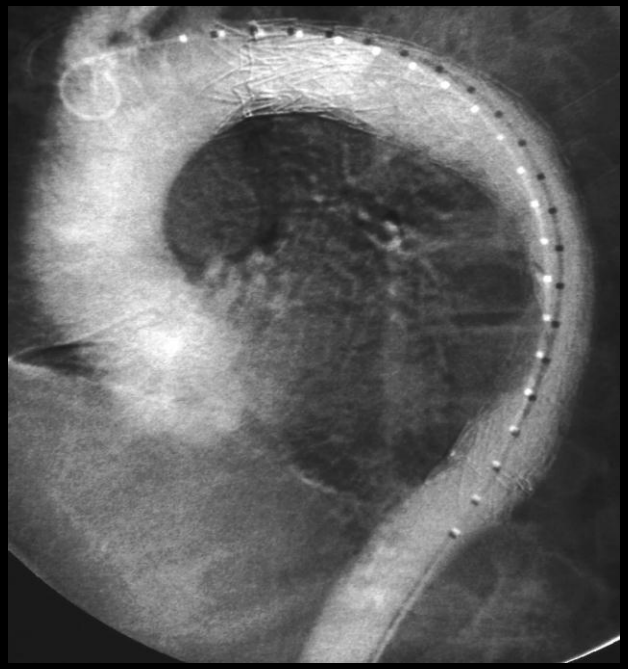
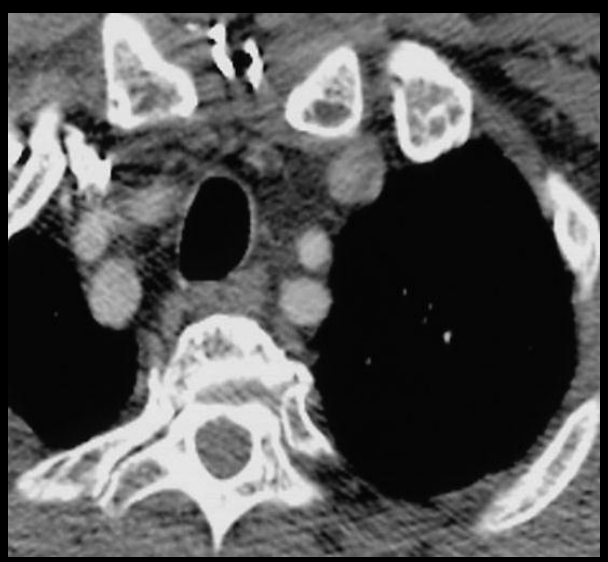


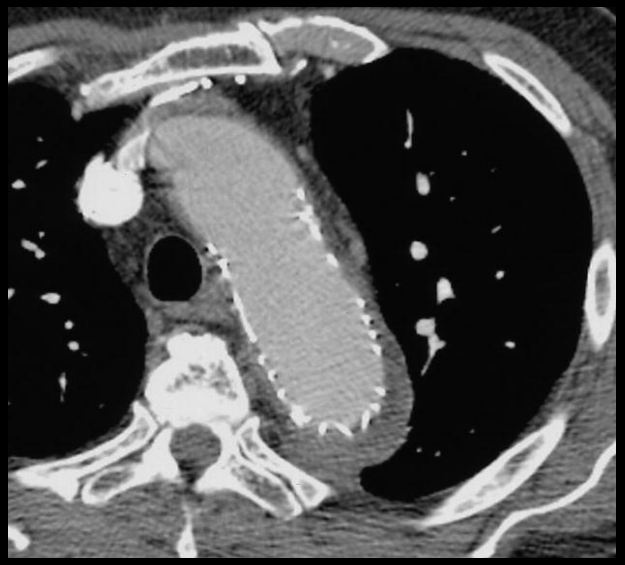
Initial Aortogram

Stent-Graft Placement

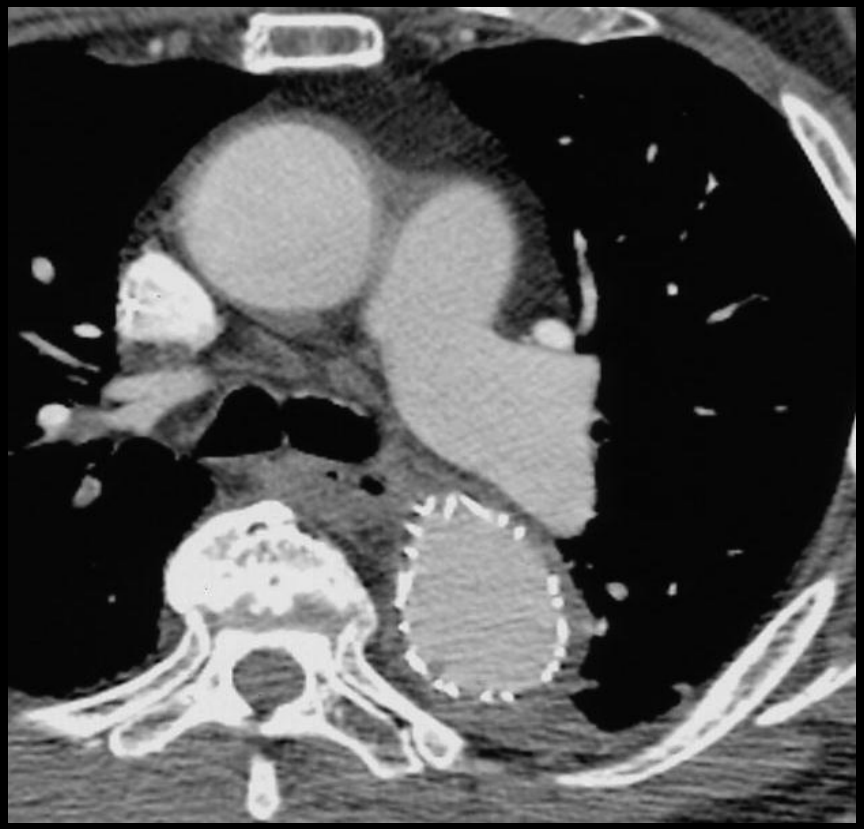


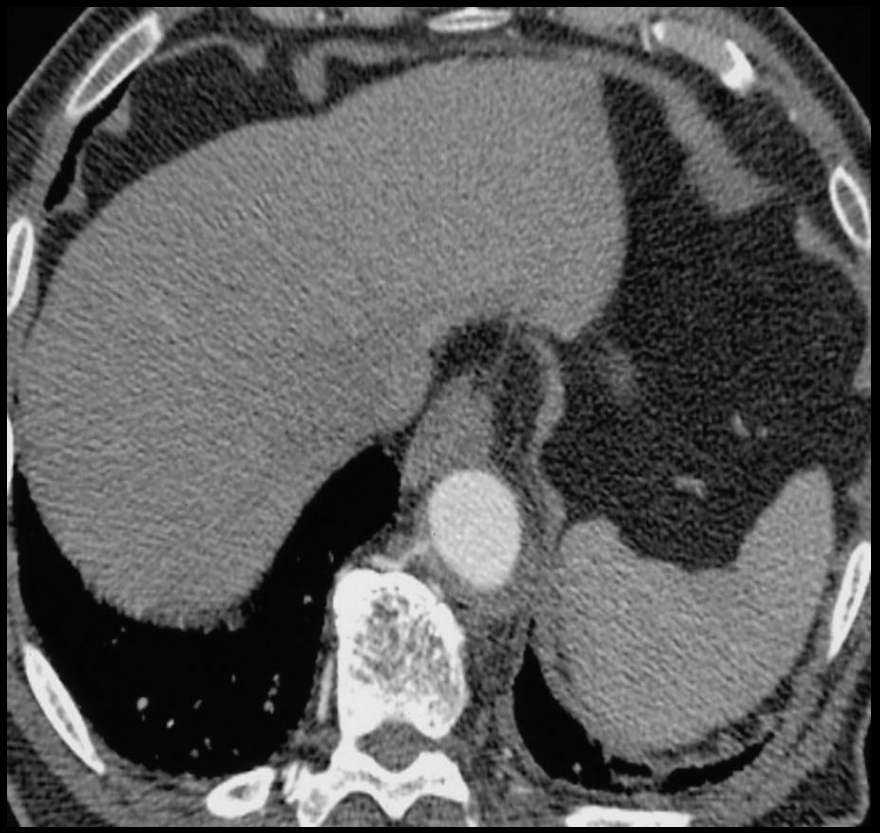
Follow-up @ 5 weeks

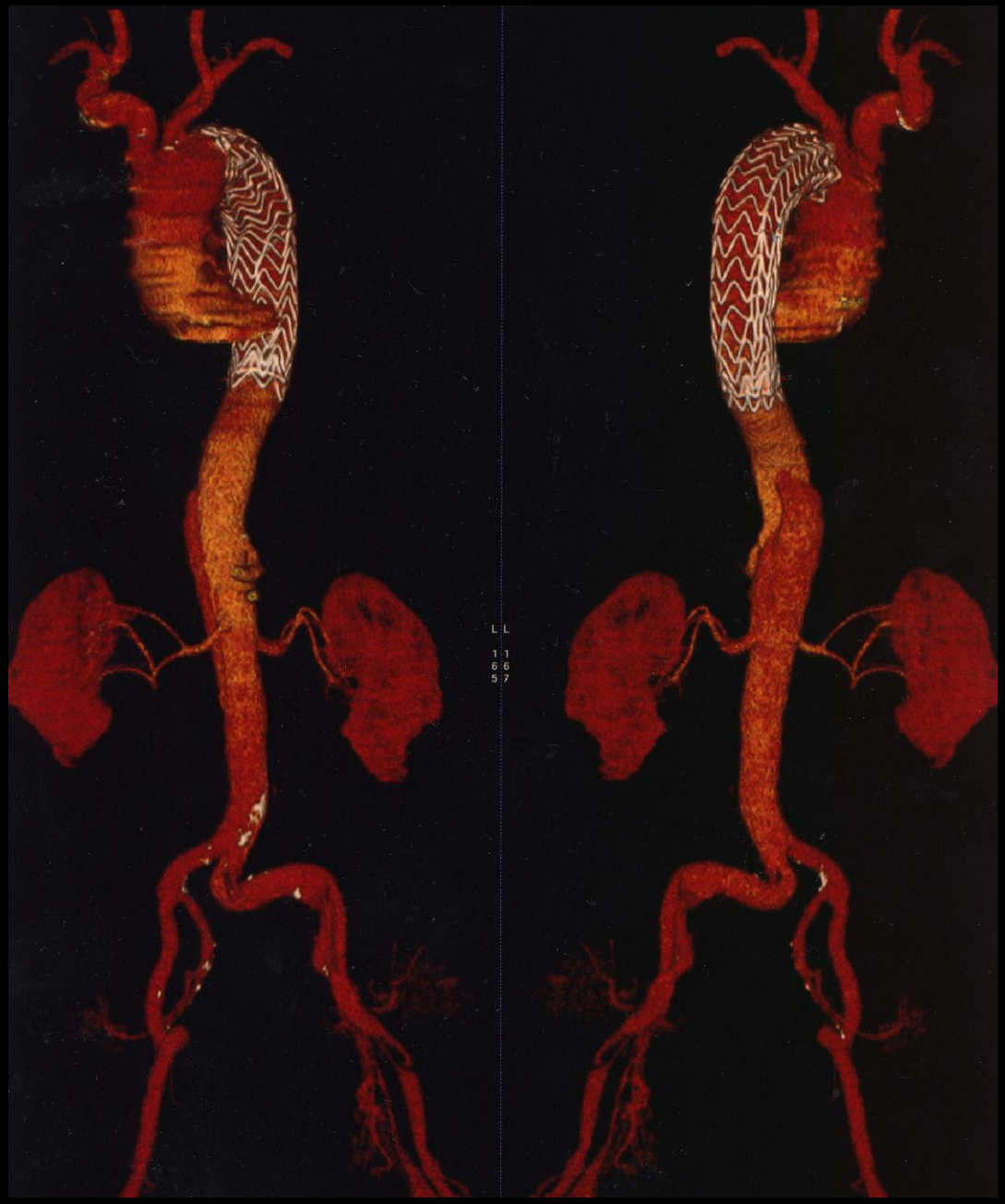




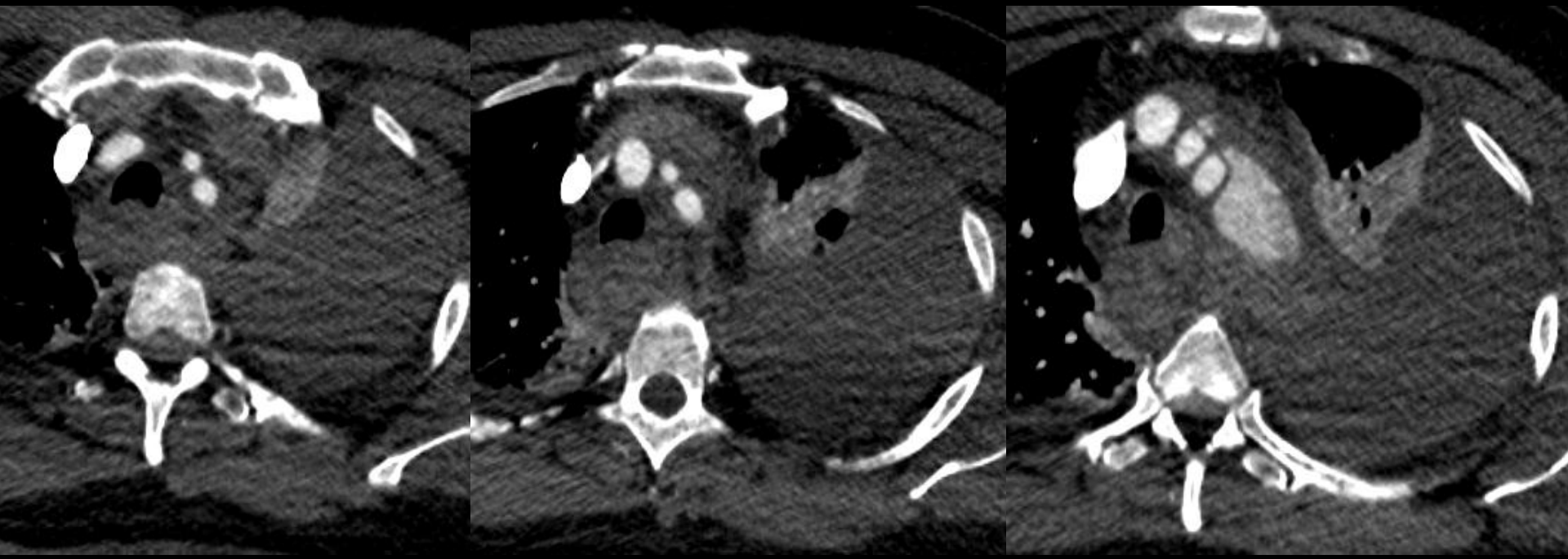
Follow-up @ 5 weeks







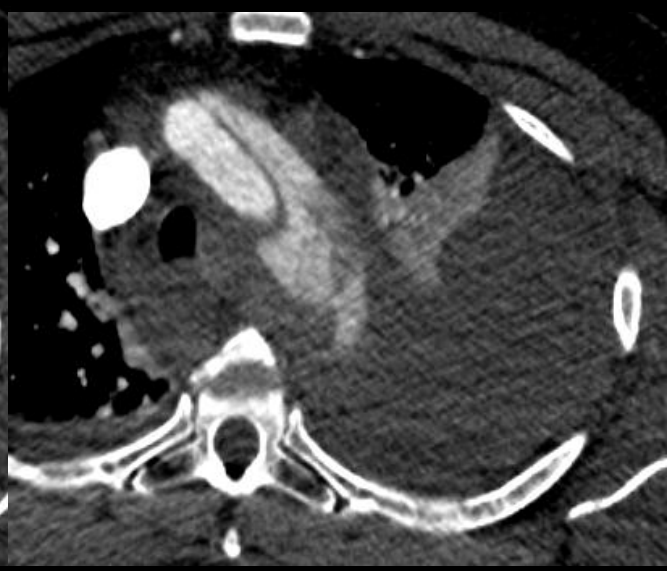
Follow-up @ 5 weeks



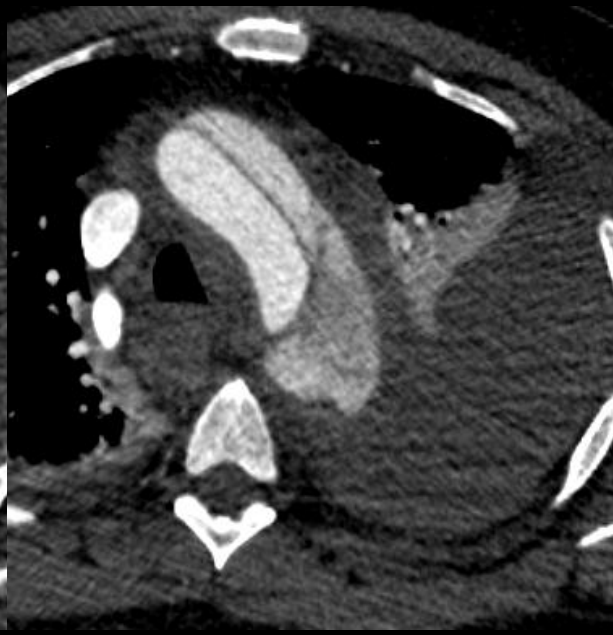
59 y/o M transferred from outside hospital intubated with suspected aortic arch aneurysm rupture. 18 hour hx of new onset diffuse crampy abdominal pain.

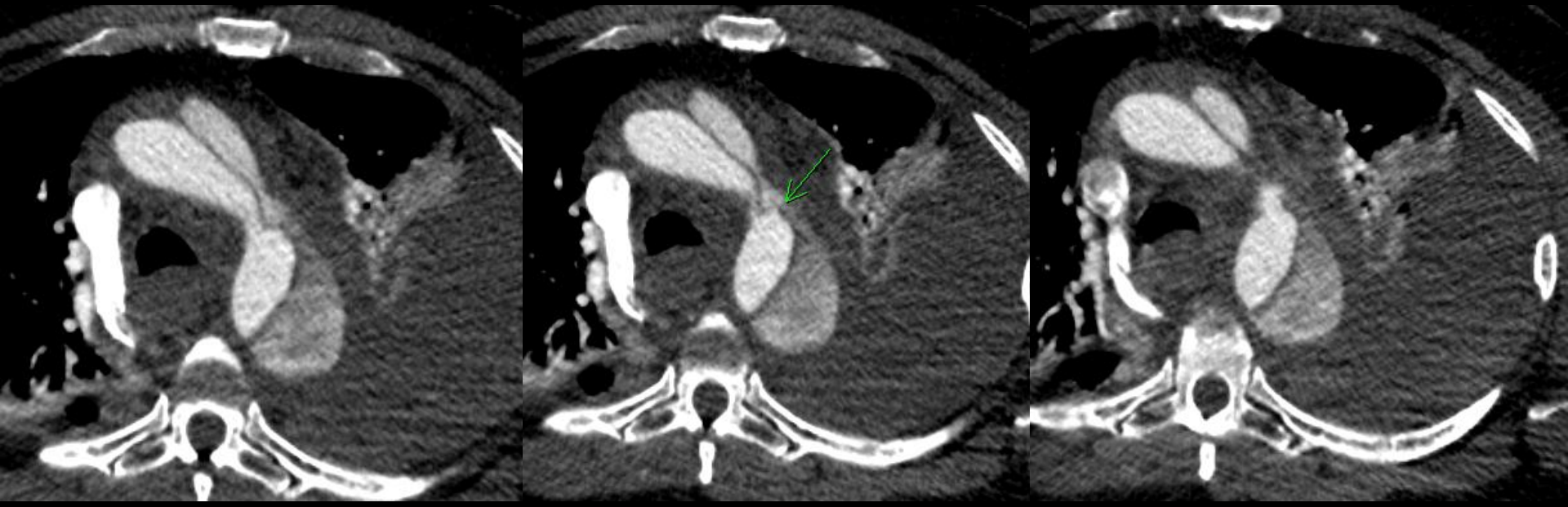
PMH: poorly controlled HTN, HLD, obesity, smoking, NIDDM

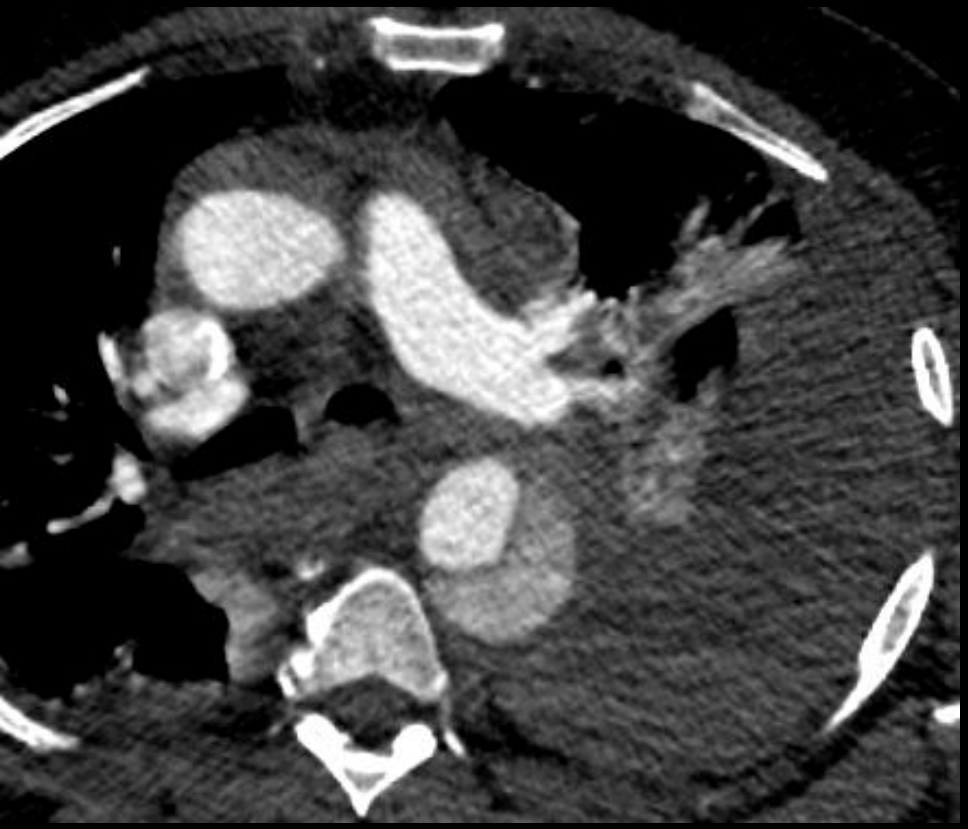


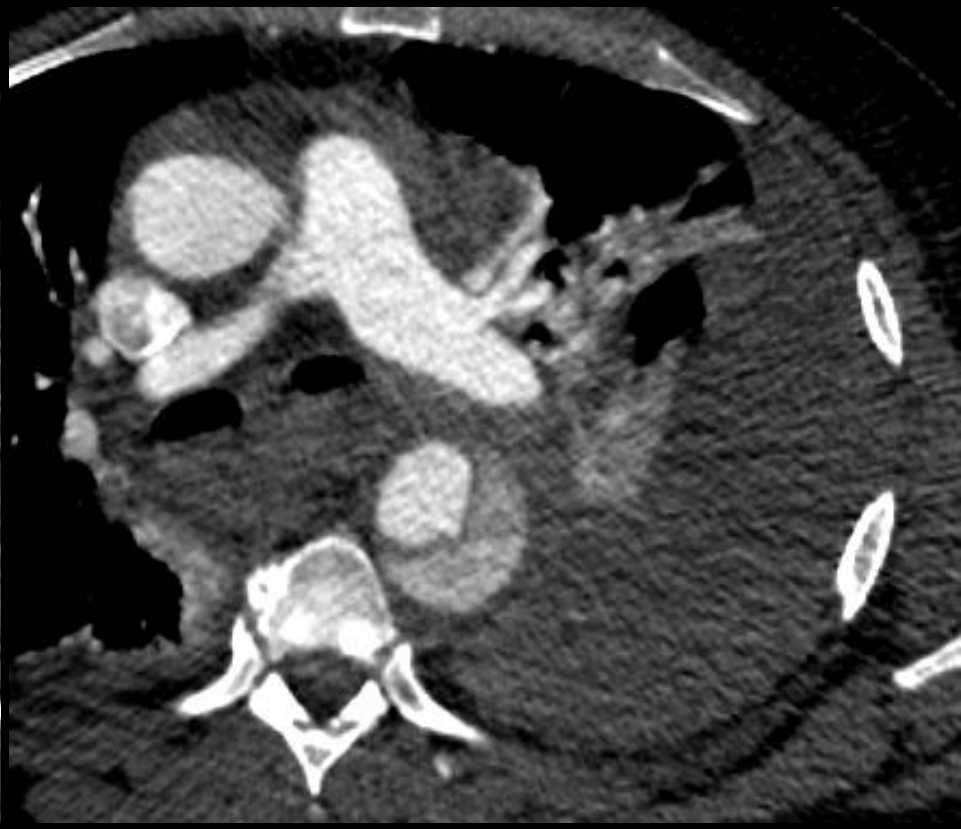


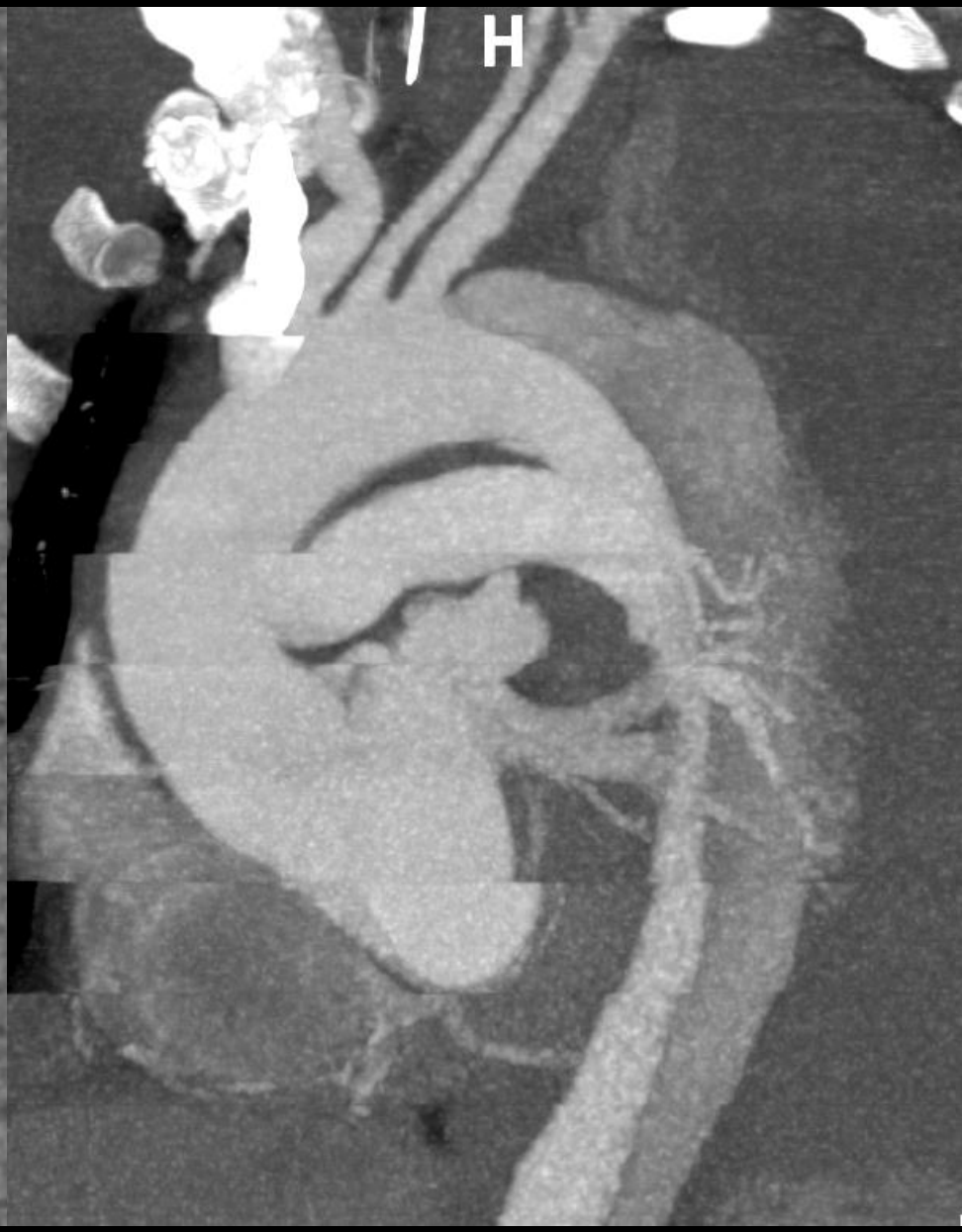




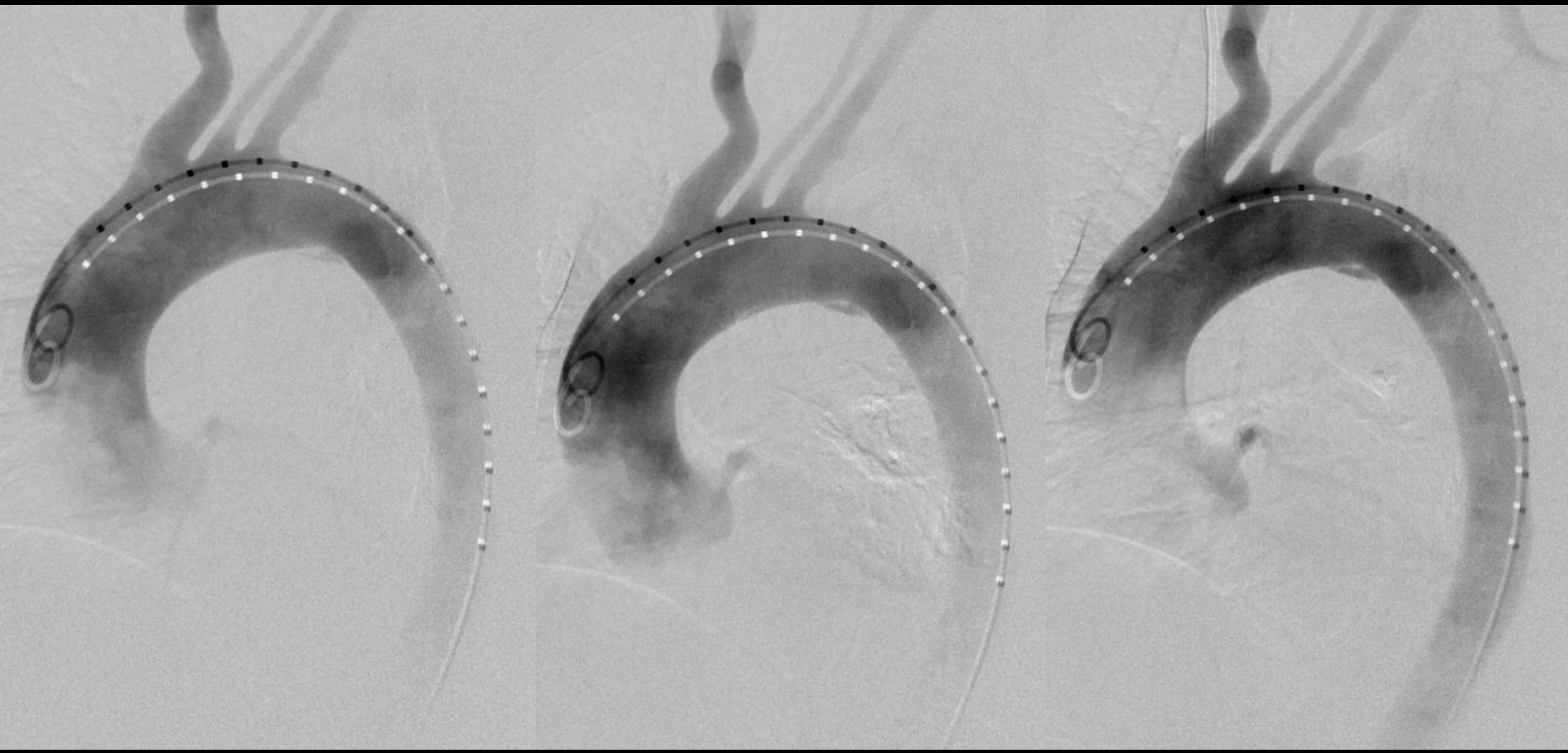


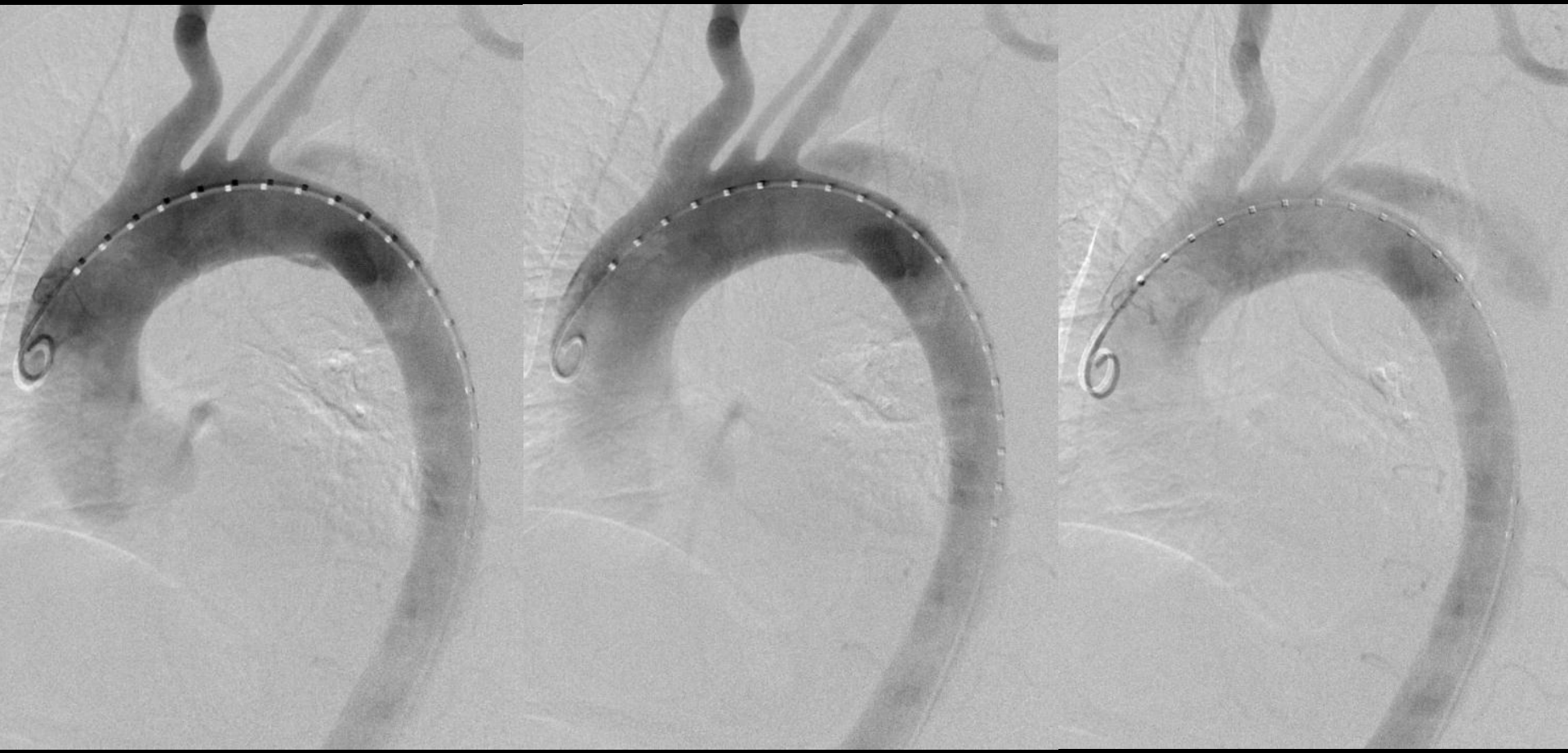


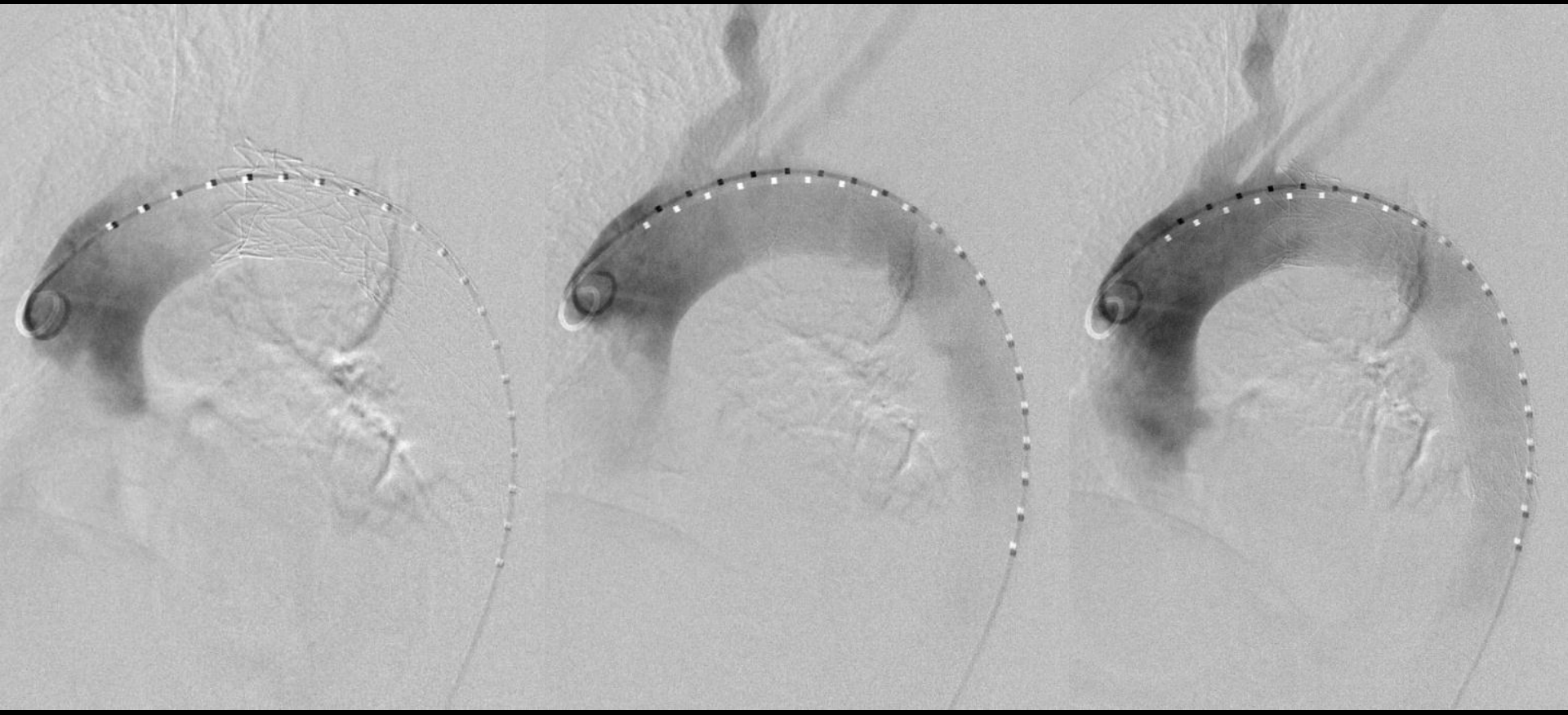


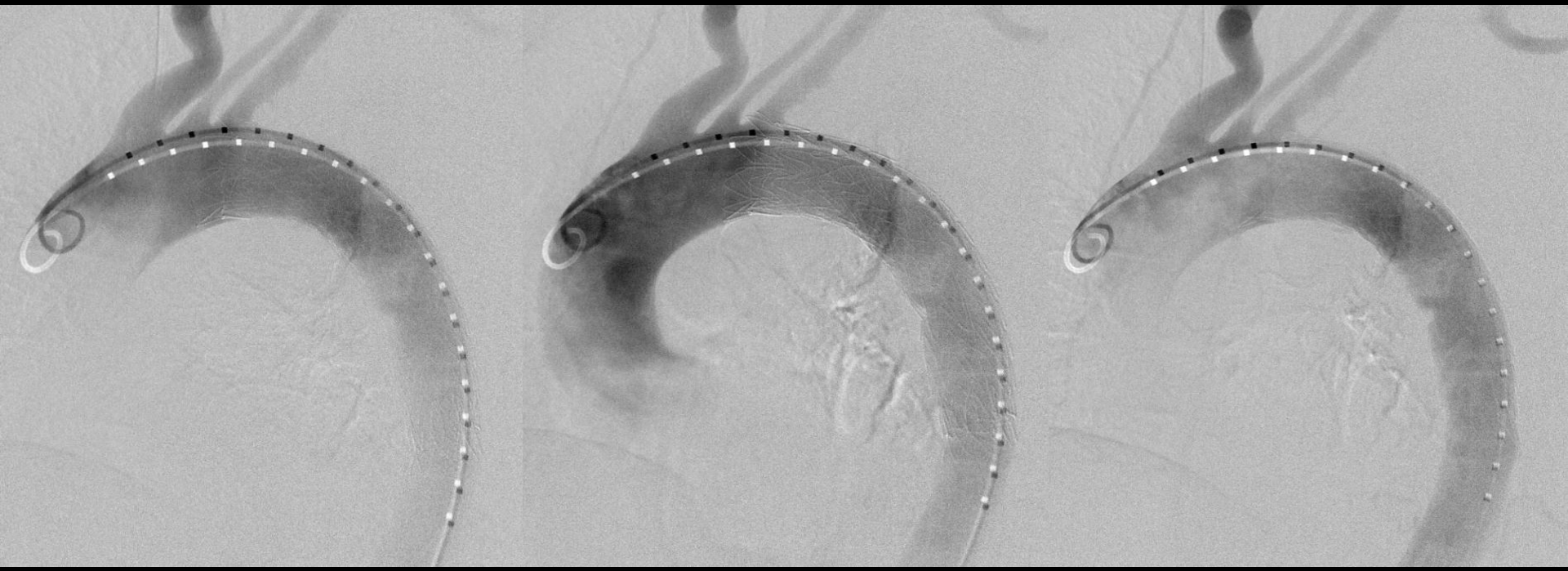


Thoracic Aorta CPR

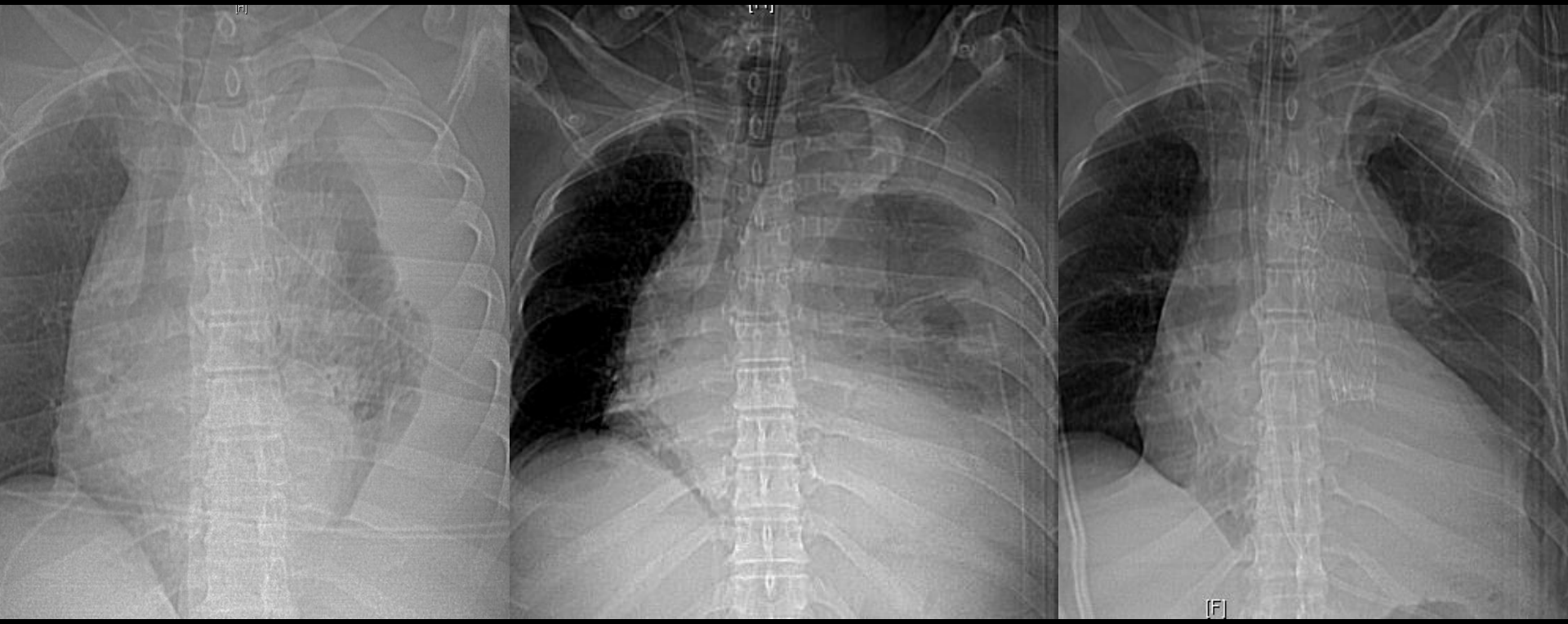












A New Mechanism by Which an Acute Type B Aortic Dissection Is Primarily Complicated, Becomes Complicated, or Remains Uncomplicated

Christian Loewe, MD,* Martin Czerny, MD, MBA,* Gottfried H. Sodeck, MD, Julie Ta, MS, Maria Schoder, MD, Martin Funovics, MD, Julia Dumfarth, MD, Marek Ehrlich, MD, Michael Grimm, MD, and Johannes Lammer, MD

Departments of Cardiovascular and Interventional Radiology, Emergency Medicine, and Cardiac Surgery, Medical University of Vienna, Vienna, Austria; Department of Cardiovascular Surgery, University Hospital Berne, Berne, Switzerland; and Department of Cardiac Surgery, Medical University of Innsbruck, Innsbruck, Austria

Background. This study is to evaluate if different locations of the primary entry tear result in primary complicated, secondary complicated, or uncomplicated acute type B aortic dissection.

Methods. Sixty-five patients were analyzed. Patients were stratified according to the location of the primary entry tear. Primary entry tears in axial computed tomographic scans at the upper circumference (180°) of the distal aortic arch were defined as convex (group A) and the remaining as concave (group B). Detailed morphometry was done and the clinical outcome, including need for thoracic endovascular aortic repair, was evaluated.

Results. Forty-two patients (group A) had the primary entry tear at the convexity and 23 patients (group B) had the primary entry tear at the concavity of the distal aortic arch. There was a significant difference with regard to the incidence of primary complicated type B aortic dissection (group A 21% vs group B 61%, $p = 0.003$) and with regard to the development of complications in group A (9 days; 9 to 37) versus group B (0 days; 0 to 13, $p = 0.03$). Cox regression analysis revealed a primary entry tear at the concavity to be the only independent predictor of primary or secondary development of a complicated acute type B aortic dissection (hazard ratio, 1.8; 95% confidence interval, 1.0 to 3.2).

Conclusions. A primary entry tear at the concavity of the distal aortic arch is associated with a significant increase of the occurrence of complicated acute type B aortic dissection. Due to low procedural risk and high success rates, closure of the primary entry tear with thoracic endovascular aortic repair is strongly recommended in this newly defined high-risk subgroup of patients.

(Ann Thorac Surg 2012;93:1215–22)

Definition of Development of Complications

This parameter was defined as the time from diagnosis to the development of complicated type B aortic dissection needing treatment as defined above. If complications were already present at the time of diagnosis, the time to development of complications was classified as 0. In the subacute phase, the definition of development of complications was further extended by an increase of the initial diameter of the proximal descending aorta exceeding baseline measurements by 20% [13–16].

Table 2. Distribution of Patients by Different Chronic Health Conditions and In-Hospital Risk Assessment Stratified to the Origin of the Primary Dissection Entry

Variable	Convex Versus Concave (n = 42)	Convex Versus Concave (n = 23)	*p* Value
Demographics			
Age, median (IQR)	59 (49–66)	56 (51–65)	0.93
Female sex, n (%)	8 (19%)	2 (9%)	0.47
Chronic health conditions and risk factors[a]			
Hypertension, n (%)	42 (100%)	23 (100%)	1.00
Chronic obstructive pulmonary disease, n (%)	10 (24%)	4 (17%)	0.52
Extracardiac arteriopathy, n (%)	2 (5%)	0 (0%)	0.28
Previous aortic surgery, n (%)	1 (2%)	1 (4%)	0.67
Suitable for open surgery, n (%)	15 (37%)	5 (22%)	0.22
Logistic EuroSCORE, median (IQR)	10 (8–20)	13 (10–30)	0.28
CT- morphology of dissection			
Max. ascending aortic DM (cm), median (IQR)	3.6 (3.4–3.9)	3.9 (3.4–4.2)	0.18
Max. descending aortic DM (cm), median (IQR)	3.6 (3.3–4.5)	4.3 (3.5–5.1)	0.04
Retrograde dissection component, n (%)	24 (57%)	15 (65%)	0.60
Distance to subclavian artery (cm), mean (SD)	2.2 (1.8)	1.6 (2.0)	0.14

[a] Classification of chronic health conditions and risk factors according to EuroSCORE criteria.

Unless otherwise indicated, data are number (percentage).

CT = computed tomography; DM = diabetes mellitus; EuroSCORE = European system for cardiac operative risk evaluation; IQR = interquartile range; SD = standard deviation.

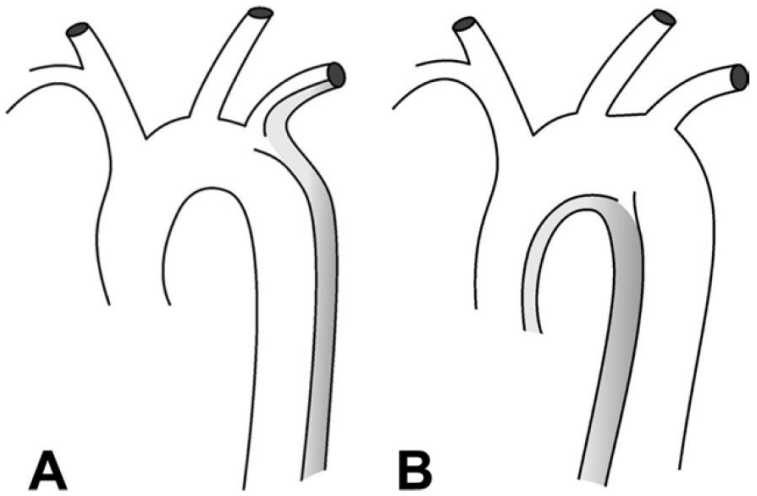
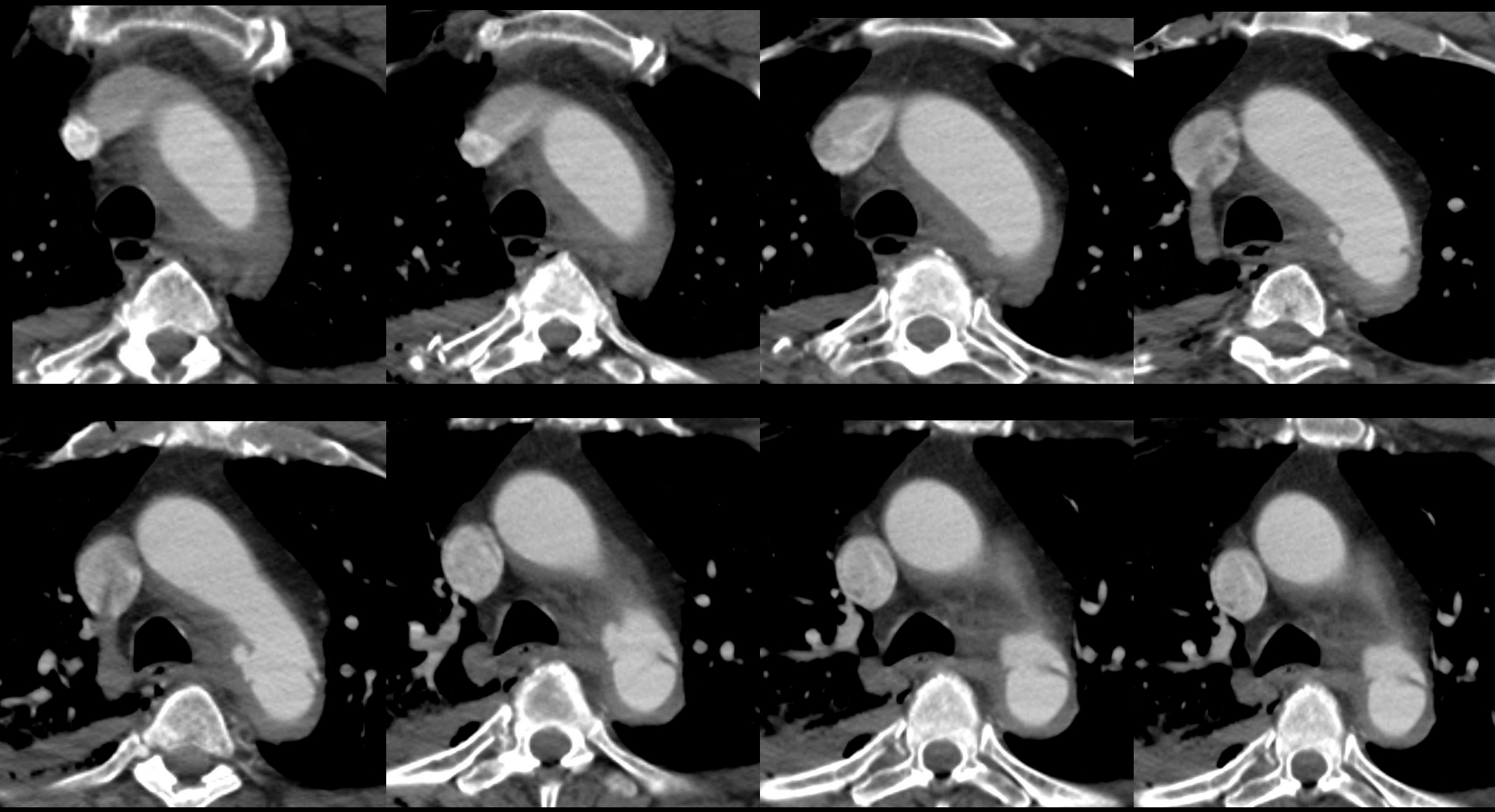
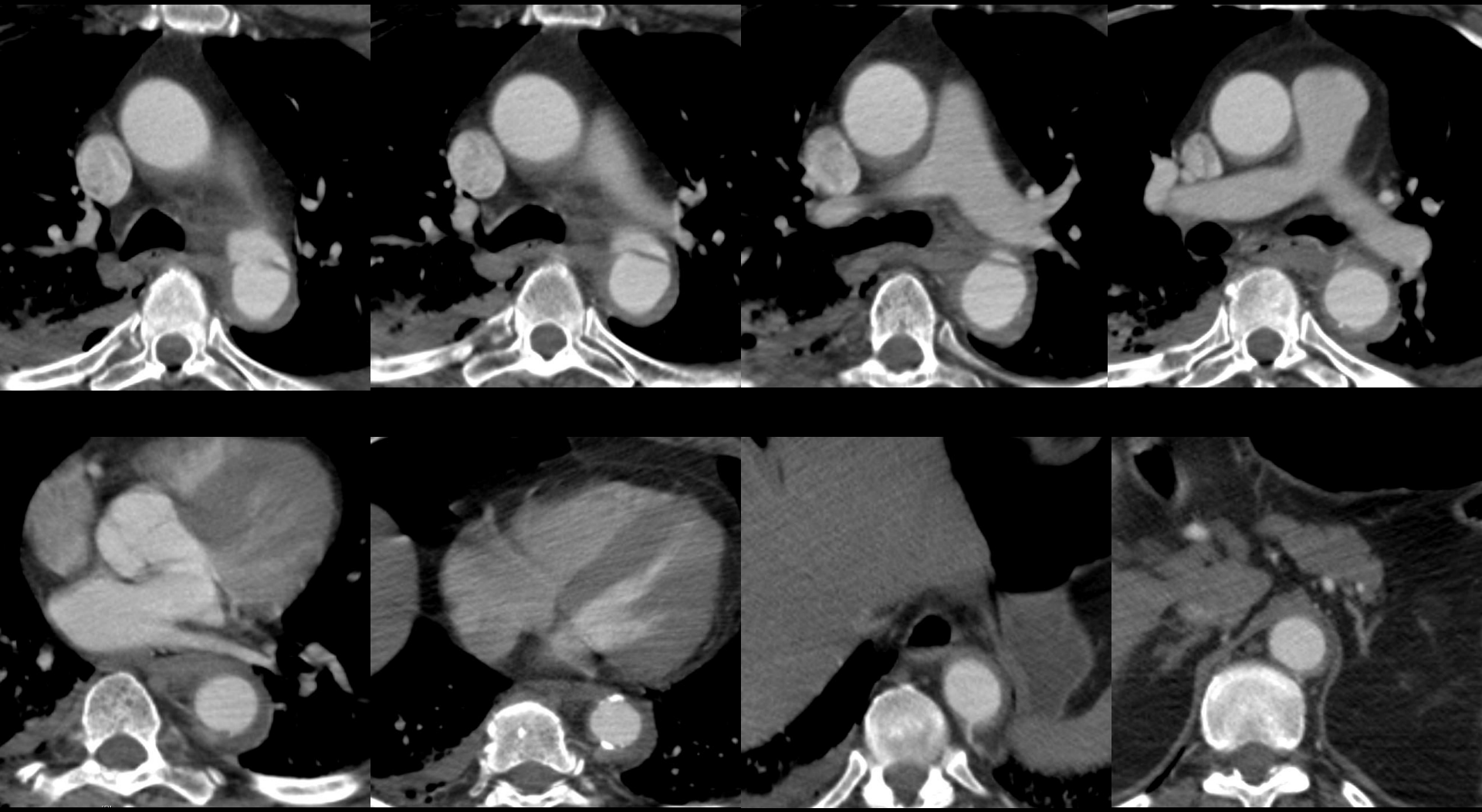


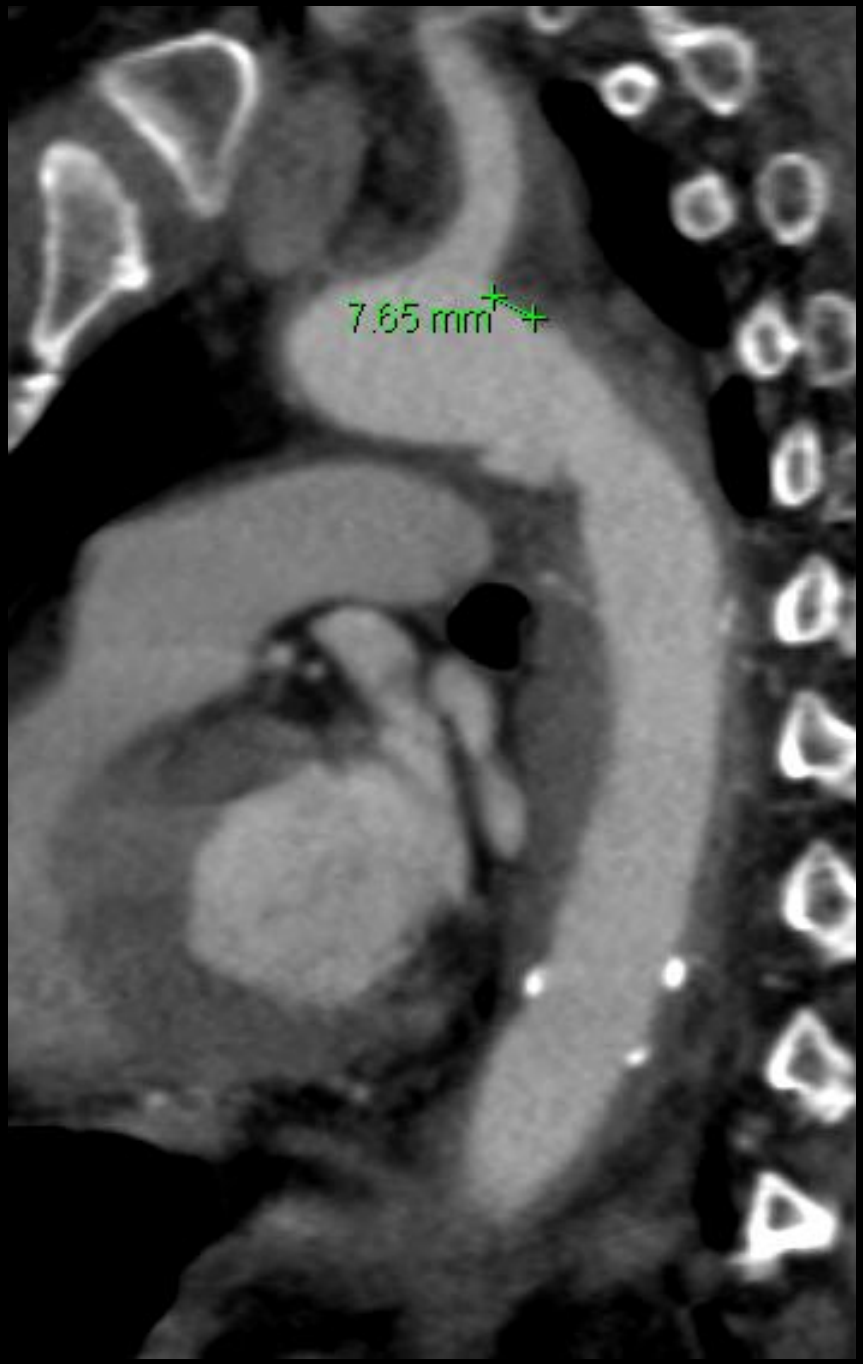
Fig 2. Scheme of different sites of the primary entry tear of acute type B aortic dissections. (A) Primary entry tear at the outer circumference of the distal aortic arch defined as "convex." The retrograde component of the dissection is stopped by left subclavian artery. (B) Primary entry tear at the inner circumference of the distal aortic arch defined as "concave," allowing progression of the retrograde component of the dissection into the aortic arch and the ascending aorta.

Notably, retrograde components of dissections were common in both primary entry tears at the convexity as well as at the concavity. This is in line with previous reports [8, 9, 17]. However, previous reports linked the location of the primary entry tear with retrograde type A dissection but not with complicated type B aortic dissection.

An anatomic barrier seems to be decisive with regard to the clinical consequences of retrograde propagation [19]. This may well explain our findings that the aortic arch and the ascending aorta were not affected in any of our patients with a primary entry tear at the convexity, but, in more than half of the patients with a primary entry tear at the concavity the aortic arch and the ascending aorta were affected. Furthermore, it was interesting to observe that retrograde components presented as progressive IMH, thus substantiating the clinical suspicion that IMH is an intermediate stage of classical dissection [8, 20]. It may well be assumed that these IMH may have propagated to classical retrograde type A aortic dissection without treatment.



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aft
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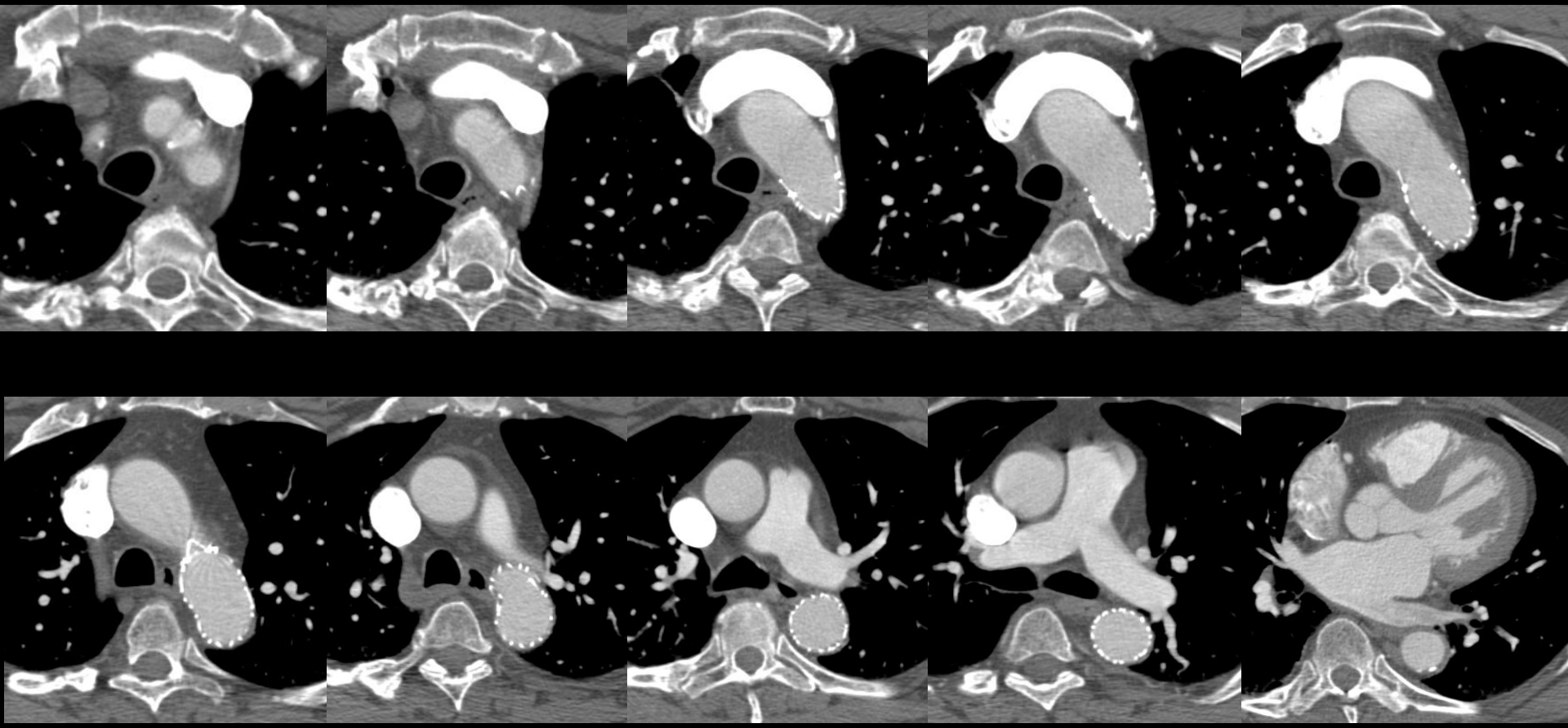
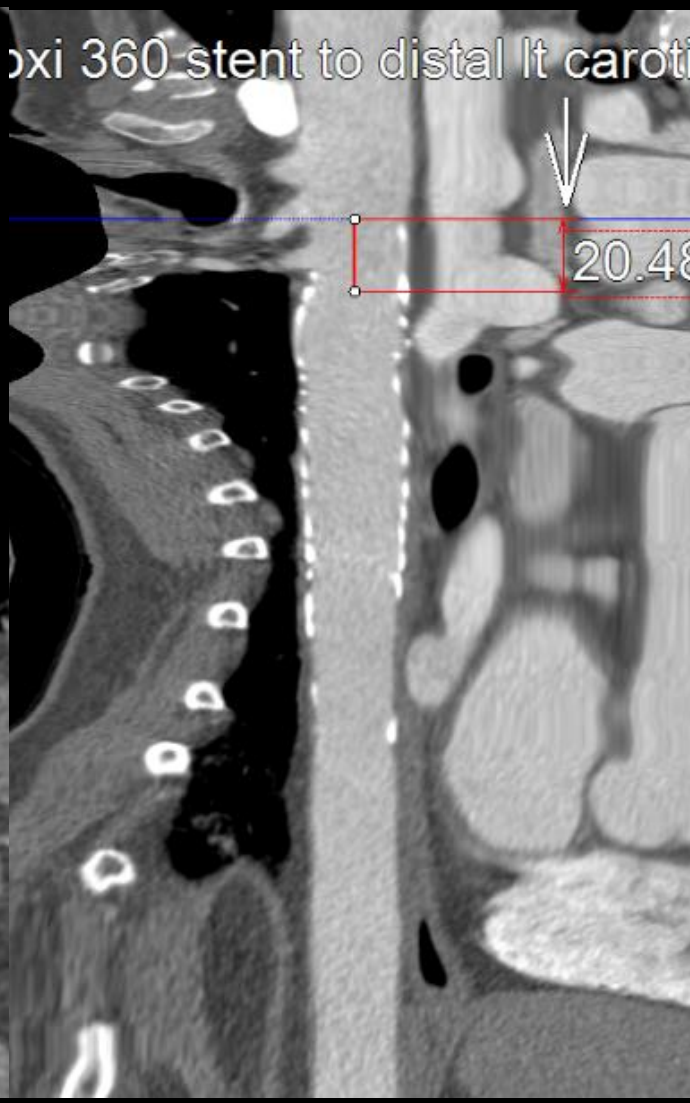
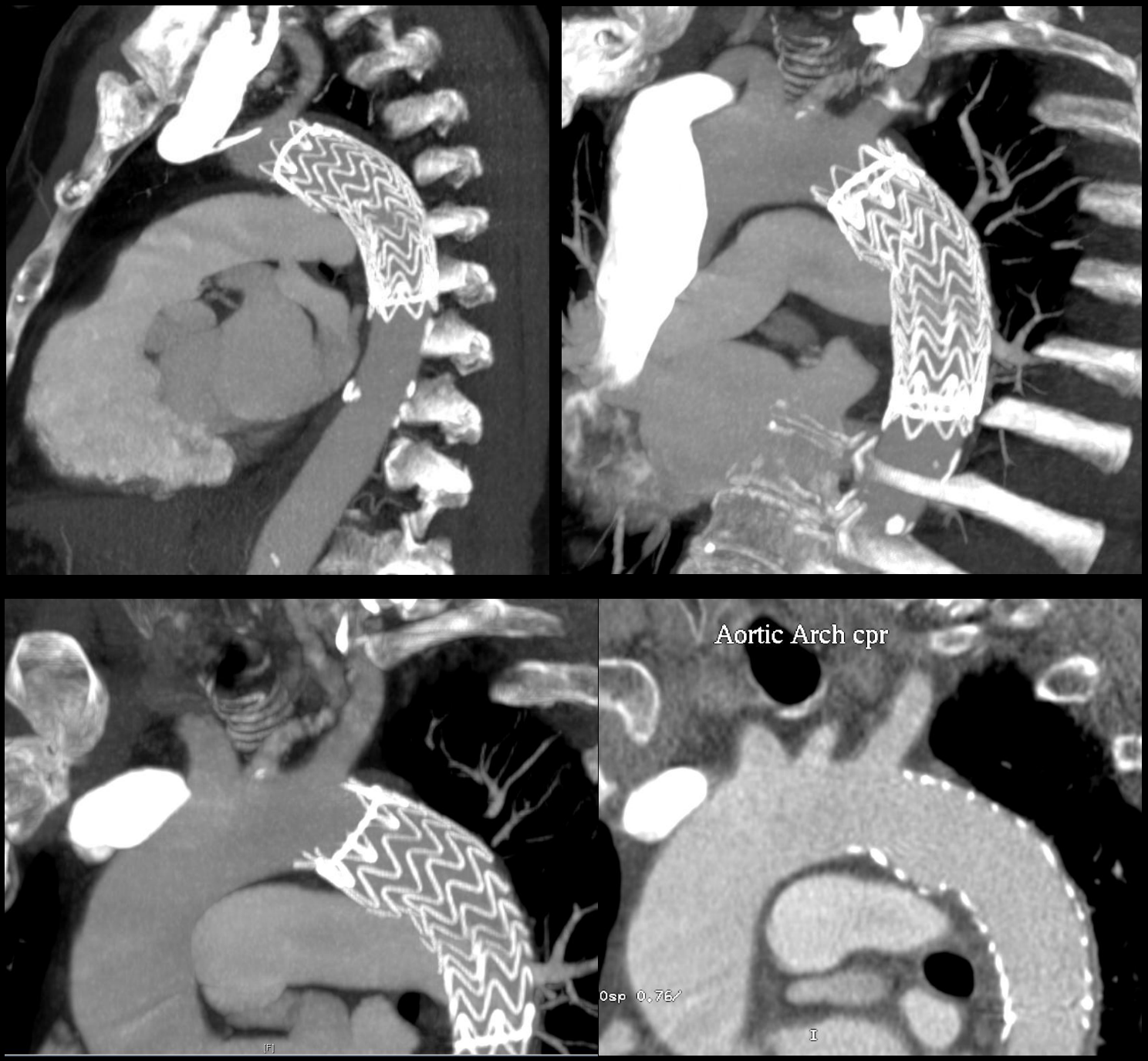



oxi 360 stent to distal lt caroti
20.48


Aortic Arch cpr
Osp 0.76/

CONCLUSION

Retrograde type A dissection with entry tear distal to left subclavian artery (DeBakey type IIId)

Our current management strategy

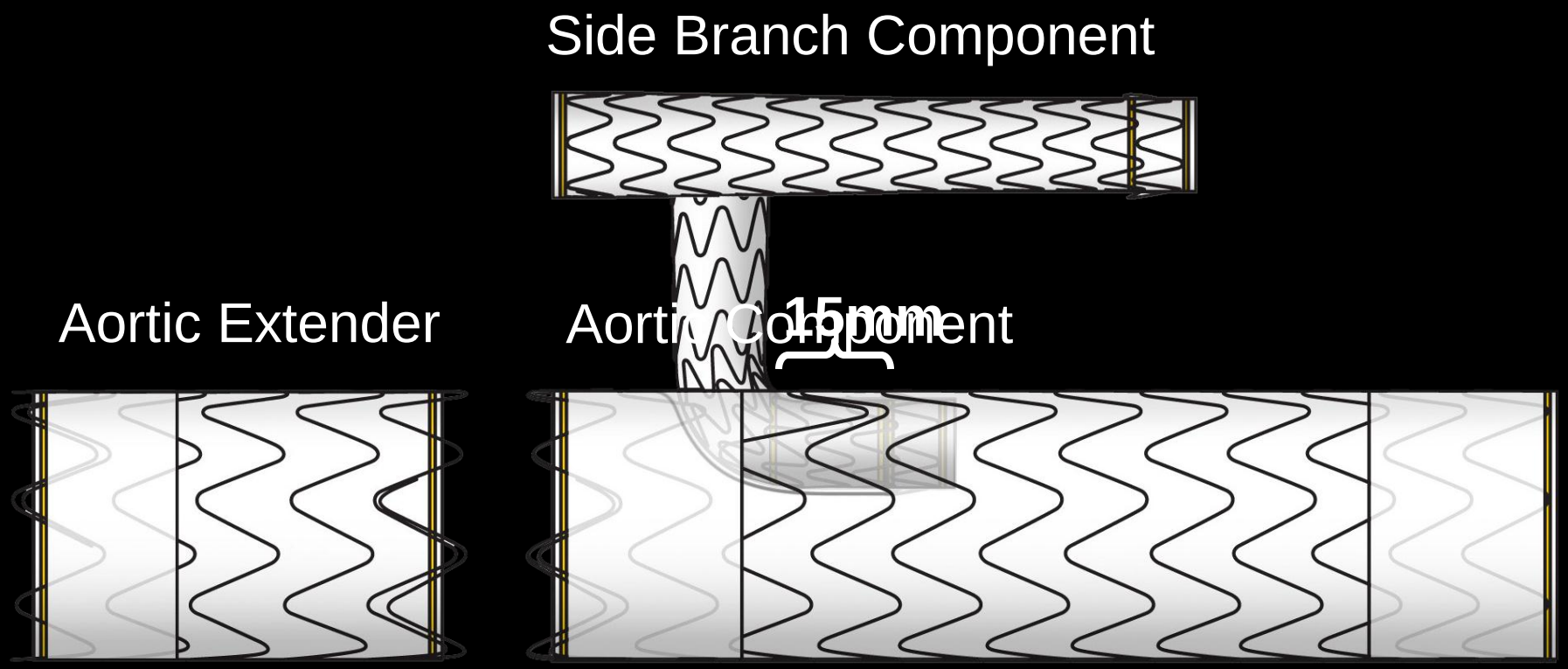
1. TEVAR over primary intimal tear for cases WITHOUT evidence of tear or flow in ascending aorta – i.e., blind sac with thrombus.
2. Open surgical repair (unless prohibitive surgical risk) if CT/TEE evidence of flow or contrast opacification of ascending segment – i.e., difficult to exclude a re-entry or secondary tear in ascending.
3. NOTE: in our experience, a disproportionate number of these cases have concave (lesser curve) location of PIT.

GORE® TAG® Branched Thoracic Endoprosthesis

Device Overview

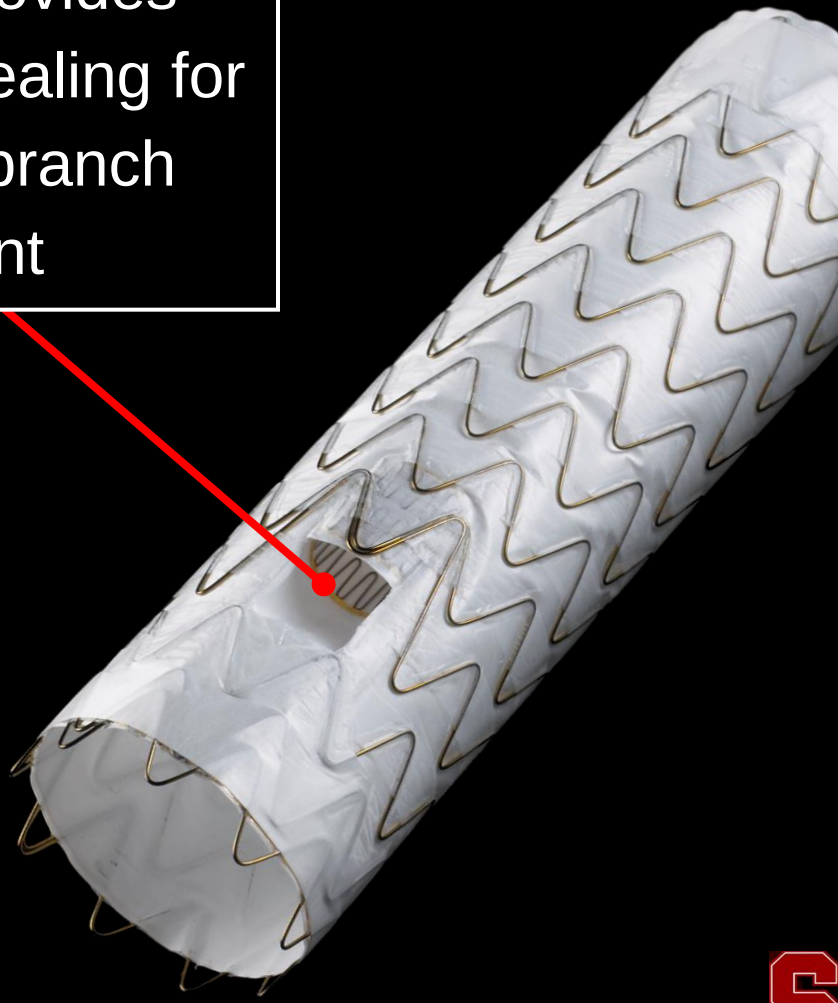
- Off-the-shelf device components
- Purpose-designed
- Safe
- Easy to use
- Leveraging existing Gore technology
  - Conformable GORE® TAG® Device
  - GORE Excluder® AAA Endoprosthesis
  - GORE® Viabahn® Endoprosthesis
  - Carmeda® BioActive Surface

TAG® Branched Thoracic Endoprosthesis

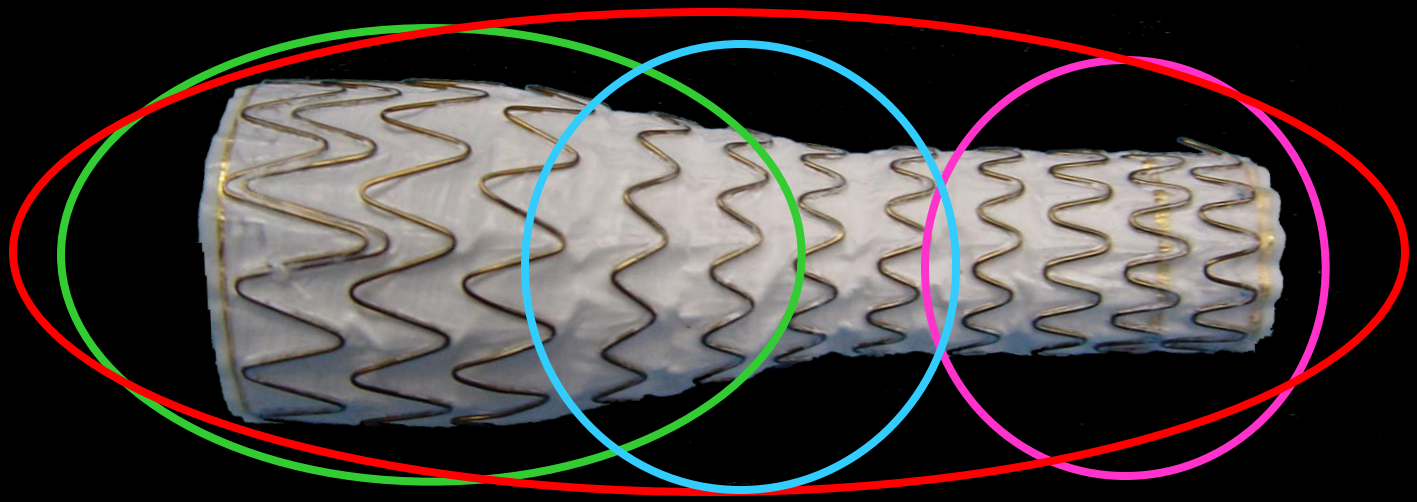


TAG® Branched Thoracic Endoprosthesis

Inner portal provides anchoring and sealing for modular side branch component



Side Branch Component Design



Vessel Sealing Zone

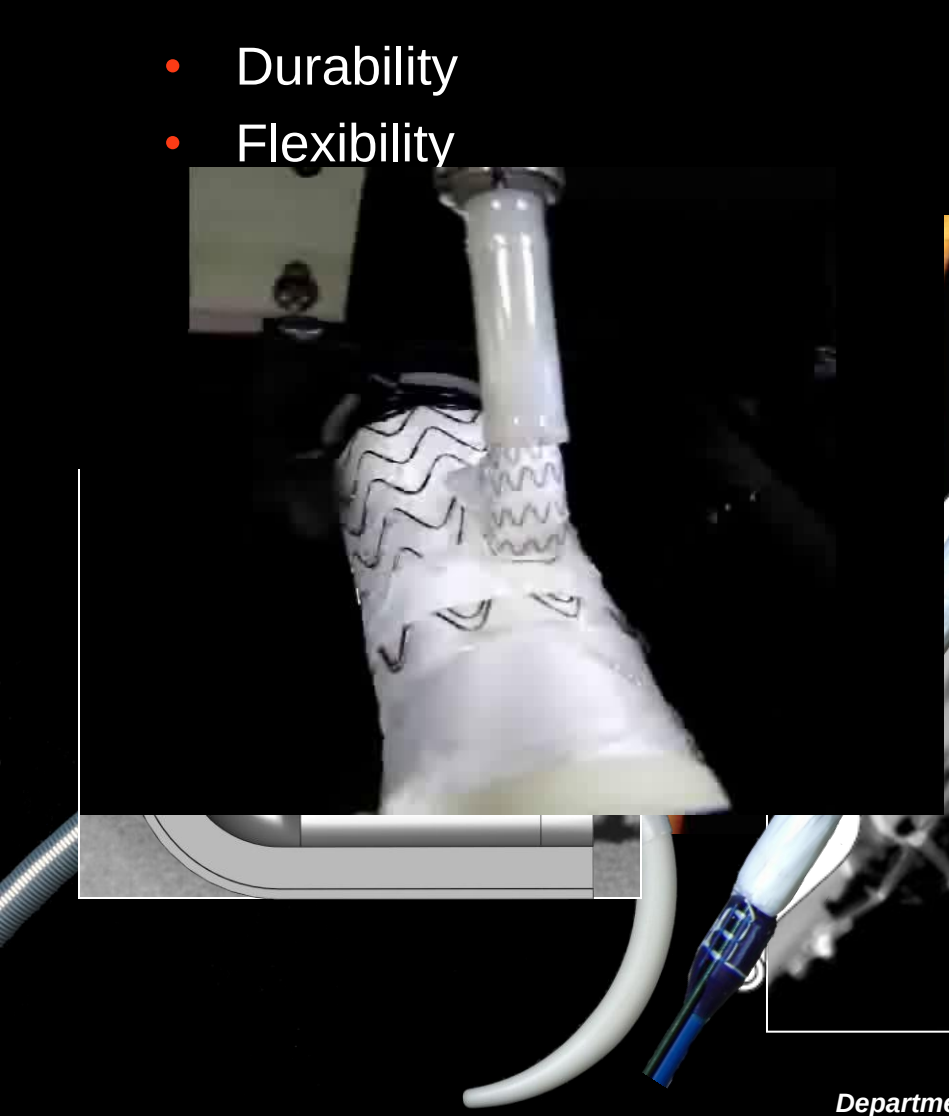
Portal Sealing Zone

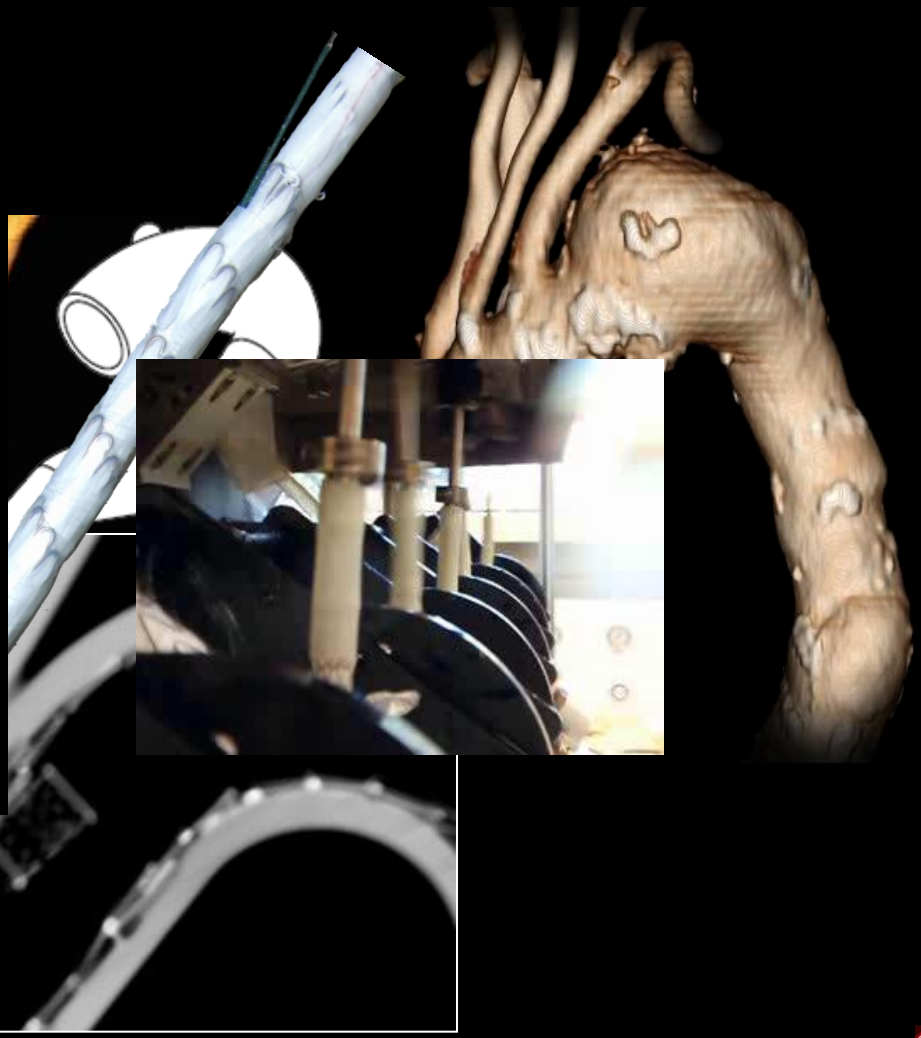
Heparin-bonded (CBAS) lumen

Tapered Flex Zone

Designed for the Arch

- Durability
- Flexibility





Designed for Challenging Anatomies

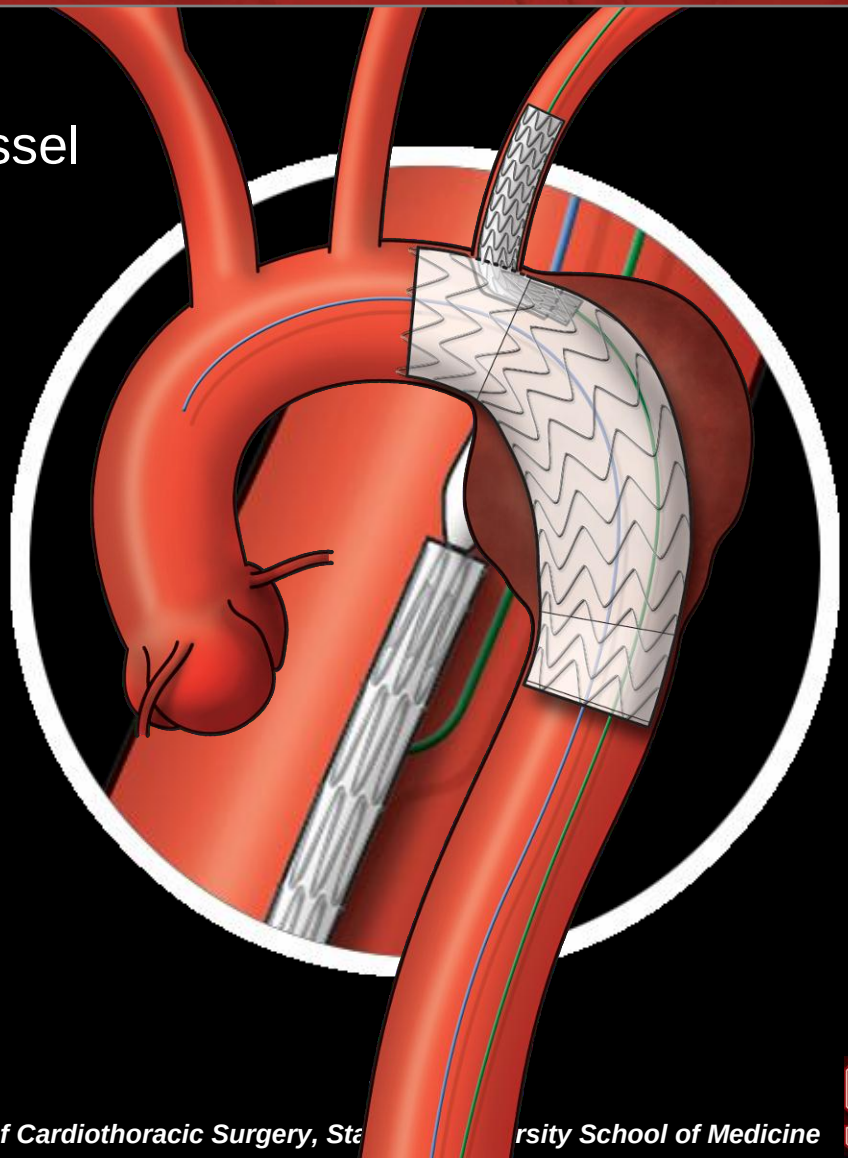
Step 1:
- Insert guidewires in aorta and branch vessel

Step 2:
- Introduce aortic component over both guidewires into position within the arch

Step 3:
- Deploy aortic component and withdraw catheter

Step 4:
- Advance introducer sheath and dilator

Step 5:
- Advance and deploy branch component



TAG® Branched Thoracic Endoprosthesis

Zone 2 | Zone 1 | Zone 0