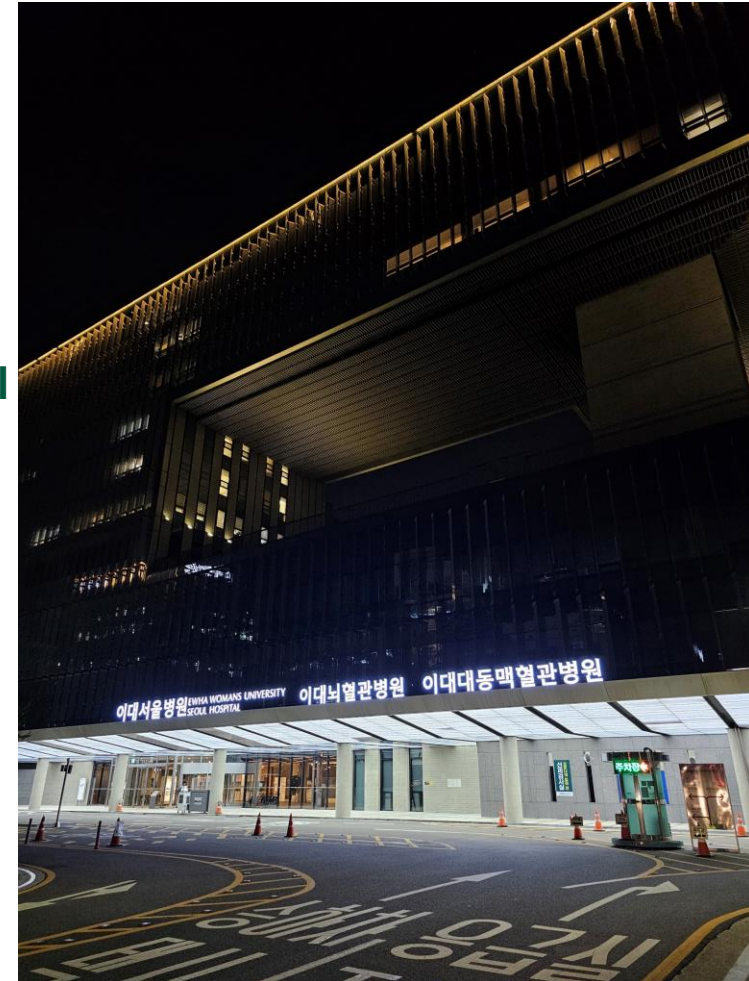


False Lumen Management in Chronic Type IIb Aortic Dissection

Suk-Won Song & Kwang-Hun Lee

Ewha Womans University Aorta and Vascular Hospital



Prognostic factors for aorta remodeling after thoracic endovascular aortic repair of complicated chronic DeBakey IIIb aneurysms

Suk-Won Song, MD, PhD,^a Tae Hoon Kim, MD,^a Sun-Hee Lim, RN,^a Kwang-Hun Lee, MD, PhD,^b Kyung-Jong Yoo, MD, PhD,^c and Bum-Koo Cho, MD, PhD^d

Objectives: The use of thoracic endovascular aortic repair (TEVAR) for chronic DeBakey III type b (CDIIIb) aneurysms is controversial. We analyzed the potential prognostic factors affecting aorta remodeling after this procedure.

Methods: A total of 20 patients with CDIIIb aneurysms underwent TEVAR, with full coverage of reentry tears at the descending thoracic aorta. The potential factors affecting false lumen (FL) remodeling were analyzed, including reentry tears (communicating channels visible on the computed tomography angiogram), large intimal tears below the stent graft (≥ 2 consecutive axial cuts on the computed tomography angiogram), visceral branches arising from the FL, and intercostal arteries (ICAs) arising from the FL.

Results: All the patients had uneventful in-hospital courses; 2 patients (10%) required reintervention during the follow-up period. Thirteen patients (65%) had complete thrombosis of the FL at stent graft segment. Compared with the complete thrombosis group, the partial thrombosis group had more reentry tears (1.8 vs 2.3, $P = .48$), large intimal tears (0.8 vs 1.7, $P < .05$), visceral branches arising from the FL (1.2 vs 2.3, $P < .05$), and ICAs arising from the FL (3.8 vs 5.1, $P = .35$). Reentry tears, visceral branches, and ICAs from the FL were significant negative prognostic factors for FL shrinkage ($P < .05$).

Conclusions: Although reentry tears above the celiac trunk were fully covered, the visceral branches and ICAs from the FL and all communicating channels below the celiac trunk kept the FL pressurized and were unfavorable prognostic factors for aorta remodeling after TEVAR for CDIIIb aneurysms. (J Thorac Cardiovasc Surg 2014;148:925-33)



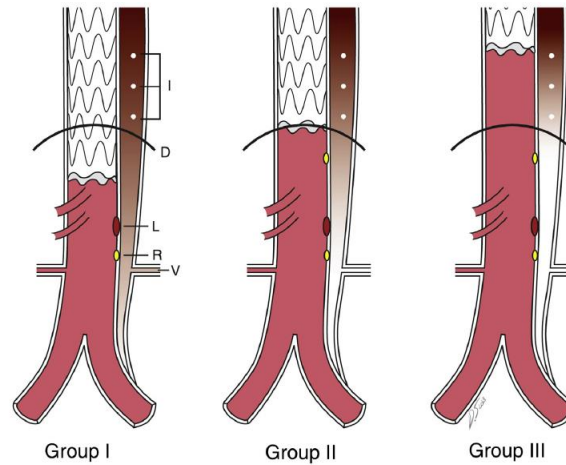


FIGURE 1. Schematic diagram of anatomic factors affecting false lumens after thoracic endovascular aortic repair. Groups were classified according to the distal landing zone: group I, covered to the celiac trunk; group II, whole descending thoracic aorta; group III, mid-descending thoracic aorta. *I*, Intercostal artery from the false lumen; *D*, diaphragm; *L*, large intimal tear; *R*, reentry tear; *V*, visceral branch from the false lumen.

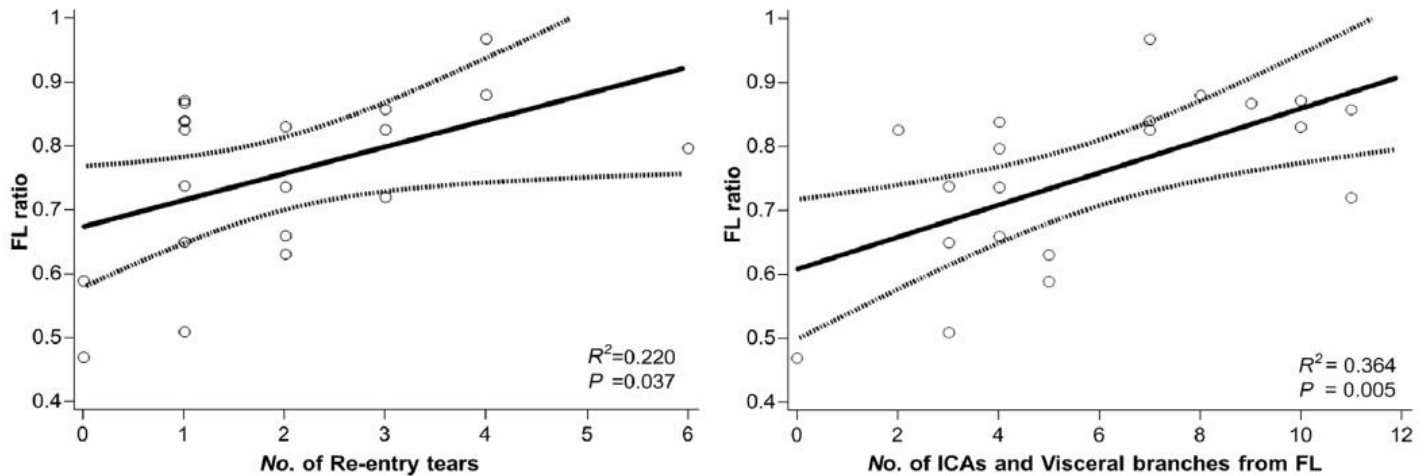


FIGURE 2. Results of univariate linear regression analysis showing prognostic factors significantly related to a decreased false lumen (FL) ratio. *ICA*, Intercostal artery.



Promote aortic remodeling

Occlusion of primary entry tear

True lumen expansion

False lumen thrombosis

TEVAR may not be a perfect procedure for CDIIb

Adjunctive technique is needed!!!



False Lumen Procedure (Stentless TEVAR)

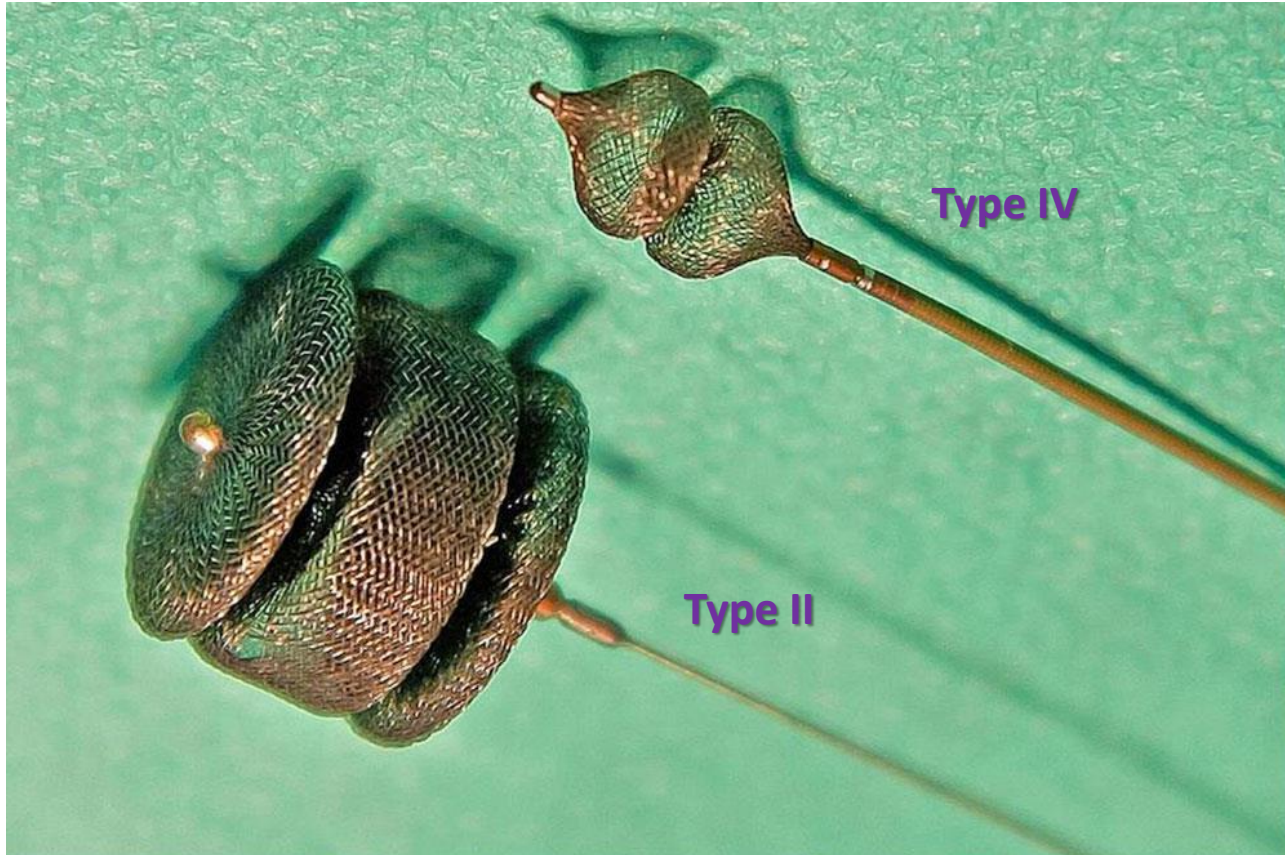
AVP

Coiling

Glue



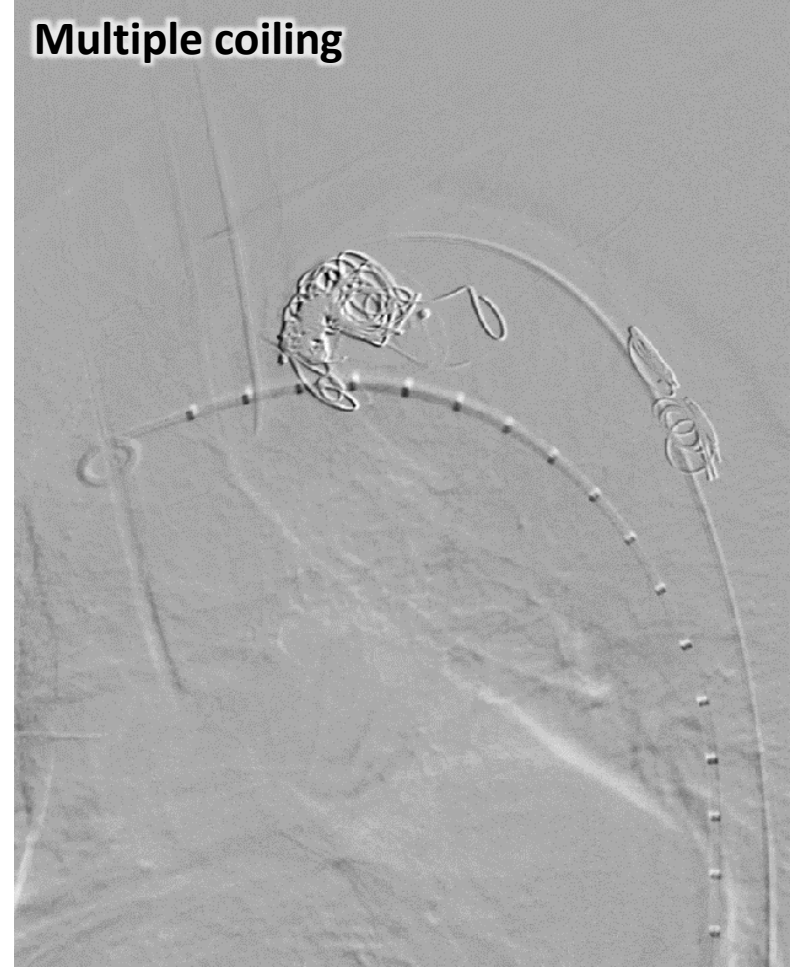
Amplatzer Vascular Plug(AVP)



Amplatzer Vascular Plug (AVP) II



Multiple coiling



Sex/Age

F/59

Chief Complaint

Back pain for 3 days

Past Medical History

Chronic DeBakey type IIIb aneurysm

Severe tricuspid regurgitation

Hypertension

Chronic renal failure, stage 3B

Liver cirrhosis

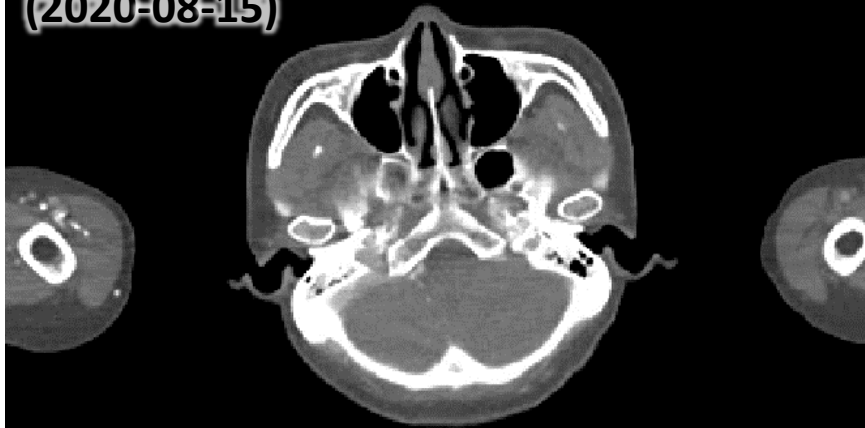
Acute type A aortic dissection s/p graft replacement of ascending aorta & 1 partial arch (2014-09-27)

Ischemic stroke d/t Rt. MCA infarction (2014-10)

Spontaneous bleeding of Rt. lateral thoracic artery s/p embolization (2018-04-08)



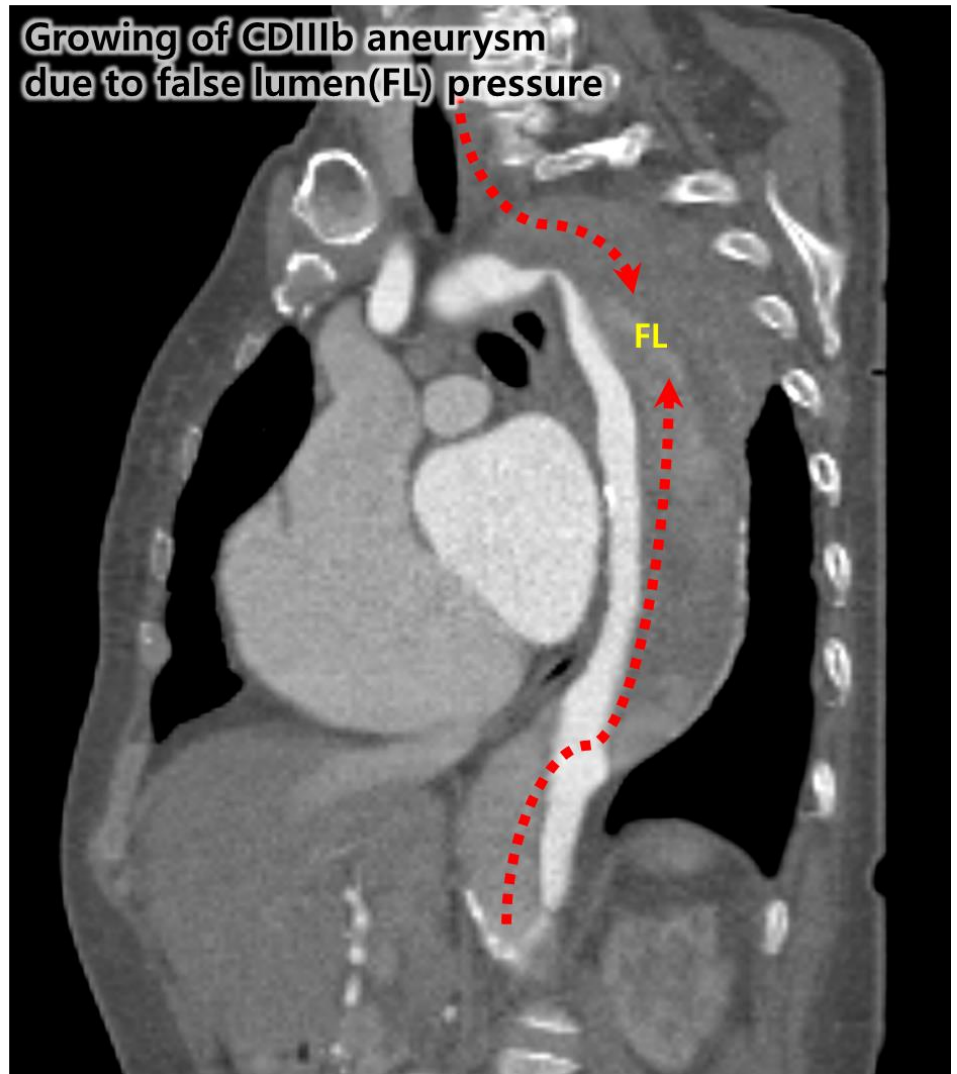
**CDIIB aneurysm, 67→70mm
(2020-08-15)**



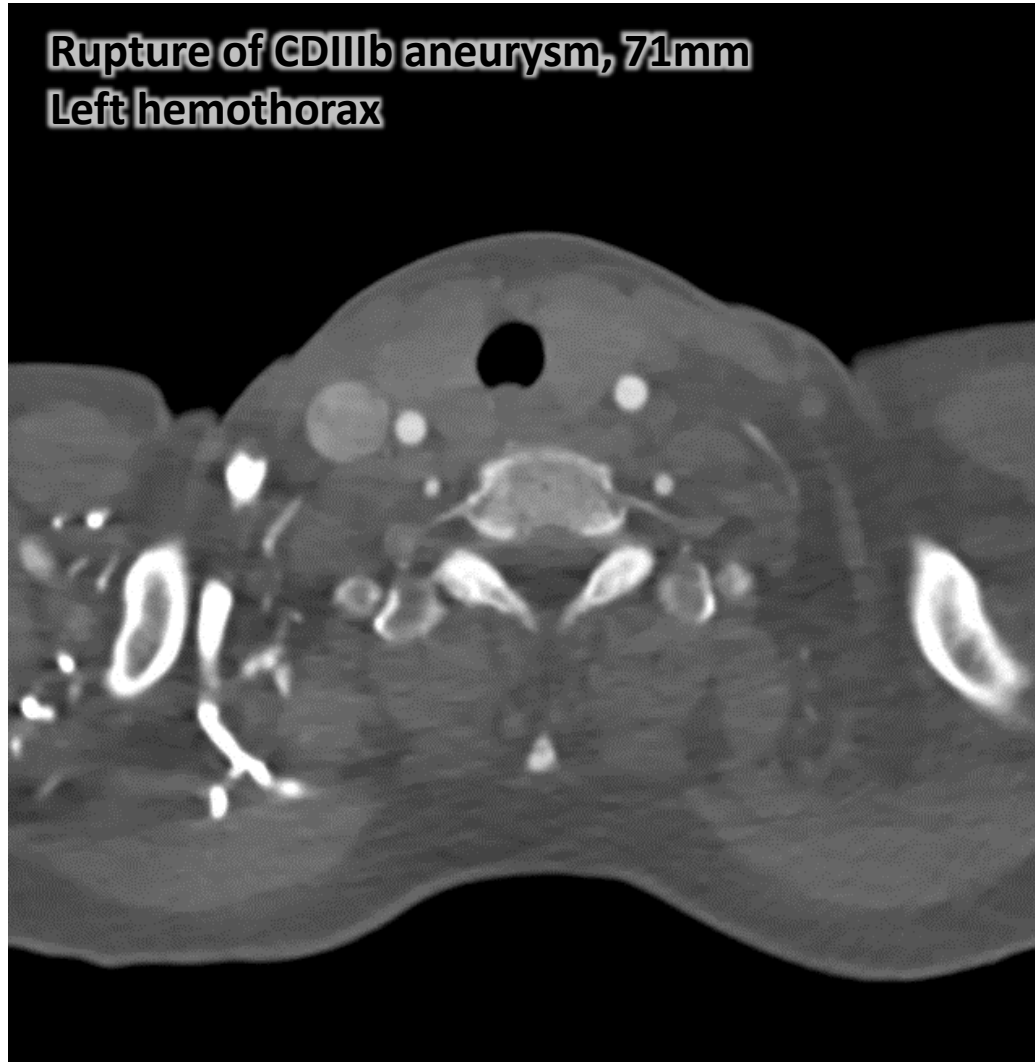
**TR grade IV (2018-08-03)
ERO=45mm², RV=39ml, TV
annulus=48mm**



Case 1, FLP Planning



**Rupture of CDIIIb aneurysm, 71mm
Left hemothorax**



Ruptured CDIIIb, 71mm

Inoperable status d/t severe comorbidities

LSCA os FL occlusion

AVP 12mm*1

Multiple coiling

Suprarenal aorta FL occlusion

AVP 22mm*2, 20mm*1, 18mm*2

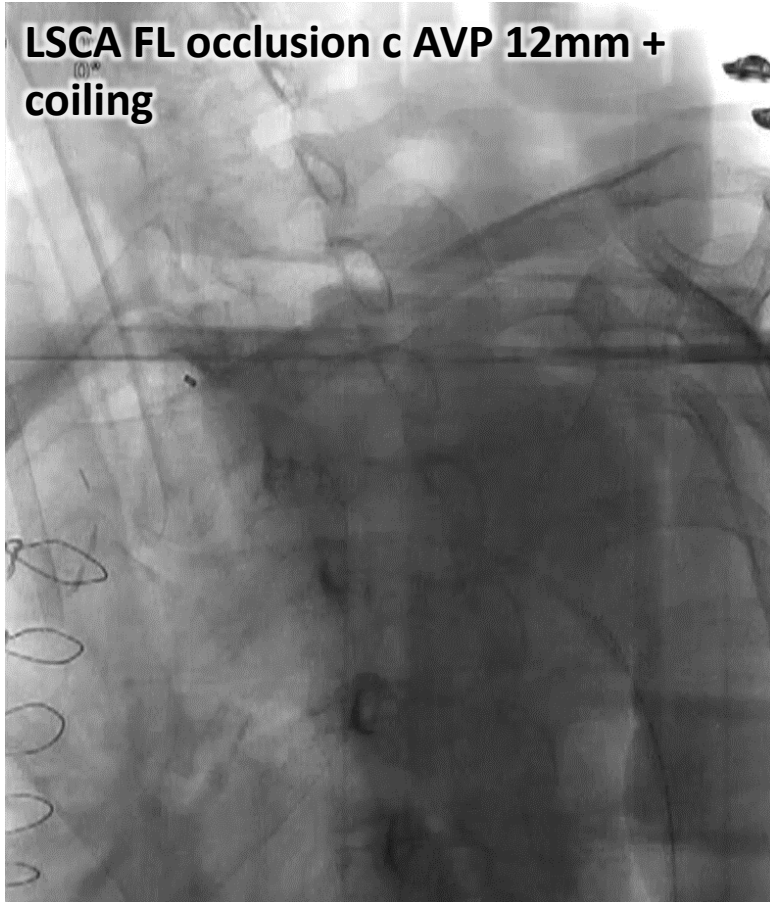
Multiple coiling

Glue 15cc

Total operation time: 116min

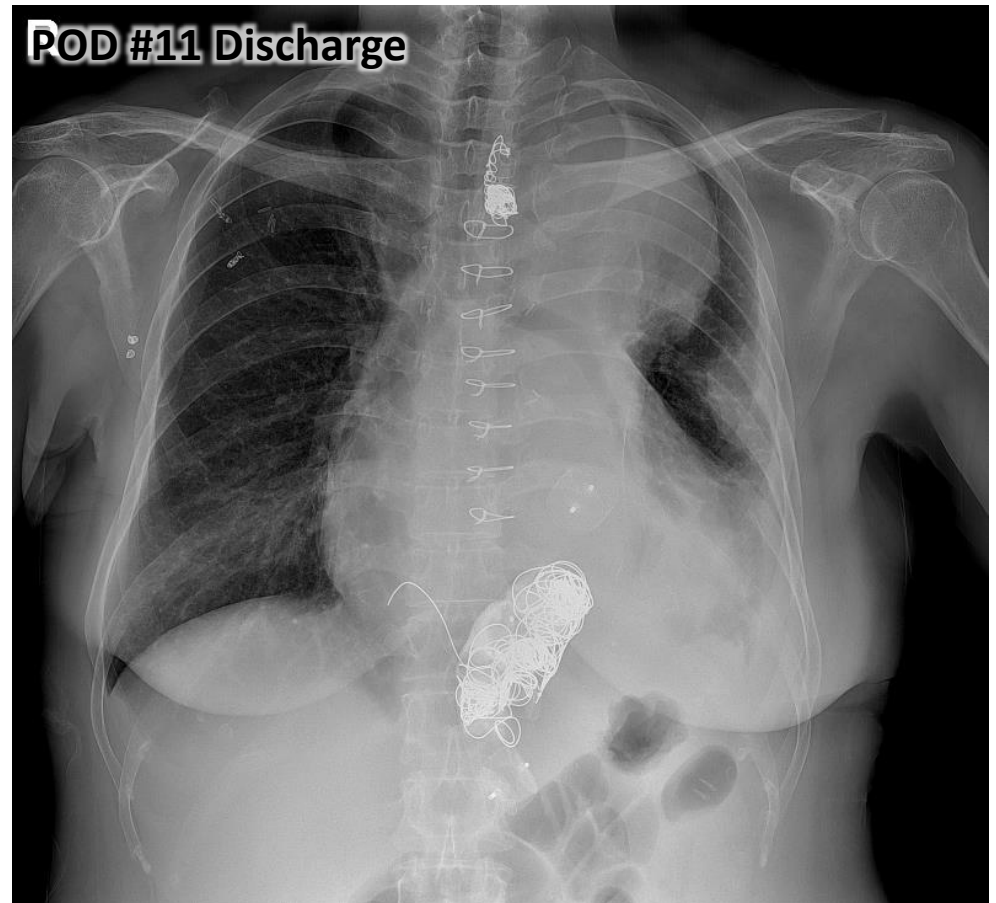
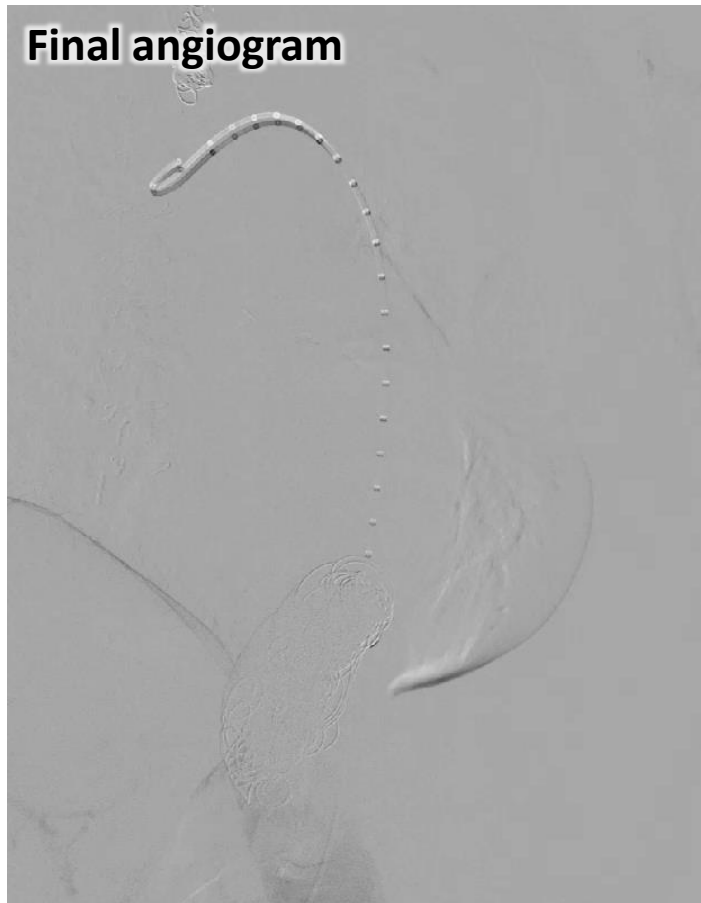


Case 1

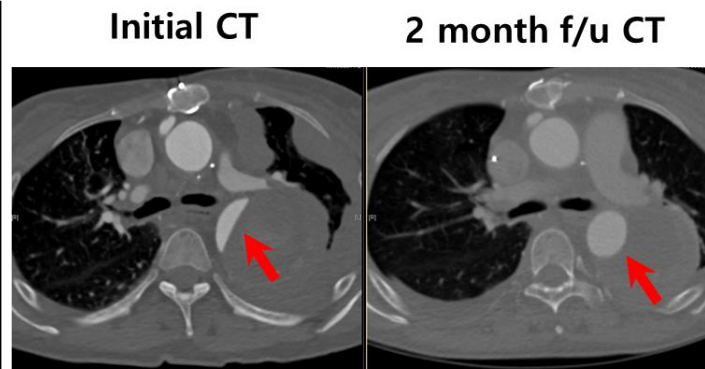
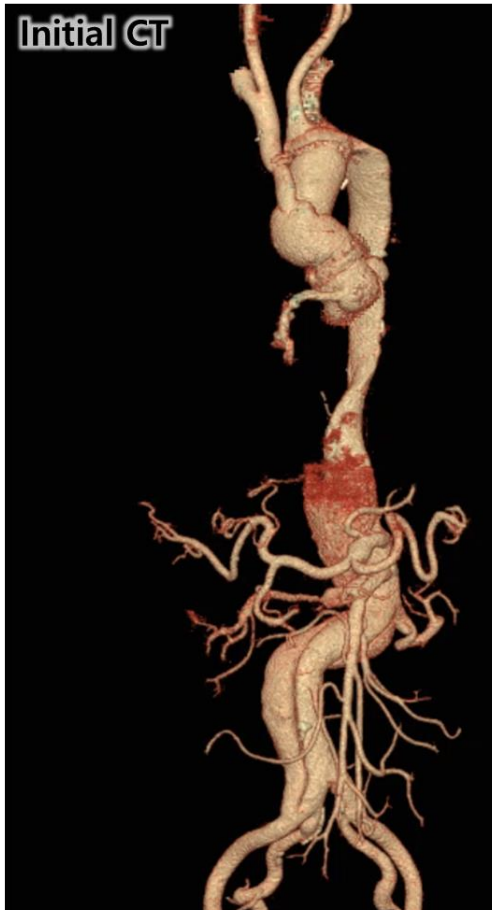


Case 1

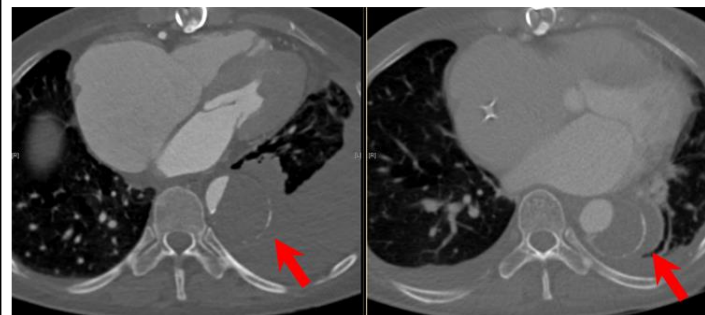




Case 1



**Pulmonary artery level,
T5**



**Aortic valve level,
T8**



Sex/Age

M/41

Chief Complaint

CDIIIb

Past Medical History

Hypertension

IgA nephropathy

Acute type B aortic dissection (2022-03-07)

- abdominal & back pain for 4 month, no evaluation

Retrograde type A IMH (2022-07-01)

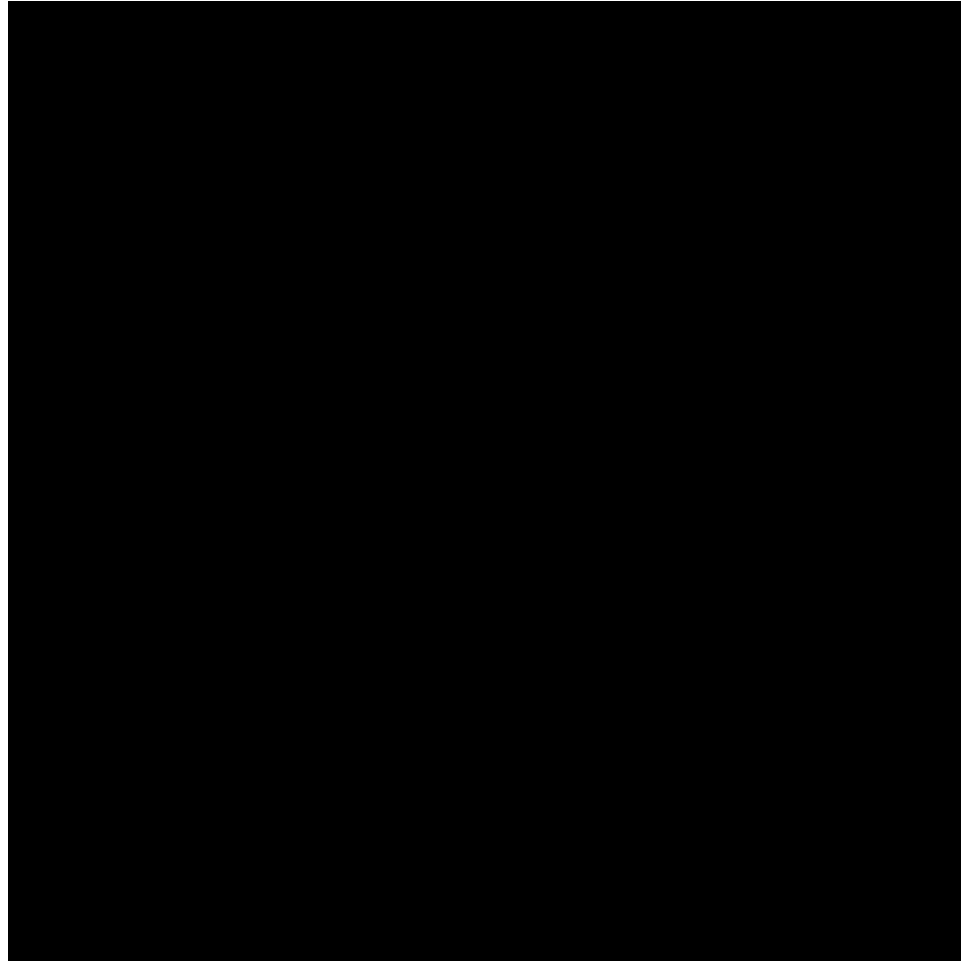
- incidental finding by medical checkup

Type A IMH resolution, CDIIIb c intimal tear (2022-09-30)

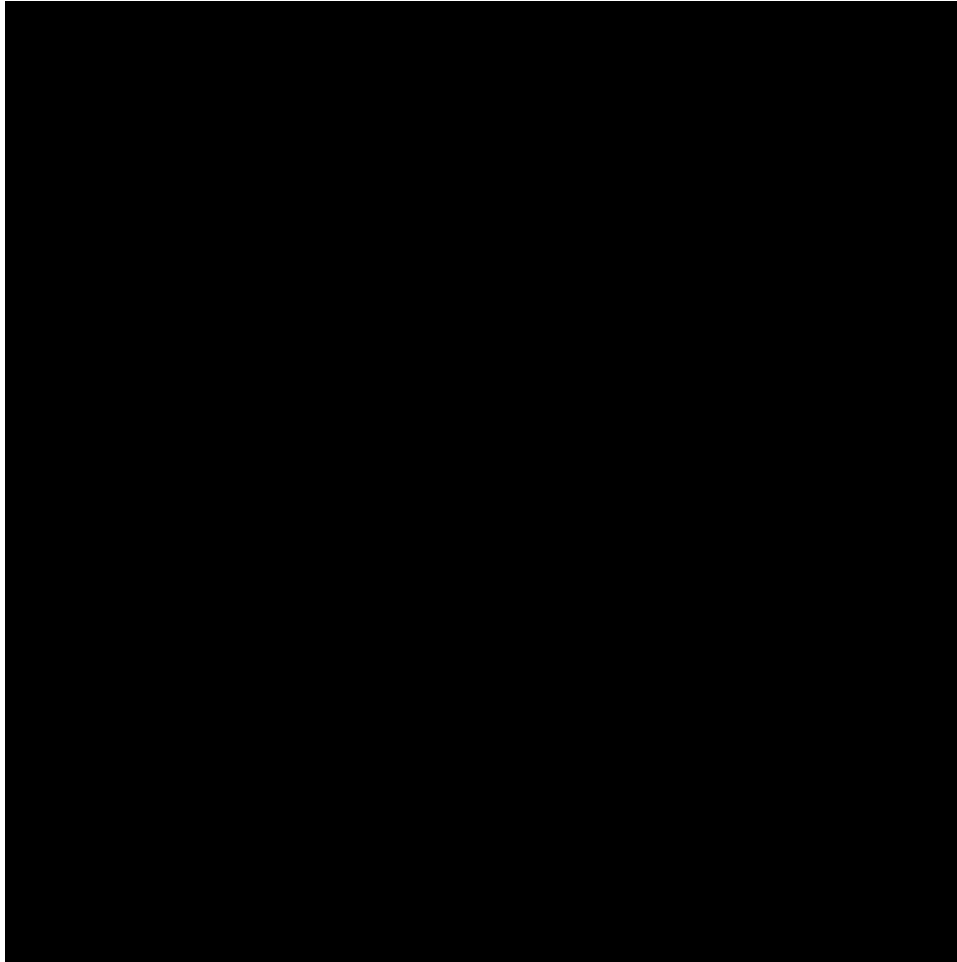
- follow-up CT



Case 2



Case 2



Sex/Age

F/56

Chief Complaint

CDIIIb

Past Medical History

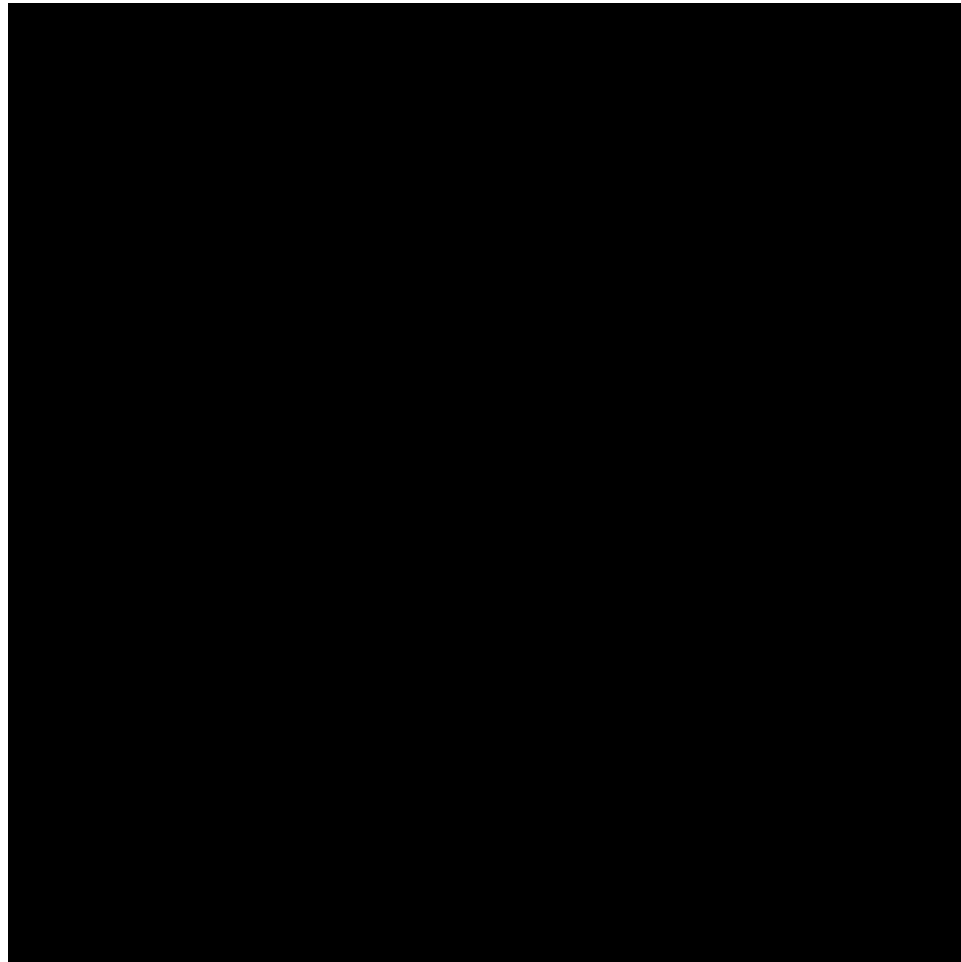
Atrial flutter

Chronic renal disease

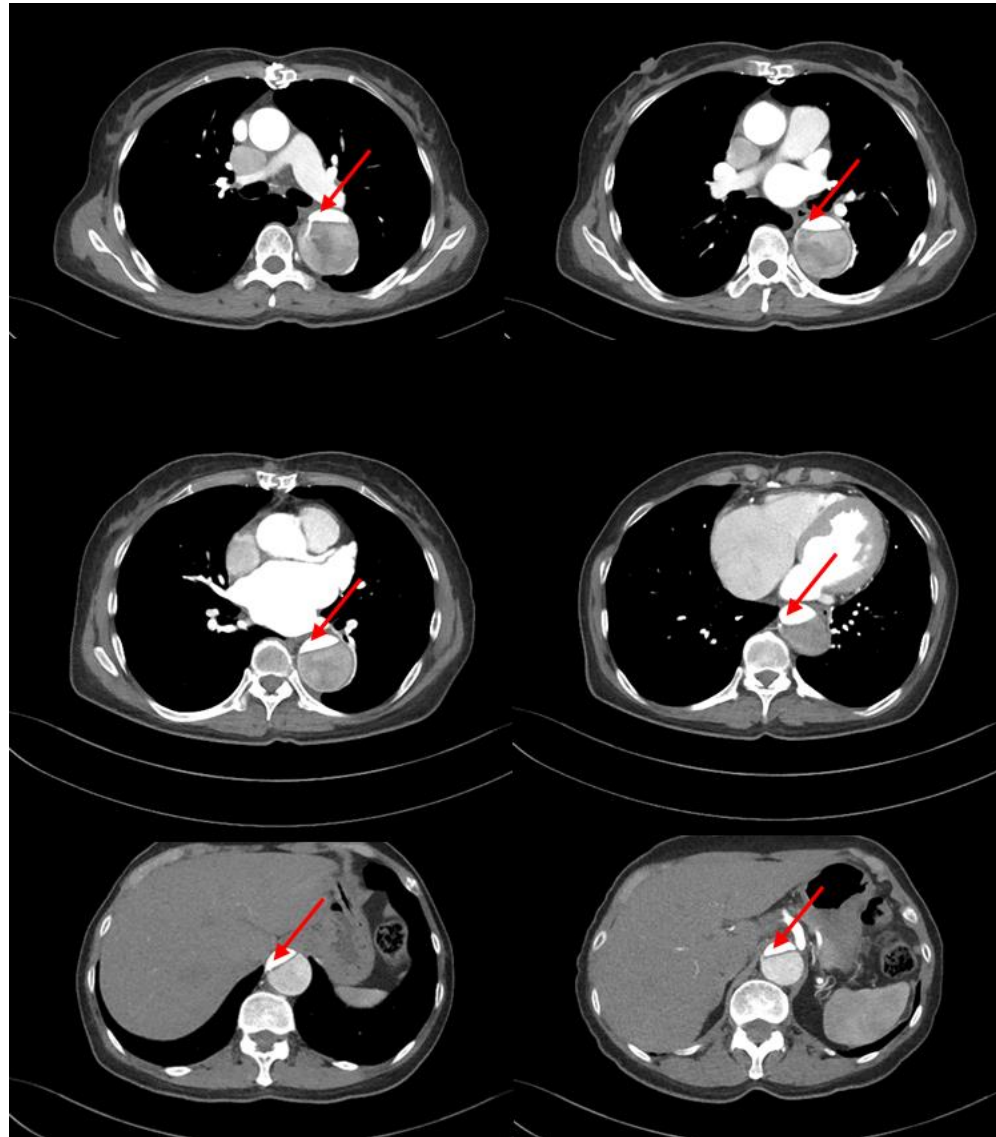
Acute type I aortic dissection s/p 1PAR (2022-04-13)

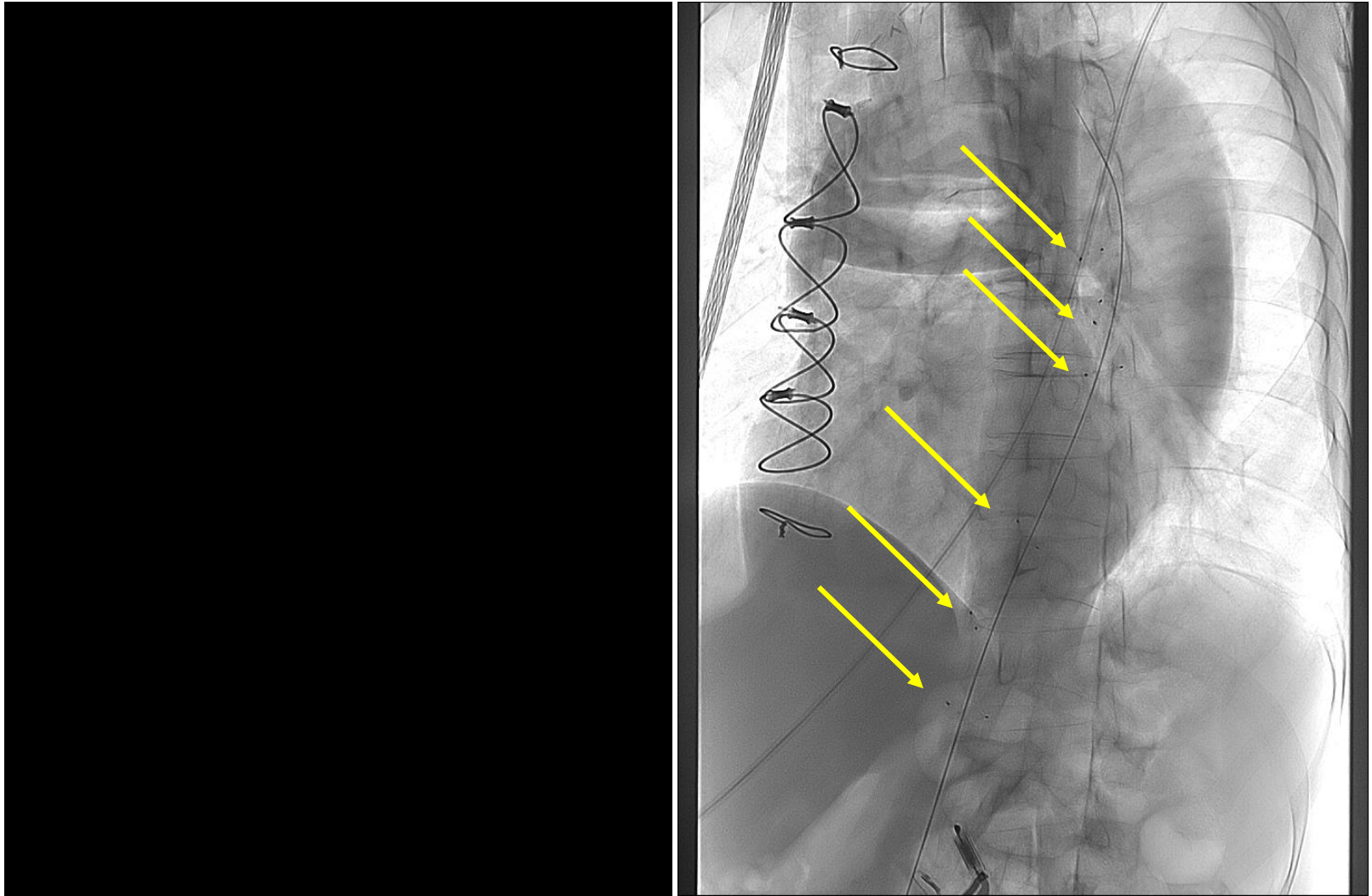


Case 3

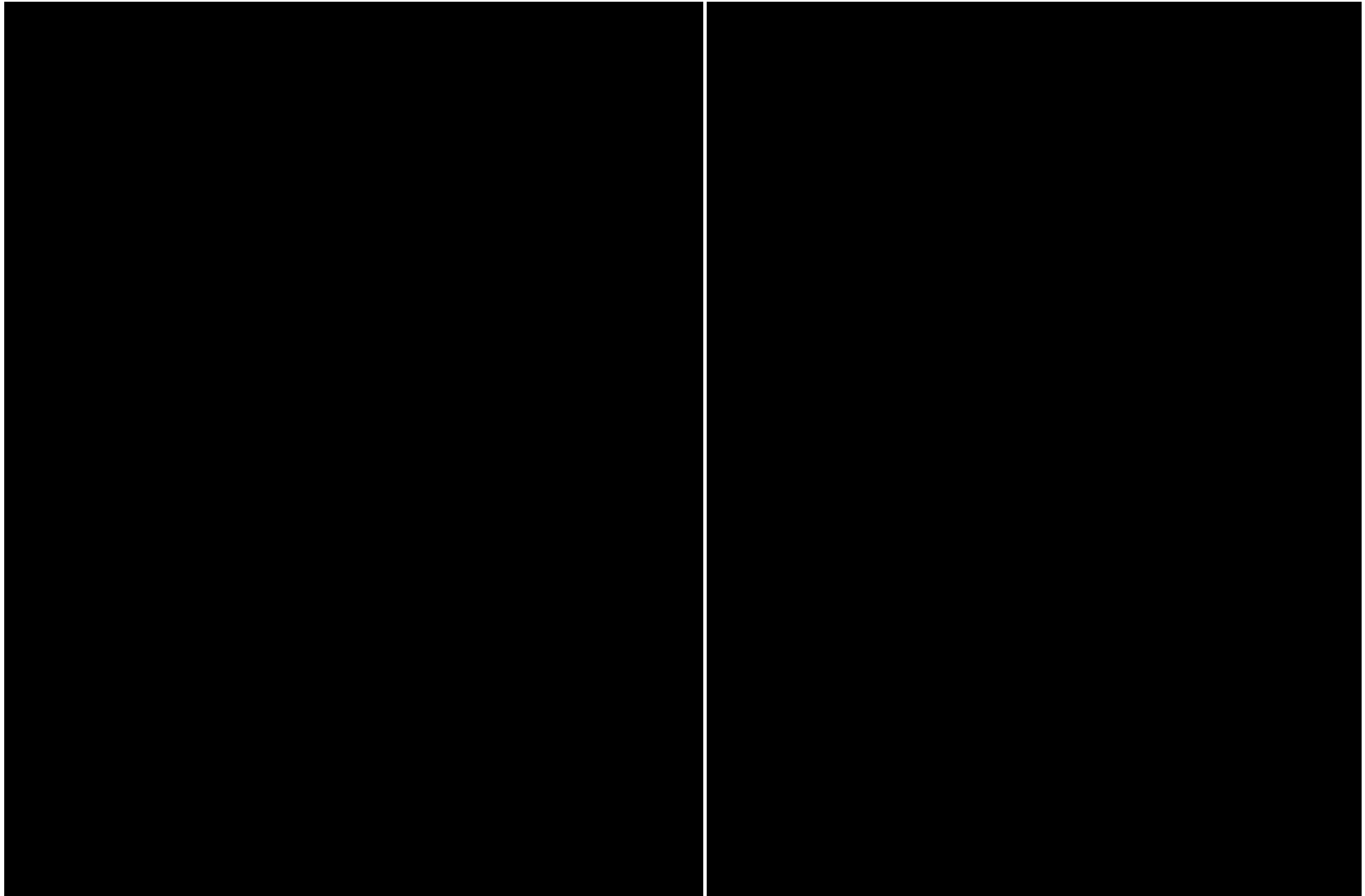


Case 3, Planning





Case 3



Effects of False Lumen Procedures on Aorta Remodeling of Chronic DeBakey IIIb Aneurysm



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Departments of Cardiovascular Surgery and Interventional Radiology, Gangnam Severance Hospital, and Department of Cardiovascular Surgery, Yonsei Cardiovascular Hospital, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background. Although thoracic endovascular aortic repair is regularly used to treat chronic DeBakey type IIIb aneurysms, persistent retrograde flow into the false lumen through distal reentry tears is a common cause of failure. We sought to determine the safety and efficacy of the false lumen procedure (FLP) for aortic remodeling with chronic DeBakey IIIb aneurysms.

Methods. From 2012 to 2015, 25 patients with chronic DeBakey IIIb aneurysms underwent FLP using vascular plugs, stent grafts, coils, or glues. The FLP was performed as an adjunctive procedure after initial thoracic endovascular aortic repair in 9 patients, in combination with initial thoracic endovascular aortic repair in 13 patients, and as an isolated procedure in 3 patients. All patients were followed up for a mean duration of 10 months after the FLP. Outcomes included the degree of thrombosis and diameter change in the true lumen and false lumen. Diameters were

measured at three levels: left subclavian artery, pulmonary artery bifurcation, and abdomen (celiac artery).

Results. No spinal cord injury, renal failure, or 30-day mortality was observed. Complete false lumen thrombosis after FLP was observed in 20 patients (80%). Compared with before FLP, the mean false lumen diameter for each level (before 22.23 ± 10.18 mm versus after 17.56 ± 10.84 mm; $p < 0.001$) significantly decreased, whereas the mean true lumen diameter for each level (20.45 ± 5.33 mm versus 25.12 ± 5.60 mm, $p < 0.001$) increased.

Conclusions. False lumen procedures were safe, promoted complete thrombosis, and had favorable aortic remodeling in patients with chronic DeBakey IIIb aneurysms.

(Ann Thorac Surg 2016;102:1941-7)

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Remodeling of False Lumen (1)

Table 2. Clinical Outcomes and Complications

	Patients (n = 25)
Operative Results	
30-day mortality	0 (0)
Hospital stay, days	7.5 ± 6.0
ICU stay, hours	27.0 ± 37.8
Complications	
Spinal cord ischemia	0 (0)
CSF complication	1 (4)
Access site complication	0 (0)
Ischemic stroke	1 (4)
Cerebral hemorrhage	0 (0)
Pulmonary	0 (0)
Cardiac	0 (0)
Renal	0 (0)
Gastrointestinal	0 (0)
Endoleak	0 (0)
Complete thrombosis	20 (80)
Reintervention	0 (0)

Values are n (%) or mean ± SD.

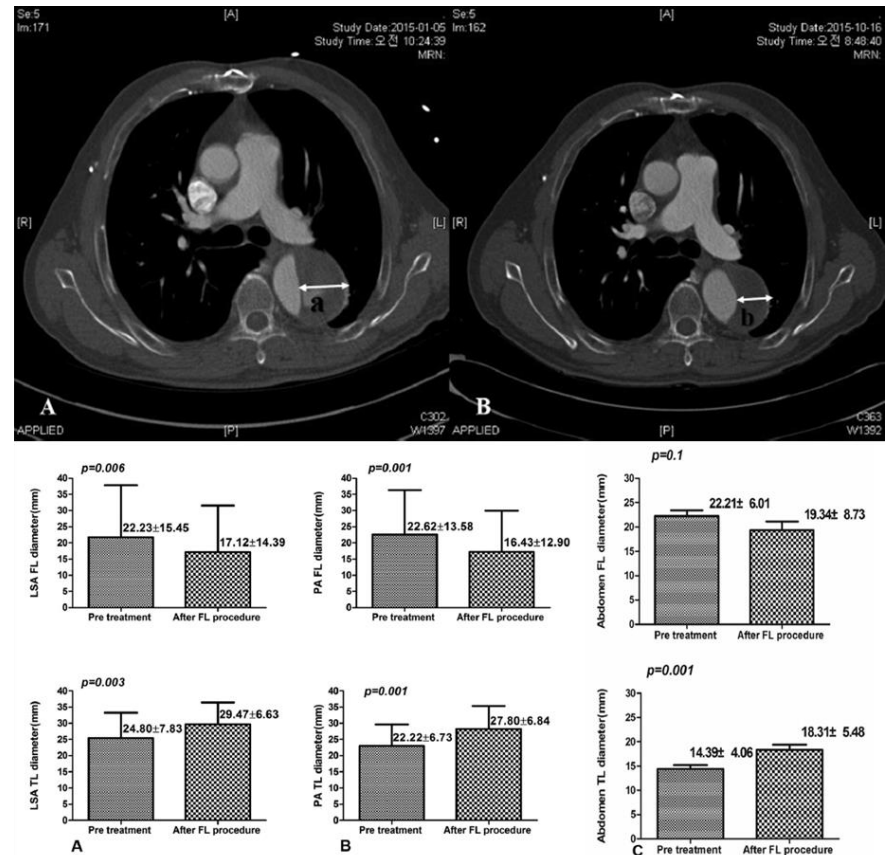


Fig 3. Mean diameter of three levels of aorta before and after treatment. Comparison of pretreatment and posttreatment at (A) left subclavian artery (LSA) level, (B) pulmonary artery bifurcation (PA) level, and (C) abdomen (celiac artery) level. (FL = false lumen; TL = true lumen.)

The effect of false lumen procedures during thoracic endovascular aortic repair in patients with chronic DeBakey type IIIB dissections



Tae-Hoon Kim, MD,^a Suk-Won Song, MD, PhD,^a Kwang-Hun Lee, MD, PhD,^b Min-Young Baek, RN,^a Kyung-Jong Yoo, MD, PhD,^c and Bum-Koo Cho, MD, PhD,^d Seoul, Republic of Korea

ABSTRACT

Objective: Although thoracic endovascular aortic repair (TEVAR) is commonly used for chronic DeBakey type IIIB (CDIIIB) dissections, aortic remodeling outcomes after the procedure have been unsatisfactory. Persistent retrograde flow to the false lumen (FL) through re-entry tears commonly causes treatment failure. The aim of this study was to clarify the safety and effect of the FL procedure (FLP) for aortic remodeling in patients with CDIIIB dissections.

Methods: From 2012 to 2016, there were 73 patients who underwent TEVAR for CDIIIB dissections. The surgery, accompanied by the FLP, was performed in 41 patients (group A, 56%); 32 patients (group B, 44%) underwent TEVAR alone. The FLP was defined as blocking the retrograde FL flow with commercial materials. Outcomes included whole thoracic aorta FL thrombosis and diameter change in the true lumen and FL. Diameters were measured at three levels (left subclavian artery, pulmonary artery bifurcation, and celiac axis).

Results: No in-hospital mortality was observed. There was one case each of paraplegia and stroke postoperatively. The whole thoracic aorta FL thrombosis rate was significantly higher in group A (83% vs 56%; $P = .002$). Significant aortic remodeling (true lumen expansion and FL regression) was observed in both groups. In multivariable Cox regression analysis, the FLP and the number of re-entries were independent predictors for thoracic FL thrombosis (hazard ratio, 2.339 [$P = .009$] and 0.709 [$P < .001$], respectively).

Conclusions: Full-coverage TEVAR with the FLP seems to be a safe endovascular treatment and promotes thoracic FL thrombosis for patients with CDIIIB dissections. (J Vasc Surg 2018;68:976-84.)

Keywords: Chronic DeBakey IIIB; Dissection; False lumen procedure; TEVAR



Remodeling of False Lumen (2)

Table II. Procedural details and clinical outcome

Operative results ^a	Group A (n = 41)	Group B (n = 32)	P value ^b
30-Day mortality	0 (0)	0 (0)	
In-hospital mortality	0 (0)	0 (0)	
Hospital stay, days	9.7 ± 10.3 (6.0, 3.5-12.5)	9.1 ± 8.3 (7.0, 5.0-10.5)	.589
ICU stay, hours	29.5 ± 35.0 (23.4, 17.9-28.7)	27.8 ± 13.2 (25.3, 20.8-28.7)	.301
TFT	34 (82.9)	15 (56.3)	.002
Complication			
Spinal cord ischemia	0 (0)	0 (0)	
CSF complication	5 (12.2)	3 (9.4)	>.999
Access site complication	1 (2.4)	1 (3.1)	>.999
Ischemic stroke	1 (2.4)	0 (0)	>.999
Cerebral hemorrhage	0 (0)	0 (0)	
Pulmonary	0 (0)	0 (0)	
Cardiac	0 (0)	0 (0)	
Renal	0 (0)	0 (0)	
Gastrointestinal	0 (0)	0 (0)	
Endoleak	9 (22.0)	5 (15.6)	.551
Iatrogenic retrograde dissection	1 (2.4)	0 (0)	>.999
Reintervention	5 (12.2)	5 (15.6)	>.999
Full coverage of DTA	32 (78.0)	21 (62.5)	.294
CSF drain	30 (73.2)	24 (75.0)	>.999
Time from dissection to intervention, months	19.0 ± 33.0 (11.9, 4.1-36.9)	18.1 ± 18.0 (7.2, 3.7-29.9)	.612
Imaging follow-up, months	18.0 ± 10.5 (18.7, 8.0-25.4)	15.1 ± 9.2 (17.8, 6.8-23.0)	.241
Follow-up, months	23.9 ± 11.4 (23.4, 14.8-34.9)	28.2 ± 12.6 (30.1, 16.3-40.1)	.112
Time from initial procedure to TFT, months	11.5 ± 11.4 (7.8, 1.5-20.3)	11.7 ± 9.6 (8.1, 2.9-20.6)	.613
Time from last procedure to TFT, months	6.1 ± 6.8 (3.6, 0.9-7.8)	9.6 ± 8.3 (6.7, 2.6-19.1)	.047
No. of procedures	1.7 ± 0.7 (2.0, 1.0-2.0)	1.2 ± 0.4 (1.0, 1.0-1.0)	<.001
FLP			
Concomitant first TEVAR with FLP	21 (51.2)		
Concomitant second TEVAR with FLP	7 (17.1)		
Isolated FLP after initial TEVAR	13 (31.7)		

CSF, Cerebrospinal fluid; DTA, descending thoracic aorta; FLP, false lumen procedure; ICU, intensive care unit; TEVAR, thoracic endovascular aortic repair; TFT, thoracic false lumen thrombosis.

^aValues are expressed as mean ± standard deviation (median, interquartile range) for continuous data or number (%) for categorical data.

^bP value was calculated on Mann-Whitney U test and Fisher exact test.

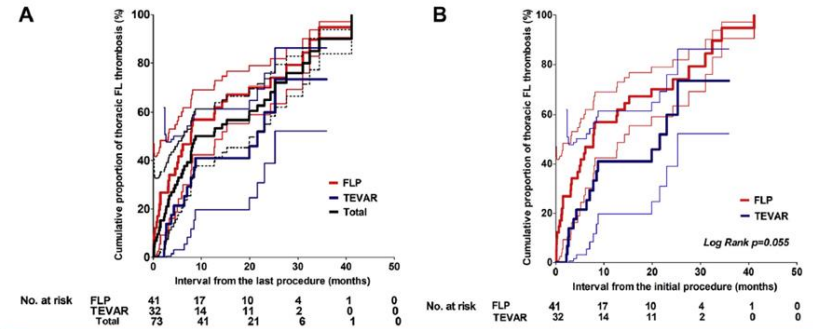


Fig 3. A. Kaplan-Meier curve for cumulative proportion of thoracic false lumen (FL) thrombosis (TFT) in entire cohort false lumen procedure (FLP) group (group A), and thoracic endovascular aortic repair (TEVAR) group (group B). B. Kaplan-Meier curve for cumulative proportion of TFT comparing FLP (group A) vs TEVAR (group B) by log-rank method. The black dotted line and the blue and red thin solid lines are 95% confidence intervals (CIs).

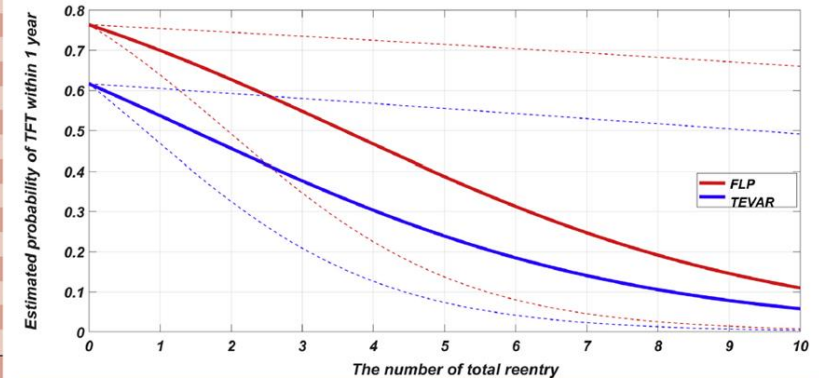


Fig 4. Estimated probability of thoracic false lumen thrombosis (TFT) within 1 year. The dotted lines are 95% confidence intervals (CIs). FLP, False lumen procedure; TEVAR, thoracic endovascular aortic repair.

Outcomes of Stentless Thoracic Endovascular Aortic Repair for Chronic DeBakey IIIb Aneurysms



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Background. We introduce a new endovascular procedure for favorable aortic remodeling in patients with chronic DeBakey IIIb (CDIIIb) aneurysms and present outcomes.

Methods. This study included 19 patients who underwent stentless thoracic endovascular aortic repair (TEVAR) for CDIIIb aneurysms between 2014 and 2016. Stentless TEVAR is defined as an endovascular procedure involving closure of communicating channels or obliteration of the false lumen itself using various materials. Thoracic false lumen thrombosis was defined as there was no flow in the false lumen of the thoracic aorta. Aortic diameter was measured at 3 levels (left subclavian artery, pulmonary artery bifurcation, and celiac axis).

Results. Fifteen of 19 (78.9%) patients demonstrated thoracic false lumen thrombosis. There was no mortality, and the mean follow-up duration was 16.8 months. False and true lumen diameters at the left subclavian and

pulmonary artery levels significantly changed after the procedure (false lumen: 22.6 ± 16.6 versus 16.1 ± 14.4 mm, 23.2 ± 14.6 versus 18.0 ± 13.2 mm, $p = 0.001$ and $p = 0.002$, respectively; true lumen: 22.7 ± 8.7 versus 27.9 ± 6.3 mm, 19.0 ± 8.3 versus 24.3 ± 6.7 mm, $p = 0.001$ and $p = 0.001$, respectively). The number of visceral stent grafts and preoperative true lumen diameter at the pulmonary artery were independent predictors for thoracic false lumen thrombosis (hazard ratio, 3.445, 95% confidence interval, 1.494 to 7.946; $p = 0.004$; and hazard ratio, 1.106; 95% confidence interval, 1.029 to 1.189; $p = 0.006$, respectively).

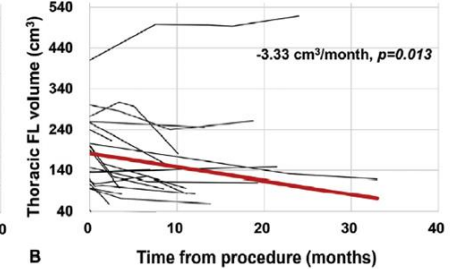
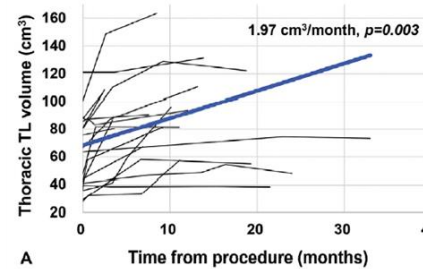
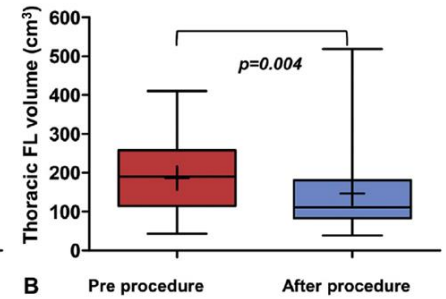
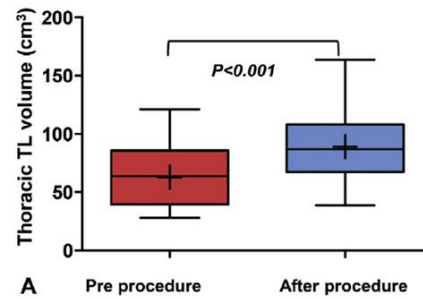
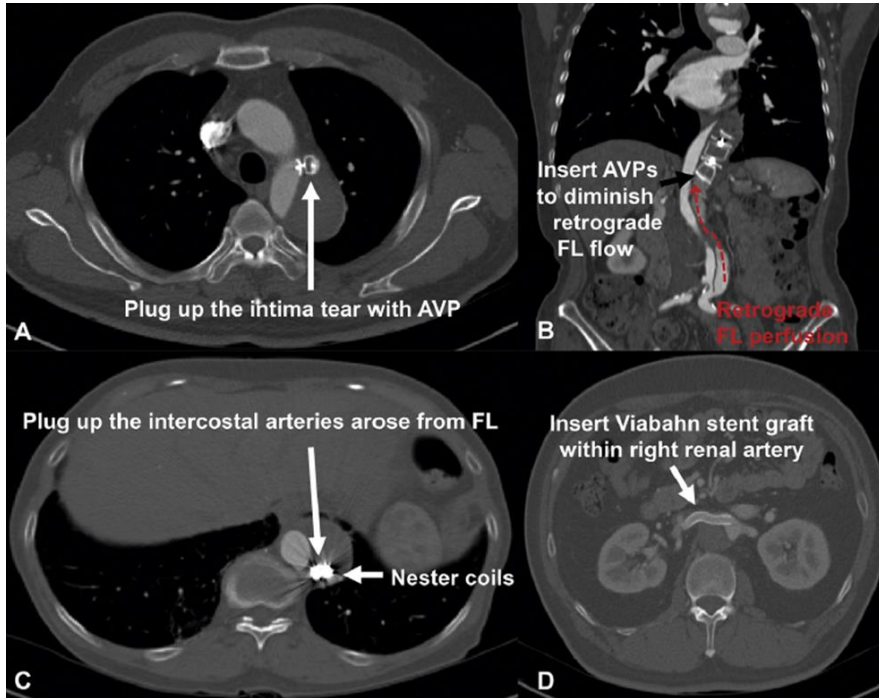
Conclusions. Stentless TEVAR seems to be a safe procedure and enables favorable aortic remodeling. Thus, this technique can be useful in a selected group of patients with CDIIIb aneurysms.

(Ann Thorac Surg 2018;106:1308–15)

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Remodeling of False Lumen (3)



False Lumen Procedure (Stentless TEVAR)

Results in a promising FL thrombosis rate

Favorable aortic remodeling

Low incidence of complications

Acceptable re-intervention rates

Should be considered in patients with severe comorbidities

Could be considered in ruptured CDIIIb

