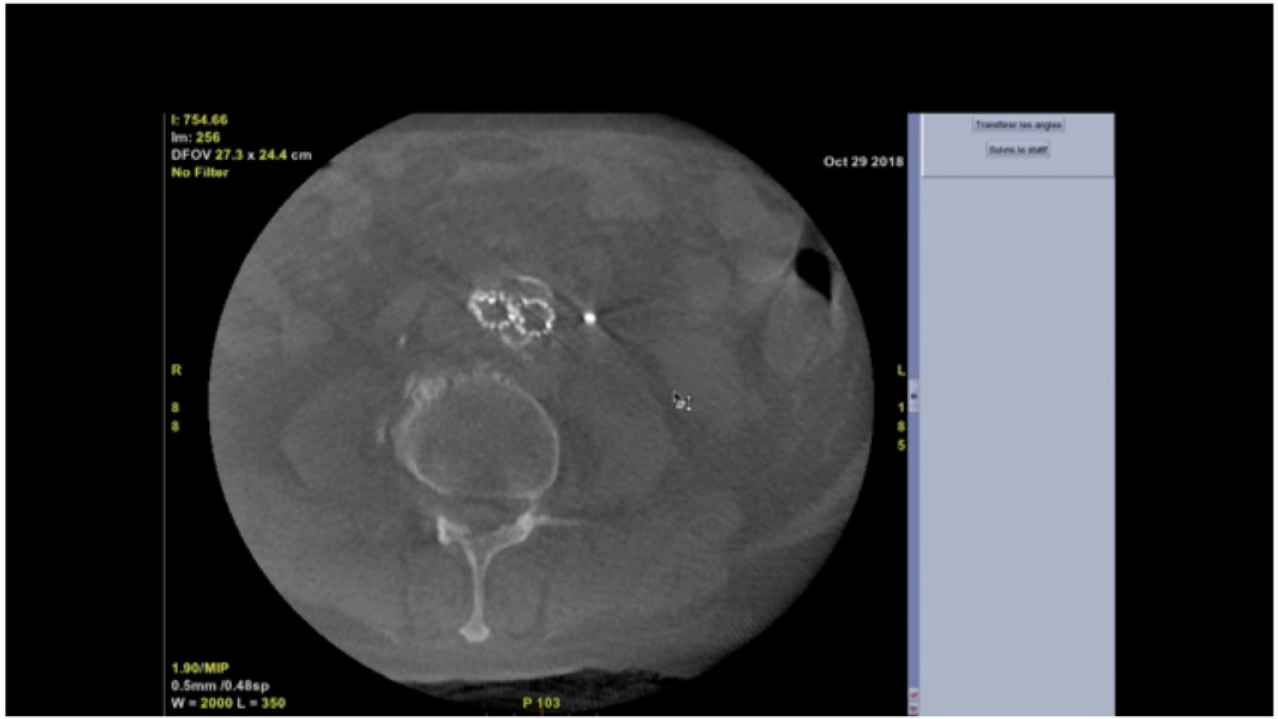
Requirements for a Durable Endo-repair in Aortic Arch

Stéphan Haulon,
D. Fabre, S. Mussot, O. Mercier, D. Mitilian, E. Fadel

Centre de l'Aorte, Hôpital Marie Lannelongue,
Université Paris Sud, France

Disclosures

- Research support, Consulting
  - Cook Medical, GE Healthcare, Bentley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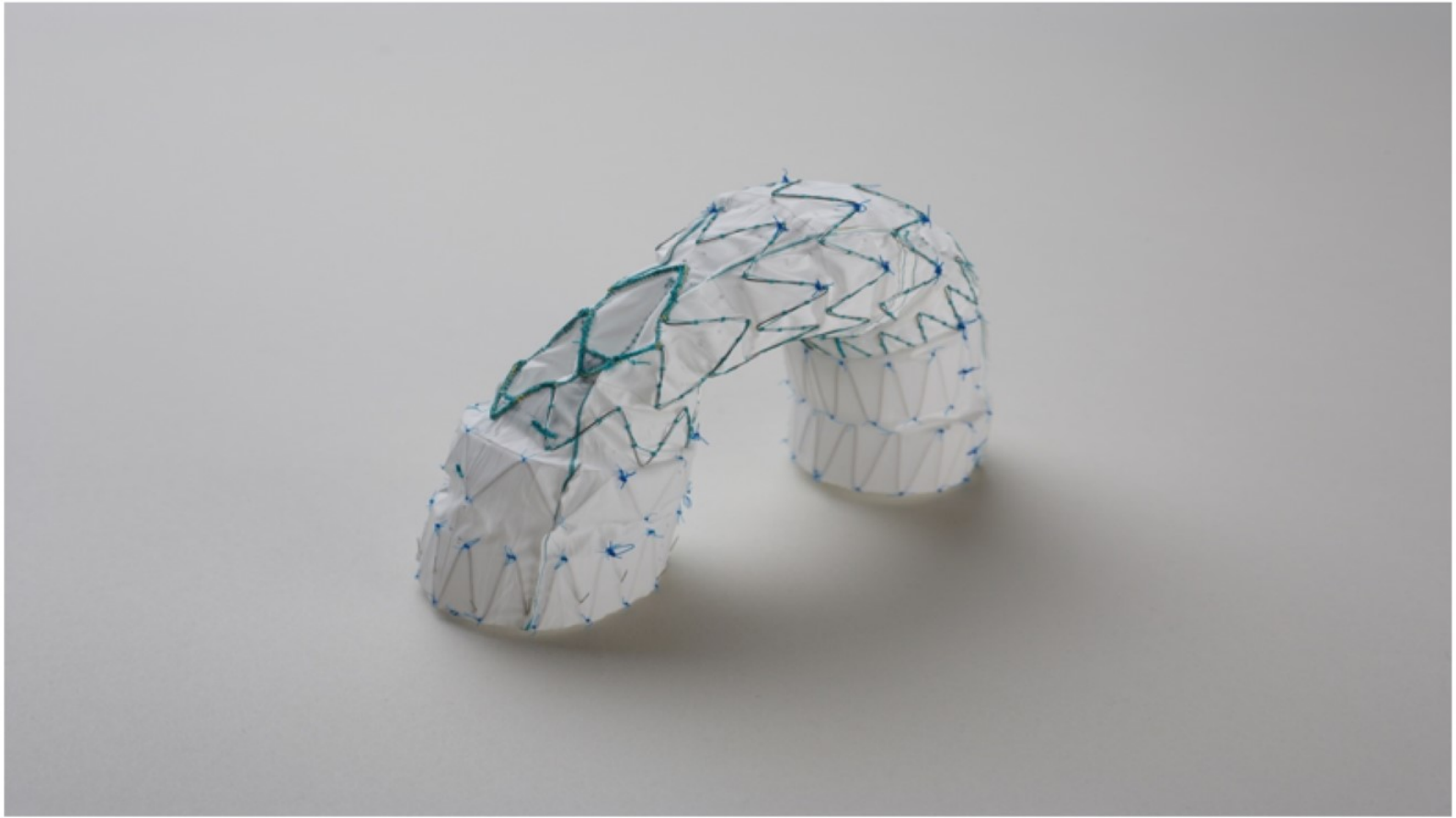

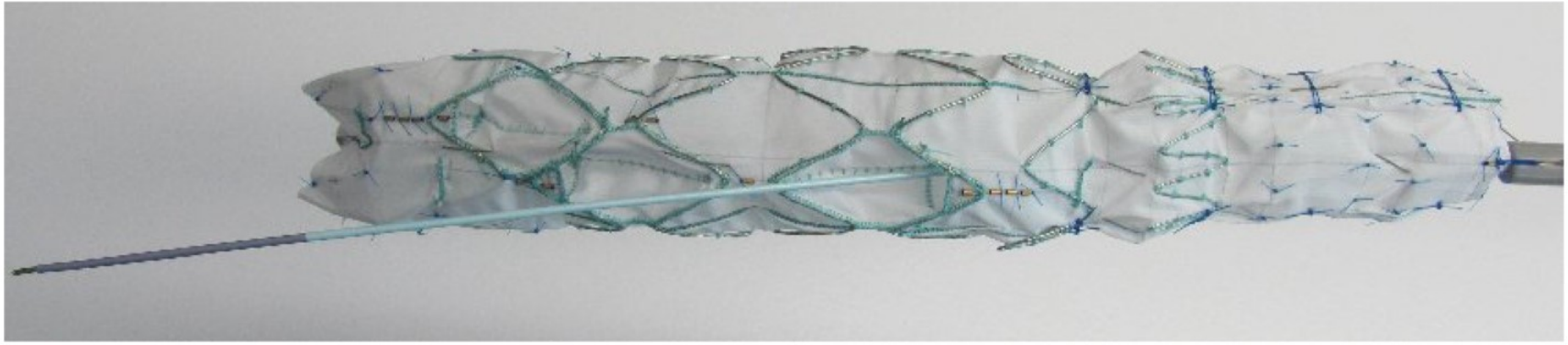

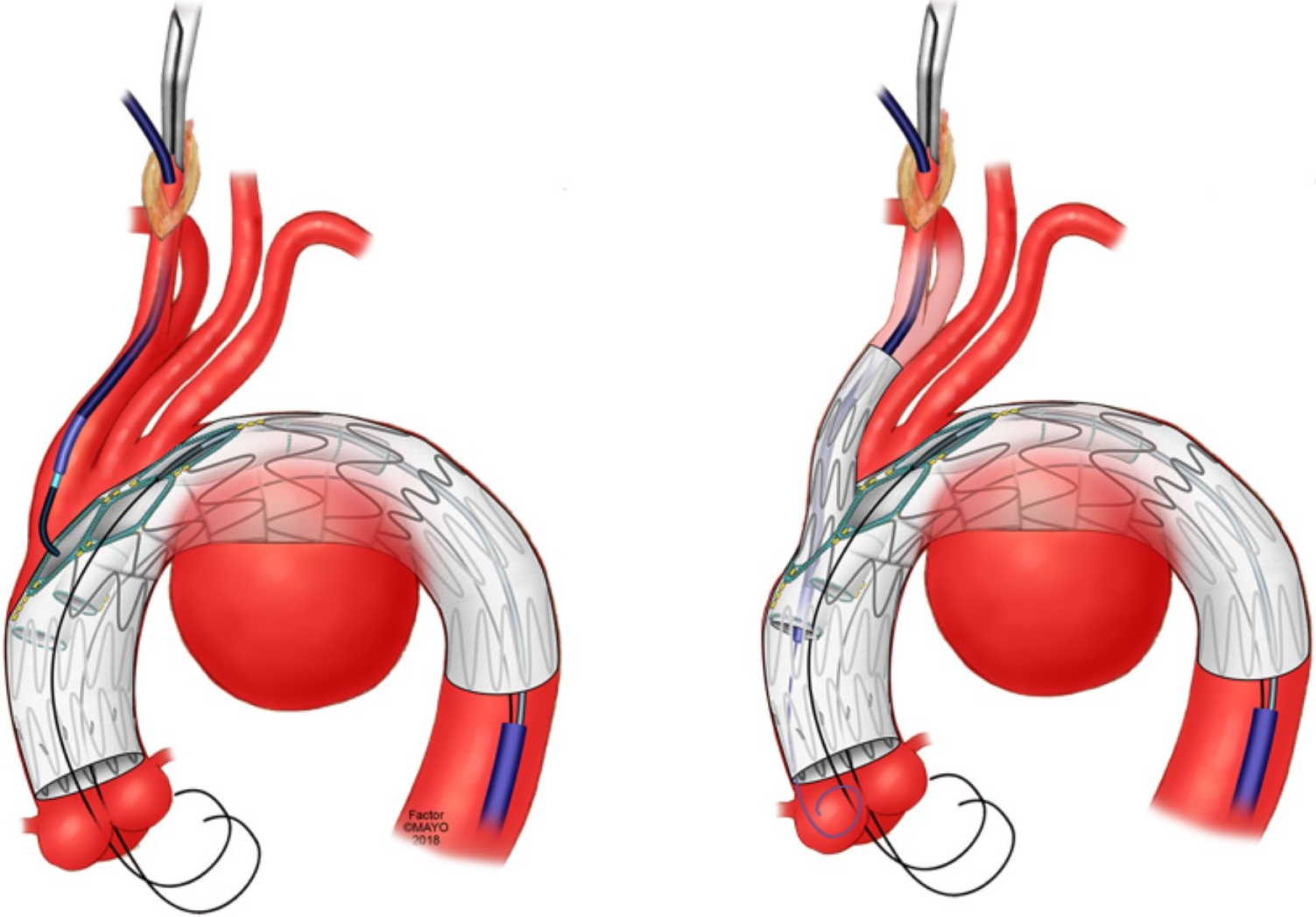
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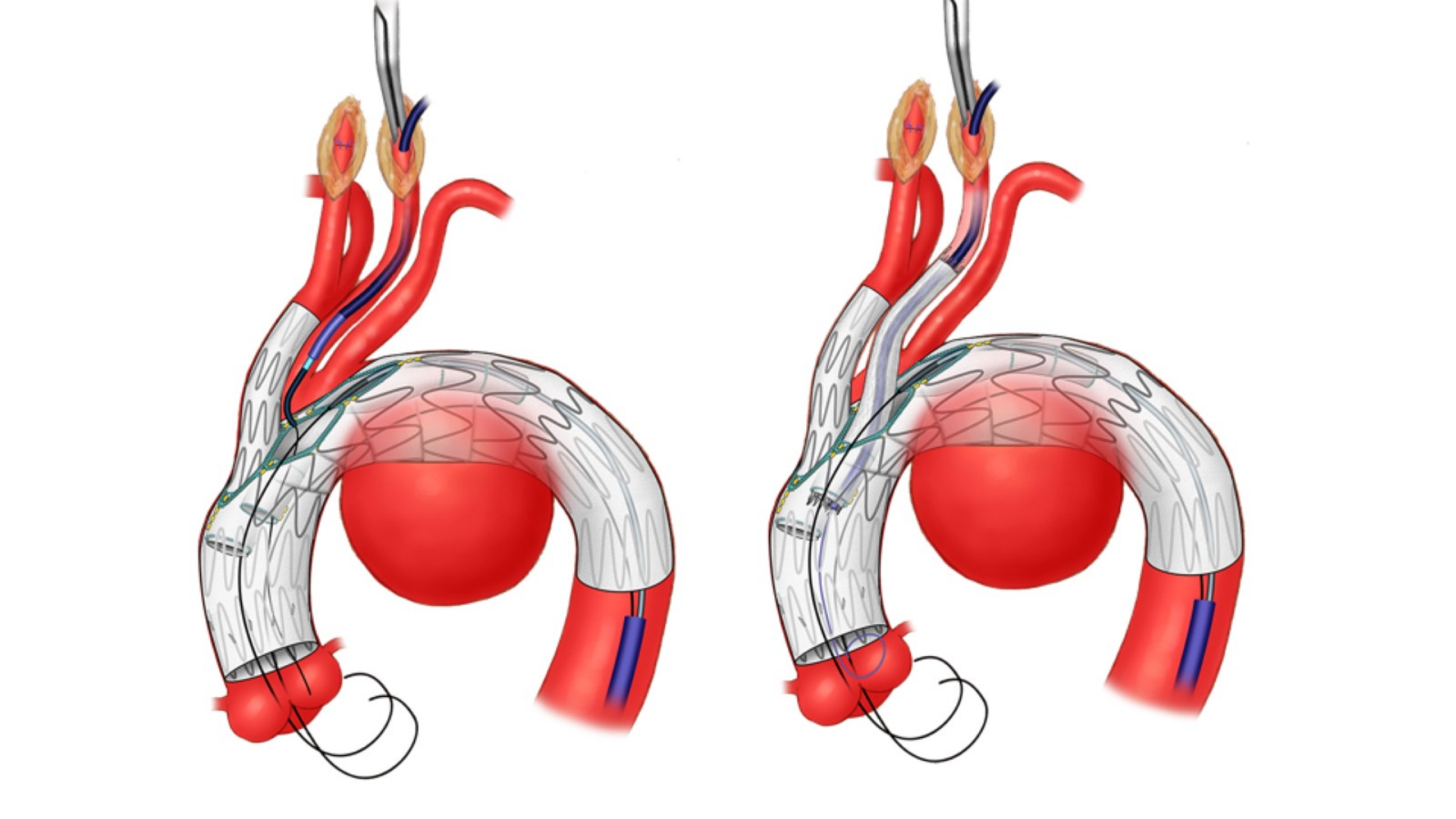
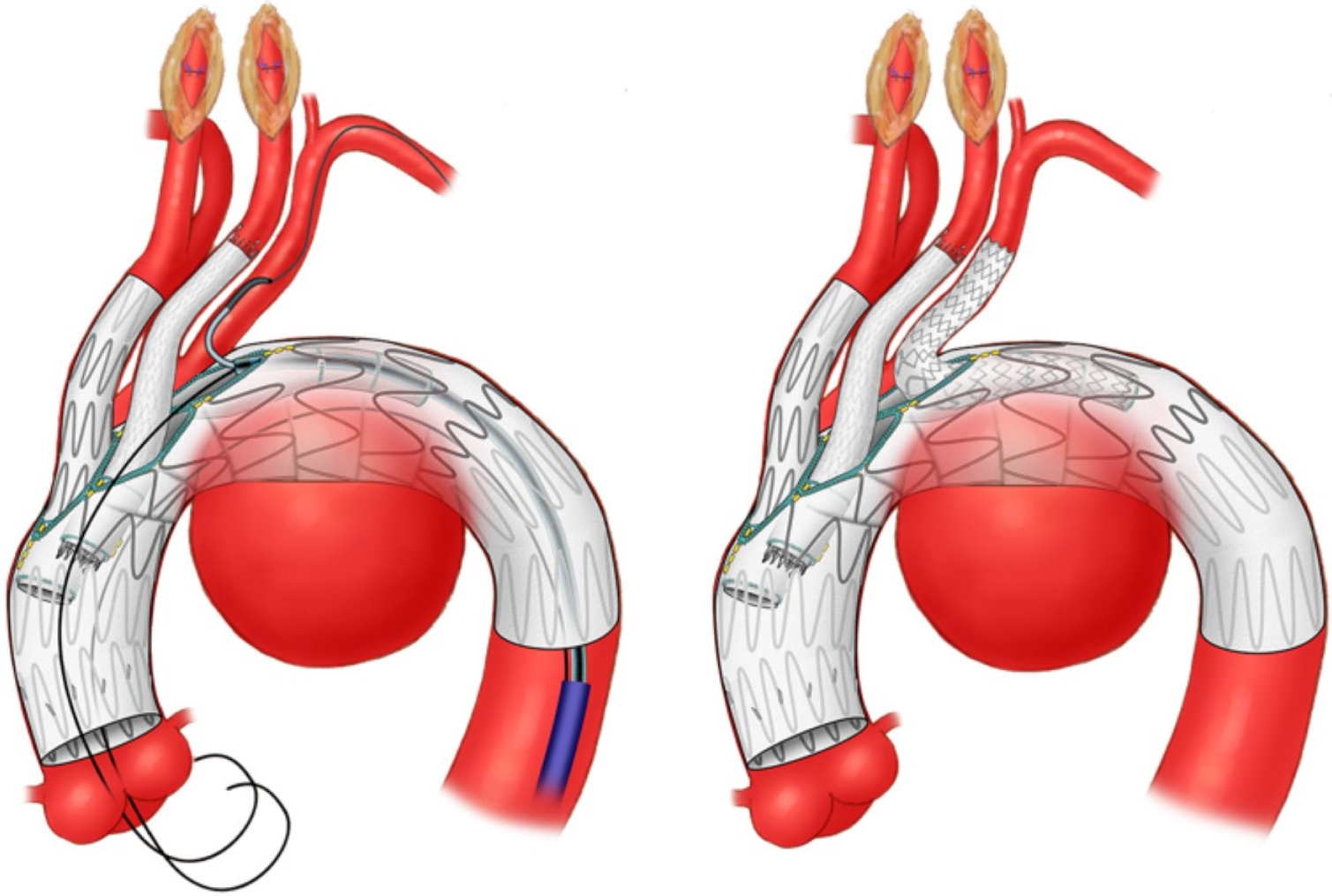




Global experience with an inner branched arch endograft

Stéphan Haulon, MD, PhD,[a] Roy K. Greenberg, MD,[b] Rafaëlle Spear, MD,[a] Matt Eagleton, MD,[b] Cherrie Abraham, MD,[c] Christos Lioupis, MD,[c] Eric Verhoeven, MD, PhD,[d] Krassi Ivancev, MD,[e] Tilo Kölbel, MD, PhD,[f] Brendan Stanley, MD,[g] Timothy Resch, MD,[h] Pascal Desgranges, MD, PhD,[i] Blandine Maurel, MD,[a] Blayne Roeder, PhD,[j] Timothy Chuter, MD,[k] and Tara Mastracci, MD[b]

Background: Branched endografts are a new option to treat arch aneurysm in high-risk patients.

Methods and results: We performed a retrospective multicenter analysis of all patients with arch aneurysms treated with a new branched endograft designed with 2 inner branches to perfuse the supra aortic trunks. Thirty-eight patients were included. The median age was 71 years (range, 64-74 years). An American Society of Anesthesiologists score of 3 or 4 was reported in 89.5% (95% confidence interval [CI], 79.7-99.3) of patients. The 30-day mortality rate was 13.2% (95% CI, 2.2-24.2). Technical success was obtained in 32 patients (84.2% [95% CI, 72.4-95.9]). Early secondary procedures were performed in 4 patients (10.5% [95% CI, 0.7-20.3]). Early cerebrovascular complications were diagnosed in 6 patients (15.8% [95% CI, 4.0-27.6]), including 4 transient ischemic attacks, 1 stroke, and 1 subarachnoid hemorrhage. The median follow-up was 12 months (range, 6-12 months). During follow-up, no aneurysm-related death was detected. Secondary procedures during follow-up were performed in 3 patients (9.1% [95% CI, 0.0-19.1]), including 1 conversion to open surgery. We compared the first 10 patients (early experience group) with the subsequent 28 patients. Intraoperative complications and secondary procedures were significantly higher in the early experience group. Although not statistically significant, the early mortality was higher in the early experience group (30% [95% CI, 0.0-60.0]) versus the remainder (7.1% [95% CI, 0.0-16.9]; $P = .066$). Being part of the early experience group and ascending aortic diameter $\geq$38 mm were found to be associated to higher rates of combined early mortality and neurologic complications.

Conclusions: Our preliminary study confirms the feasibility and safety of the endovascular repair of arch aneurysms in selected patients who may not have other conventional options. Clinical trial registration information: Thoracic IDE NCT00583817, FDA IDE# 000101. (J Thorac Cardiovasc Surg 2014; ■:1-8)

Eur J Vasc Endovasc Surg (2016) 51, 380–385

Early neurologic events:
2 major and one minor strokes (11%)

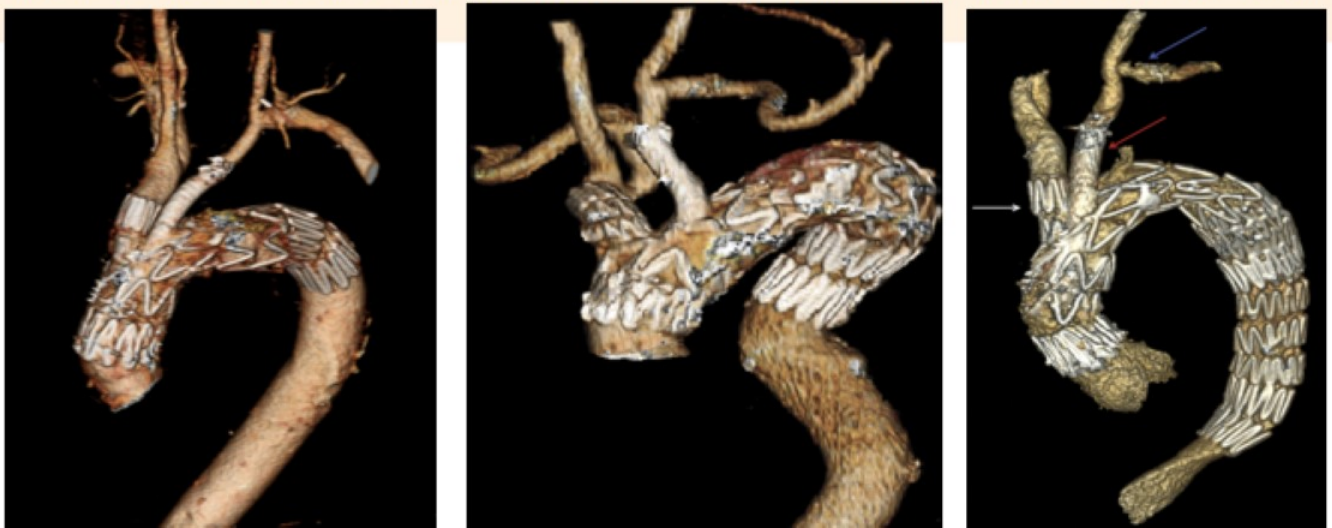
Editor's Choice — Subsequent Results for Arch Aneurysm Repair with Inner Branched Endografts,☆

R. Spear [a], S. Haulon [a,*], T. Ohki [b], N. Tsilimparis [c], Y. Kanaoka [b], C.P.E. Milne [a], S. Debus [c], R. Takizawa [b], T. Kölbel [c]

[a] Aortic Centre, CHRU Lille, France
[b] Vascular Surgery, Jikei University, Tokyo, Japan
[c] German Aortic Center, University Heart Center Hamburg, Germany

WHAT THIS STUDY ADDS

This study reports early outcomes following endovascular repair of arch aneurysms in patients unfit for open surgery and is the first evaluation of arch aneurysm endovascular repair performed after the initial learning curve.

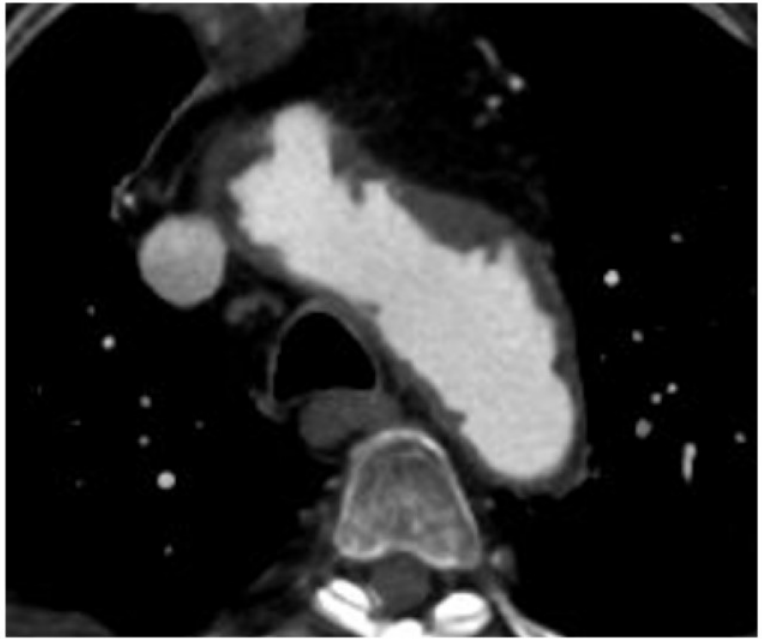


Inner Branched Arch Endografts following Ascending Open Repair

- 70 patients
- In-hospital combined mortality and stroke rate was 4% (n=3)
  - one minor stroke, one major stroke causing death, and one death following multi-organ failure.
- Technical success rate was 97%

Institution	Patients included
CHU Lille and Hôpital Marie Lannelongue, France	21
German Aortic Center, Hamburg, Germany	20
Skåne University Hospital, Malmö, Sweden	6
Uppsala University, Uppsala, Sweden	5
Cleveland Clinic Foundation, Cleveland, United States	4
Casa de Saúde São José, Rio de Janeiro, Brazil	3
Maastricht University Medical Center, Maastricht, The Netherlands	3
St Thomas' Hospital, London, United Kingdom	2
Department of Vascular Surgery, University of Regensburg, Regensburg, Germany	2
University Hospitals Birmingham NHS Foundation Trust, Birmingham, United Kingdom	1
Department of Surgery, The University of Hong Kong, Hong Kong	1
CHU de Nantes, Nantes, France	1
Medical University of Warsaw, Warsaw, Poland	1

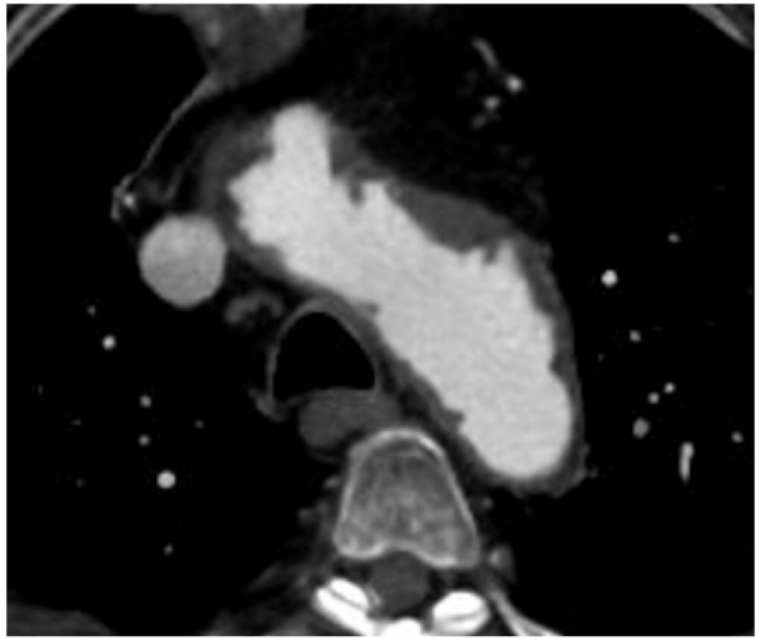
Reduce Stroke Risk



Risk Factors for Stroke

- Predictors:
  - LSCA/Zone 2 coverage
  - History of prior stroke
    (OR 9.4, p 0.002)
  - Extensive arch atheroma
    (OR 14.8, p 0.0016)

- Stroke was associated with 33% in-hospital mortality

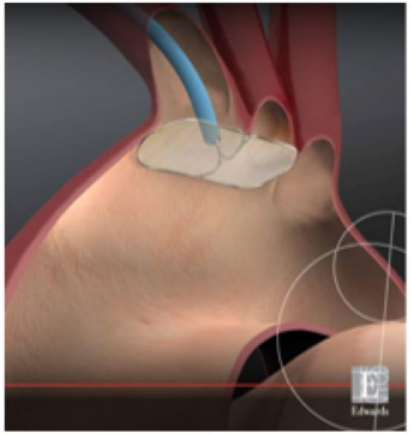


Gutsche, et al. *Ann Thorac Surg* 2007

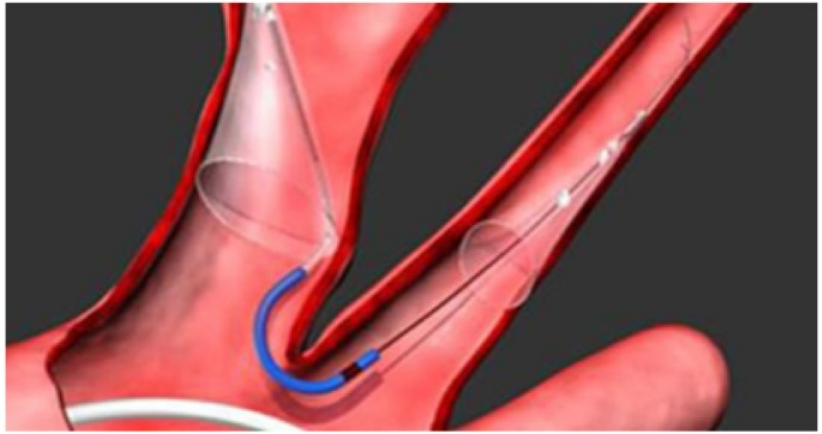
Reduce Stroke Risk

- Patient selection
- Absolute CI
- « Center line » navigation
  - Fusion
  - Steerable sheaths / robotic

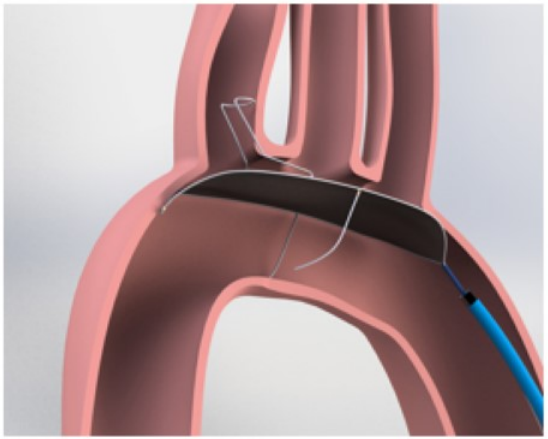
Embolic Protection



Embrella

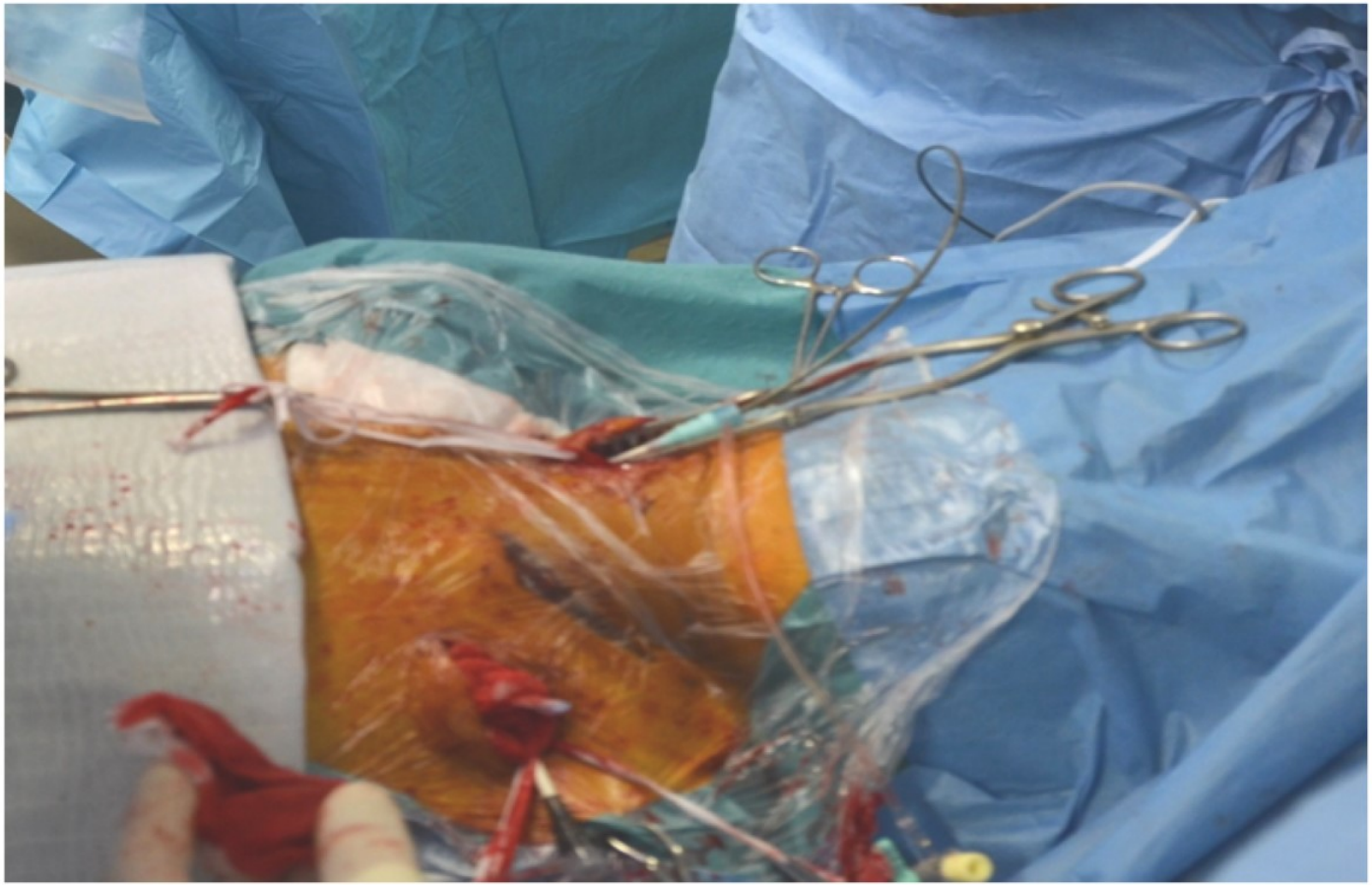


Sentinel



TriGuard

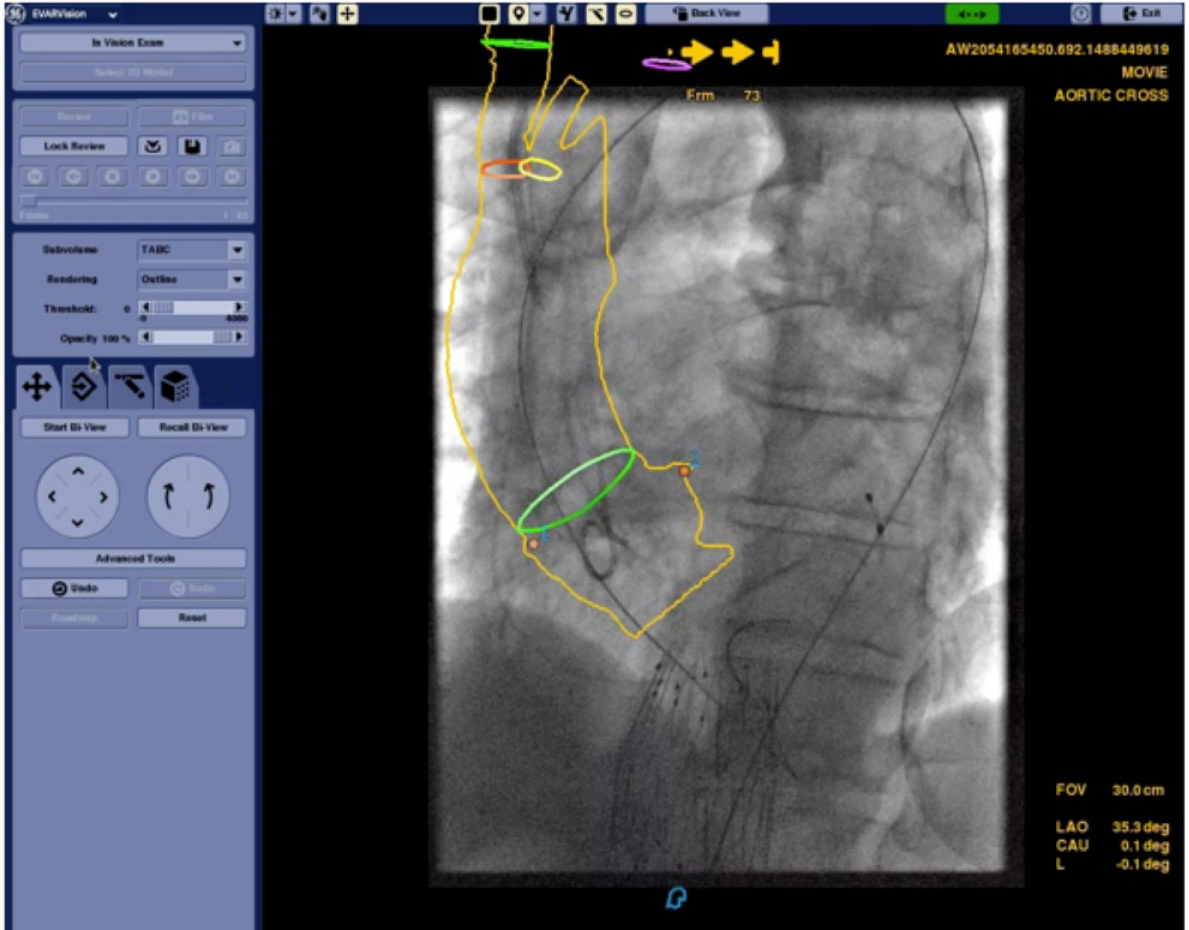
Sheath in the RCC



Reduce Stroke Risk

- Aggressive anticoagulation
- 100 UI/kg
- Monitoring ACT>300s

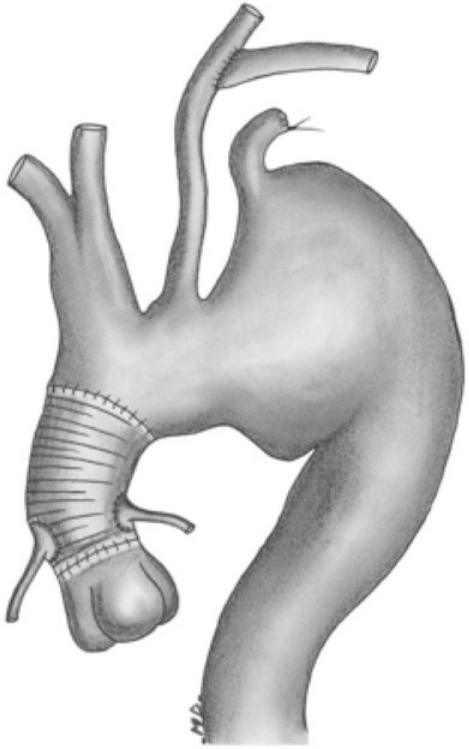
Endograft Delivery System through the Arch



Reduce Stroke Risk

- Reduce Introducer profile
- Stiff double curved wire into LV
- Trans apical or trans septal


TeraRecon



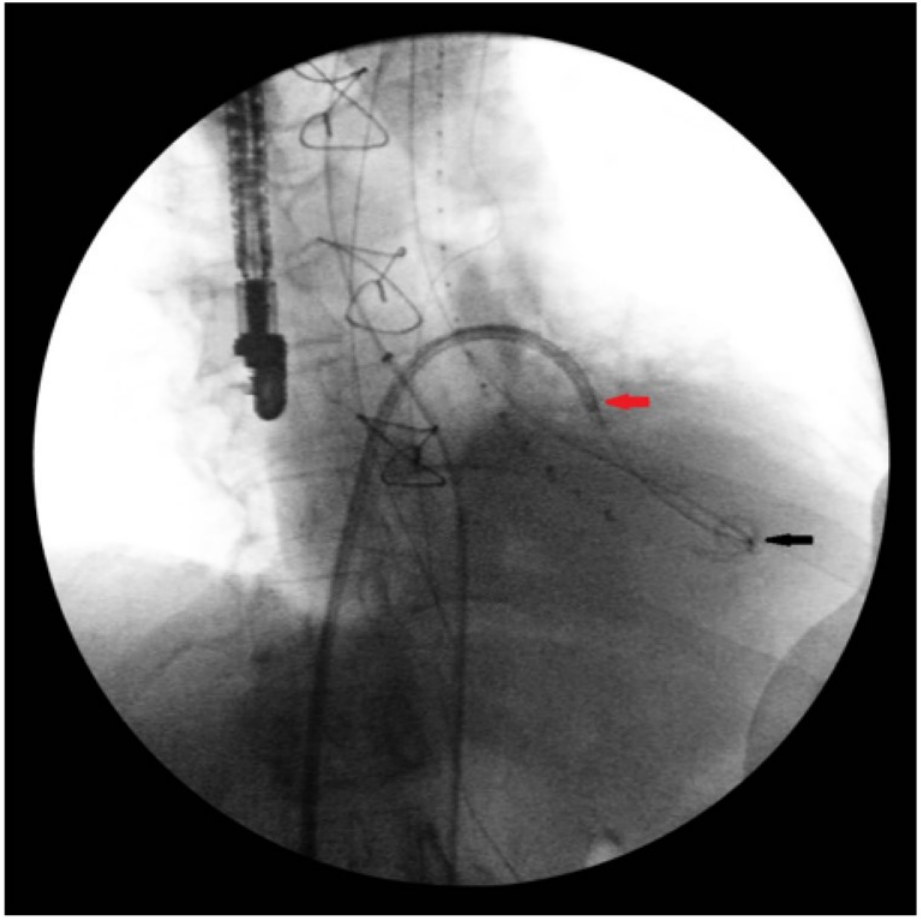
J ENDOVASC THER
2010;17:744–749

◆TECHNICAL NOTE

An Externalized Transseptal Guidewire Technique to Facilitate Guidewire Stabilization and Stent-Graft Passage in the Aortic Arch

Tilo Kölbel, MD; Thomas Rostock, MD; Axel Larena-Avellaneda, MD; Hendrik Treede, MD; Olaf Franzen, MD; and Eike Sebastian Debus, MD

University Heart Center Hamburg Eppendorf, Germany.

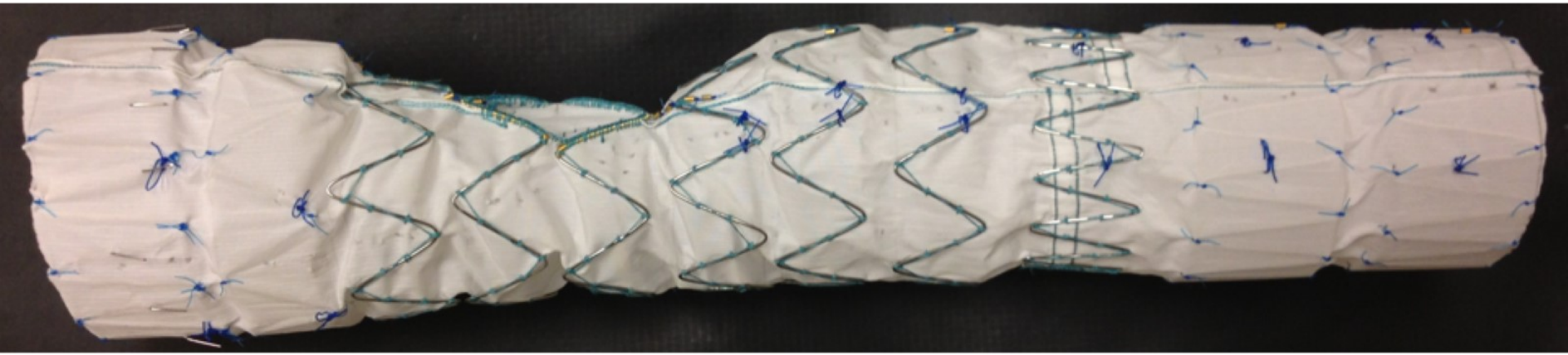


Completion Angiogram and post

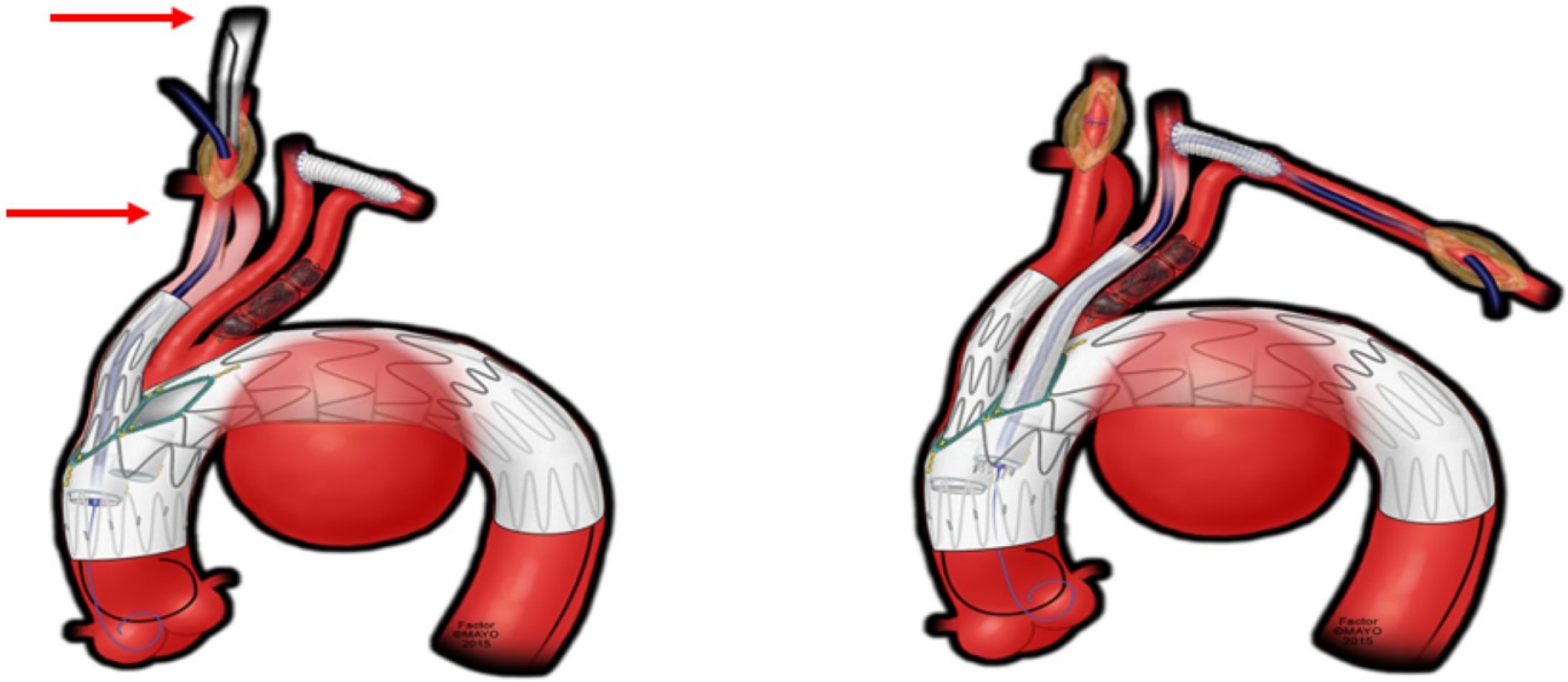
Catheterization

Endovascular Aortic Repair - Edited by Gustavo Oderich, Springer

Catheterization



Inserting Bridging Stent



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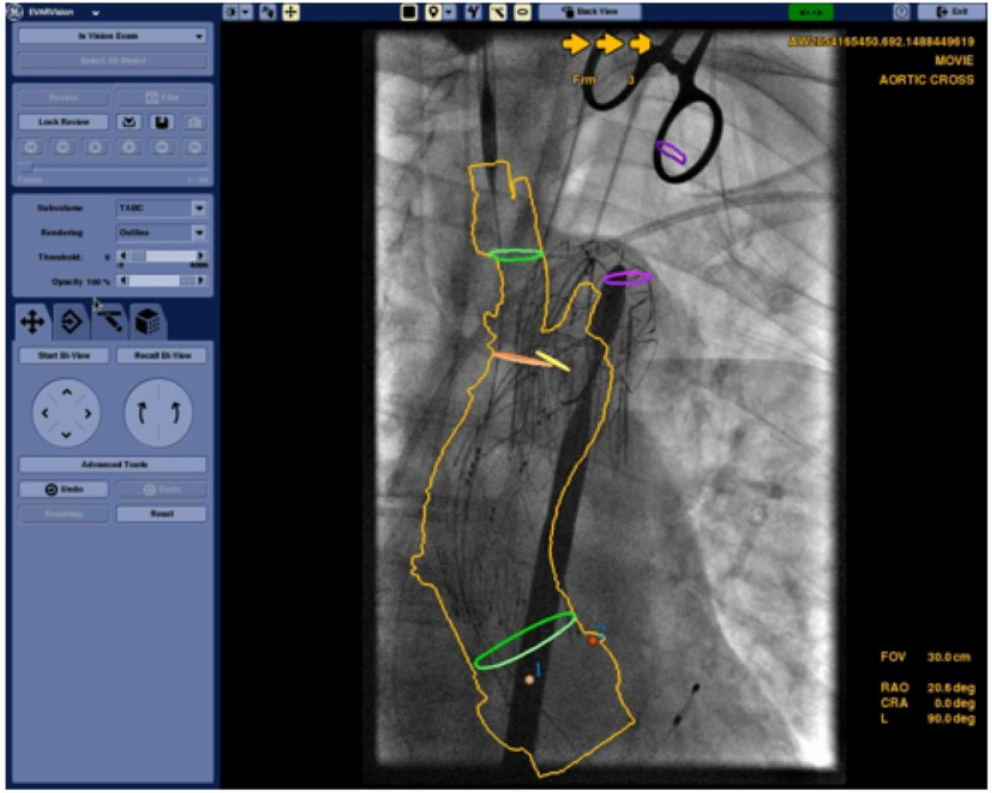
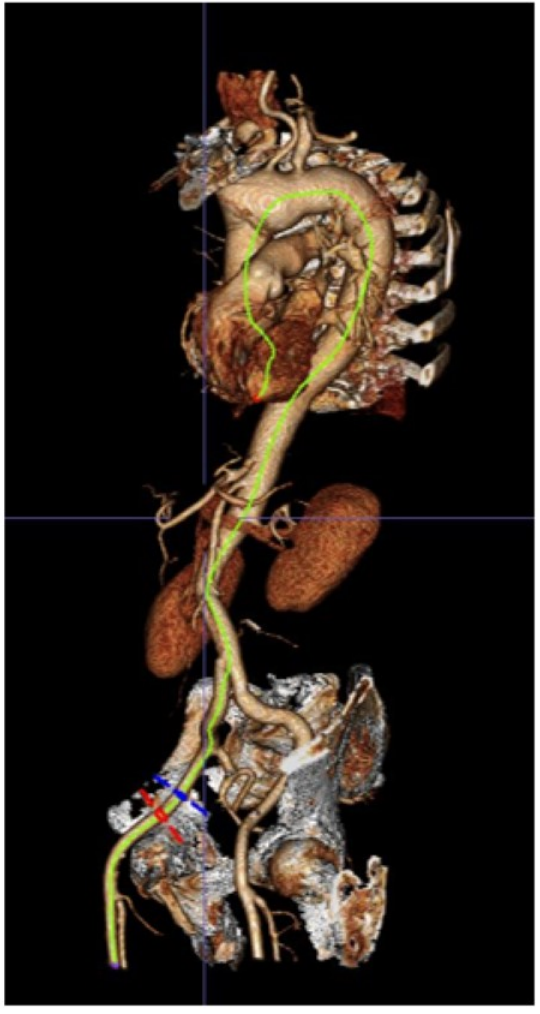
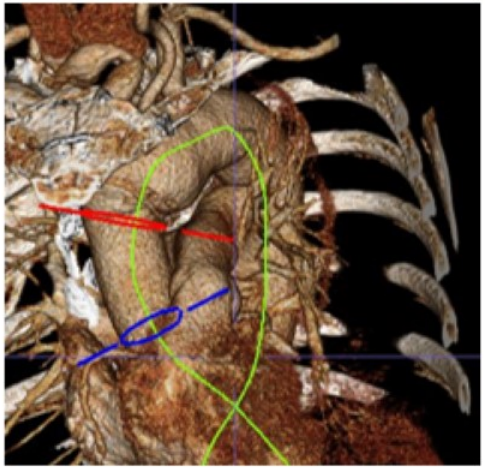
Inserting Bridging Stent



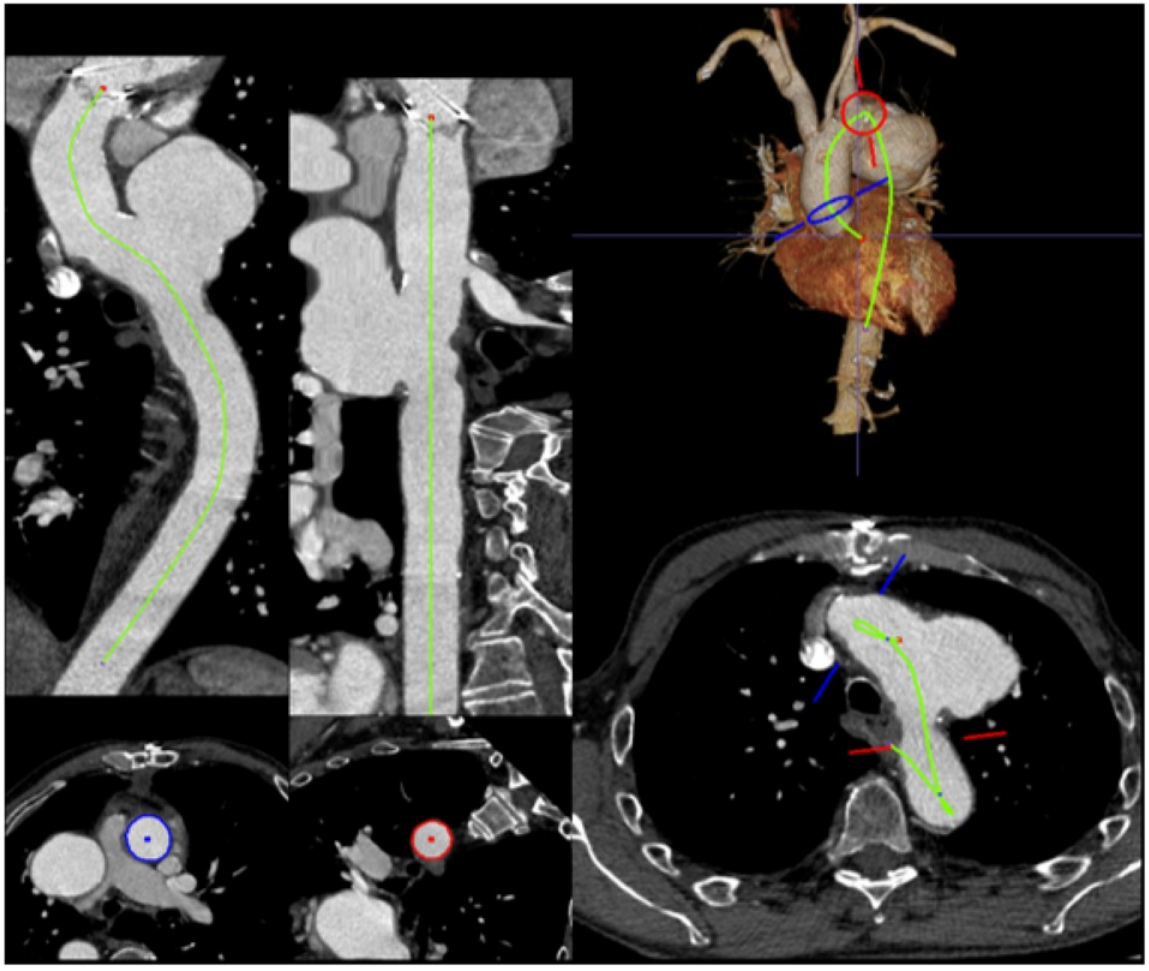
Inserting Bridging Stent

- Direct route from RCC & LCC
- Clamp RCC & LCC
- Fusion mask



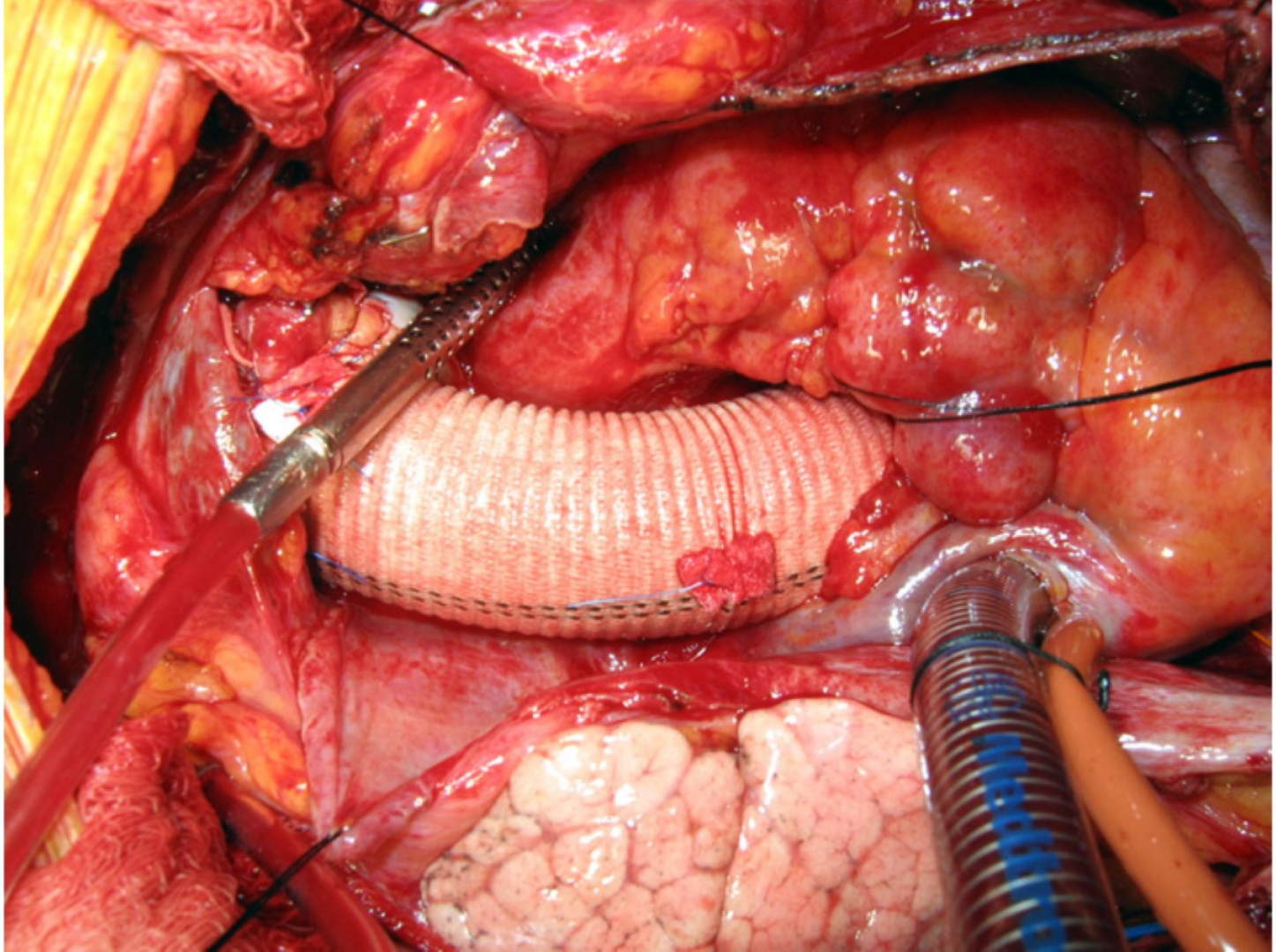


Preoperative measurements with CPR on workstation



PROXIMAL SEAL - No Compromise!

- Prox neck length>25mm
- Asc Aorta diam<38mm



Previous Ascending Repair

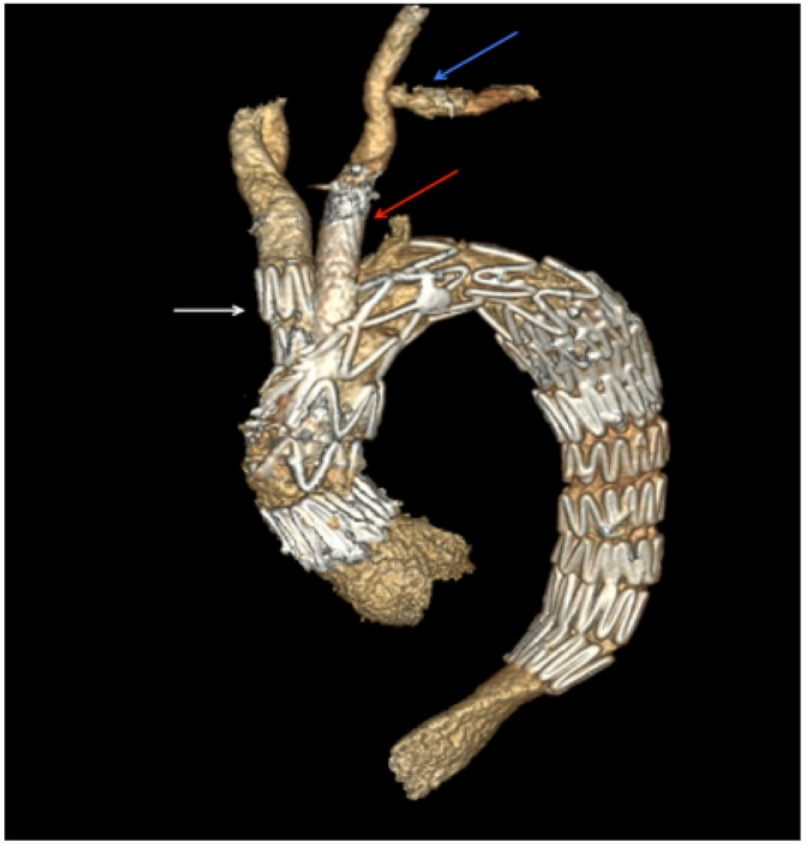
Table 2. Ascending Aorta (Proximal Landing Zone) Variables

Variables	No.	Mean	SD	Range
Measurements				
Maximum diameter of graft in AA, mm	73	33.4	3.2	26–42
Length from coronary sinus to				
Distal anastomosis, mm	73	42.1	20.4	2–85
IA, mm	73	52.3	19.7	9–99
		Median	Q1, Q3	Range
Length from distal anastomosis to IA, mm	73	7	0, 17	0–54

Landing zone characteristics	Yes No. (%)	No No. (%)
Suitable proximal landing zone?	52/73 (71.2)	21/73 (28.8)
Reasons for unsuitability		
AA graft too short (<40 mm)	15/21 (71.4)	
Major kink (≥90 degrees) in AA graft	5/21 (23.8)	
AA graft diameter too large (>38 mm)	1/21 (4.8)	

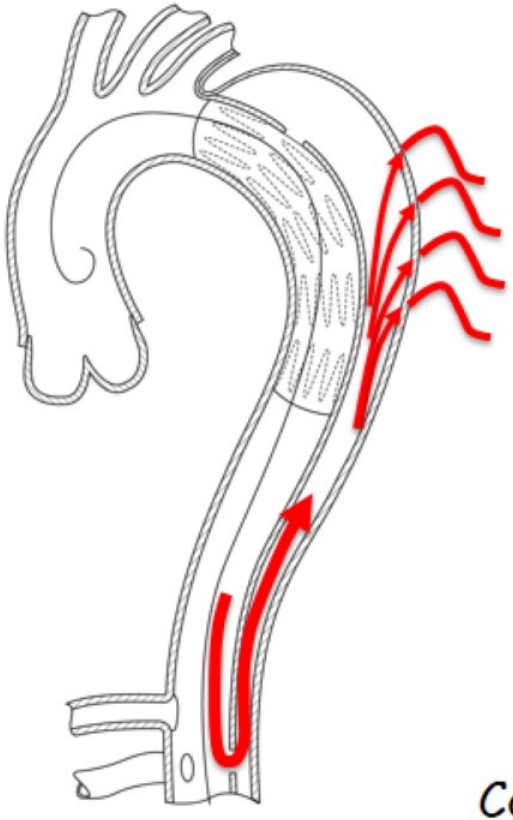
AA = ascending aorta; IA = innominate artery; Q1 = quartile 1 (25th percentile); Q3 = quartile 3 (75th percentile); SD = standard deviation.

Milne CPE et al. Ann Thorac Surg 2016



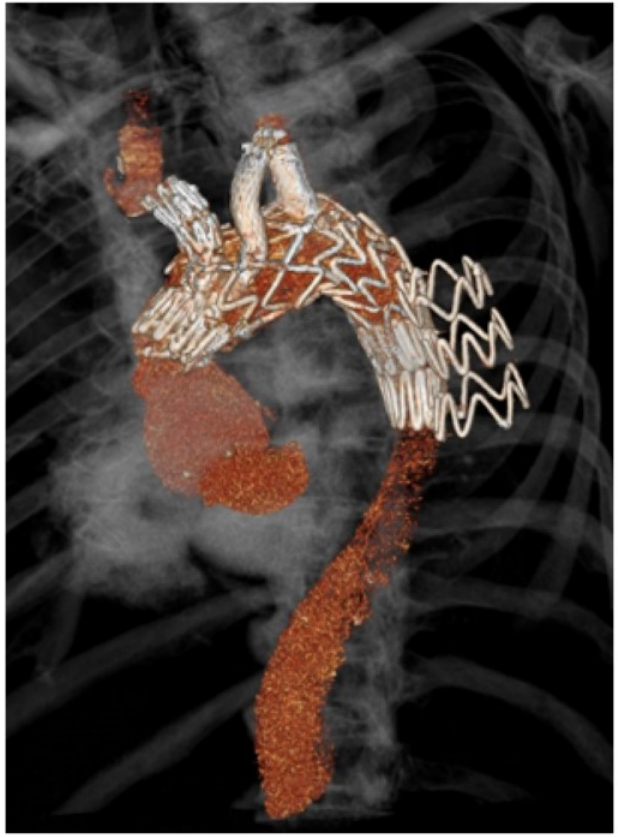
Distal Seal?

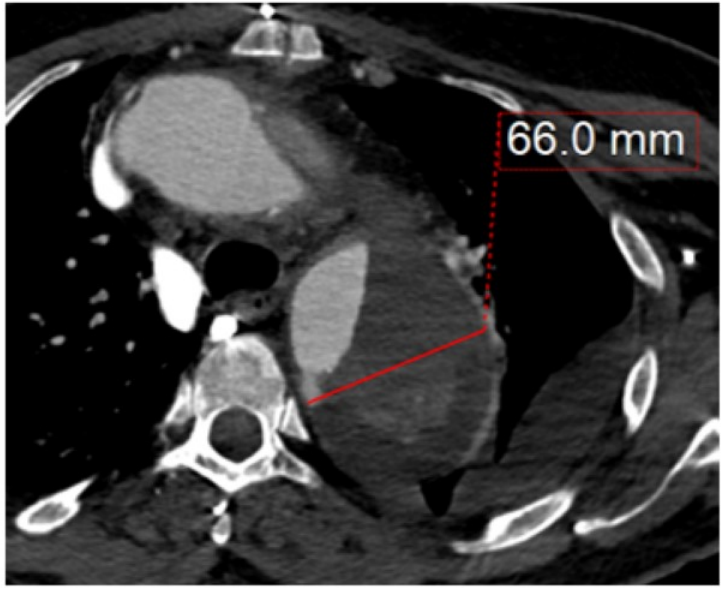
Failure to Remodel in Chronic Dissection



- Perfusion and pressure unchanged in false lumen
- Presence of Intercostals originating from false lumen
- False lumen back flow to Intercostals

Courtesy Tilo Kölbel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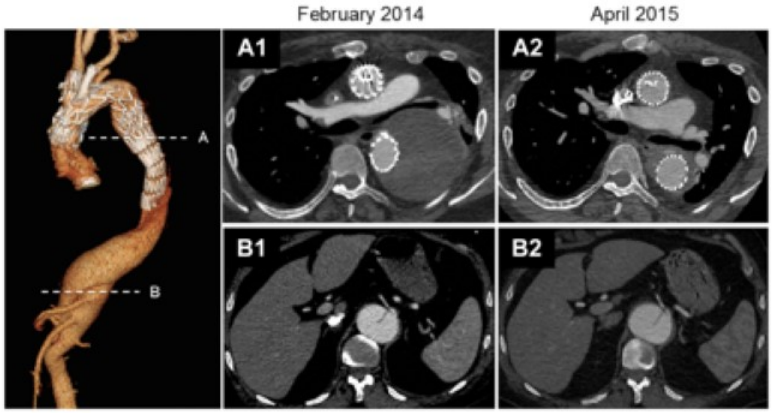
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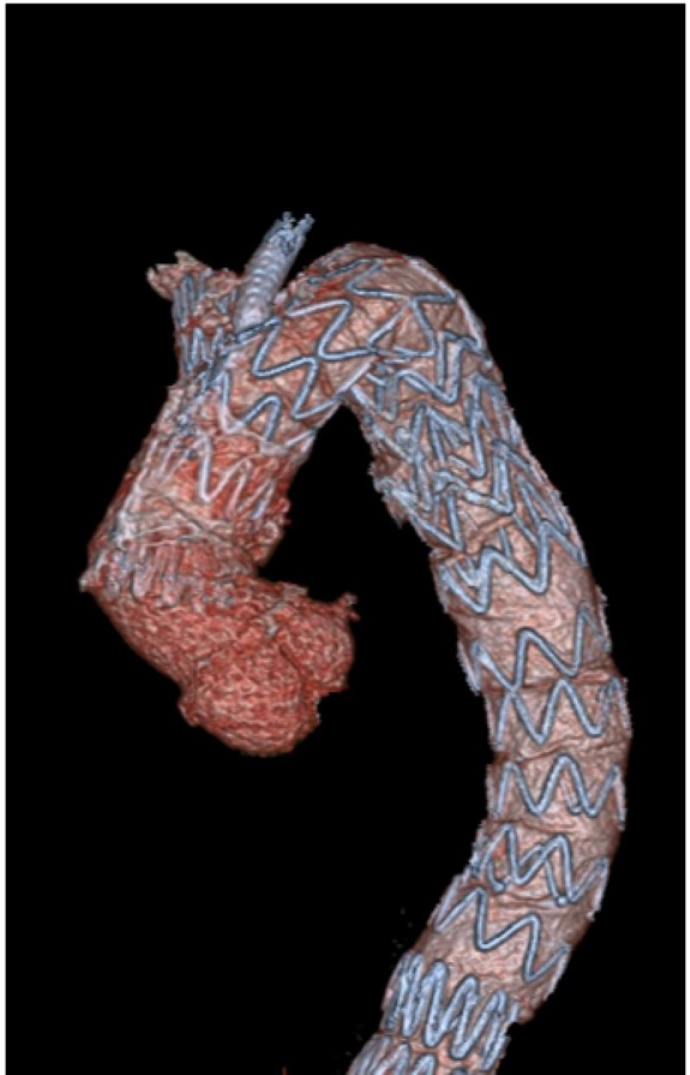


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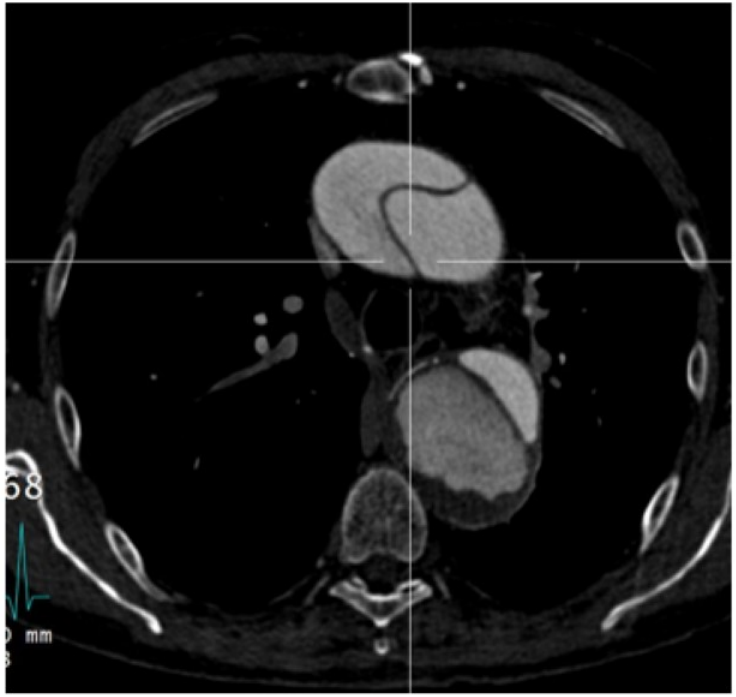
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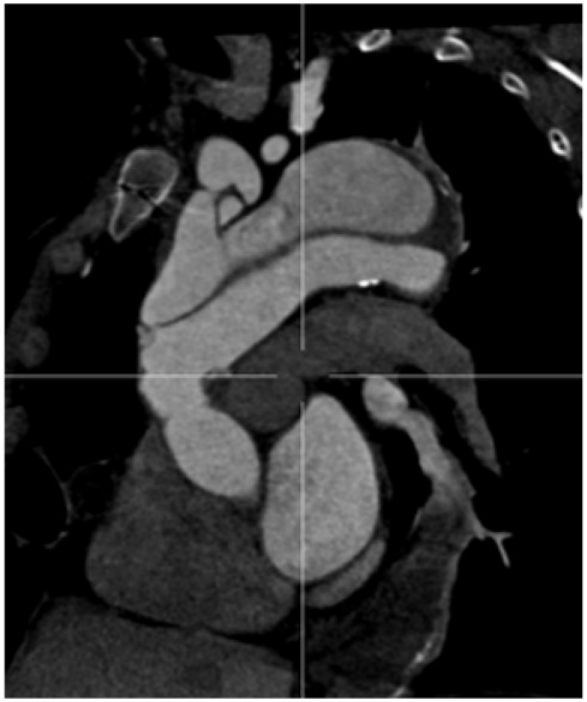

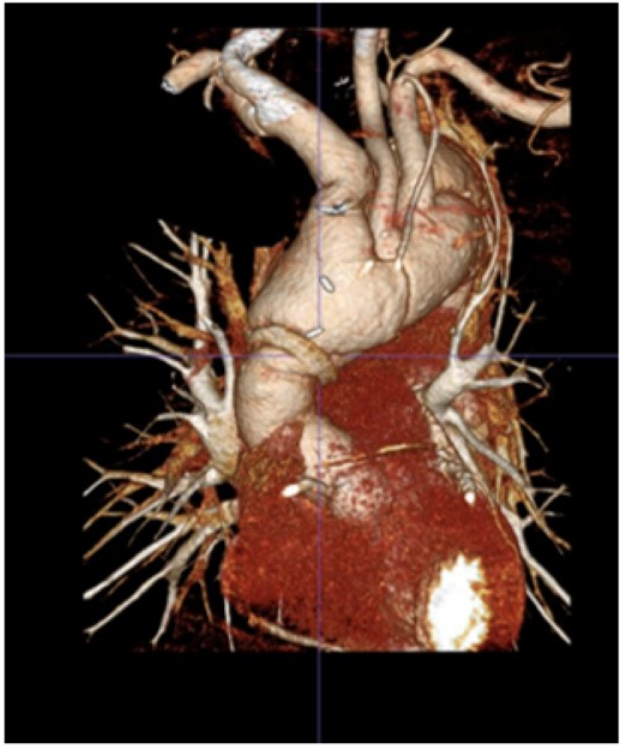

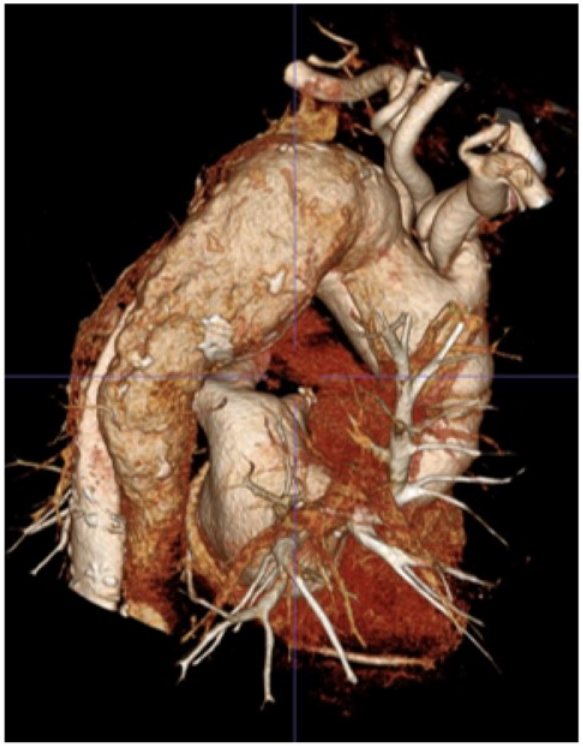

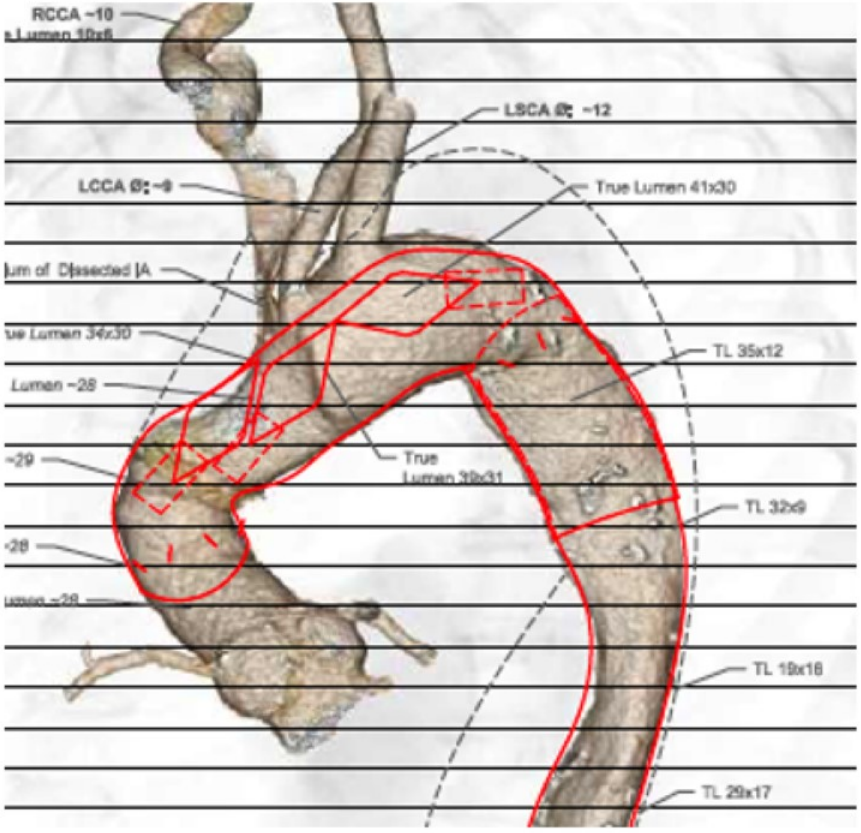
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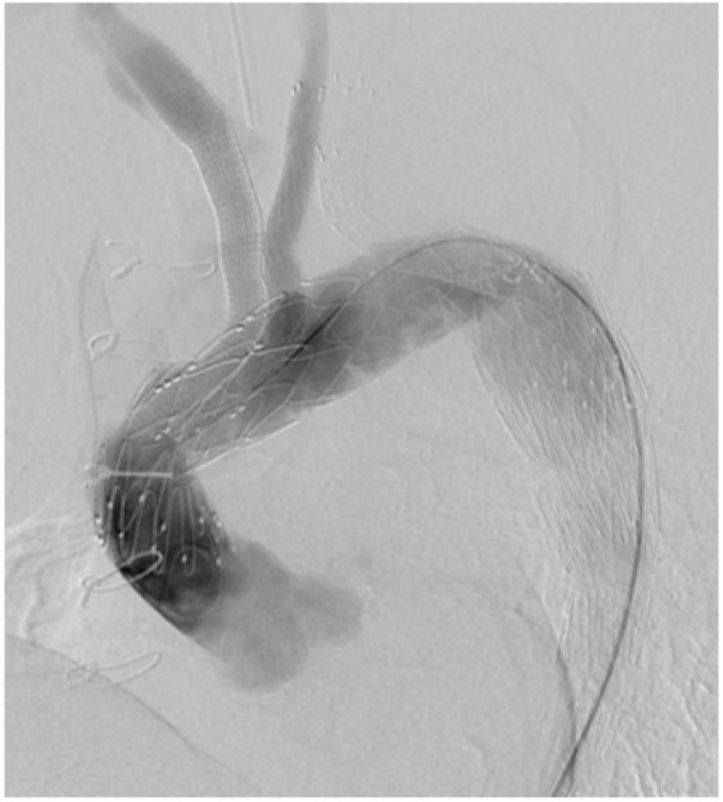
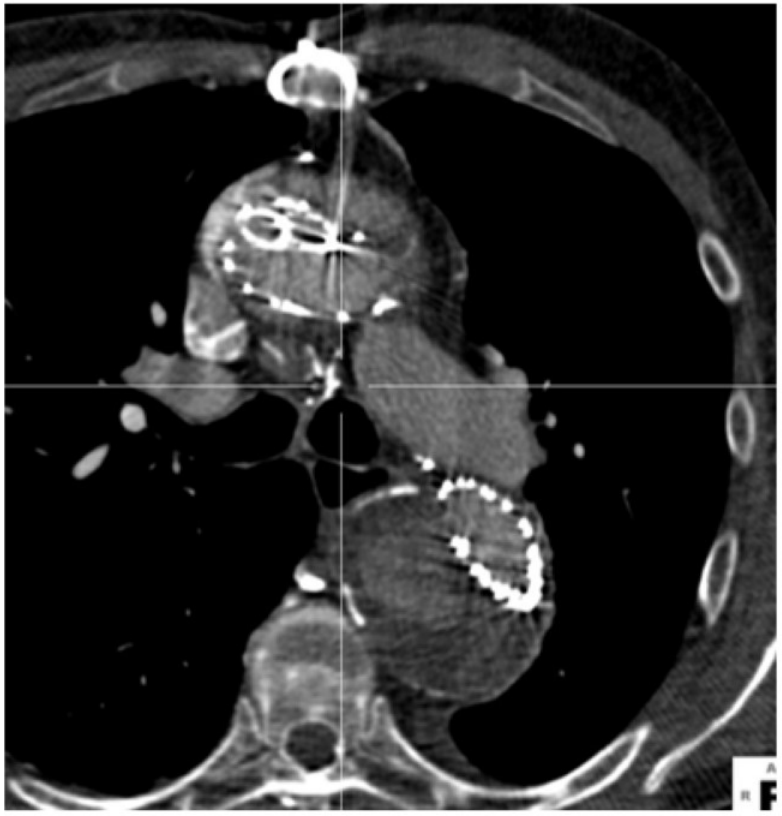
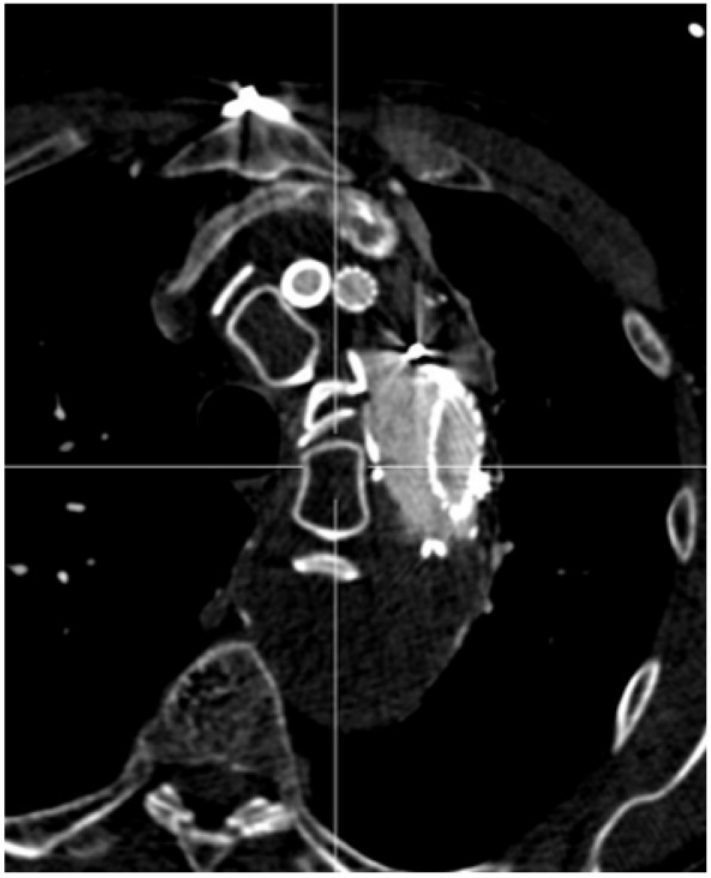
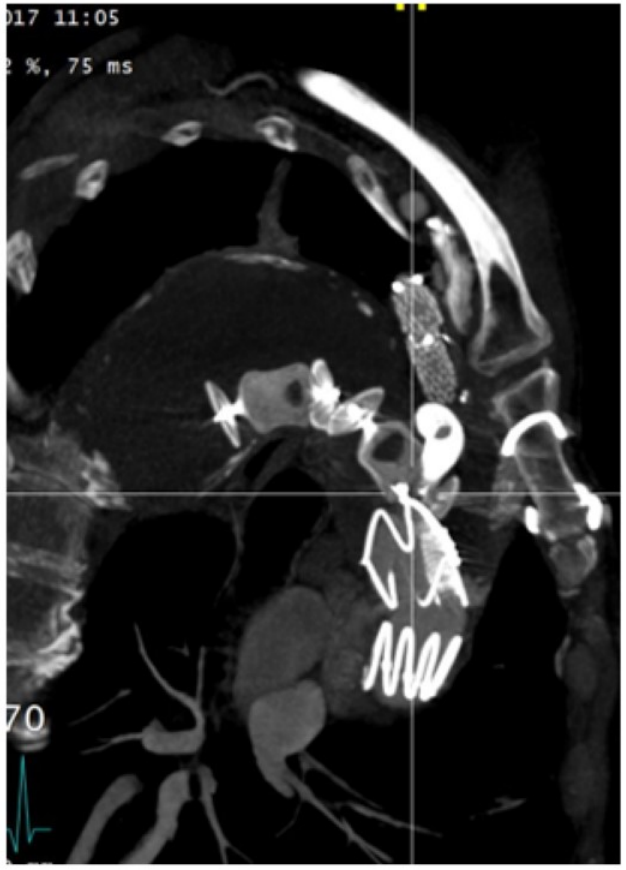
LSCA Ø: ~12
LCCA Ø: ~9
True Lumen 41x30
TL 35x12
True
TL 32x9
TL 19x18
TL 29x17


H





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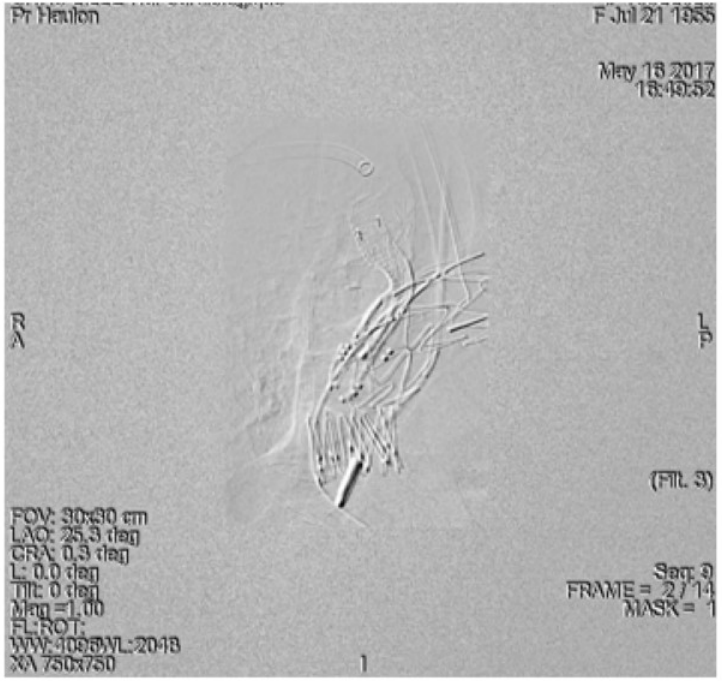
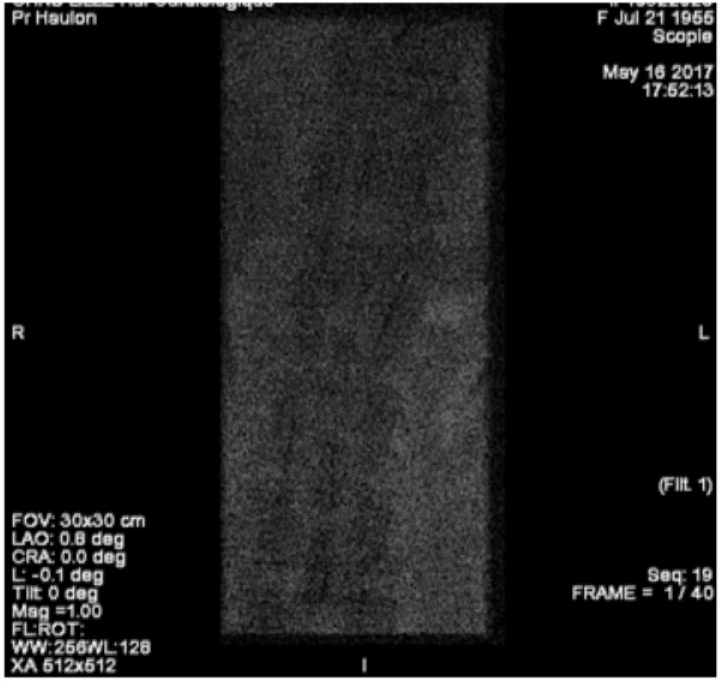
2 %, 75 ms
70

Dissection of the SAT

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May 16 2017
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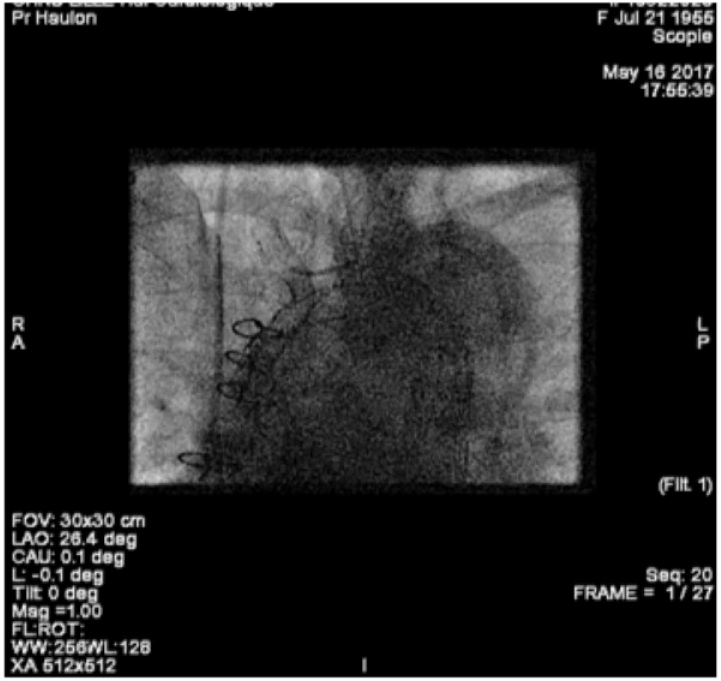
Pr Haulon
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17:55:39
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(Filt. 1)
FOV: 30x30 cm
LAO: 26.4 deg
CAU: 0.1 deg
L: -0.1 deg
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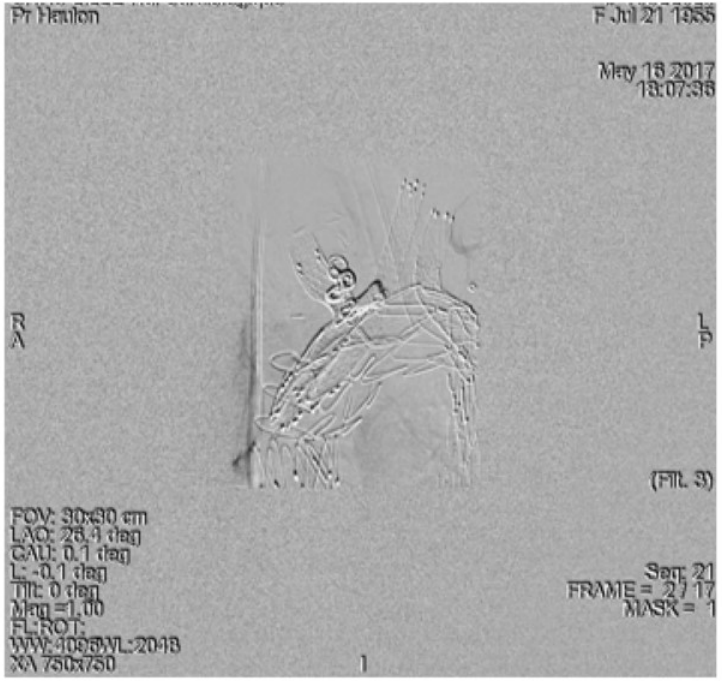
Pr Hewton
F Jul 21 1955
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(Fil. 3)
FOV: 30x30 cm
LAO: 25.4 deg
CAU: 0.1 deg
L: -0.1 deg
Tilt: 0 deg
Mag =1.00
FL:ROT:
WW:4096WL:2048
XA 750x750
Seq: 21
FRAME = 2 / 17
MASK = 1
1

Conclusions

- Patient selection
- No compromise landing zones
- Staged procedures