



CRITICAL ISSUES 20TH INTERNATIONAL EXPERTS SYMPOSIUM
in aortic endografting **2016**

May 20 & 21, 2016 - BARRIÈRE HOTEL - **LILLE** - **FRANCE**



How to promote distal aortic remodeling in acute type A aortic dissections

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Disclosure

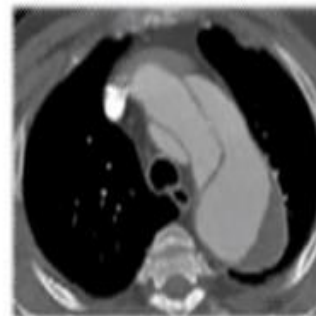
- Professional service agreement with COOK Medical

AsAo grafting is NOT enough

- If the patient survived AAD-I and had a long term survival
→ Downstream aorta posed a problem in the future.



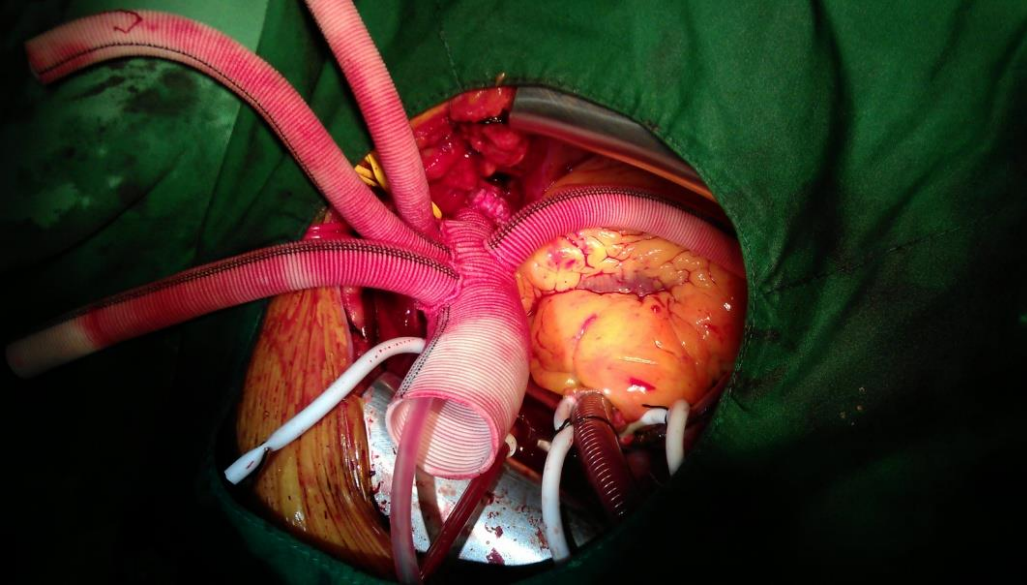
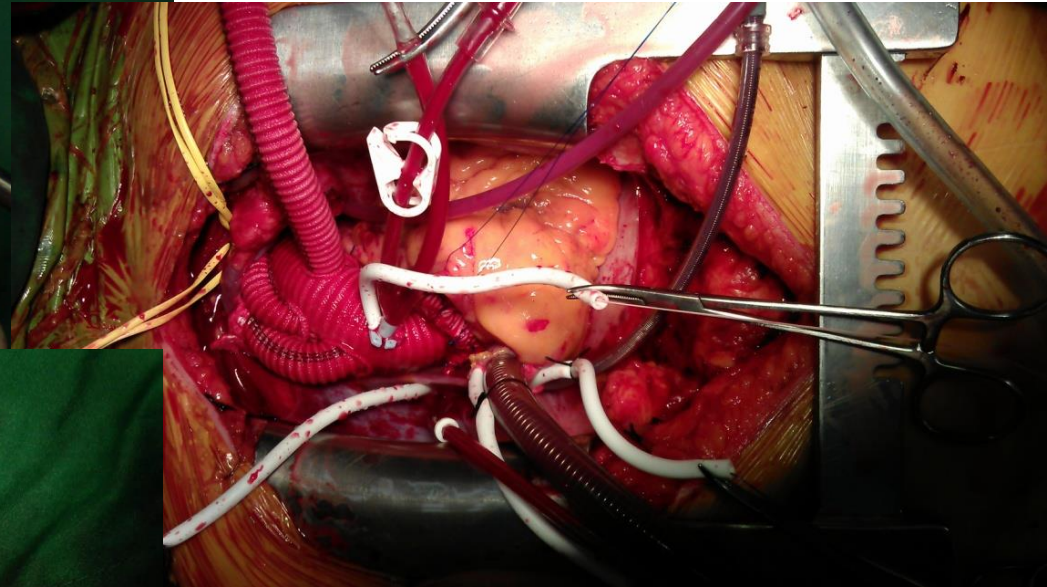
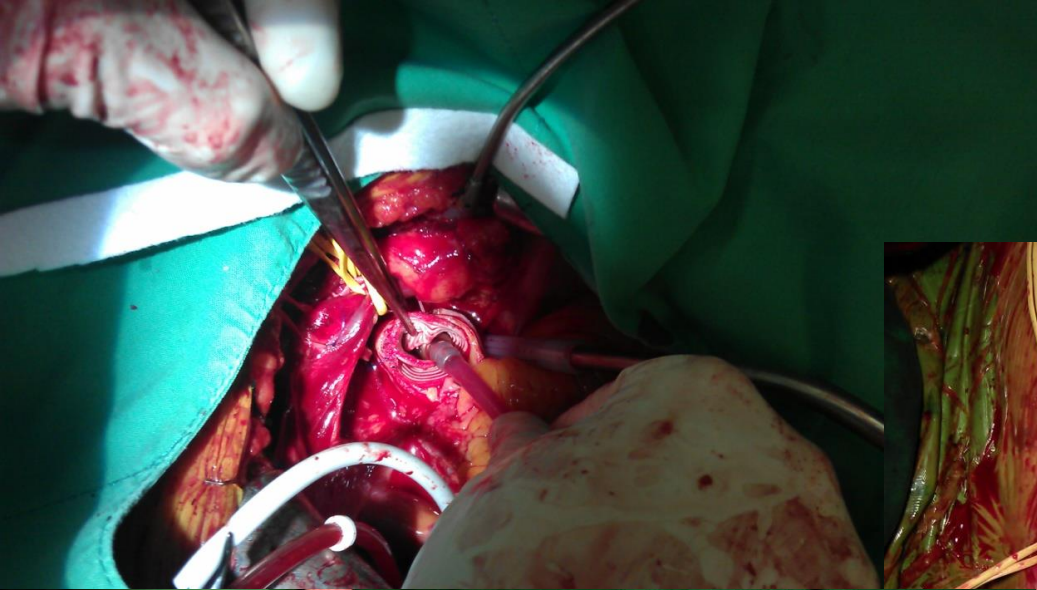
...Chronic type B
dissection...



...Persistent arch
dissection and
aneurysm..

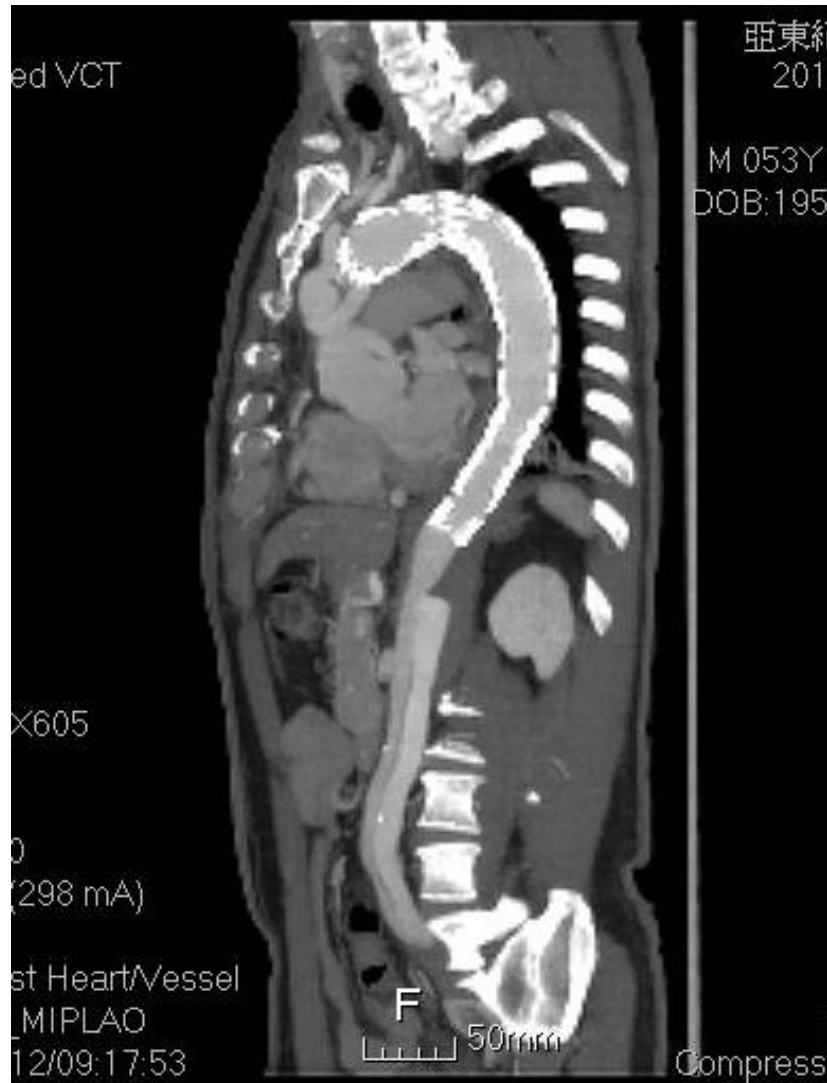
Total arch grafting with elephant trunk

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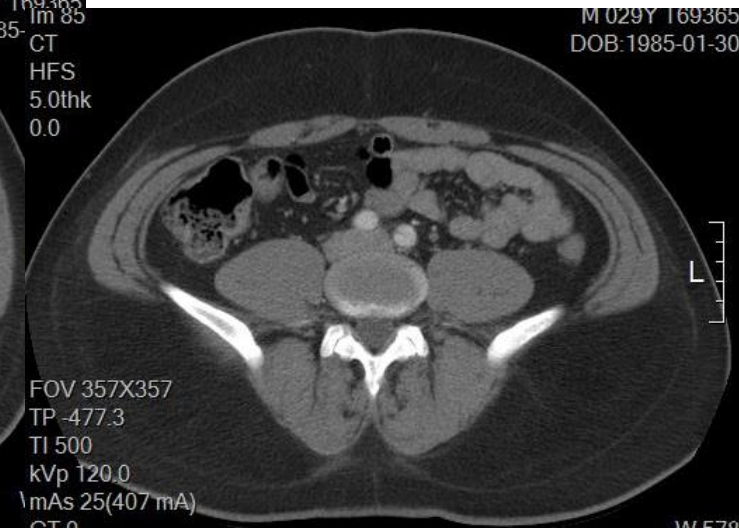
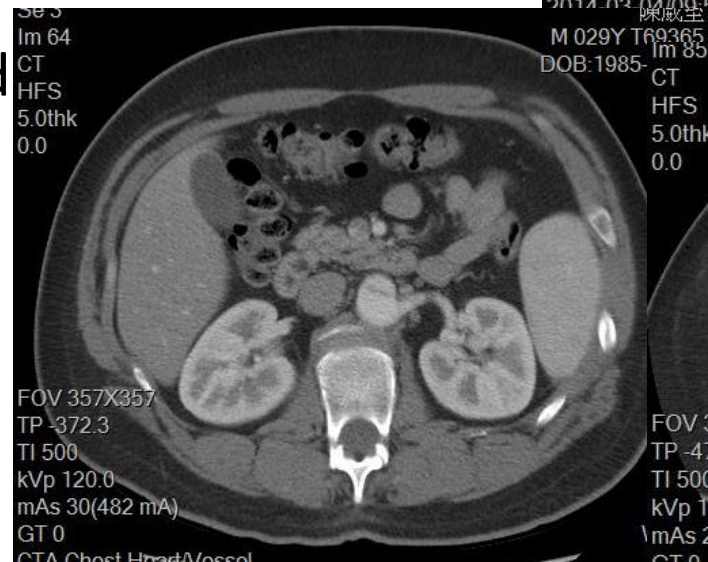
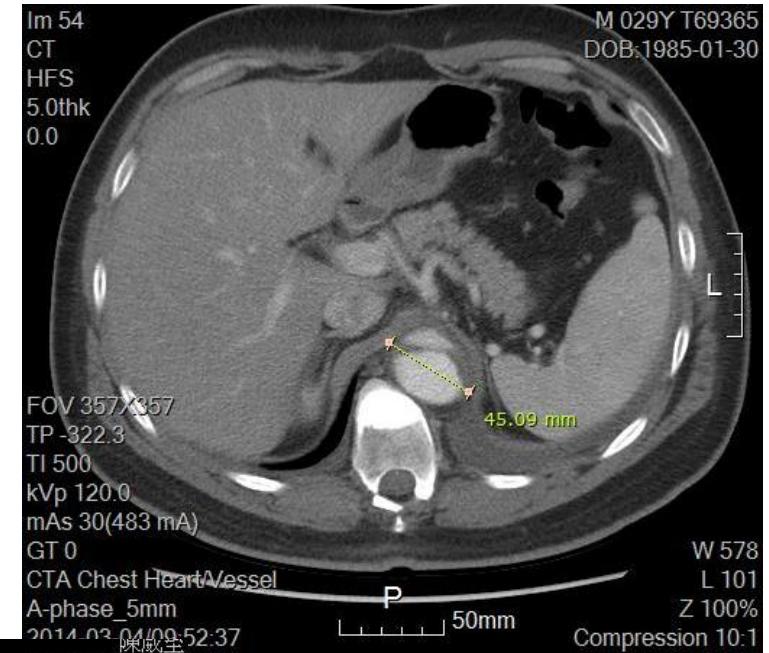
Frozen elephant trunk did well **only at the endografted area**

5



Rapid/progressive enlargement in the abdominal aorta

- 29-year-old male,
s/p total arch & TEVAR
 - Persistent back pain
- <CT>
- False lumen at abdominal
aorta expanded **> 1.5cm in
2.5 months**
 - L pleural effusion
- Highly pressurized
false lumen



How about extended distal bare stenting ?

- Debakey I AD s/p total arch replacement
≡ Debakey III AD
- Provisional Extension To Induce Complete Attachment (**PETTICOAT**) technique: a combination of stent-grafting and bare metal stenting of the visceral and infrarenal segments.

**Let's try PETTICOAT in
DeBakey –I AAD**

Our strategy

- Zenith Dissection Endovascular Stent (Cook Medical) was first available in Taiwan since **April 2014**
- Until November 2014
9 patients in the PETTICOAT group;
9 in the non PETTICOAT group (proximal endografting only)
- **Two-staged** operations
 - 1: AsAo + total arch replacement (Vascutek 4 branched graft)
 - 2: PETTICOAT or non PETTICOAT

2nd stage

PETTICOAT vs non PETTICOAT

- Usually **2~3 days** after total arch grafting
- If malperfusion was suspected, in advance on postop day 1

<Endografting>

- Proximal landing in 4-branched graft & FET
(sandwich area and FET are easy to identify)
- Distally landing: around the **T9 level**

<Distal Bare Stenting>

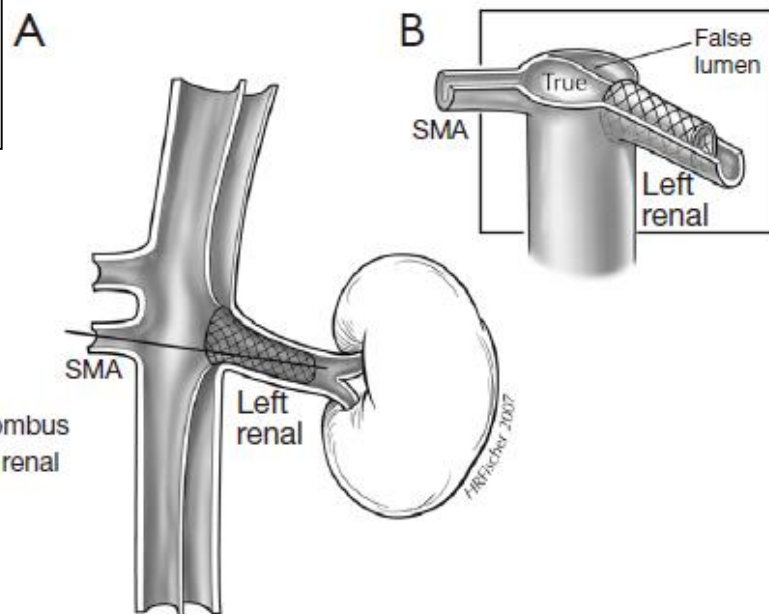
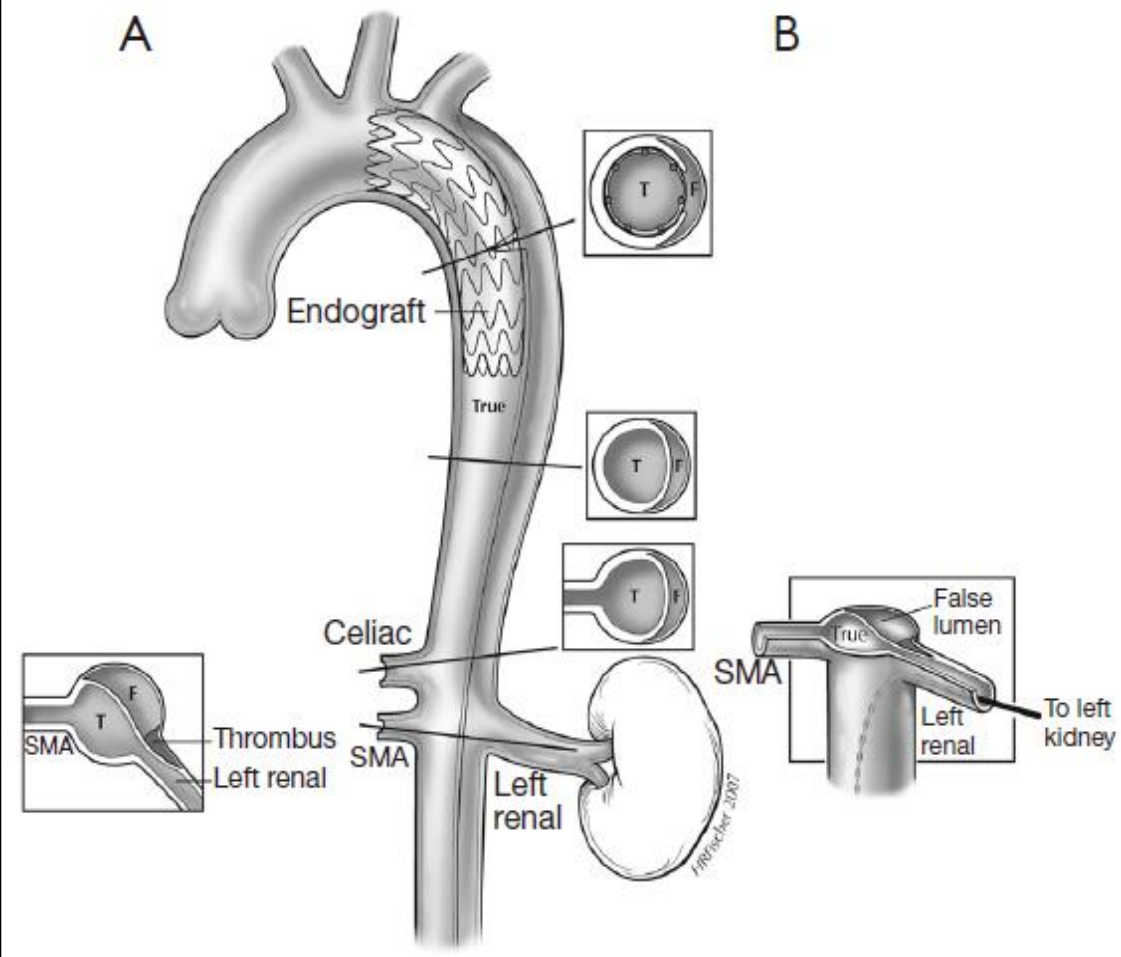
- address **all segments of dissected aorta**
- terminated near the **aortic bifurcation for iliac involvement**

2nd stage aortography



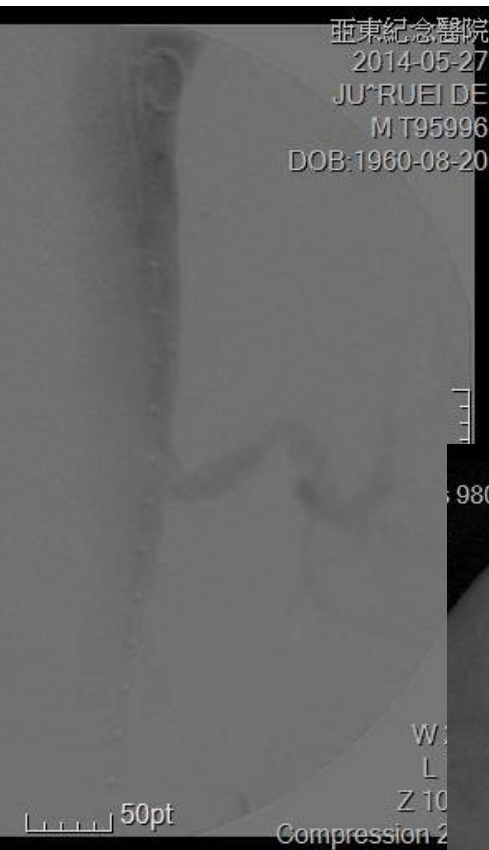
- For total arch patients, 2nd stage endografting is relative easy
- Sometimes aortography via L brachial artery to confirm true lumen course
- Clear landing zone
- Clear sandwich area
- Short procedure time

Re-routing of visceral arteries if necessary

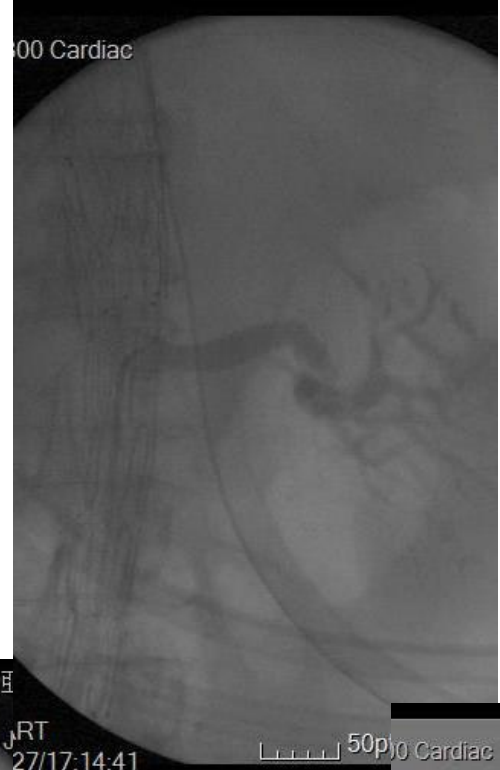


Guido H.W et al. Ann Cardiothorac Surg.
 2014;3:423- 427

L renal artery “re-routing”

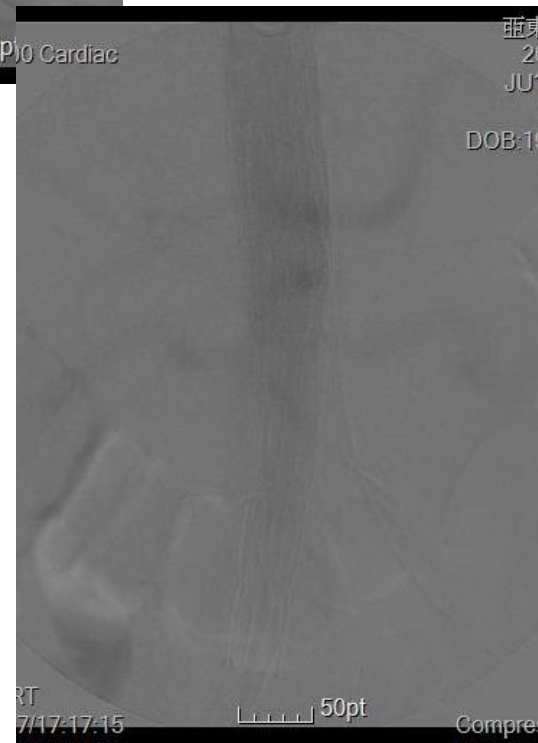
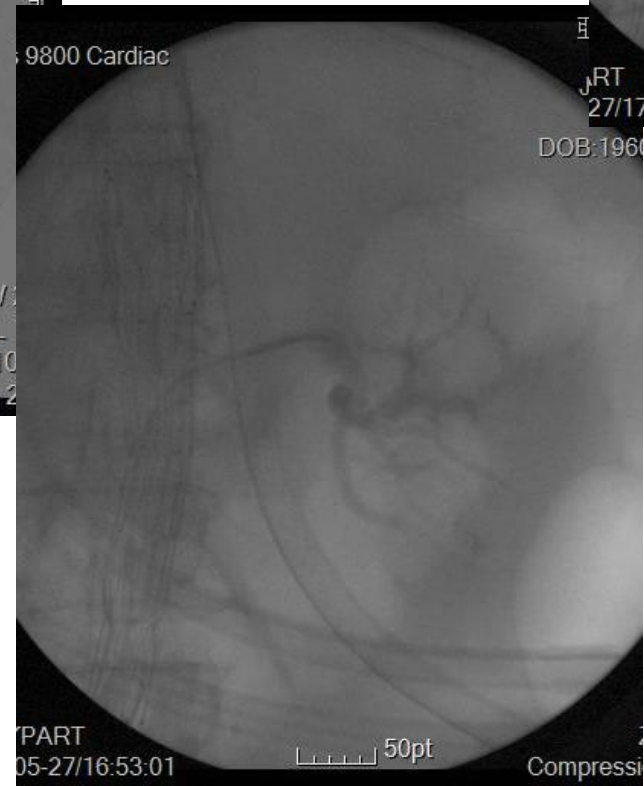


After bare aortic stents,
engage from true lumen



Put a stent graft
into L renal
→ “re-route” back
to true lumen

L renal artery
from false
lumen

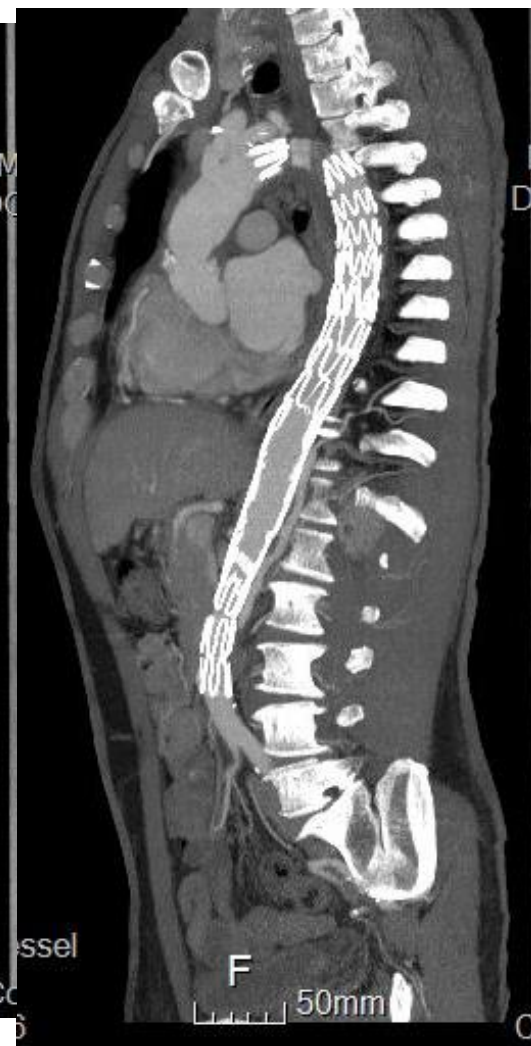


A typical case after staged PETTICOAT

- 52-year-old male
- 2 days after total arch
 - 34-26-156mm COOK
 - 36-180mm bare stent * II
 - 6*50mm Viabahn in L renal

<CT> 3 mo later

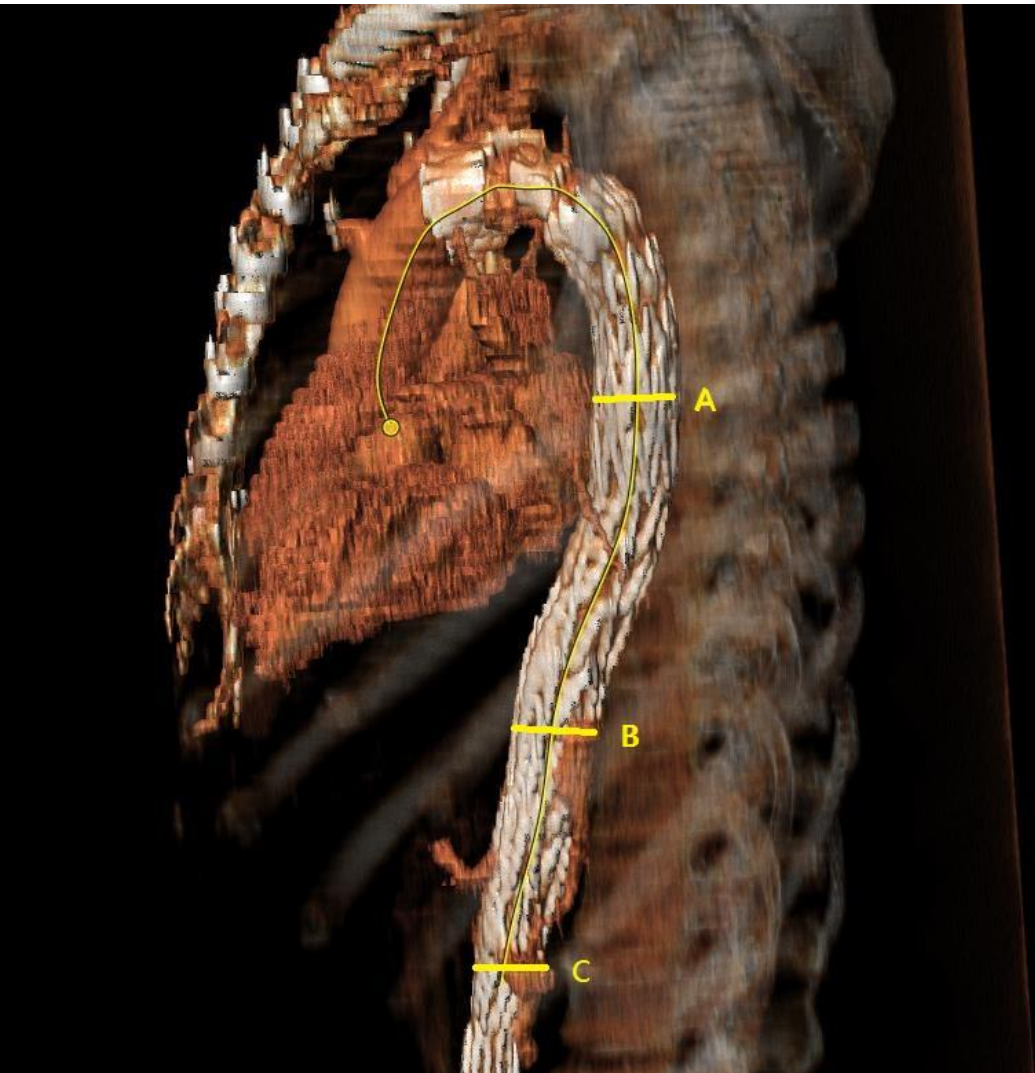
- **nicely alignment** in aorta
- (Low risk for distal stent graft tears)
- healed Aorta in most levels



Evaluations—6 months

- Intraoperative and postoperative outcomes
- CT scan: postop 6 month vs preop
 - * **diameter** change (True & False)
 - * **volume** change (True & False)
 - * **total thrombosis of false lumen**
- Statistical analysis
 - Fisher exact tests; Mann-Whitney test

Levels of measurement

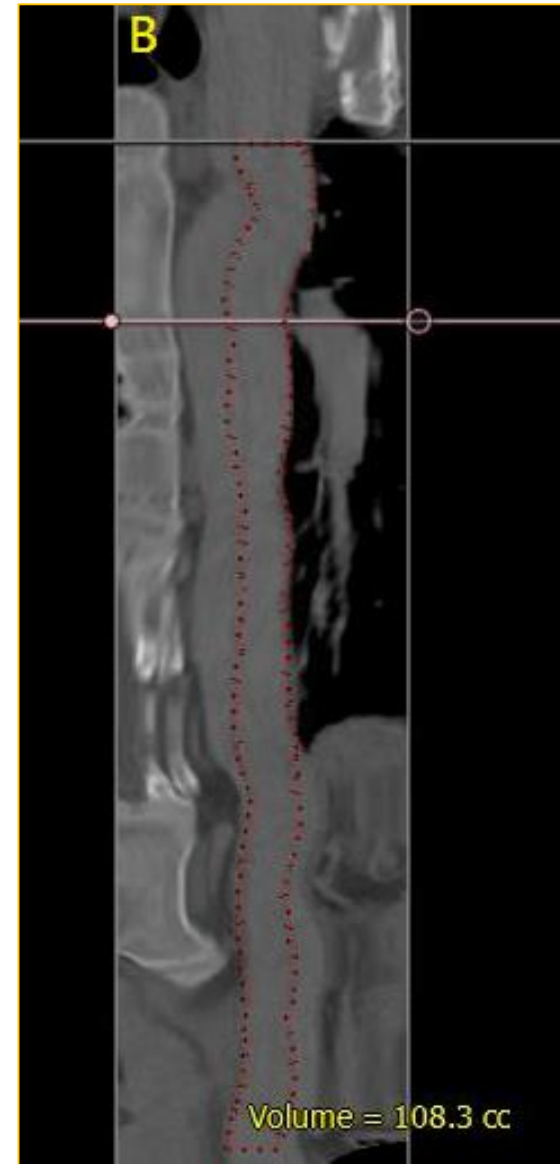


A: 10 cm beyond the left subclavian artery

B: The diaphragm level (around T9)

C: The lowest renal artery

Measurement of diameter and volume (3Mensio system, Bilthoven, Netherlands)



Results

Preoperative characteristics

	All (N=18)	PETTICOAT (N=9)	Non-PETTICOAT (N=9)	P value
Age, year	52.5(29.0,70.0)	52.0(34.0,70.0)	56.0(29.0,62.0)	0.65
Male	14	7	7	1.00
CAD	2	1	1	1.00
Hypertension	13	7	6	1.00
Smoking	12	7	5	0.62
Renal insufficiency ^a	3	1	2	1.00
Stroke	2	1	1	1.00
Diabetes mellitus	1	0	1	1.00
Hyperlipidemia	4	2	2	1.00
Malperfusion	7	5	2	0.34

Data are shown as median (range)

^aChronic kidney disease stage 3 or worse (GFR < 60 mL/min/1.73 m²)

CAD = coronary artery disease;

the PETTICOAT group (3 compromised renal artery flow; 2 compromised femoral artery flow),
the non-PETTICOAT group (1 compromised superior renal artery flow; 1 compromised right
coronary artery flow and myocardial infarction)

Intraoperative and postoperative outcomes

	All (N=18)	PETTICOAT (N=9)	Non-PETTICOAT (N=9)	P value
Intraoperative				
Bentall procedure	4	3	1	0.58
Endobranching ^a	6	5	1	0.13
Cardiopulmonary bypass time, min	222.5(162.0,335.0)	222.0(162.0,259.0)	223.0(162.0,335.0)	0.79
Aortic crossclamp time, min	138.5(73.0,204.0)	135.0(73.0,204.0)	139.0(96.0,190.0)	1.00
Selective cerebral perfusion time, min	51.0(24.0,90.0)	41.0(24.0,64.0)	55.0(39.0,90.0)	0.05
Postoperative				
In hospital/30-day mortality	1	1	0	1.00
Stroke	1	1	0	1.00
Paraplegia or paralysis	0	0	0	1.00
LCOS	1	0	1	1.00
Sternal wound infection	1	1	0	1.00
Dialysis	1	1	0	1.00
Reoperation for bleeding	2	1	1	1.00
Length of stay, day	15.0(8.0,127.0)	15.0(8.0,127.0)	14.0(9.0,33.0)	0.29

Data are shown as median (range)

^aEndobranching = endovascular visceral branch intervention

CAD = coronary artery disease; LCOS = low cardiac output syndrome

Mortality and Morbidity

- one ≤ 30 -day mortality (1/9, 11.1%) was note in the PETTICOAT group (major R MCA infarction)
- One TIA in the non PETTICOAT group
- One pre-op MI (RCA) with ECMO support in the non PETTICOAT group
- One with cardiac tamponade and mediastinitis with prolonged hospital stay (127 days) in the PETTICOAT group
- Two need repeat endografting over distal aorta in the non PETTICOAT group

Parameters of aortic remodeling (I)

	PETTICOAT(N=8 ^a)	Non-PETTICOAT(N=9)	p value
True lumen diameter change^b			
LSA + 10cm, mm	1.4(-0.2,1.8)	1.2(-0.1,1.8)	0.59
Diaphragm, mm	1.0(0.0,1.7)	0.3(-0.2,2.0)	0.15
Lowest renal artery, mm	0.6 (0.3,1.2)	0.1(-0.7,0.7)	<0.01
False lumen diameter change^b			
LSA + 10cm, mm	-2.0(-3.6,-0.9)	-1.6(-1.9,-0.9)	0.21
Diaphragm, mm	-1.3(-2.1,-0.2)	-0.4(-2.5,1.0)	0.23
Lowest renal artery, mm	-1.0(-1.5,-0.2)	0.0 (-0.3,0.8)	<0.01

Data are shown as median (range) or Number

^a the patient with ≤ 30 day mortality was excluded

^b Changes of the parameters were defined as differences between measurements at 6 month and baseline

LSA = left subclavian artery

Parameters of aortic remodeling (II)

	PETTICOAT(N=8 ^a)	Non-PETTICOAT(N=9)	p value
True lumen volume change ^a , mm ³	53.9(40.4,149.7)	33.5(2.9,96.2)	0.15
False lumen volume change ^a , mm ³	-98.4(-166.7,-43.2)	-42.2(-100.7,4.3)	0.03
Totally thrombosed or regressed false lumen level			
LSA + 10cm, N	8	9	1.00
Diaphragm, N	6	4	0.34
Lowest renal artery, N	5	0	<0.01

Data are shown as median (range) or Number

^a the patient with ≤ 30day mortality was excluded

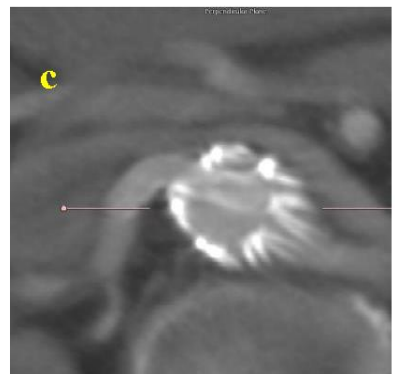
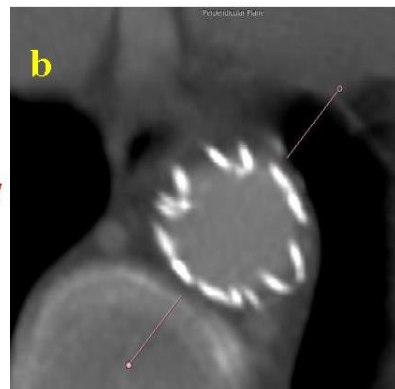
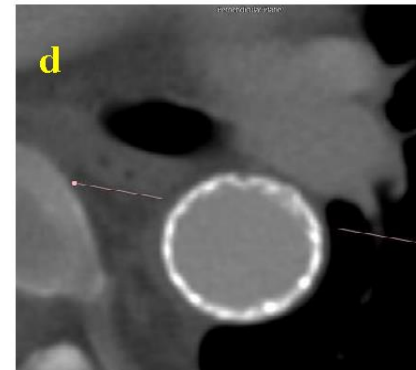
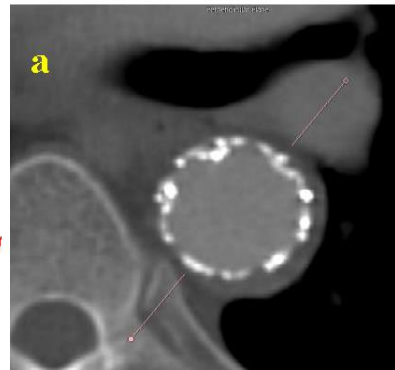
^b Changes of the parameters were defined as differences between measurements at 6 month and baseline

LSA = left subclavian artery

typical cases

PETTICOAT group

Non-PETTICOAT group



PETTICOAT facilitates positive remodeling

- **proximal stent grafting** seals the proximal tear and depressurizes the false lumen in the thoracic aorta
- **bare stenting** reinforces the true lumen to expand against the false lumen and promotes aortic remodeling more distally

Limitations

- a small cohort with short-term follow-up
- Adequate timing of 2nd stage endografting is unknown
- Treat everyone or only high risk group?
- The role of “re-routing” is unknown

The best is the enemy of the good

- *We should be very careful when we push the boundary forward*
- *Do No Harm*

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EDITORIAL COMMENT

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The provisional extension to induce complete attachment technique to promote distal aortic remodelling in repair of acute DeBakey type I aortic dissection: is the best the enemy of the good?

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Conclusions

- The PETTICOAT technique in repair of acute DeBakey type I dissection is a **feasible**
- It can provide promising aortic remodeling, including the abdominal aorta
- However, outcomes are preliminary and larger studies are required