23RD INTERNATIONAL EXPERTS SYMPOSIUM

CRITICAL ISSUES in aortic endografting 2019

LIVERPOOL UNITED KINGDOM MAY 23-24

The inner Branch approach: A versatile option for complex Aortic Endorepair

Nilo J Mosquera, MD.

www.critical-issues-congress.com

ENDOVASCULAR FOUNDATION

Disclosure

Speaker name:

Nilo J Mosquera, MD.

I have the following potential conflicts of interest to report:

☑ **Consulting and Clinical Proctor: Lombard Medical, Cook Medical, WL Gore, Terumo Aortic, Cordis (Cardinal Health), JOTEC-Cryolife.**

Employment in industry

Stockholder of a healthcare company

Owner of a healthcare company

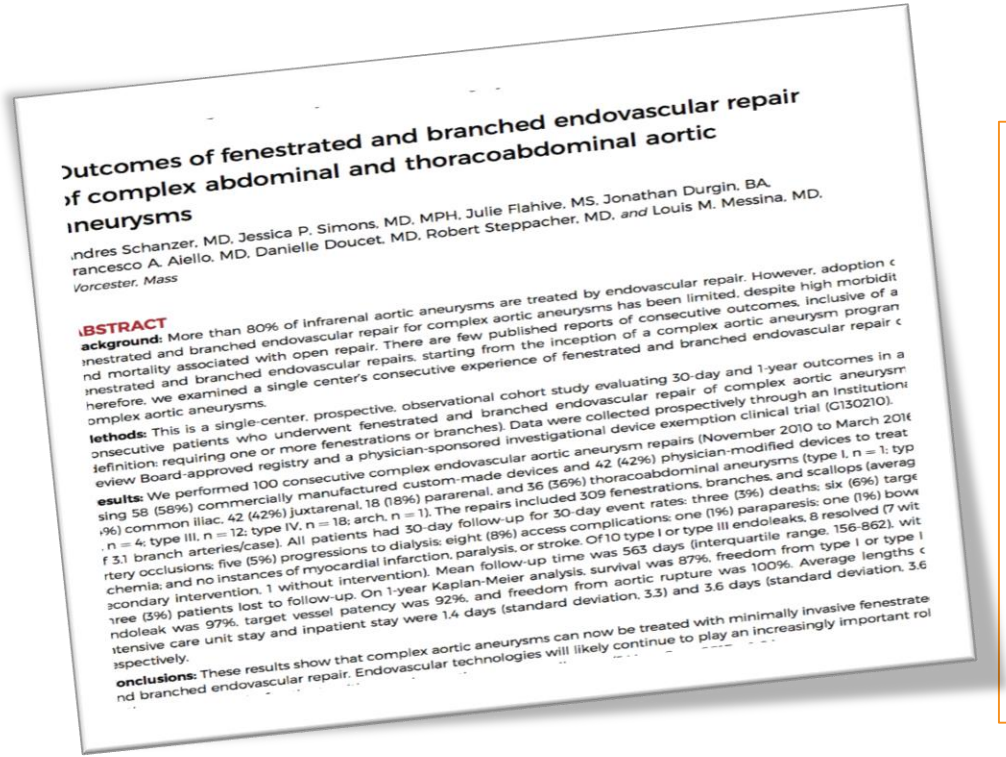
☑ **Other(s): Spanish National Health Service Employee**

I do not have any potential conflict of interest

Complex aortic aneurysm repair: The Endovascular Approach

Branched and fenestrated endografts ARE an established therapy: increasing evidence up to now

Endo-optimism even from Andres Schanzer!!!



Outcomes of fenestrated and branched endovascular repair of complex abdominal and thoracoabdominal aortic aneurysms

ndres Schanzer, MD, Jessica P. Simons, MD, MPH, Julie Flahive, MS, Jonathan Durgin, BA, rancesco A. Aiello, MD, Danielle Doucet, MD, Robert Steppacher, MD, *and* Louis M. Messina, MD, *Vorcester, Mass*

ABSTRACT

ackground: More than 80% of infrarenal aortic aneurysms are treated by endovascular repair. However, adoption c nestrated and branched endovascular repair for complex aortic aneurysms has been limited, despite high morbidit nd mortality associated with open repair. There are few published reports of consecutive outcomes, inclusive of a nestrated and branched endovascular repairs. starting from the inception of a complex aortic aneurysm progran herefore, we examined a single center's consecutive experience of fenestrated and branched endovascular repair c omplex aortic aneurysms.

ethods: This is a single-center, prospective, observational cohort study evaluating 30-day and 1-year outcomes in a onsecutive patients who underwent fenestrated and branched endovascular repair of complex aortic aneurysm efinition: requiring one or more fenestrations or branches). Data were collected prospectively through an institutiona eview Board-approved registry and a physician-sponsored investigational device exemption clinical trial (G130210).

esults: We performed 100 consecutive complex endovascular aortic aneurysm repairs (November 2010 to March 201(sing 58 (58%) commercially manufactured custom-made devices and 42 (42%) physician-modified devices to treat)%) common iliac, 42 (42%) juxtarenal, 18 (18%) pararenal, and 36 (36%) thoracoabdominal aneurysms (type I, n = 1; typ , n = 4; type III, n = 12; type IV, n = 18; arch, n = 1). The repairs included 309 fenestrations, branches, and scallops (averag f 3.1 branch arteries/case). All patients had 30-day follow-up for 30-day event rates: three (3%) deaths; six (6%) targe rtery occlusions; five (5%) progressions to dialysis; eight (8%) access complications; one (1%) paraparesis; one (1%) bowe chemia; and no instances of myocardial infarction, paralysis, or stroke. Of 10 type I or type III endoleaks, 8 resolved (7 wit econdary intervention, 1 without intervention). Mean follow-up time was 563 days (interquartile range, 156-862). wit hree (3%) patients lost to follow-up. On 1-year Kaplan-Meier analysis, survival was 87%, freedom from type I or type I ndoleak was 97%, target vessel patency was 92%, and freedom from aortic rupture was 100%. Average lengths c ntensive care unit stay and inpatient stay were 1.4 days (standard deviation, 3.3) and 3.6 days (standard deviation, 3.6 spectively.

onclusions: These results show that complex aortic aneurysms can now be treated with minimally invasive fenestrate nd branched endovascular repair. Endovascular technologies will likely continue to play an increasingly important rol

J Vasc Surg 2017

Finally in 2017…

*These results show that **complex aortic aneurysms can now be treated with minimally invasive fenestrated and branched endovascular repair**. Endovascular technologies will likely continue to play an increasingly important role in the management of patients with complex aortic aneurysm disease.*

so.. Do we have ultimate solution? Not really

Visceral Branch durability still a issue

Supplement to

Sponsored by Cook Medical

Endovascular TODAY

November 2015

BRANCHING OUT

Is Renal Branch Occlusion the Achilles Heel of Endovascular TAAA Repair?

A look at the causes of and possible solutions to this lingering complication.

BY TIMOTHY A.M. CHUTER, MD

There is no shortage of candidates for the title "Achilles heel of endovascular thoracoabdominal aortic aneurysm (TAAA) repair." For all of its advantages, endovascular TAAA repair has many potential failure modes. However, the

artery to the flexible unstented portion, and stabilize branch attachment by providing a site for arterial ingrowth. Commonly used covered stents include iCast (Maquet; balloon expandable), Jostent (Abbott Vascular; balloon expandable), Viabahn (Gore & Associates; self-expanding), and Fluency (Bard Peripheral Vascular,

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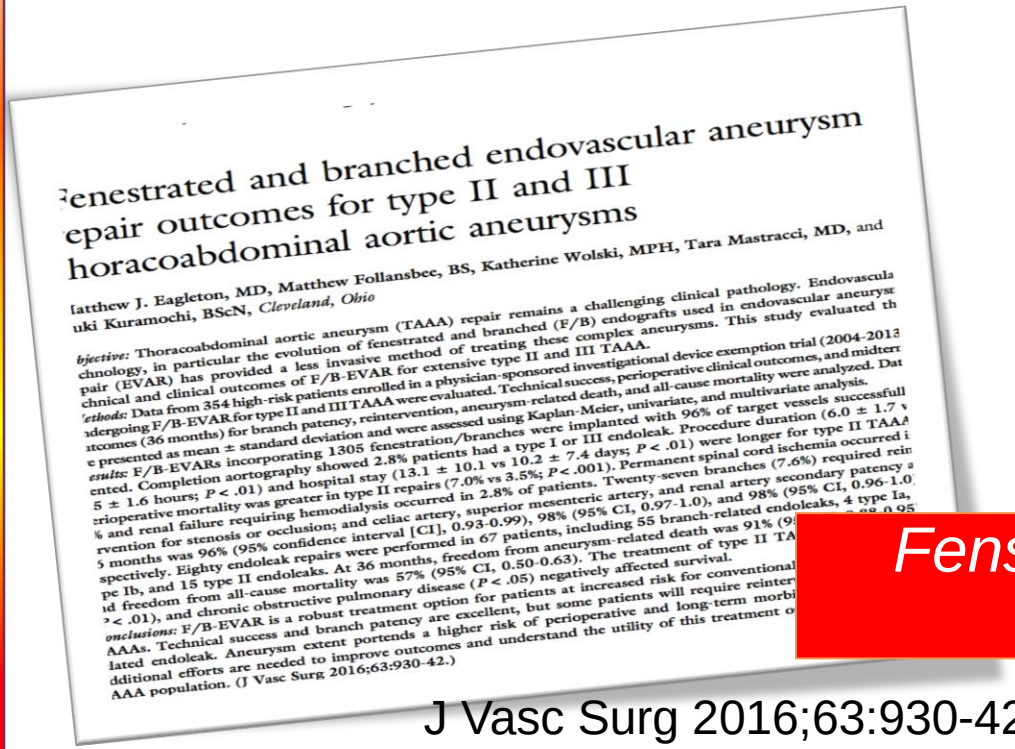
Mostly related to Branch Devices but also relevant in fenestrated

could become a limiting factor. It is still difficult to advocate endovascular TAAA repair in patients who are healthy enough to undergo open repair, and the prospect of long survival after endovascular repair

others[5] use terms like "branched stent g
a stent graft with cuff-based branches) a
stent grafts" (meaning a stent graft with
based branches).

We have learned a lot from fenestrated and outer branch experience



enestrated and branched endovascular aneurysm
epair outcomes for type II and III
horacoabdominal aortic aneurysms

latthew J. Eagleton, MD, Matthew Follansbee, BS, Katherine Wolski, MPH, Tara Mastracci, MD, and
uki Kuramochi, BScN, *Cleveland, Ohio*

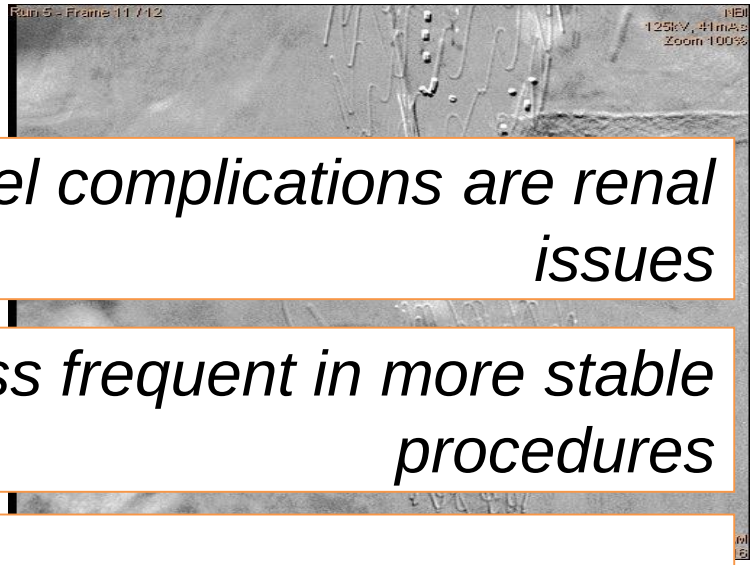
bjective: Thoracoabdominal aortic aneurysm (TAAA) repair remains a challenging clinical pathology. Endovascula
chnology, in particular the evolution of fenestrated and branched (F/B) endografts used in endovascular aneurysr
pair (EVAR) has provided a less invasive method of treating these complex aneurysms. This study evaluated th
chnical and clinical outcomes of F/B-EVAR for extensive type II and III TAAA.
ethods: Data from 354 high-risk patients enrolled in a physician-sponsored investigational device exemption trial (2004-2013
dergoing F/B-EVAR for type II and III TAAA were evaluated. Technical success, perioperative clinical outcomes, and midterr
tcomes (36 months) for branch patency, reintervention, aneurysm-related death, and all-cause mortality were analyzed. Dat
e presented as mean ± standard deviation and were assessed using Kaplan-Meier, univariate, and multivariate analysis.
esults: F/B-EVARs incorporating 1305 fenestration/branches were implanted with 96% of target vessels successfull
ented. Completion aortography showed 2.8% patients had a type I or III endoleak. Procedure duration (6.0 ± 1.7 v
5 ± 1.6 hours; $P < .01$) and hospital stay (13.1 ± 10.1 vs 10.2 ± 7.4 days; $P < .01$) were longer for type II TAAA
erioperative mortality was greater in type II repairs (7.0% vs 3.5%; $P < .001$). Permanent spinal cord ischemia occurred i
% and renal failure requiring hemodialysis occurred in 2.8% of patients. Twenty-seven branches (7.6%) required rein
rvention for stenosis or occlusion; and celiac artery, superior mesenteric artery, and renal artery secondary patency a
5 months was 96% (95% confidence interval [CI], 0.93-0.99), 98% (95% CI, 0.97-1.0), and 98% (95% CI, 0.96-1.0
spectively. Eighty endoleak repairs were performed in 67 patients, including 55 branch-related endoleaks, 4 type Ia,
pe Ib, and 15 type II endoleaks. At 36 months, freedom from aneurysm-related death was 91% (9
d freedom from all-cause mortality was 57% (95% CI, 0.50-0.63). The treatment of type II TA
$> < .01$), and chronic obstructive pulmonary disease ($P < .05$) negatively affected survival.
onclusions: F/B-EVAR is a robust treatment option for patients at increased risk for conventional
AAAs. Technical success and branch patency are excellent, but some patients will require reinter
lated endoleak. Aneurysm extent portends a higher risk of perioperative and long-term morbi
dditional efforts are needed to improve outcomes and understand the utility of this treatment o
AAA population. (J Vasc Surg 2016;63:930-42.)

These outcomes are similar to those reported by others, with perhaps a slight patency advantage for reinforced fenestrations compared with directional branches when targeting the Renal arteries

Fens seem to perform better than branches for the renals

J Vasc Surg 2016;63:930-42.

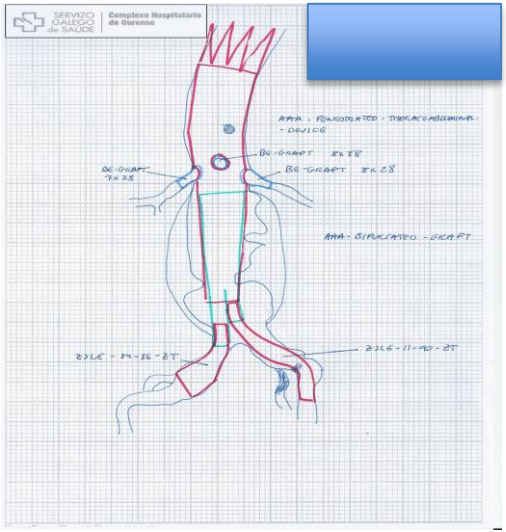
Learning curve lessons learned: Indication

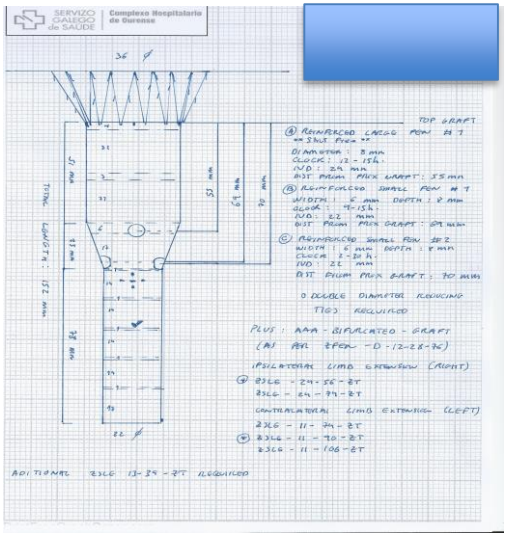


1. *Almost all the target vessel complications are renal issues*
2. *Renal complications less frequent in more stable procedures*
3. *More aggressive approach with 3 or 4 vessel designs to achieve more stable and durable repair*

So: Let´s Be Agresive!

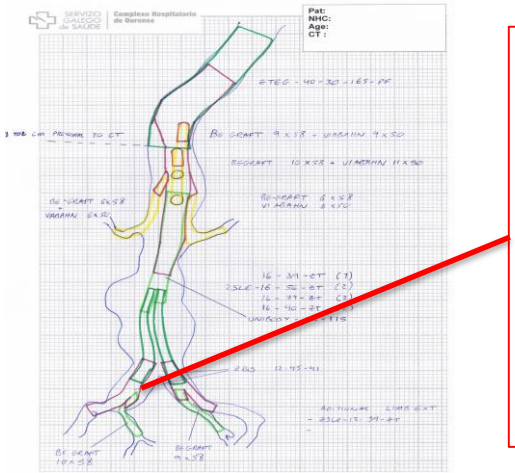
- Means…If you go for complex do not cheat on landing zone

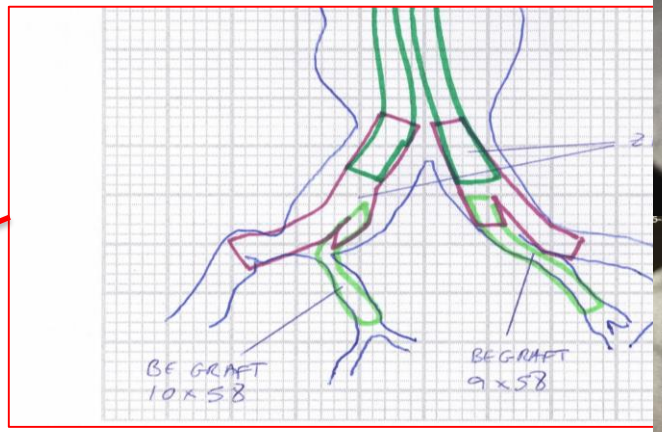


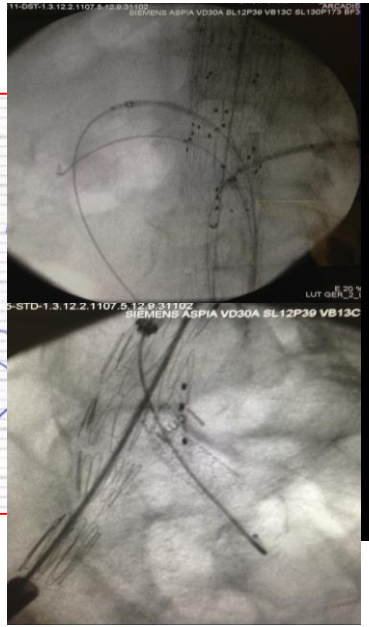


To Be Agresive

- Means… If you go for complex PRESERVE to the maximum to prevent neurological complications







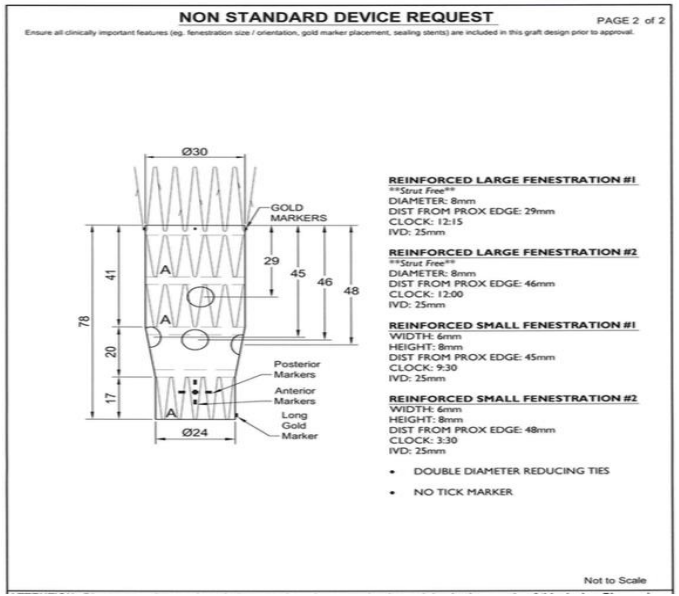
But Take it easy

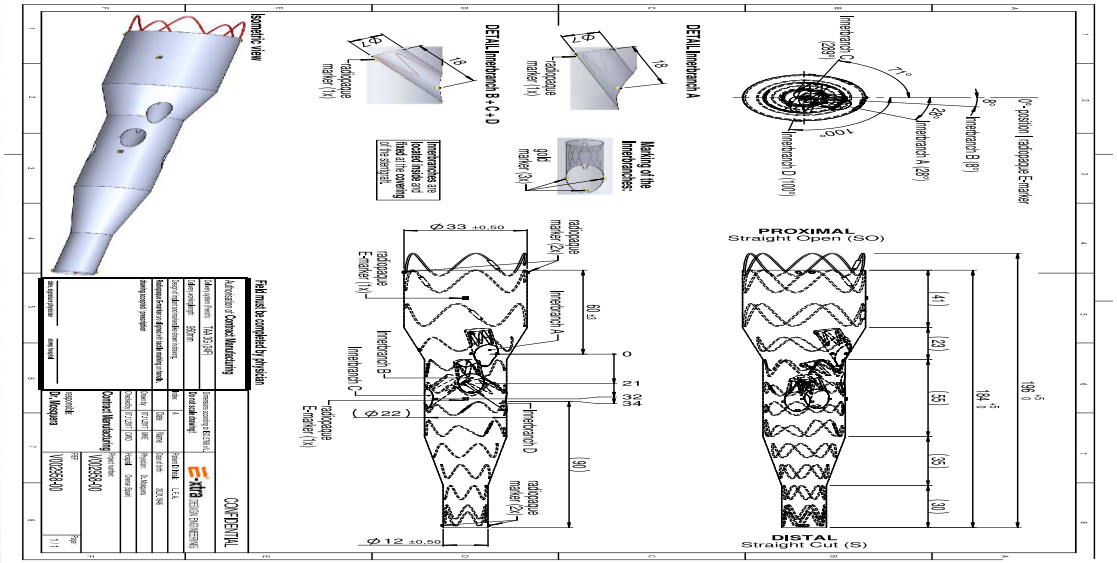
- Use best approach to reduce the impact of the procedure

On you!!!!

Take it easy

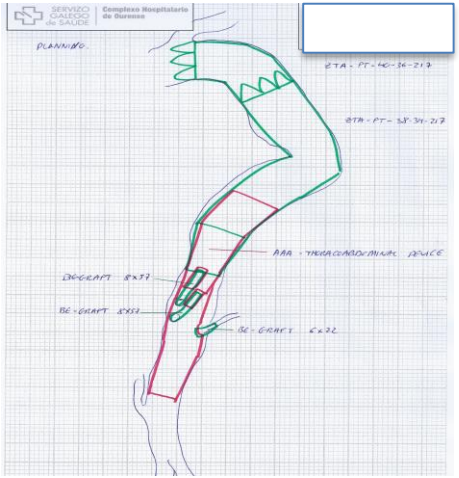
- Choose whatever tool you need which fits better to the patient.

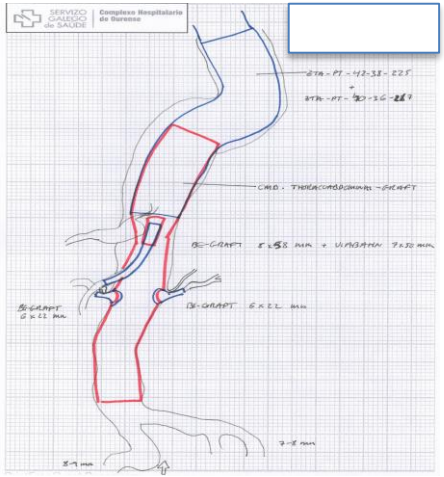


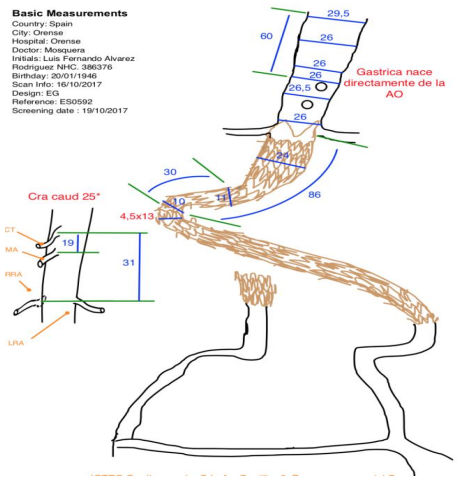


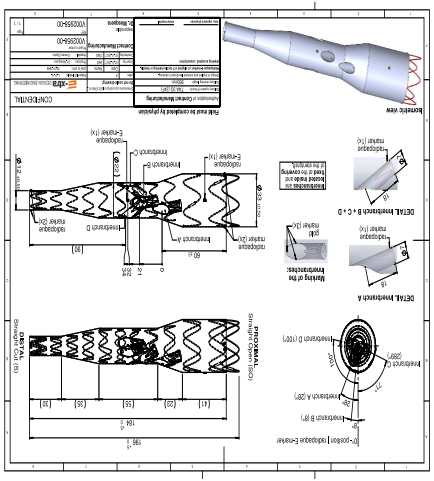
Take it easy

- Plan the complex case to make it simple: use combinations of branches, fenestrations, scallops… to simplify the problems.

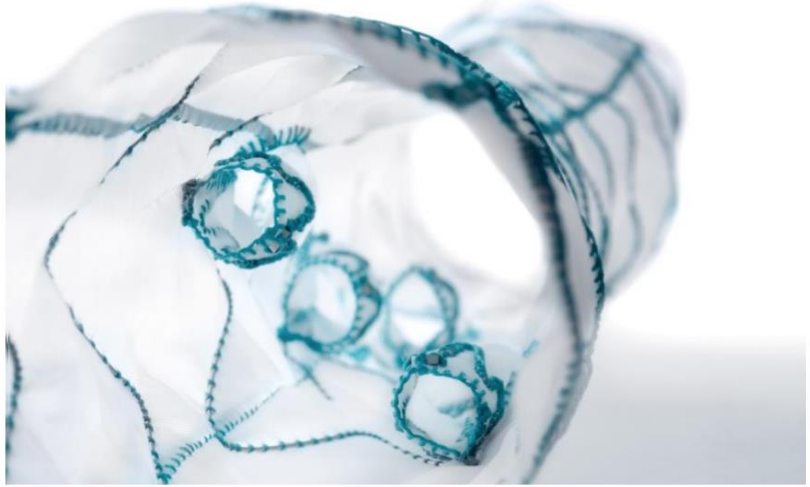




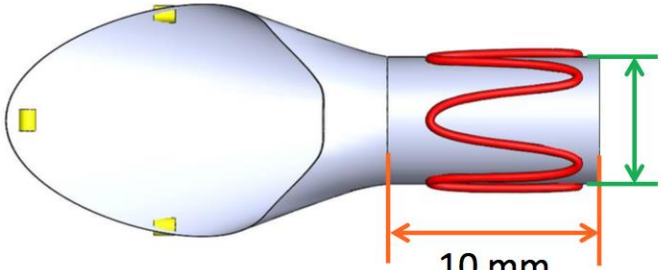




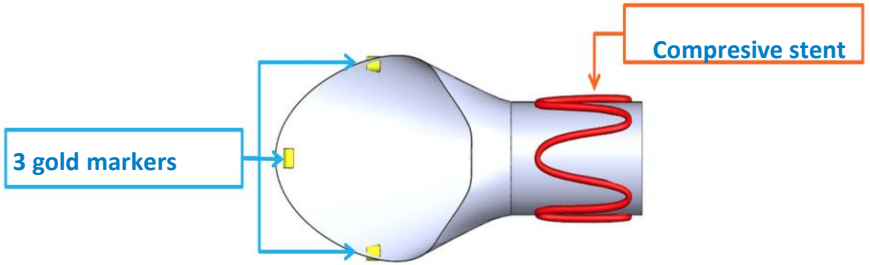
The role for Inner branches: best of both worlds?

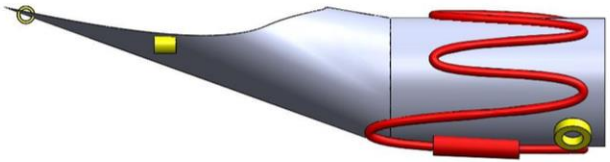


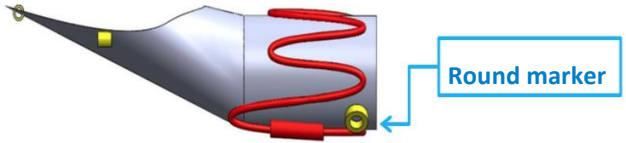
Inner branches: design features



Ø 6, 7, 8

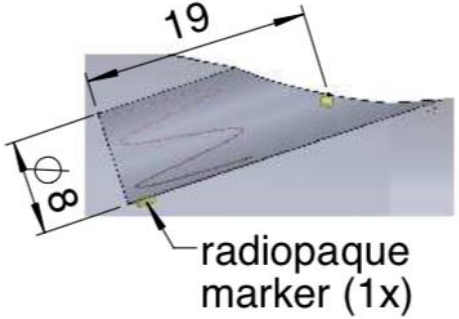


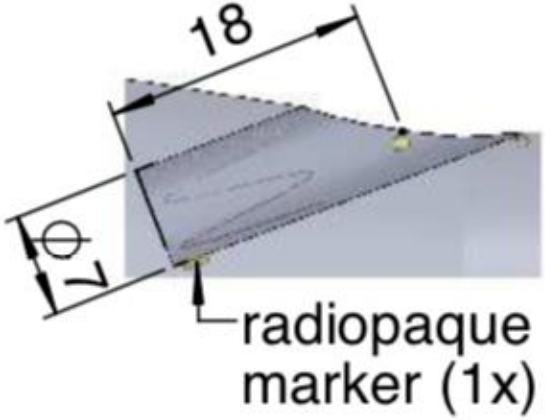


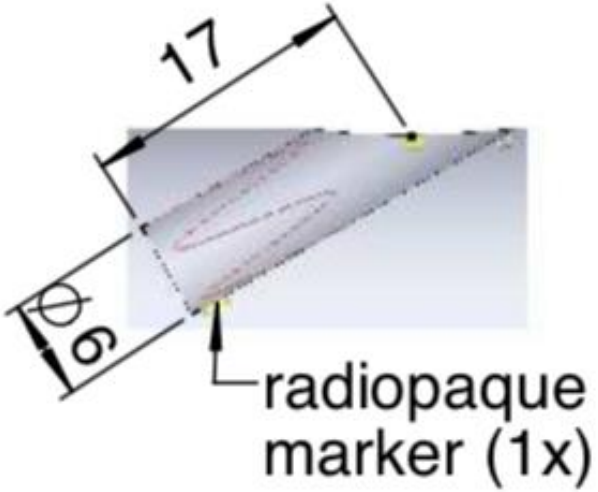


Inner branches: design features

Branch length depends on chosen diameter

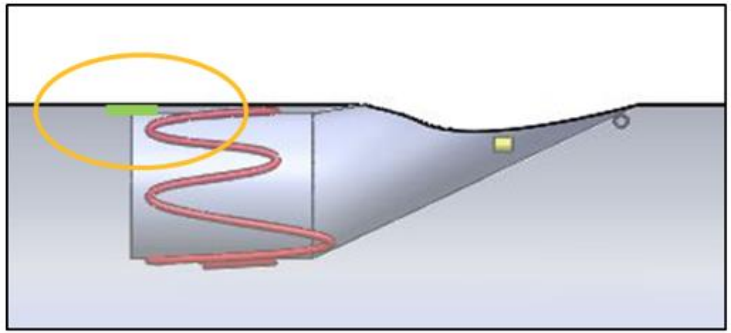


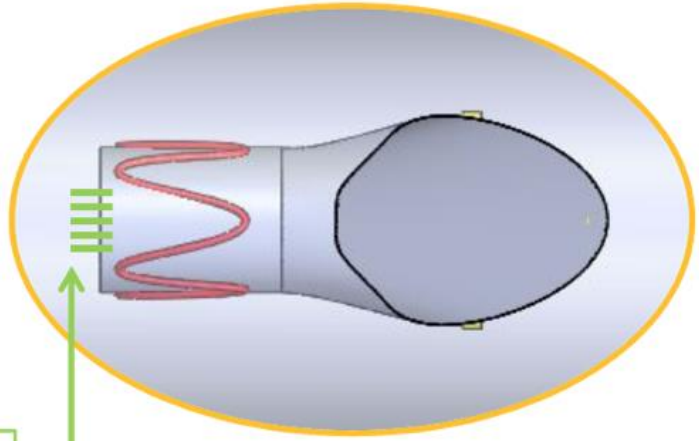




Inner branches: design features

Proximal branch to graft suture to facilitate cannulation and provide more stability

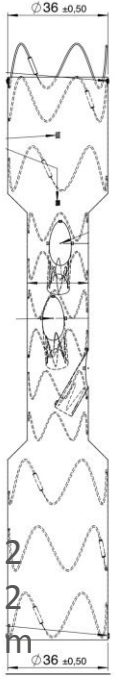


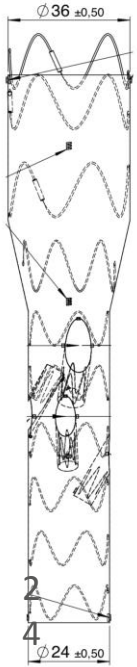


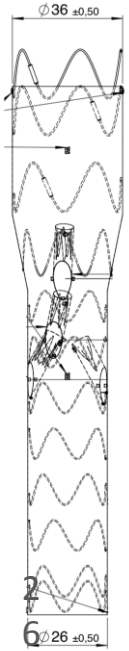
Continuous suture

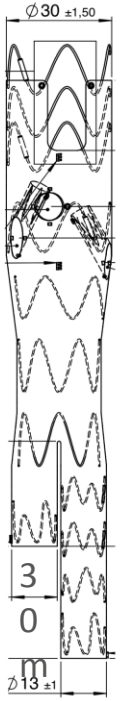
Inner branches: design features

Manufacturing options

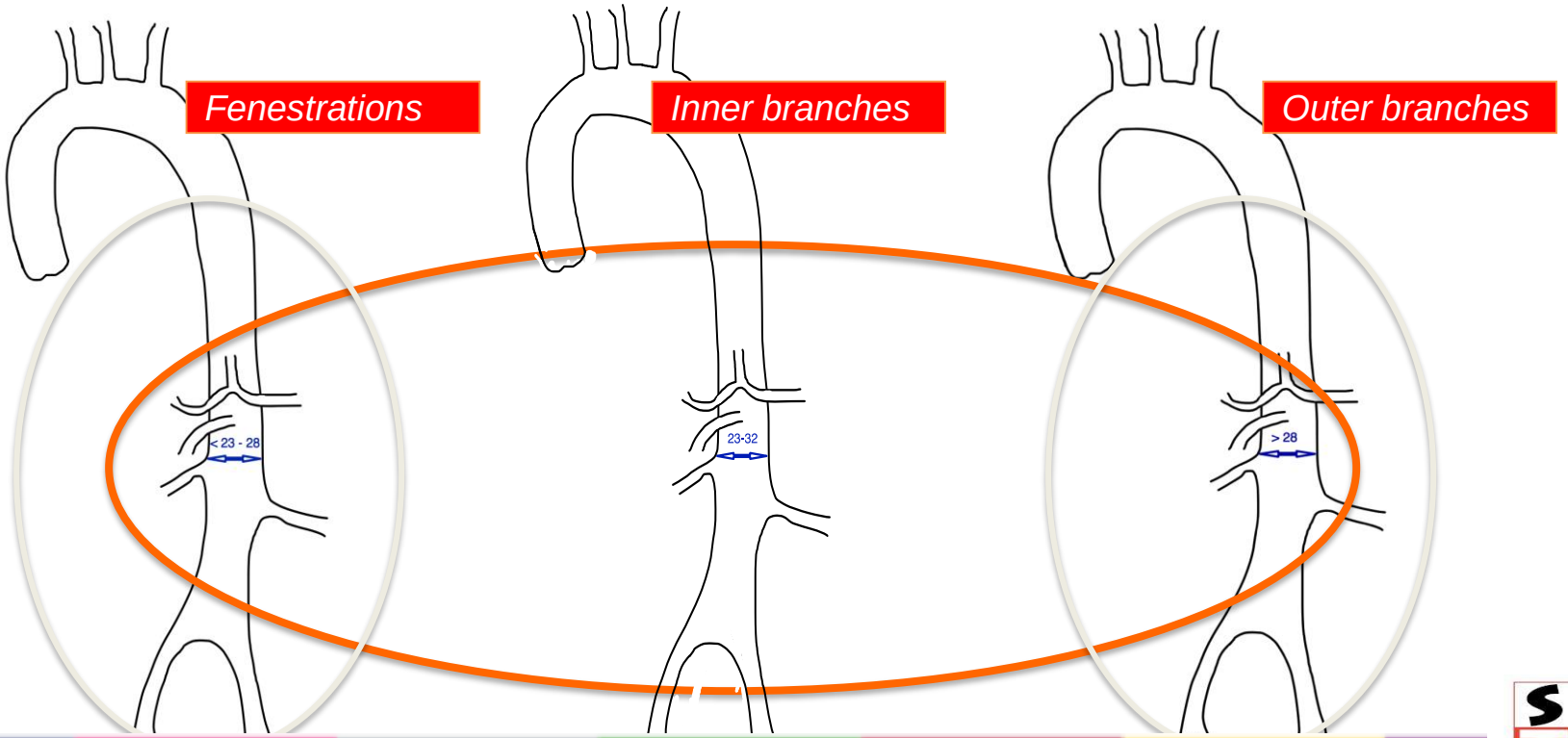








Inner branches: inner lumen is not a major limitation

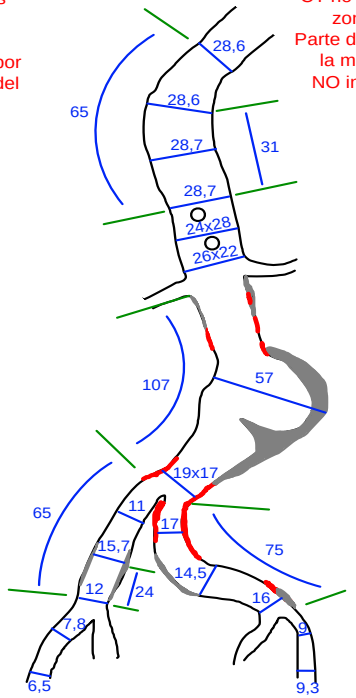


Inner branches: comparative features

	OUTER BRANCHES	FENESTRATIONS	INNER BRANCHES
NATURAL FLOW	✓	✗	✓
AORTA COVERED	✗	✓	✓
VERSATILITY	✓	✗	✓
ORIENTATION	✓	✗	✓
HEIGTH	✓	✗	✓
OVERLAPING	✓	✗	✓
FREE LUMEN	✗	✓	✓
FRENCH	✗	✓	✗
PROCEDURE STAGES	✓	✗	✓
COMPLEX ANATOMIES	✓	✗	✓
PERMEABILITY	✓	✓	✓

Our initial experience with Inner branches: The good, the bad, the ugly

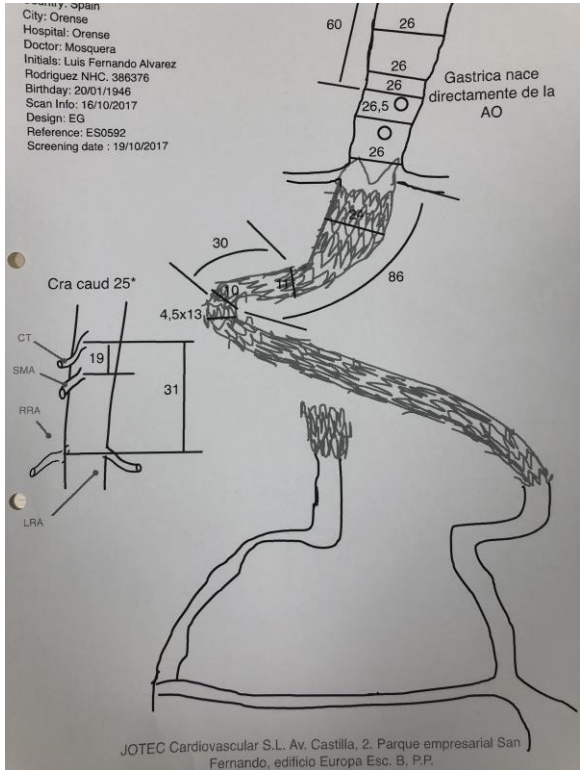
4 pares lumbares permeables
AMI permeable
Acceso izquierdo por diámetro y forma del aneurisma

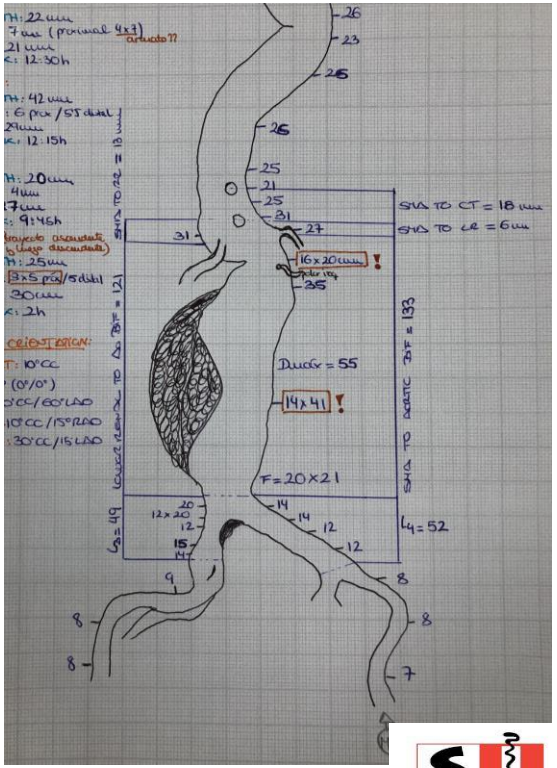


CT no tiene cortes de zona torácica.
Parte distal llega hasta la mitad de AIE,s
NO información de SFA,s

Caudo cra 22*
LAO 20*

Caudo cra 29*
RAO 24*

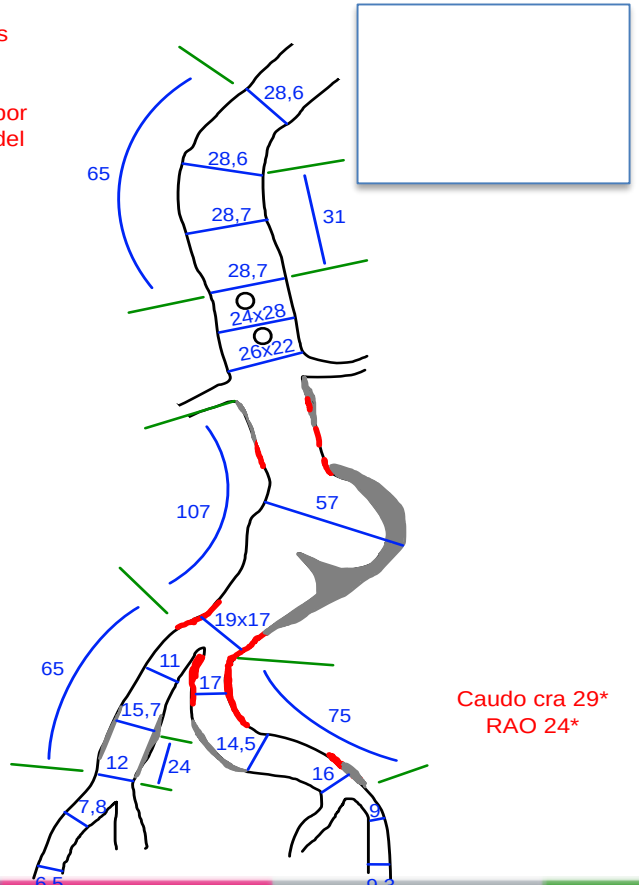




The good

78 years old CRF patient

4 pares lumbares permeables
AMI permeable
Acceso izquierdo por diámetro y forma del aneurisma

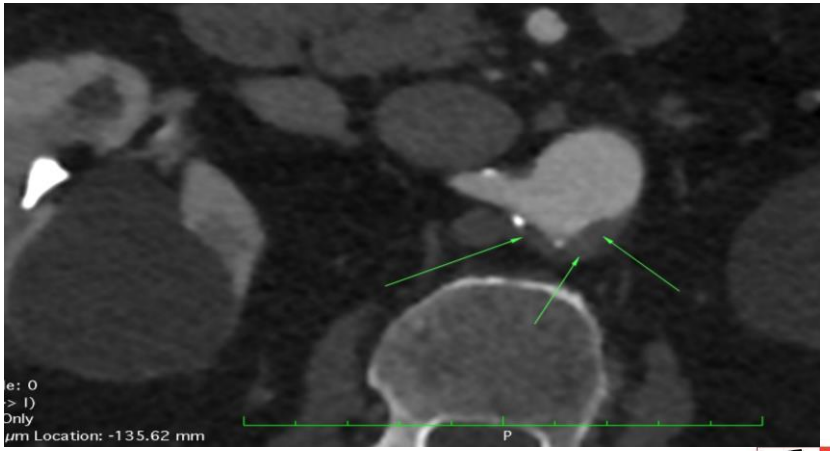


Caudo cra 22*
LAO 20*

Caudo cra 29*
RAO 24*

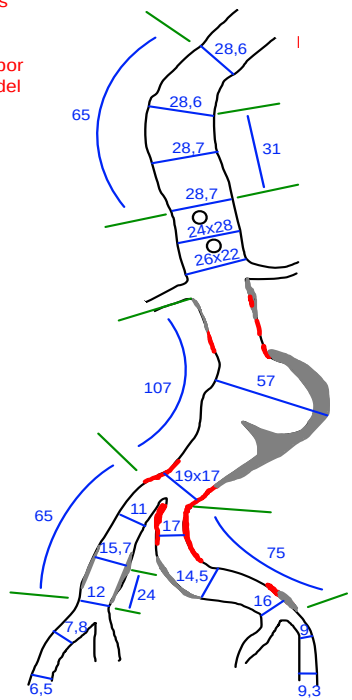
57 mm AAA

25 mm infrarenal neck with posterior thrombus and ulceration at renal level extending to SMA



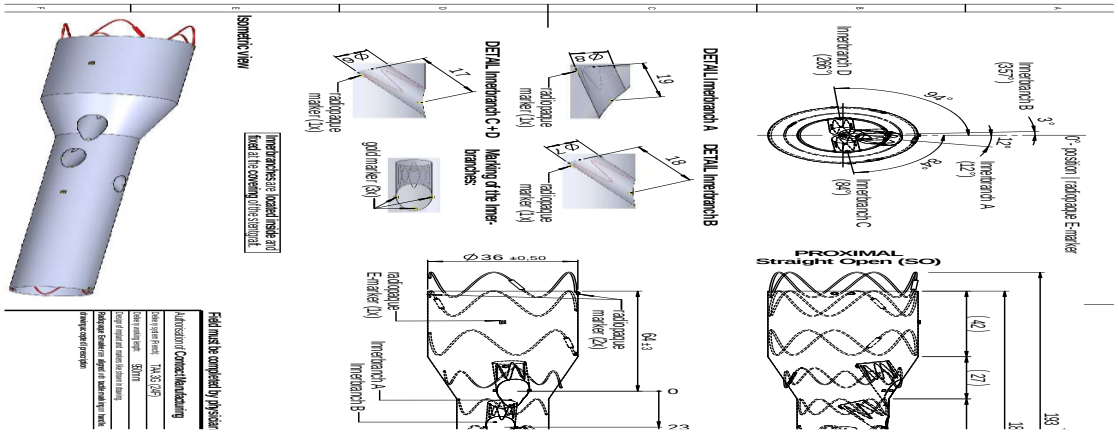
4 vessel inner branch CMD device from JOTEC

4 pares lumbares permeables
AMI permeable
Acceso izquierdo por diámetro y forma del aneurisma



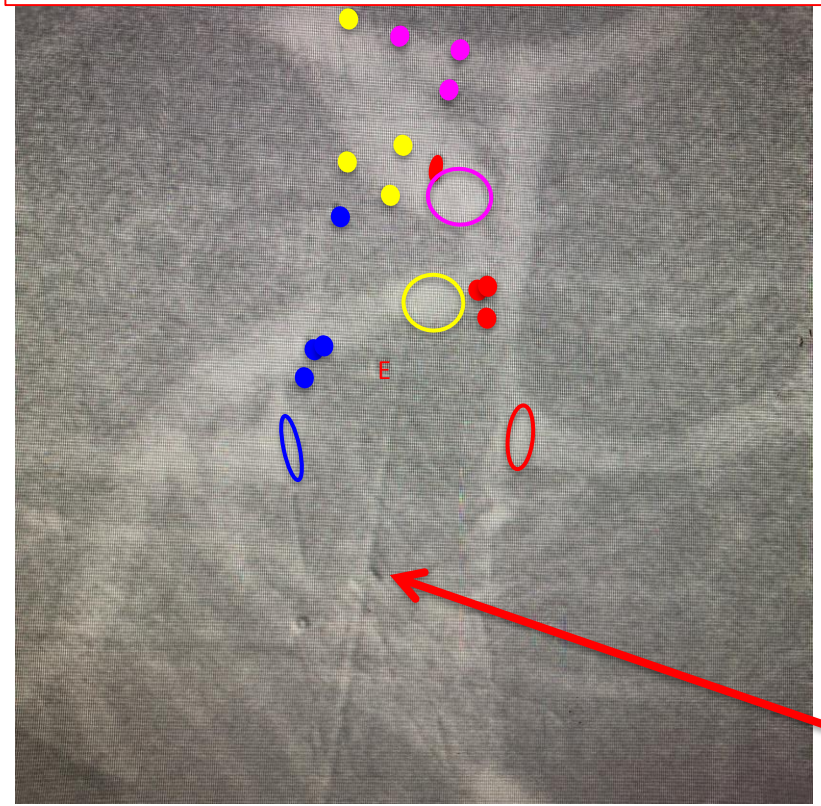
Caudo cra 22*
LAO 20*

Caudo cra 29*
RAO 24*



Check position after branch deployment

Procedure



Graft in position:
EVAR/FEVAR CO2 protocol

- **Preasure** → **650**
- **Volume** → **100 ml.**
- **Flush** →

6F 55cm Flexor as “Pig tail” for CO2

Remarks

1. Zero Iodine procedure is posible today even in complex aortic repair

2. Inner branch allowed a “easy procedure”

3. Inner branch allow room for cannulation even in relatively narrow lumen

The bad

US: 2 cm sac diam increase confirmed by CT Scan

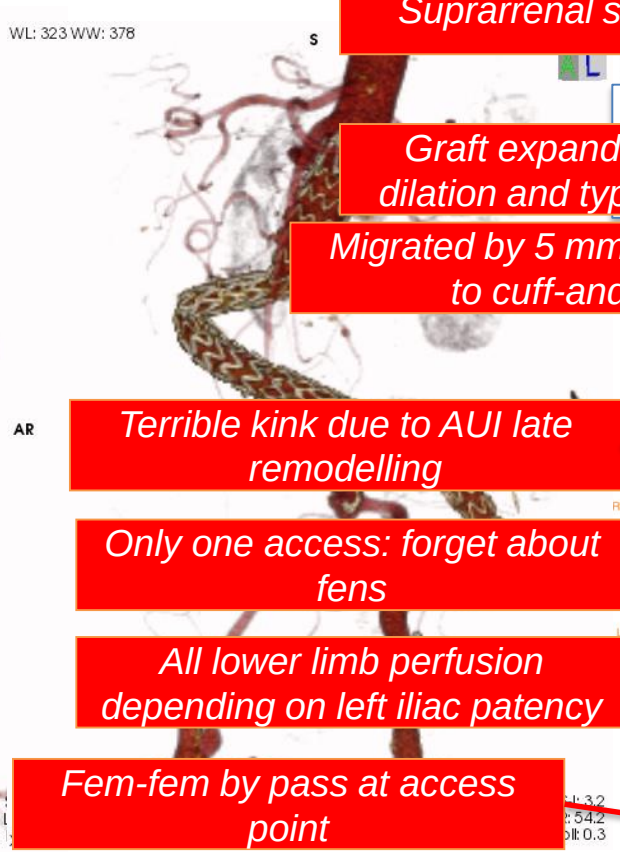
72 years old male

2008 Ruptured AAA treated with AUI + fem-fem by pass

Postop compartment syndrome and 15 days ICU survival

10 years FU with exclusion and sac stability, no redo, no complications. Senior Tennis player

The bad



Too narrow for outer branch

Suprarrenal stent crossing

Graft expanded with neck dilation and type Ia endoleak

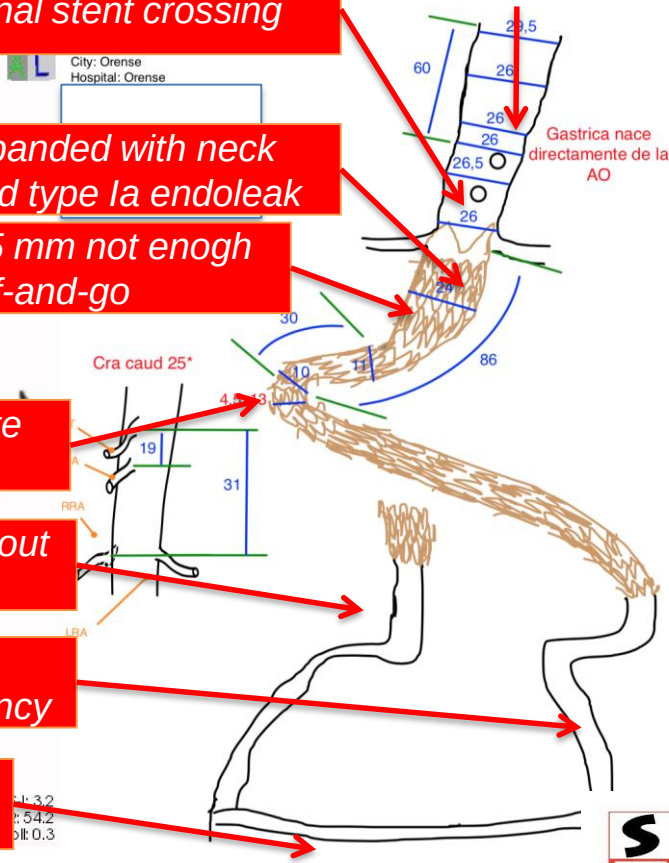
Migrated by 5 mm not enogh to cuff-and-go

Terrible kink due to AUI late remodelling

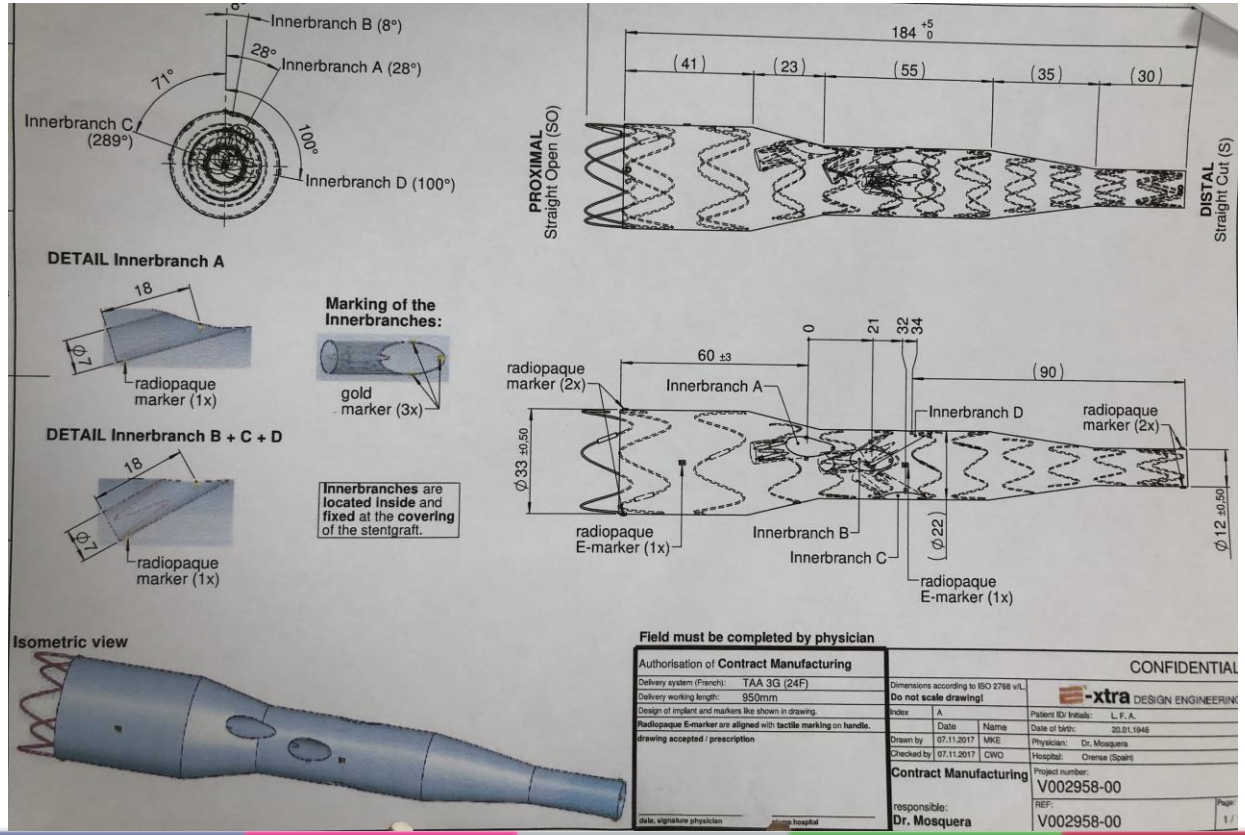
Only one access: forget about fens

All lower limb perfusion depending on left iliac patency

Fem-fem by pass at access point



The bad



4 Inner branch custom made device

Designed to match the AUI device

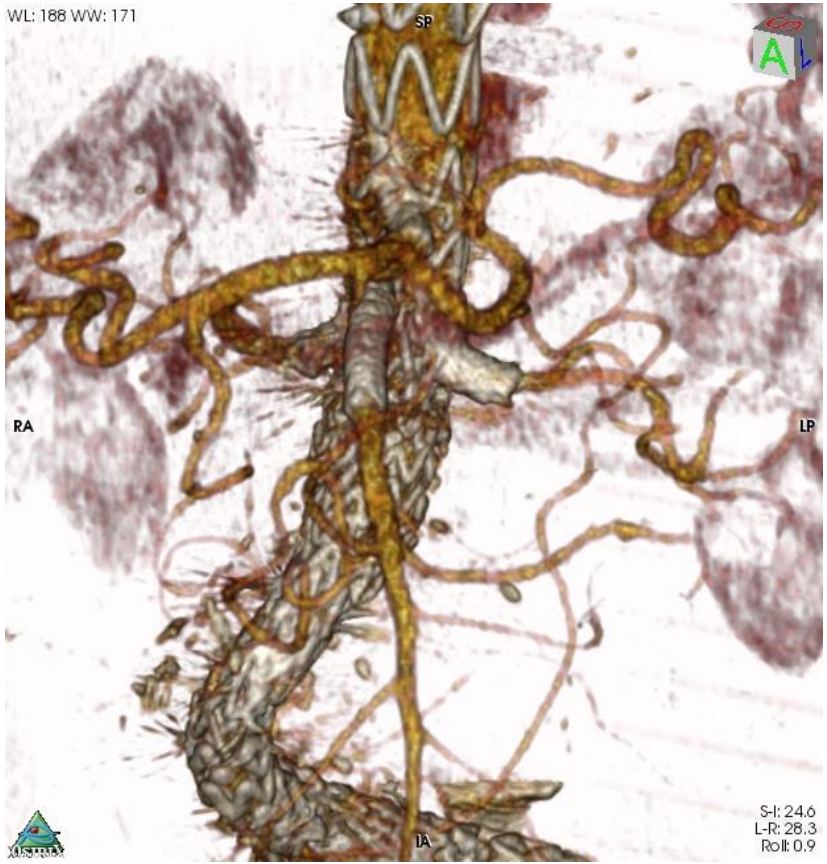
Long 26F sheath needed to provide torque and prevent torsion

And…

The bad

…aditional support requested before starting in the OR.

The bad



4 Inner branch custom made deployed

1 cm Sac reduction at 1 month

Kink corrected

No complications postop or at the FU SO FAR

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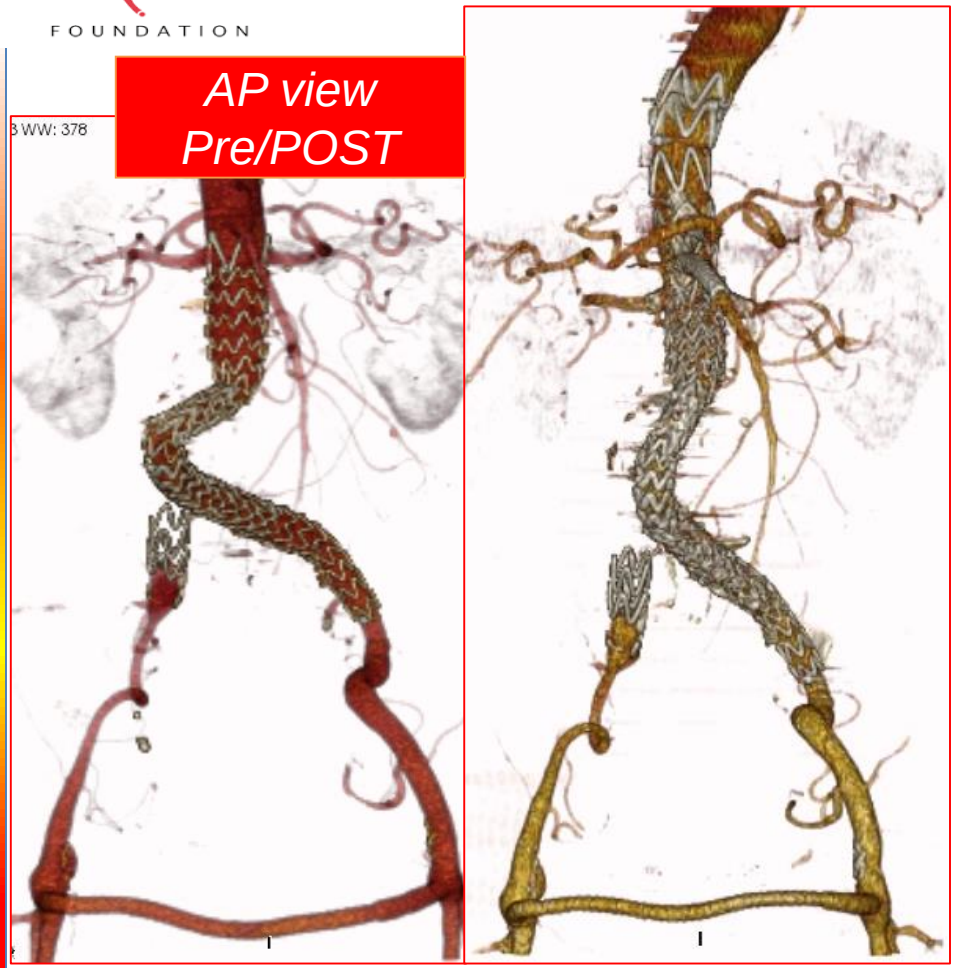
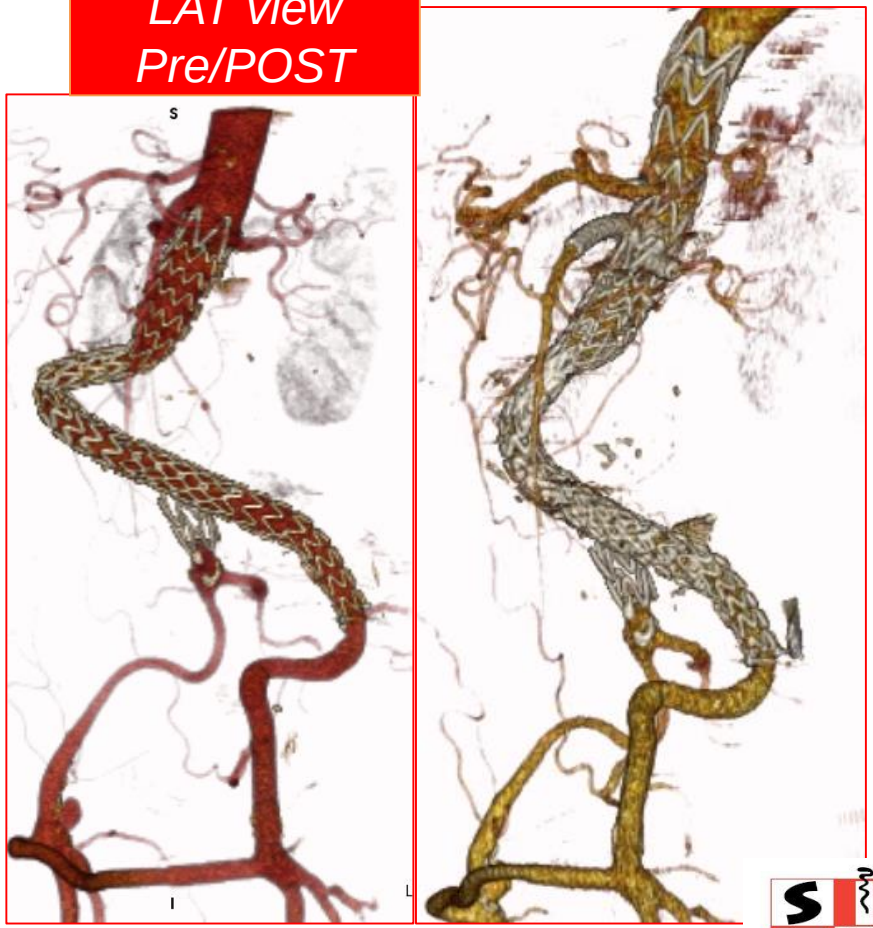
AP view Pre/POST

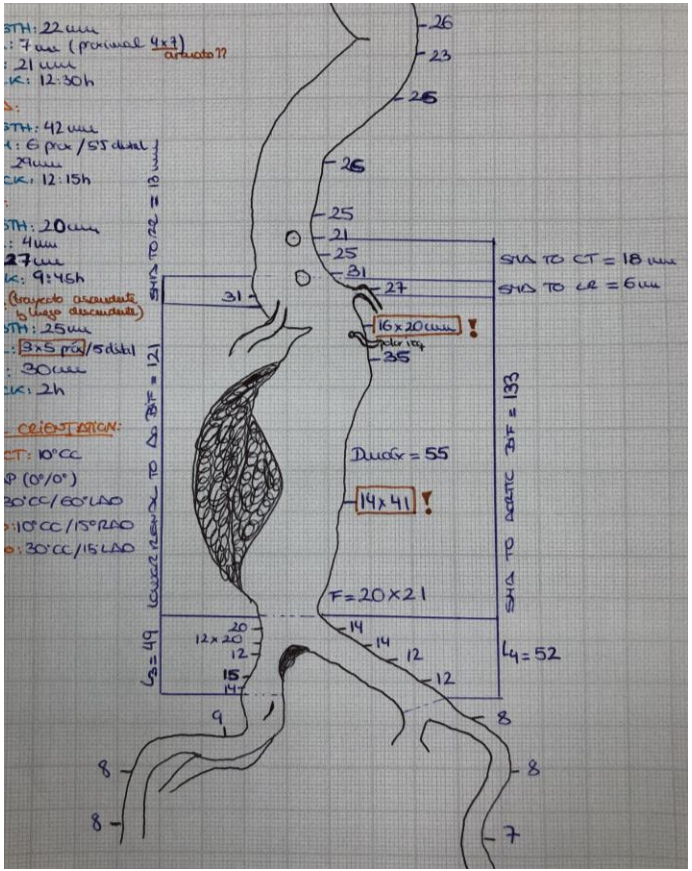


LAT view Pre/POST



STE

The Ugly



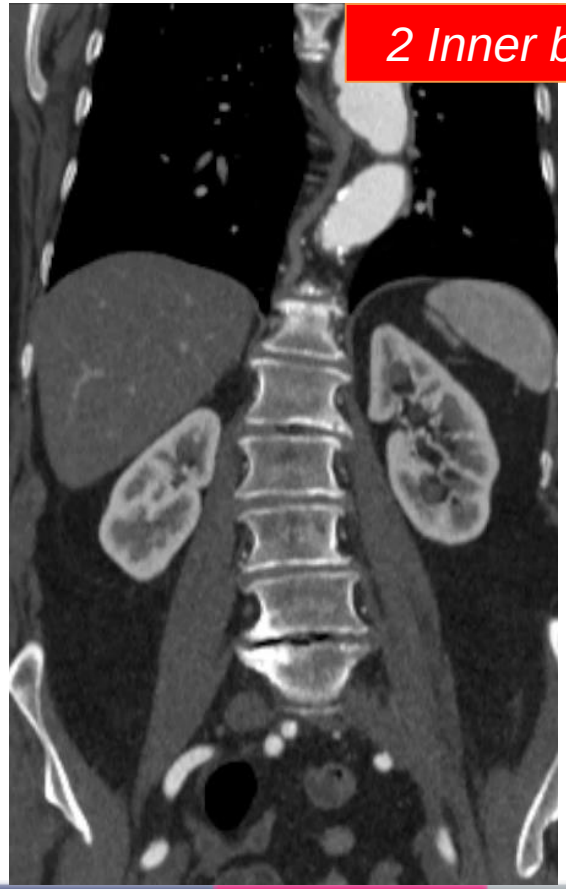
79 years old lady

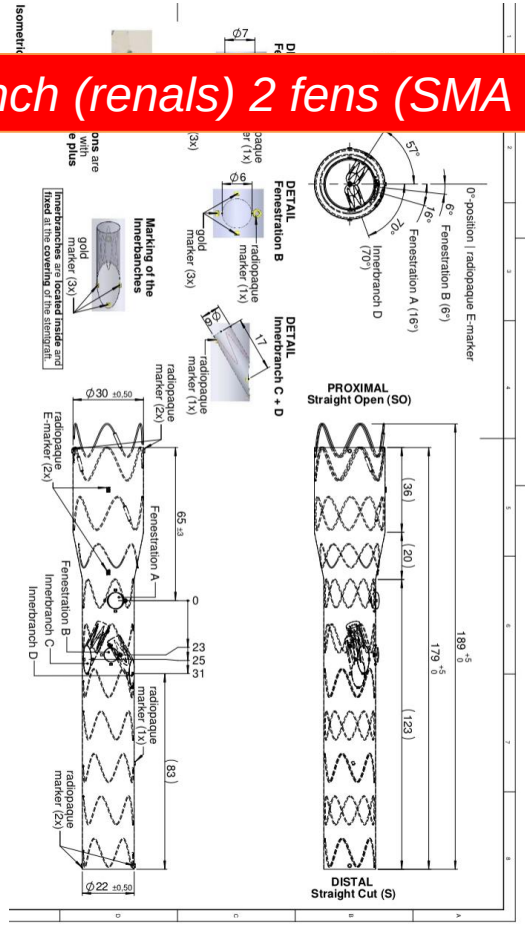
Infrarenal critical angulation: design concern for fens

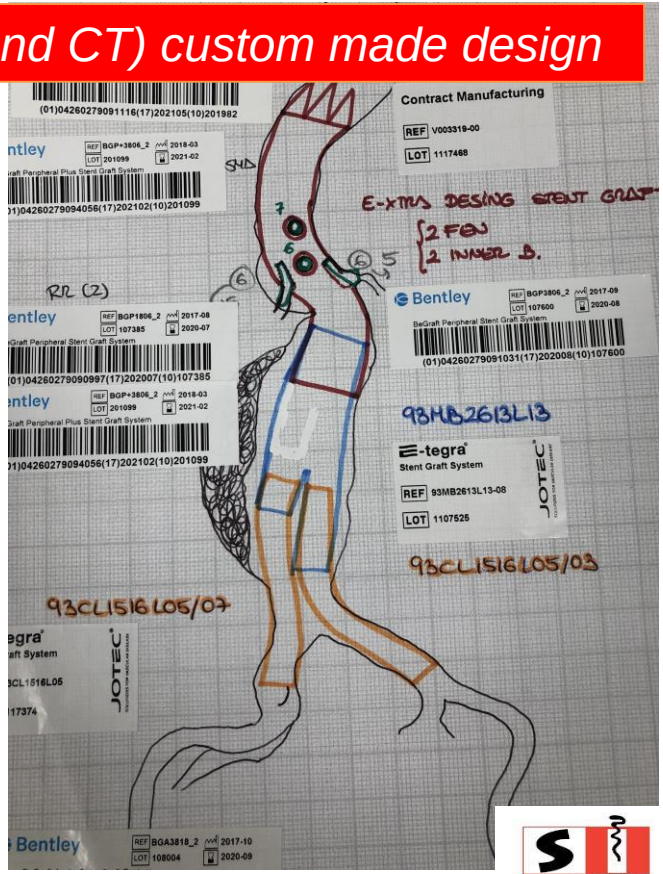
Narrow suprarenal lumen and all vessels close together

The Ugly

2 Inner branch (renals) 2 fens (SMA and CT) custom made design







The Ugly finally looked good

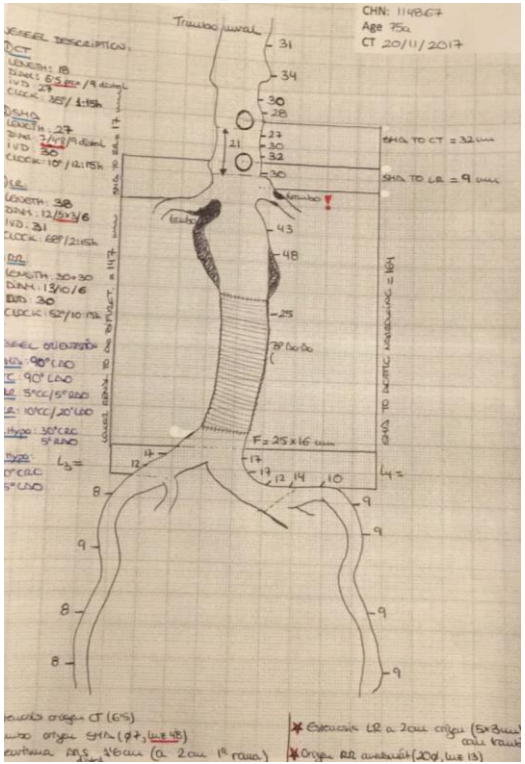
1 month FU looks OK

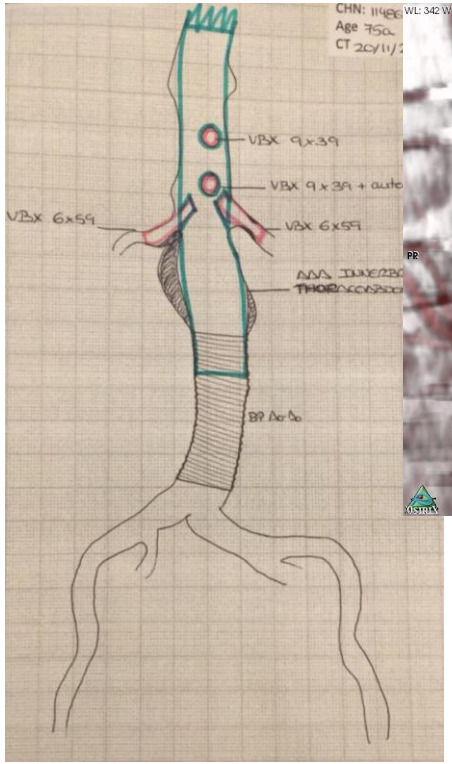
Adapted to IR angulation

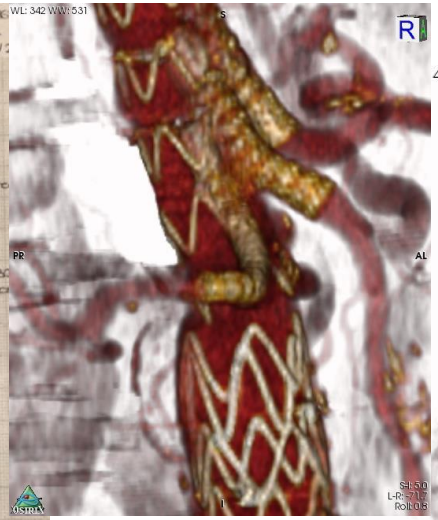
And…

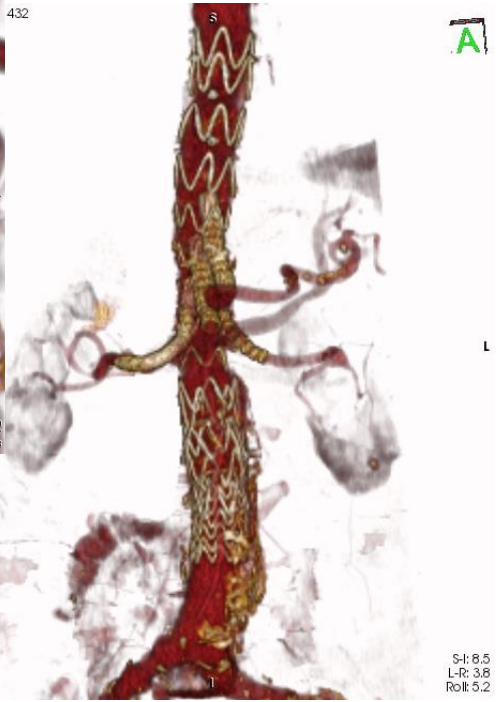
No complications postop or at the FU SO FAR

One very last case: now we cheat… …tomorrow off the shelf









Ruptured AAA suprarenal: 1st stage

Suprarenal repair : 2nd stage

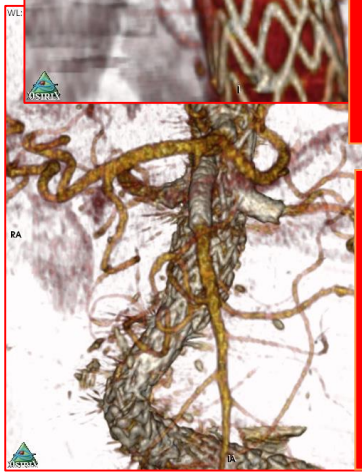
E-nside „first off the shelf device with inner branches precannulated"

- 4 INNER BRANCHES PRECANNULATED
- 4 different choices
- Availability
- High feasibility for TAAA treatment
- Based on Extra Design technology

CryoLife® Life Restoring Technologies®

JOTEC® Joined the CryoLife® Family

Inner branches: conclusions



Inner branches perform well in narrow lumen; equivalent to fens

Inner branches performance allow less thoracic coverage than outer branchs

Inner branches do not need to-the-milimeter precission required in fenestrated approach

Inner branches are more versatile than fens or outer branched grafts; could be a powerful tool for off the shelf solution to complex aortic Endorepair

Thanks for your attention!

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