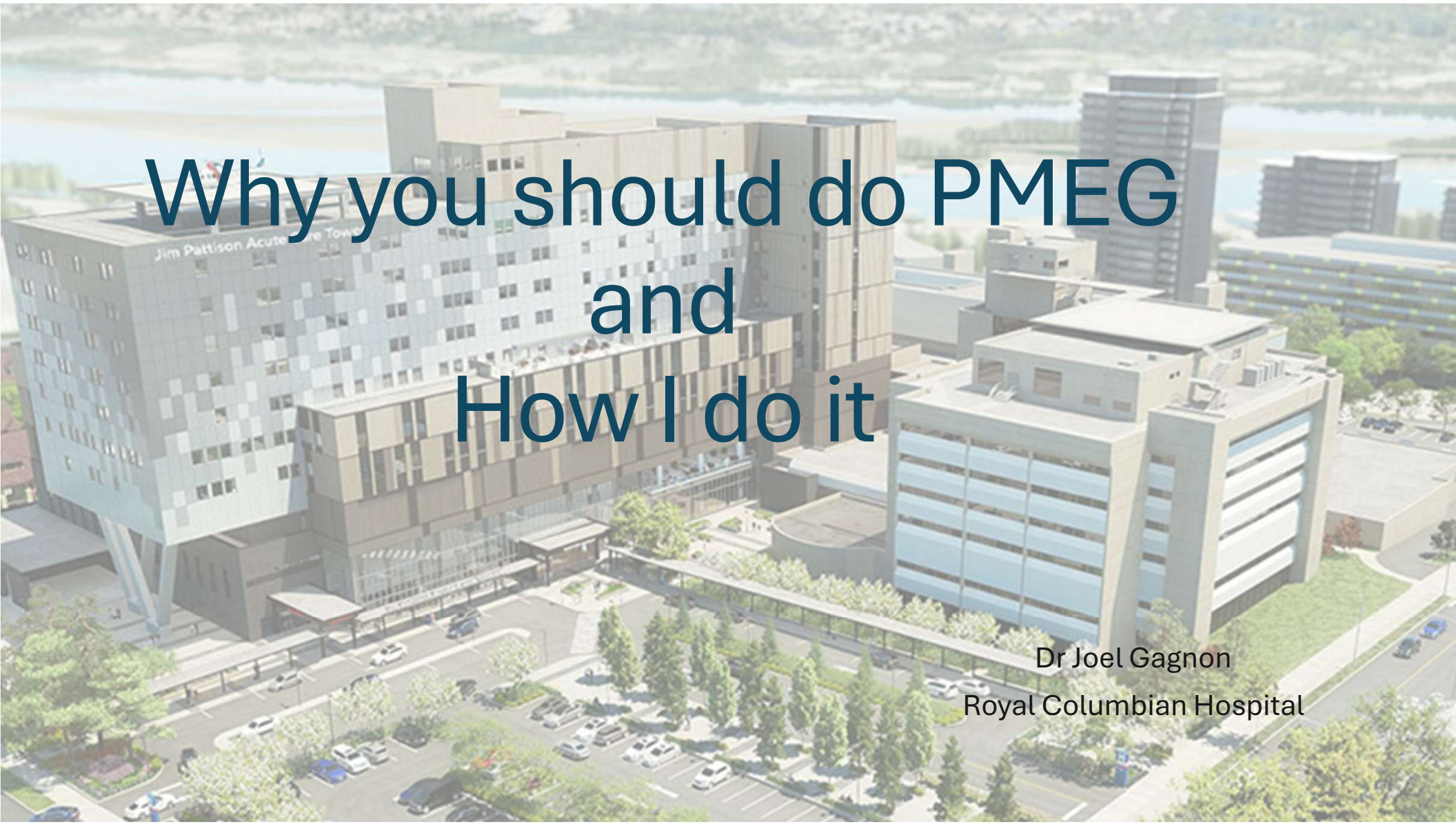
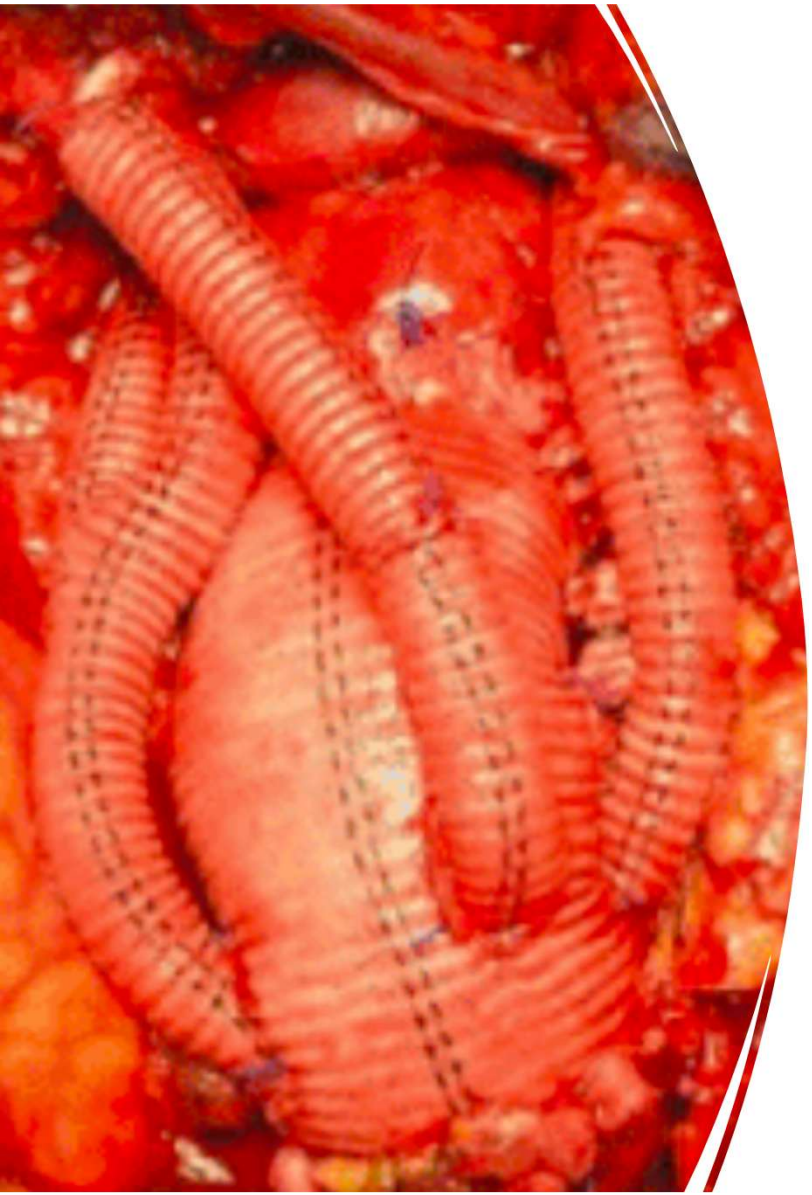


Why you should do PMEG and How I do it

Dr Joel Gagnon

Royal Columbian Hospital



PMEG not foreign to Surgeons or IR

- We routinely modified commercially available vascular graft
- Why not modifying an endograft?

- **Described by IR in 2006**

Clinical Experience with a Customized Fenestrated Endograft for Juxtarenal Abdominal Aortic Aneurysm Repair

Renan Uflacker, MD, Jacob D. Robison, MD, Claudio Schonholz, MD, and Krassi Ivancev, MD

Despite the numerous stent-graft devices available, unsuitable anatomy is still the greatest exclusion criterion for endovascular abdominal aortic aneurysm (AAA) repair (EVAR). The present report describes an on-site preprocedural customization of a conventional Zenith stent-graft device just before the endovascular procedure that includes the creation of fenestrations and scallops as necessary for the patient's anatomy. Three patients with difficult anatomy in whom conventional AAA repair posed a high degree of risk were treated with customization of the stent-graft device to fit disparate renal arteries. A single fenestration for the left renal artery was made in two cases, and a single scallop was made in the other case to accommodate the superior mesenteric artery. Gold beads were used to mark the location of the fenestration and scallop. The three cases were successfully performed without perceptible endoleaks in the follow-up period, which ranged from 4 to 14 months. No procedure-related complications were detected; however, pneumonia developed in one patient 3 weeks after EVAR. The initial results with this technique are encouraging, and the role of EVAR can be significantly increased with the use of this customization technique when the interventionalist does not have access to the commercially available devices or when the waiting time is too prolonged to accommodate the patient's clinical situation.

J Vasc Interv Radiol 2006; 17:1935–1942

Abbreviations: AAA = abdominal aortic aneurysm, EVAR = endovascular abdominal aortic aneurysm repair, SMA = superior mesenteric artery

THERE has been a rapid evolution in the technology used for endovascular abdominal aortic aneurysm (AAA) repair (EVAR) since the inception of the technique by Parodi and colleagues in 1991 (1). Despite the numerous devices available, unsuitable anatomy is still the greatest exclusion criterion for EVAR. Inadequate proximal neck anatomy is the most frequent rejection factor despite recent developments in fixation systems. The presence of a short "landing zone" in the proximal neck requires accurate delivery. In addition, angulation and mural thrombus may even further limit the success of the procedure. Because of these difficulties, a fenestrated device was developed by Park et al in 1996 (2) and refined by Faruqi et al in 1999 (3) in an attempt to increase the sealing area. Further development included a modular system, which is the platform for the currently available fenestrated devices used for EVAR (4–6), in addition to reinforced fenestrated branched grafts and directional branches for more complex aneurysms (7). Fenestrated devices are currently commercially available and have been used in Australia and in Europe, but the devices are in short supply, and the waiting time can reach several weeks. The fenestrated endograft is manufactured in a lengthy process based on detailed measurements of the patient's aorta and review of imaging studies, and the device is eventually made for that specific patient. Sterilization time and long-distance shipping lengthen the process. In addition, fenestrated endografts are not readily available in the United States outside of clinical trials. As a result of these limitations, there is an increasing underserved population of patients with unsuitable anatomy for the regular devices. Particularly at risk are symptomatic patients who may not be able to wait for the manufactured device and patients with juxtarenal aneurysms seeking endovascular treatment in areas of the world where the device is not available.

The present report describes a useful technique of on-site preprocedural customization of the conventional Zenith device (Cook, Bloomington, IN) with creation of fenestrations and scallops as necessary for the patient just before the endovascular procedure, according to the technique developed by Ivancev (personal communication).

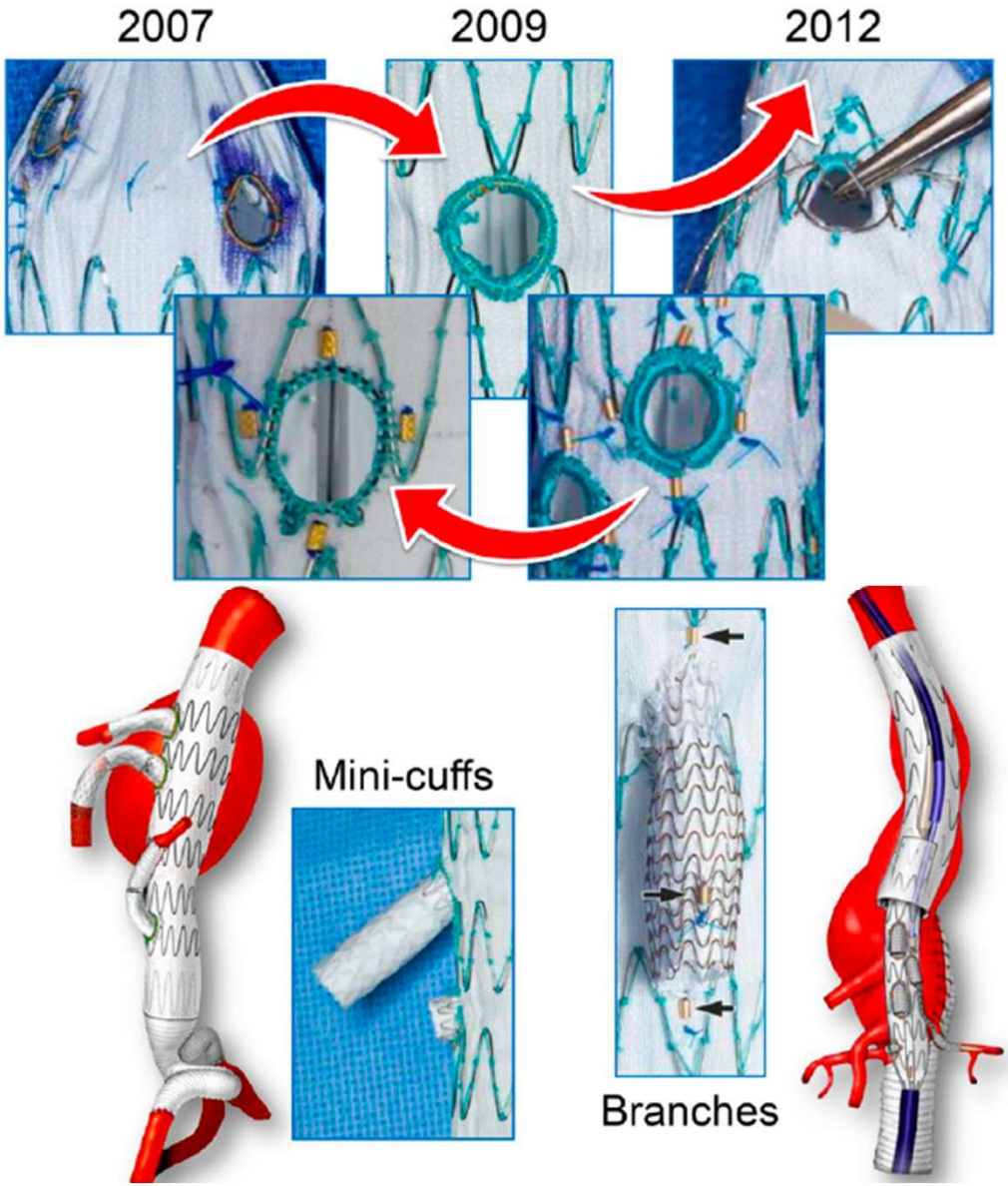
From the Departments of Interventional Radiology (R.U., C.S.) and Vascular Surgery (J.D.R.), Medical University of South Carolina, 169 Ashley Avenue, Charleston, South Carolina 29425; and Endovascular Center (K.I.), University of Lund, Malmo, Sweden. Received April 27, 2006; revision requested August 27; final revision received September 3; and accepted September 20. **Address correspondence to** R.U.; E-mail: uflacker@musc.edu

None of the authors have identified a conflict of interest.

DOI: 10.1097/01.RVI.0000248828.92093.1A

PMEG were rapidly adopted by VS, who perfected the technique and introduced novel concepts of:

- Reinforced fenestrations, branches
- Diameter-reducing ties
- Preloaded wires/catheters



Why should you do it?

- To treat aortic urgency
- Rather than pushing the envelope with off-the-shelf devices, performing PMEG for patients not amenable to a CMD due to waiting time might overall benefit the largest patient population.
- PMEG best replicates CMD principles
- In situ fenestrations lack reinforcement, which may compromise durability and lead to type 3 endoleak
- To save money

Why PMEG should be integrated to your practice?

Currency!

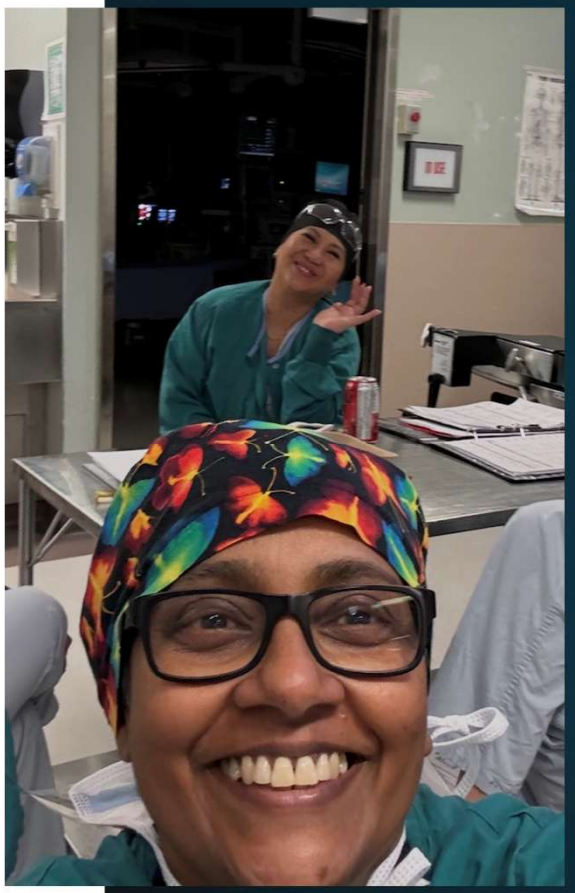
Would you flight with a PIC that haven’t flown for a while?

Situation awareness

Student: So just do the runup here?
Me: You're PIC you decide.

Nursing education

- My team are aware of the situation, need to modify graft ahead
- Side table ready to go prior to main table prepare
- We have a PMEG kit
  - Ophthalmic cautery, coils, sutures, ruler, marker, pen…



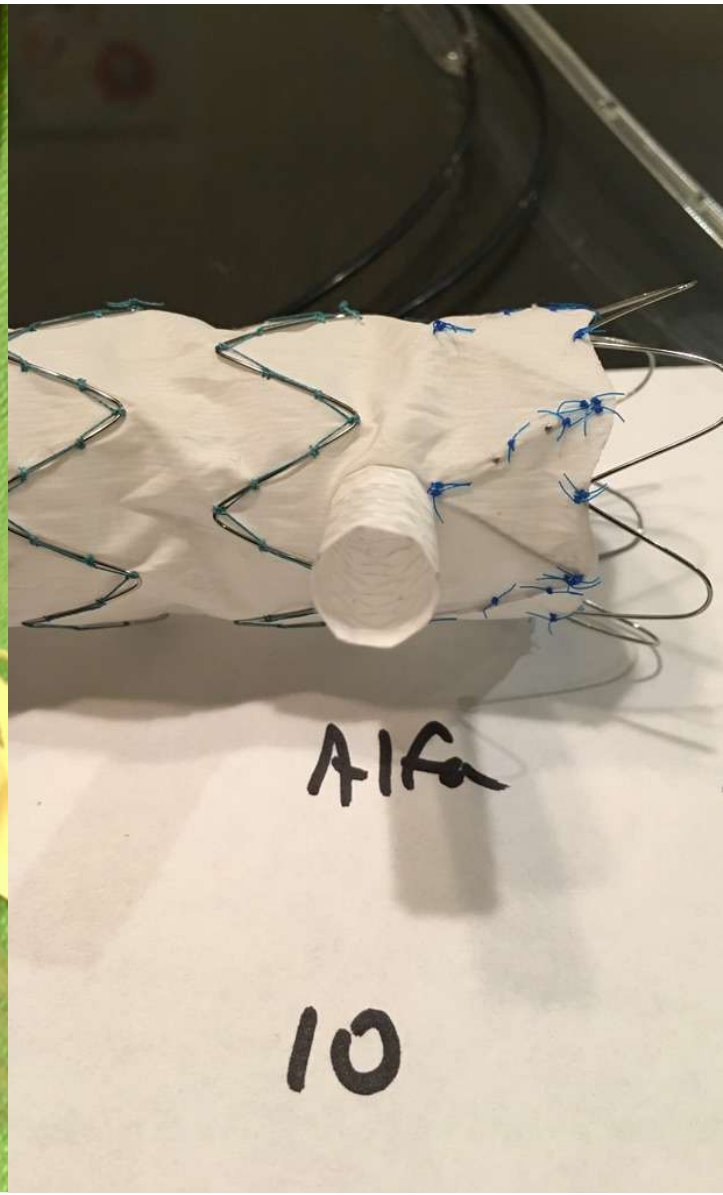
PMEG should be incorporated into your daily practice

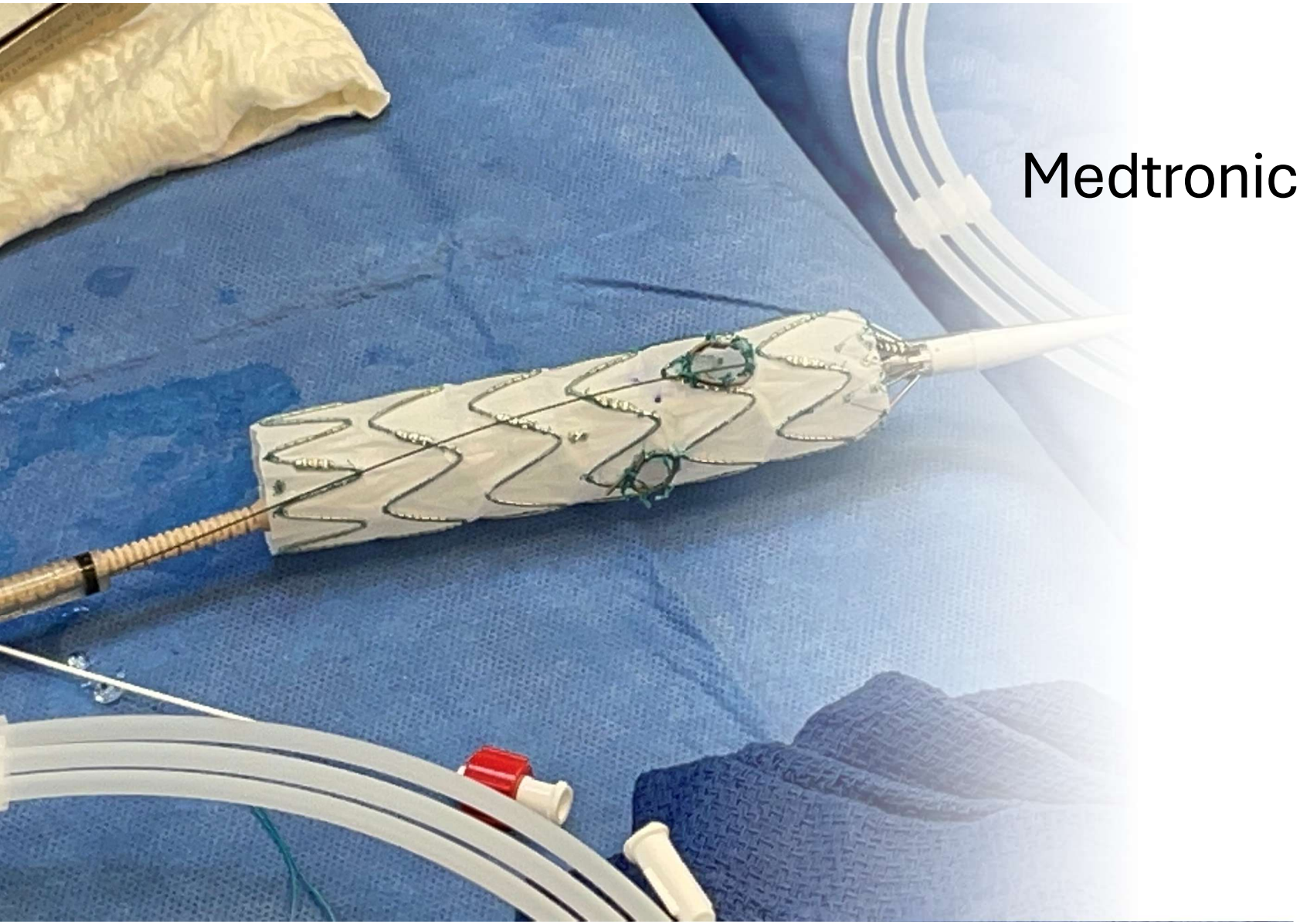
- Not time to learn during stress
- Need to have logged a few flight prior to solo!
- Need a trained team

HOW I DO IT

My lab

Cook




Medtronic

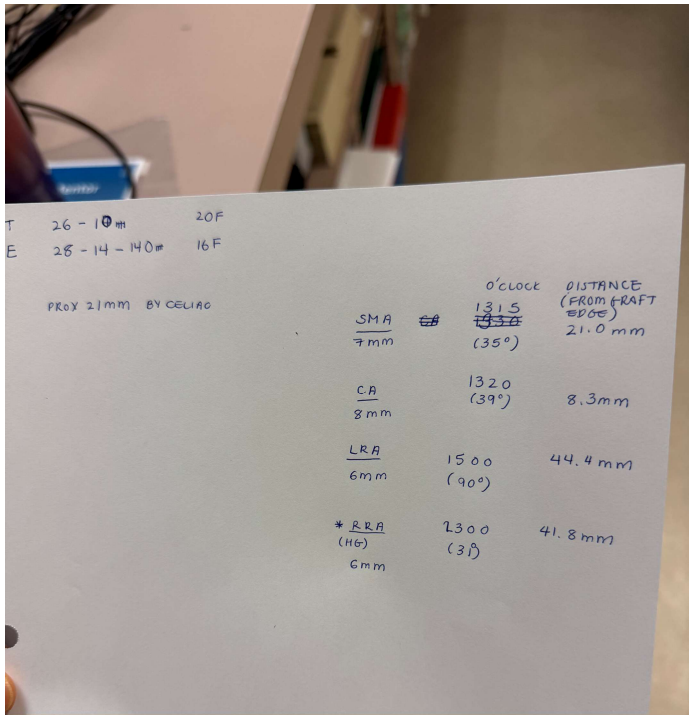

Next frontier

Background

- Been in practice for 20 yrs
- Did a fellowship oriented in FEVAR in 2006
- Did my first FEVAR at VGH in 2007
- Did my first PMEG in 2015 (Thanks to Dr Chen!)

How I do it

- You can modify any endograft
- Need to be familiar with the delivery system
- Need to remember some math concept
- Need some preop planning



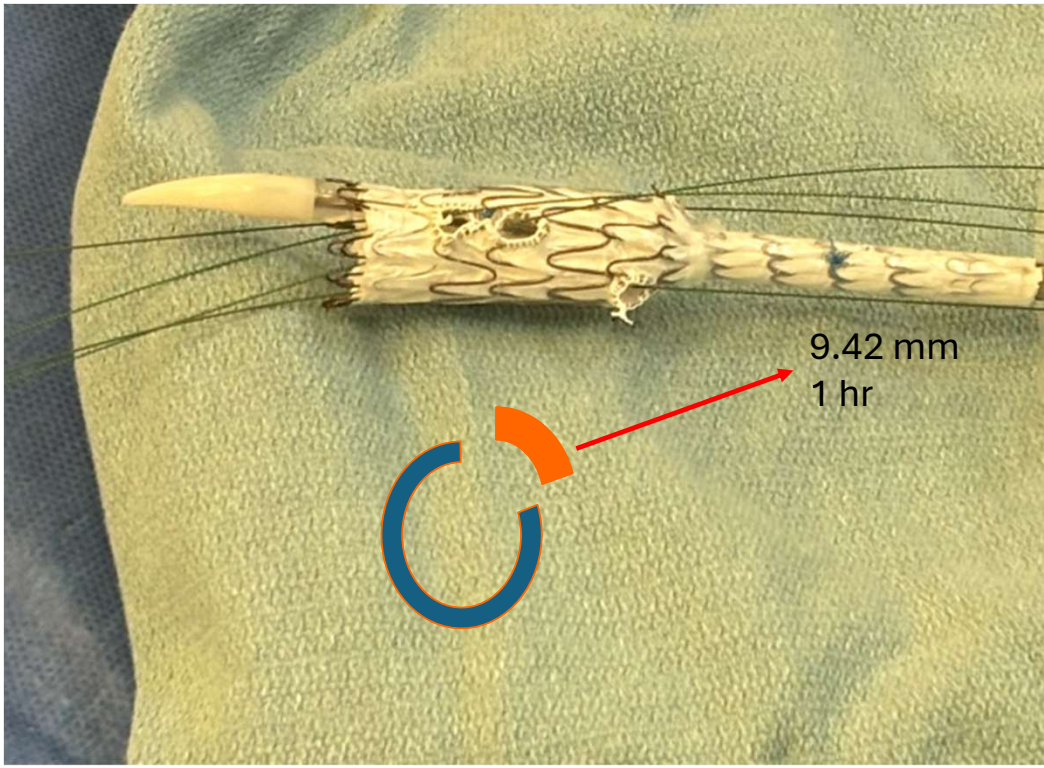
Planning

- Like preparing for a CMD
  - Landing zones (prox/dist)
  - Decision about Scallop/ Fen combinations
  - For each of them need:
    - distance from edge
    - O’clock position or distance of arc from 12 o’clock
  - Necessity of loaded wire

How to translate your plan to the OR

Need to calculate distance of an hour

- (C=πD)/12
- Example graft D 36, 2 o'clock, then π x 36/12 = 9.42 mm
- From 12 o'clock measurement is done

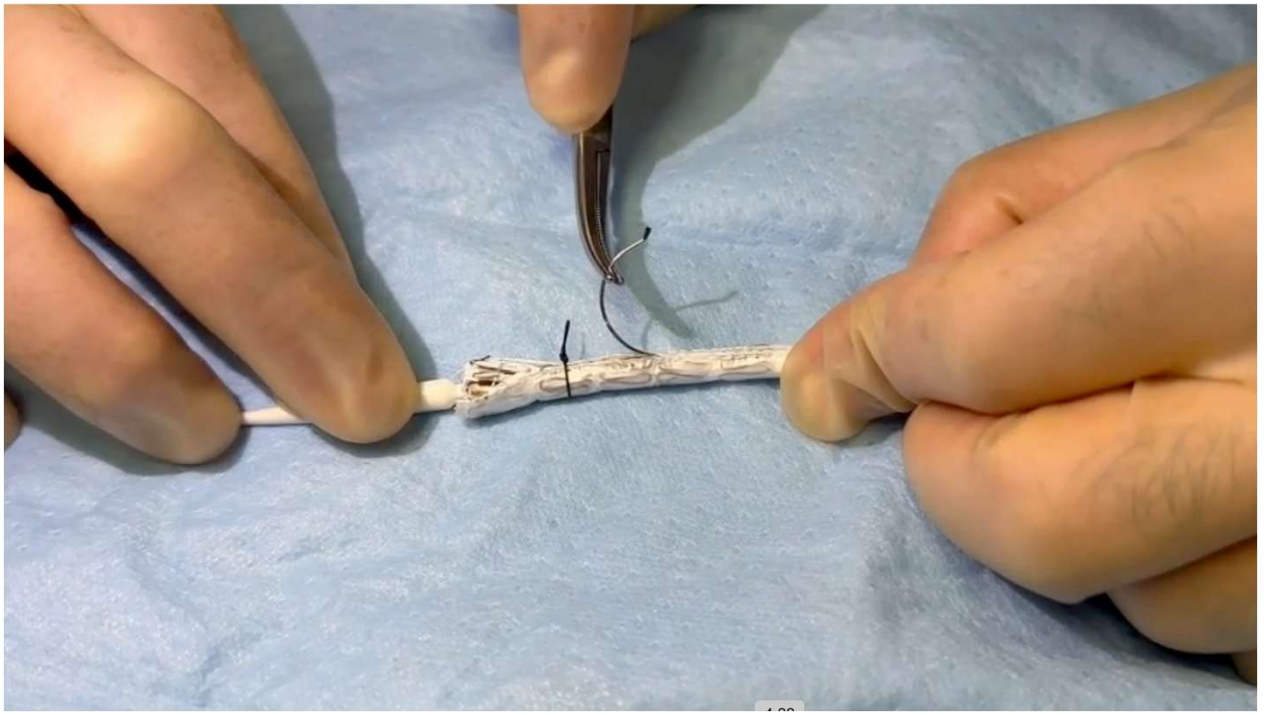


Because of time restriction…
Let’s talk about how I
PMEG Gore graft

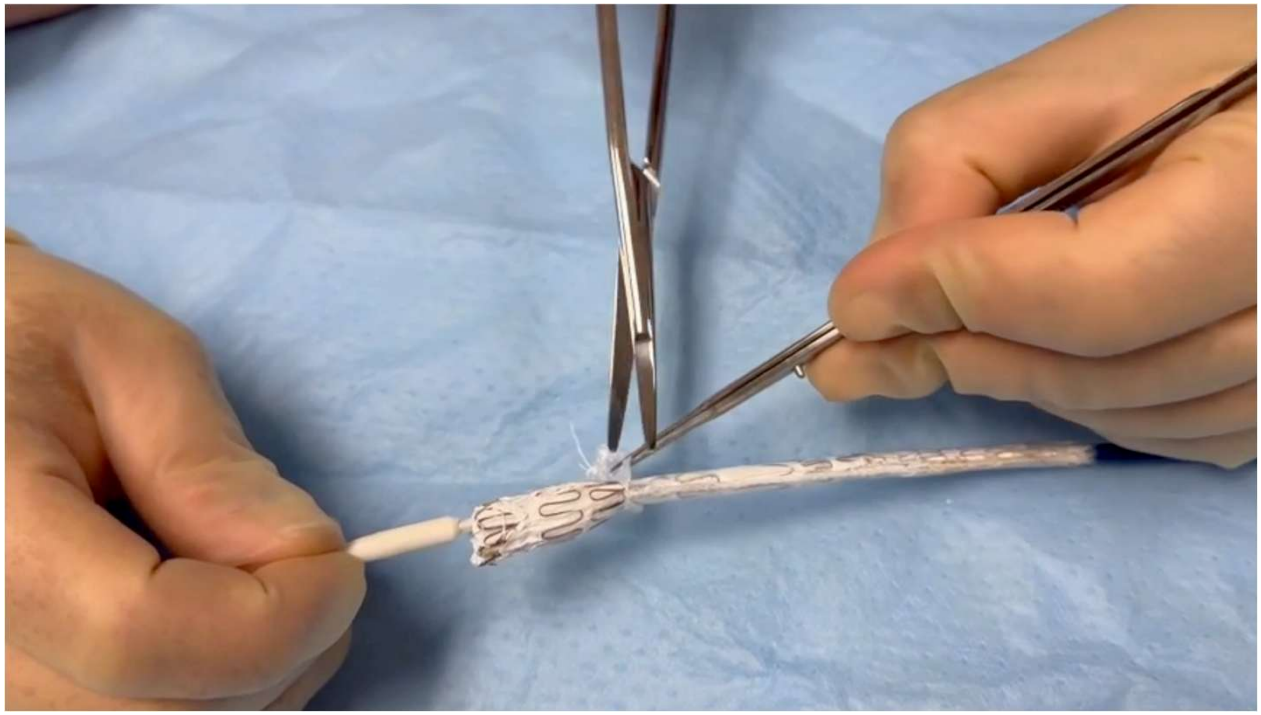
First step; keep sleeve for later…

Silk tie to prevent further graft deployment
Close the proximal graft

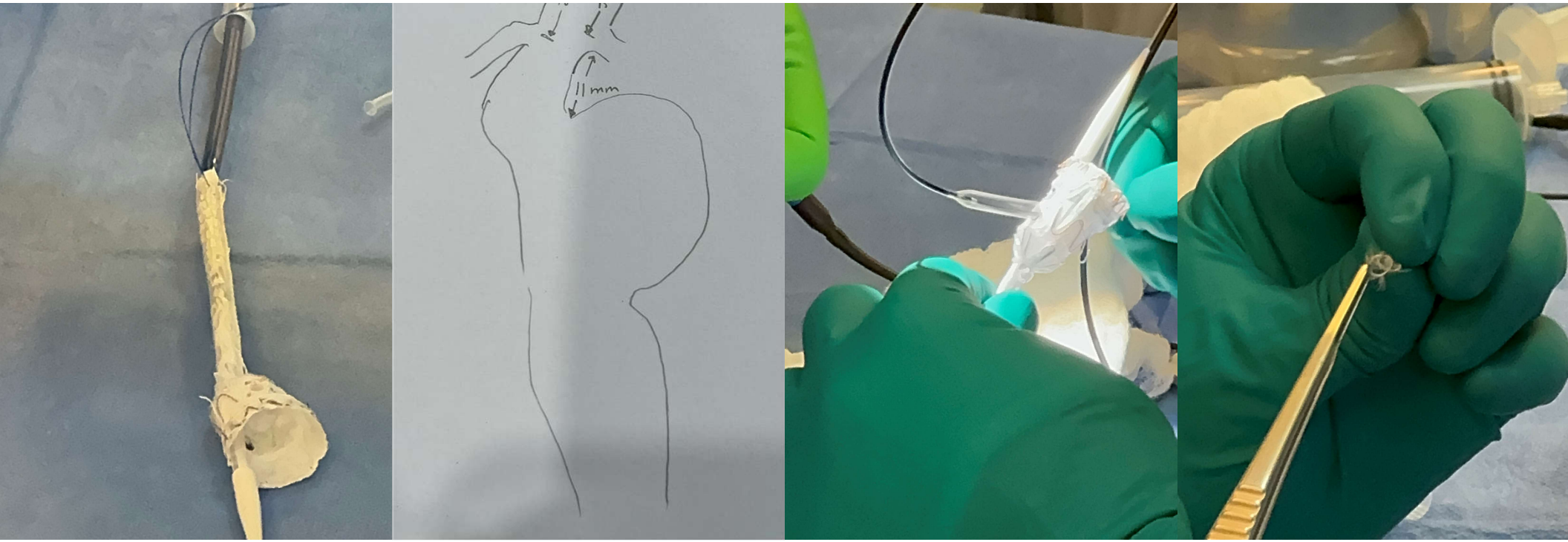
Lock the deployment line



Remove endo-trash (sleeve)

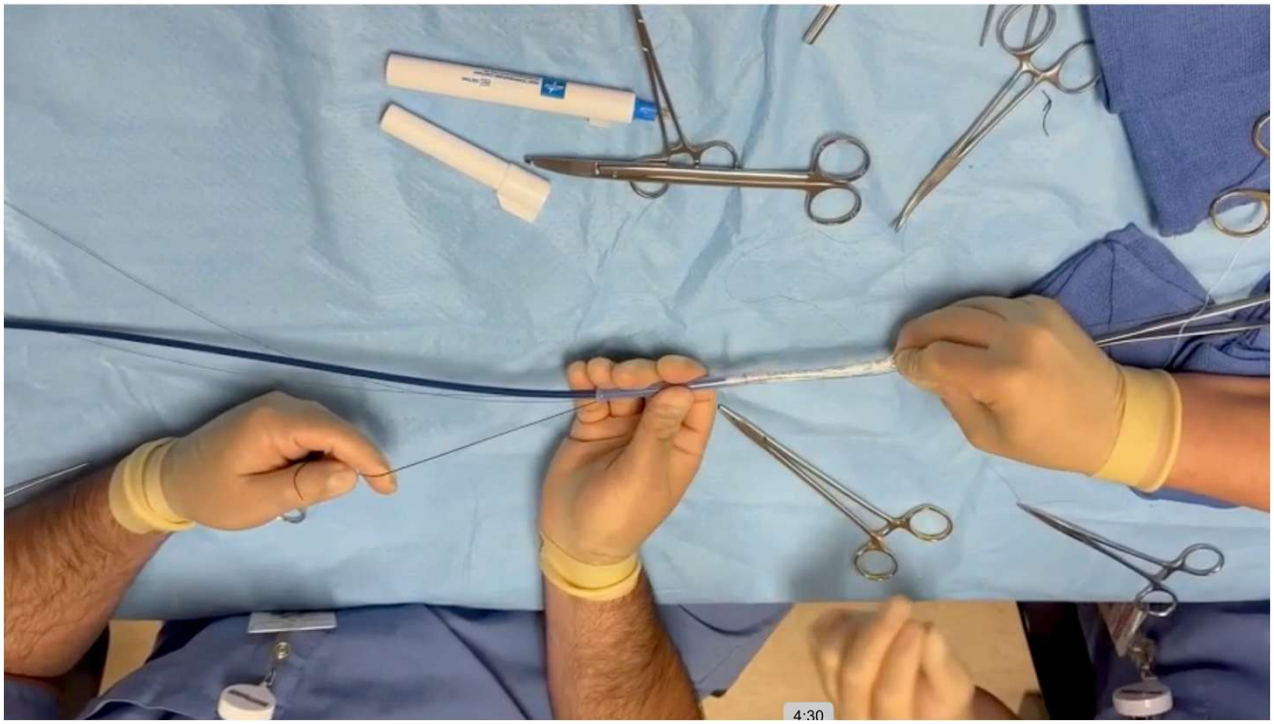


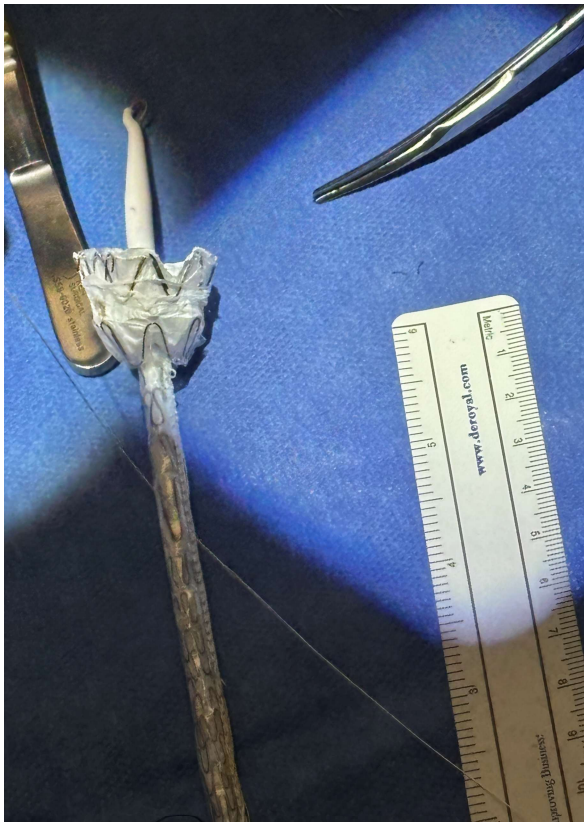
Create fenestration

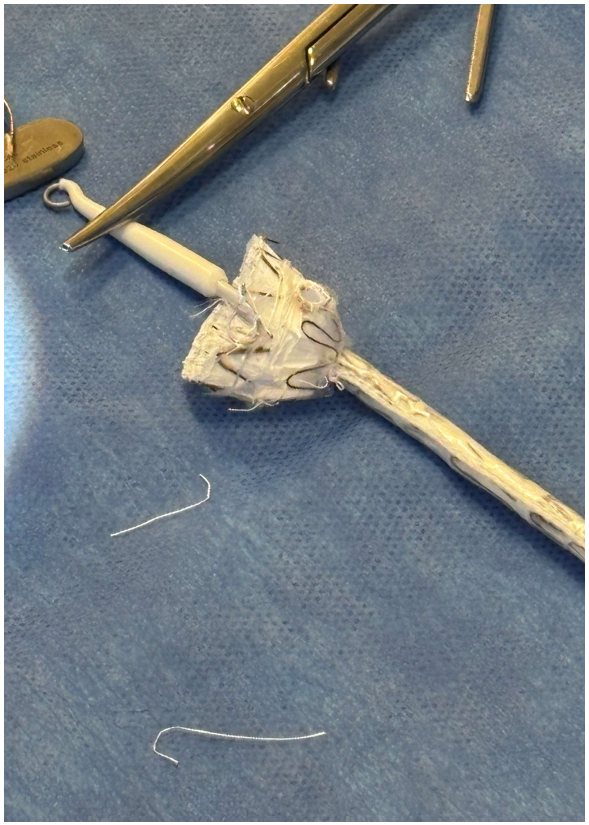


Gore Graft modificationtration creation

Re-sheathing

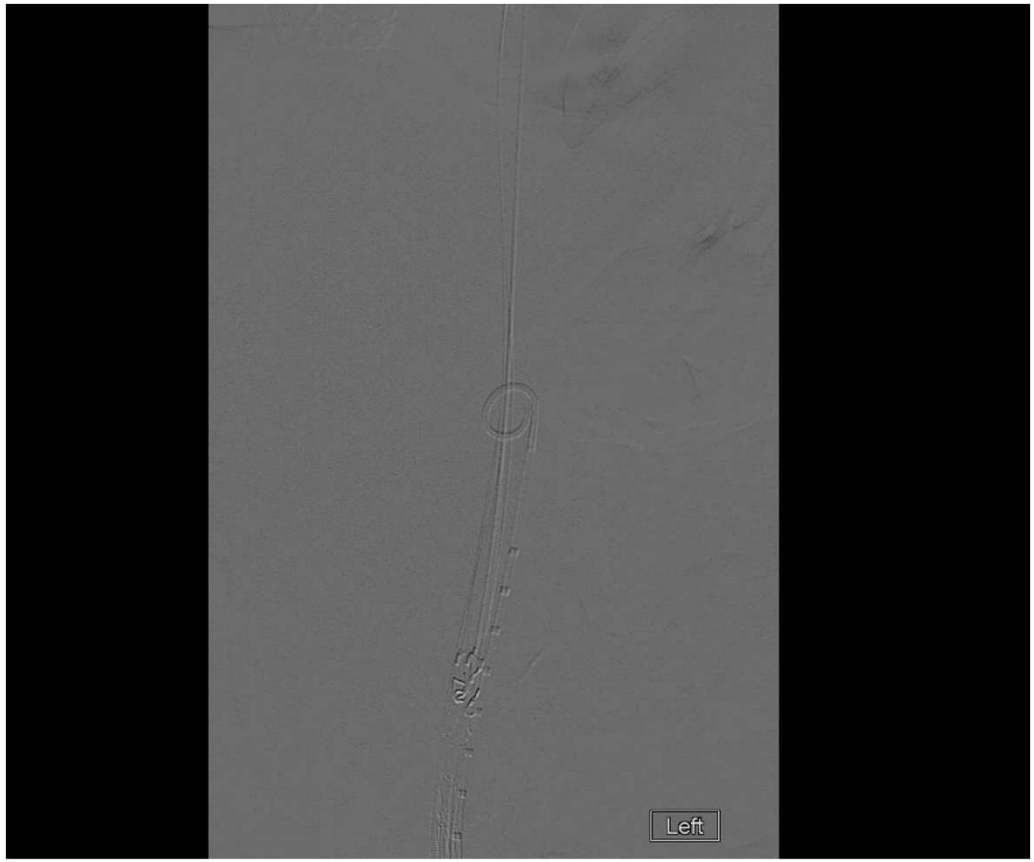


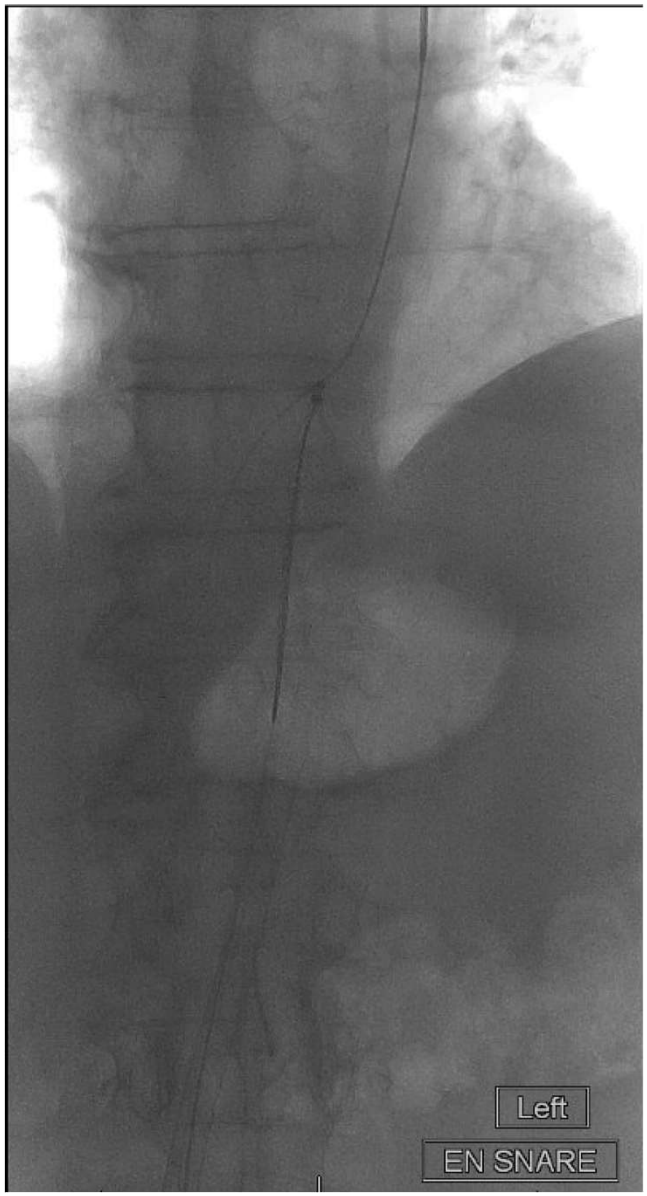




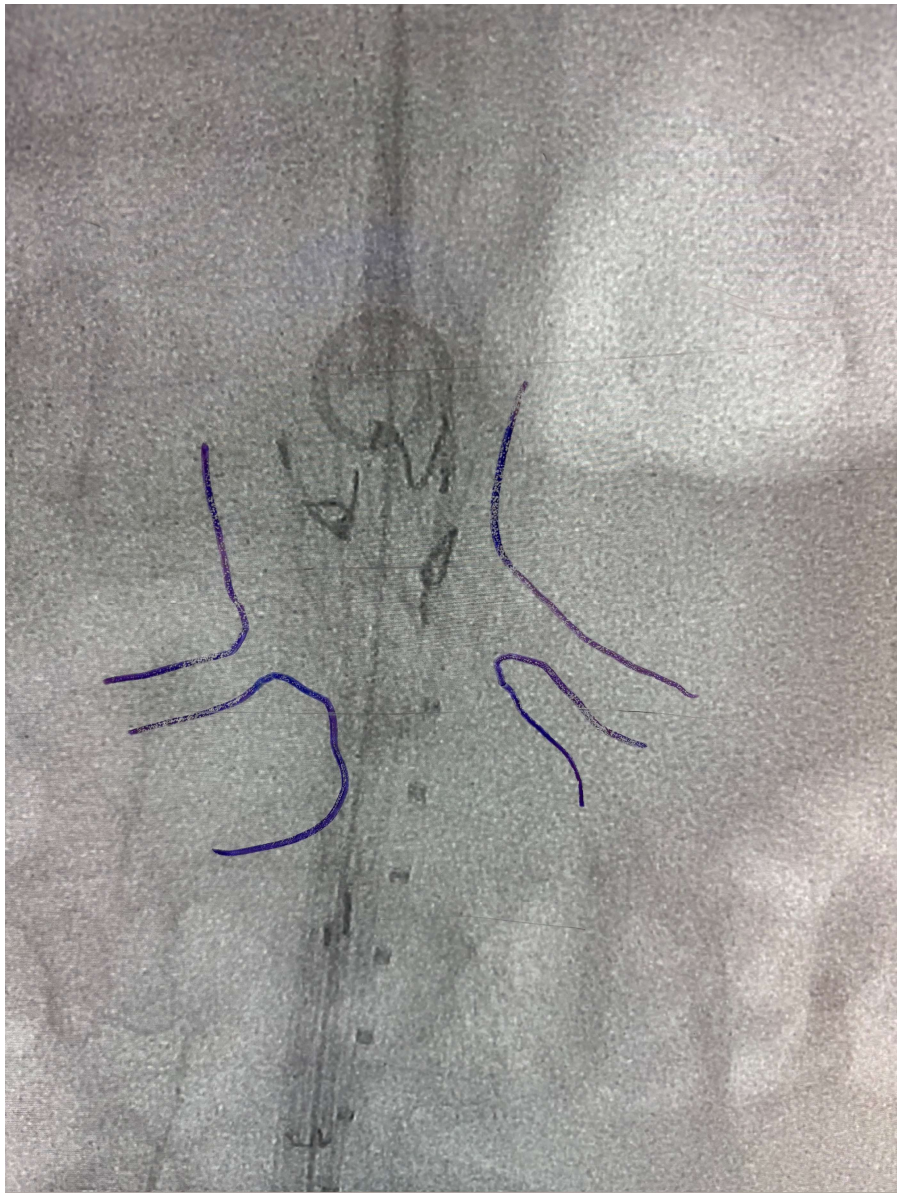
- Right renal @ 1000
  10mm from edge
- Left renal @ 0245
- 10 mm from edge
- Scallop @1200

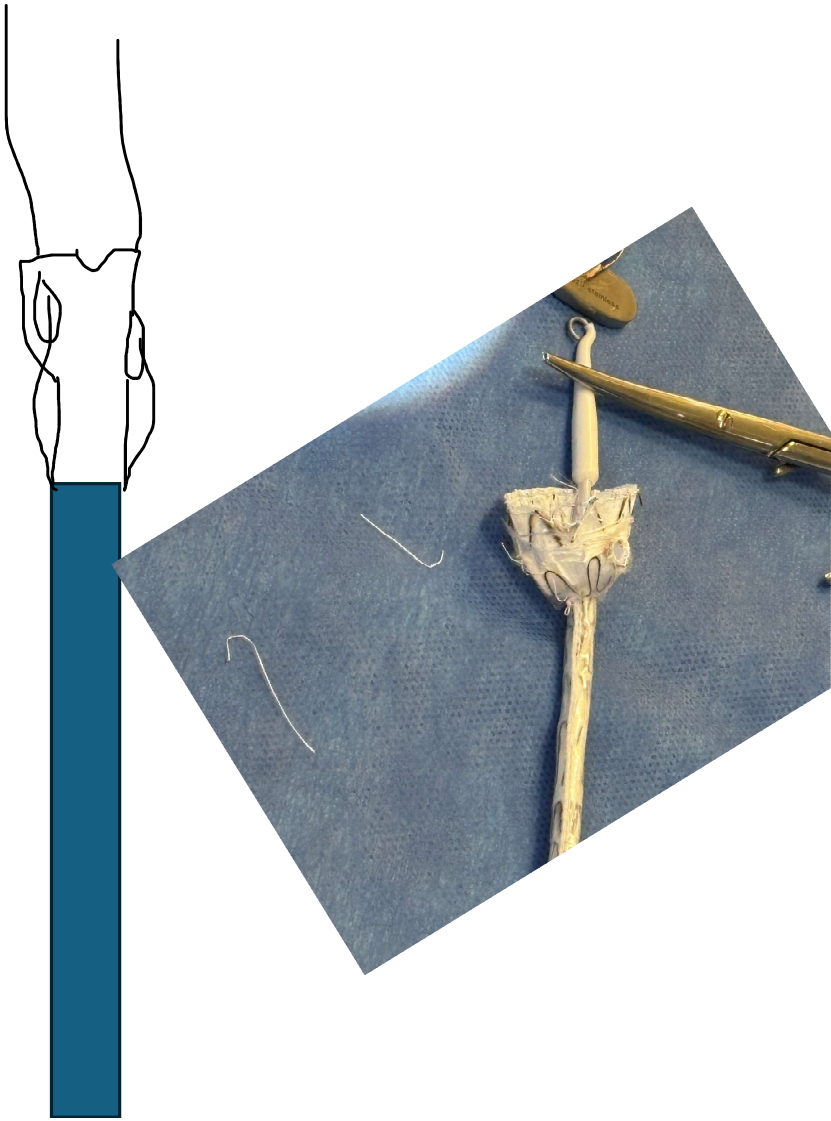
First angiogram

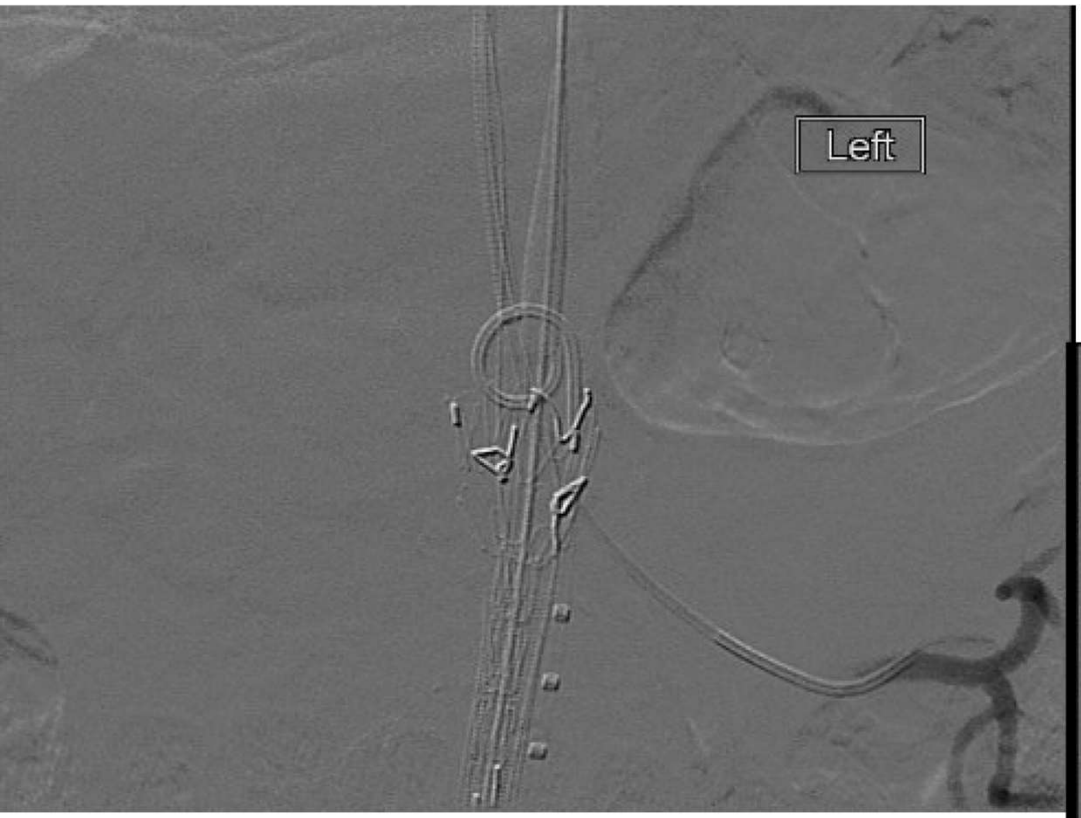


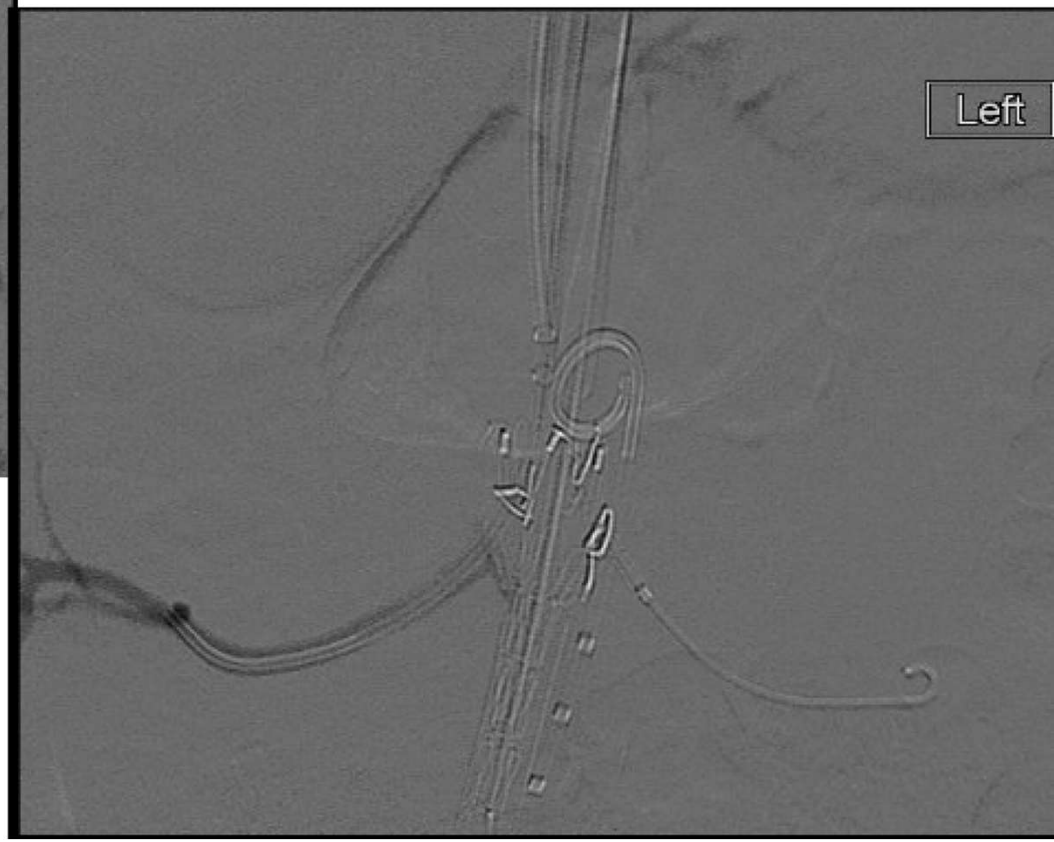


Navicross






Left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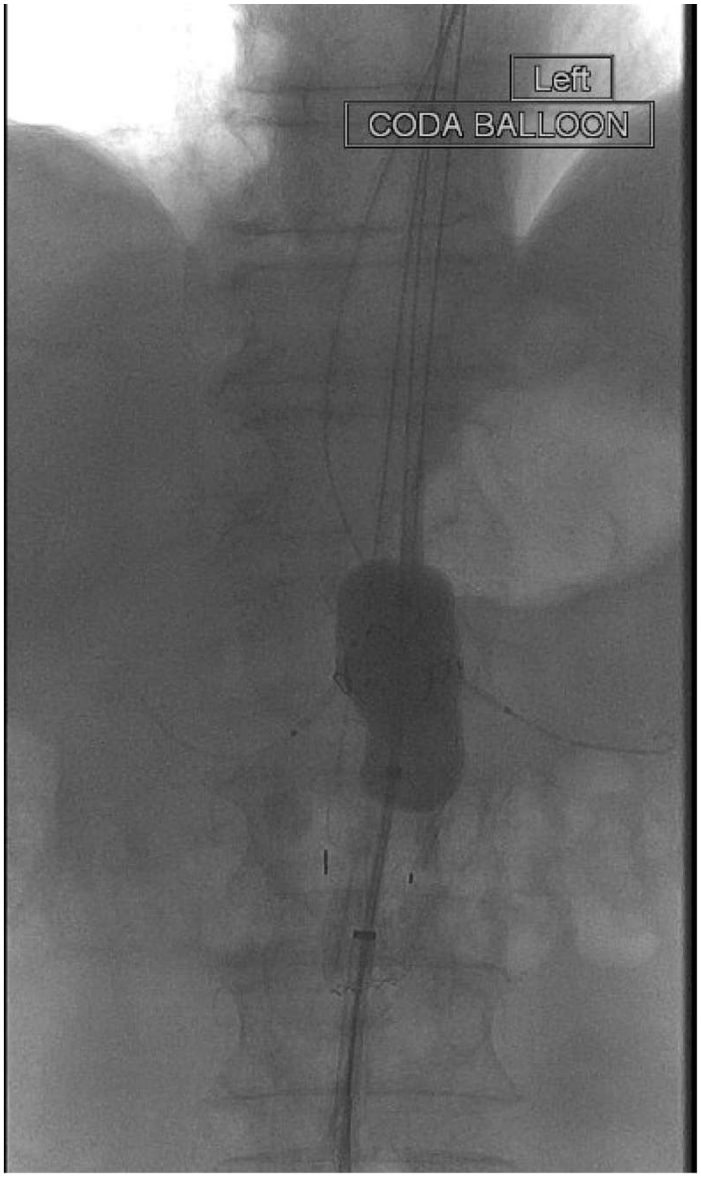
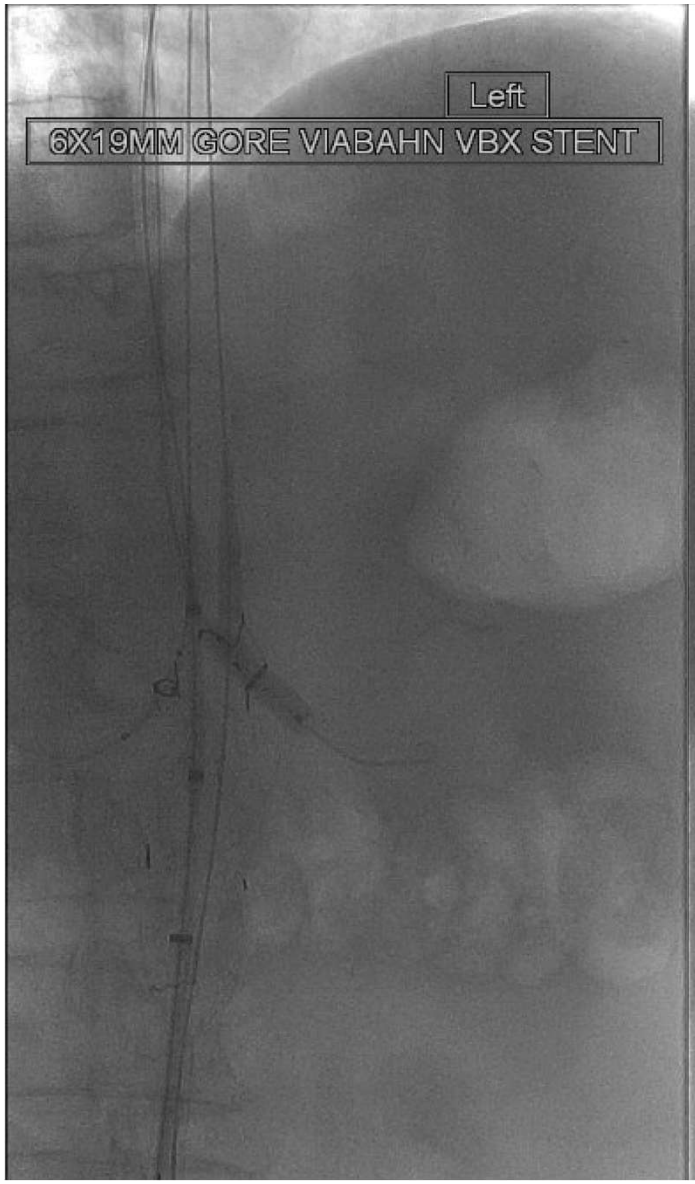

Left
CODA BALLOON


Left
6X19MM GORE VIABAHN VBX STENT

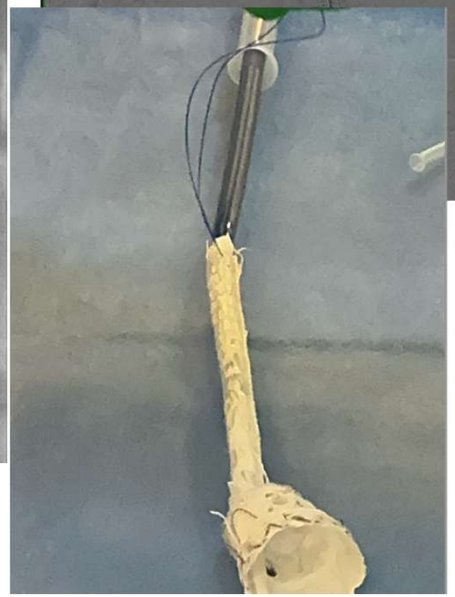

Right
5X19MM GORE VIABAHN VBX STENT


Left
POST STENTS

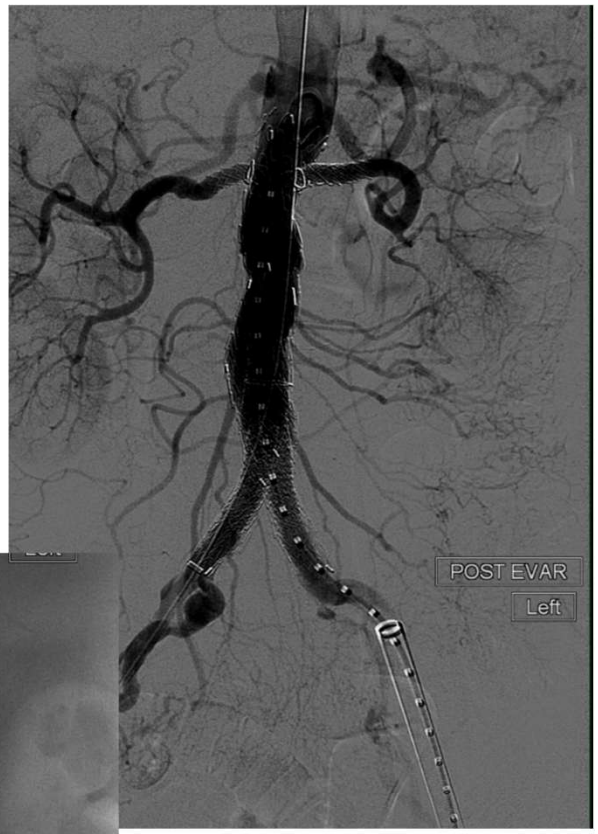
Case 2


20MMX14.5MMX12CM GORE EXCLUDER
MAIN BODY GRAFT
Left


20MMX14.5MMX12CM GORE EXCLUDER
MAIN BODY GRAFT
Left

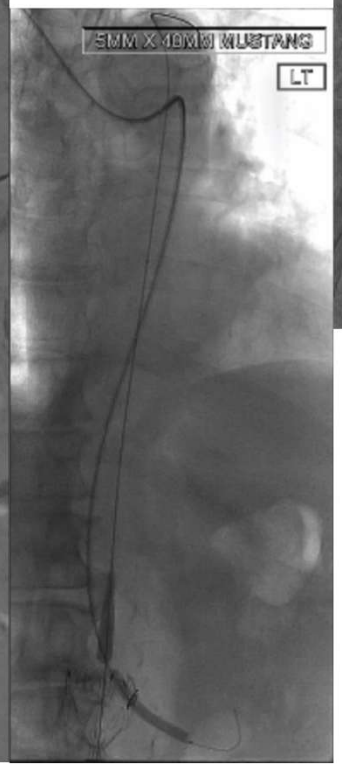


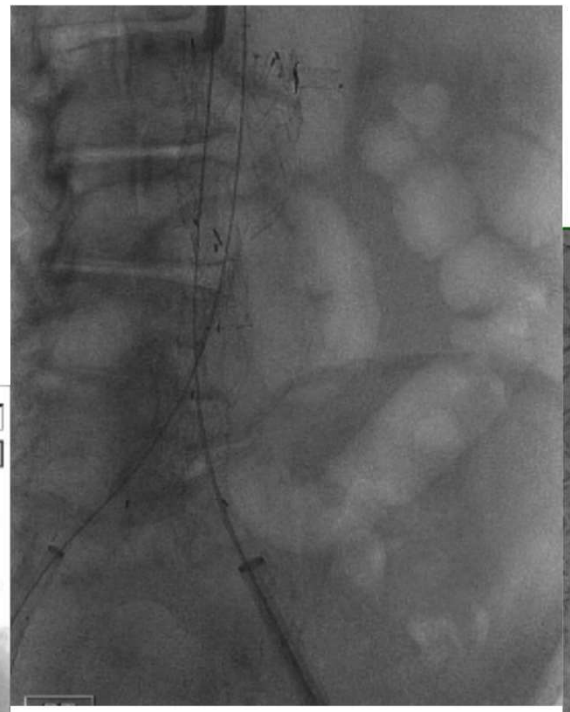

VIABAHN VBX STENT BALLOONS

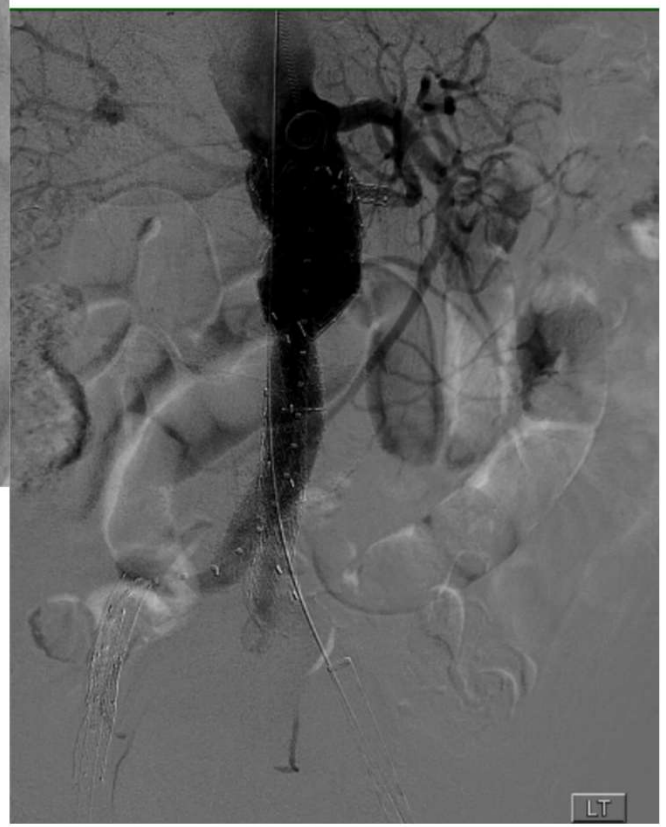

POST EVAR
Left

Case 3

Case 4(Mr K)

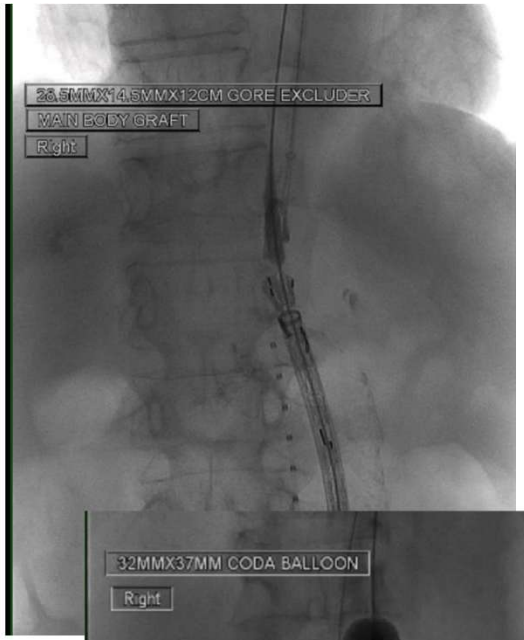






Case 5


Right


26.5MMX14.5MMX12CM GORE EXCLUDER
MAIN BODY GRAFT
Right


32MMX37MM CODA BALLOON
Right


POST EVAR
Right

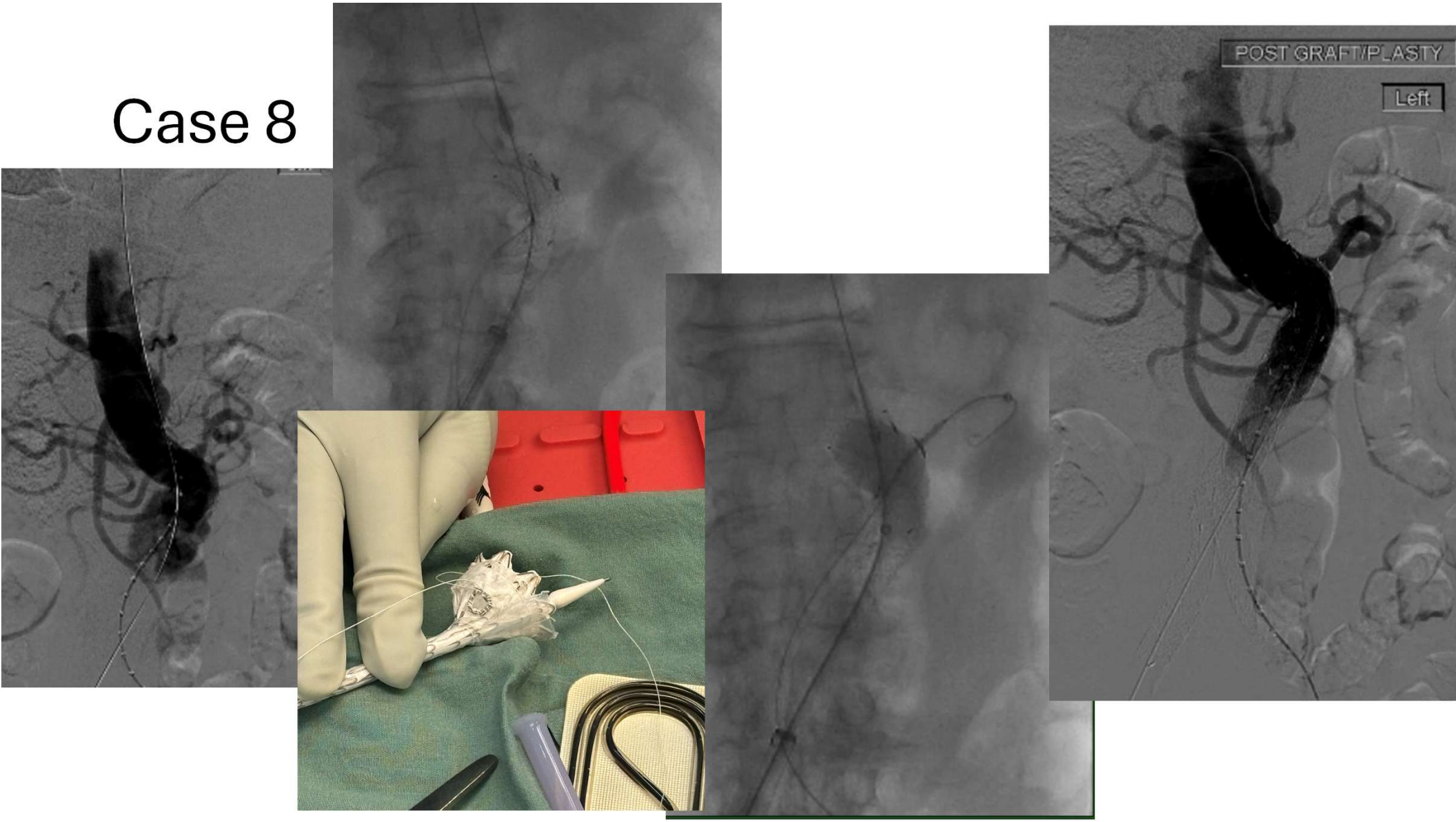

POST EVAR
ROT+70DEG
Right


POST PLASTY
POST STENT
ROT-74DEG
Left

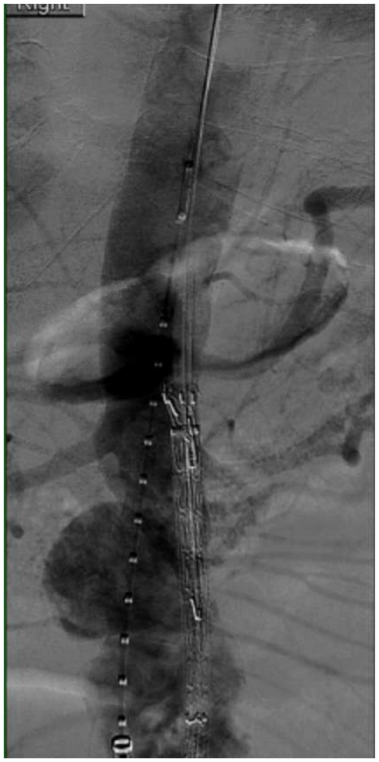
Case 6

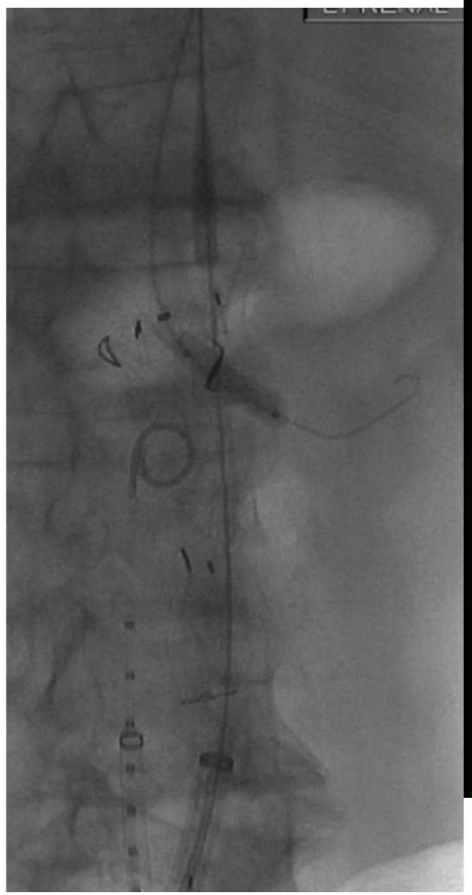
Case 7

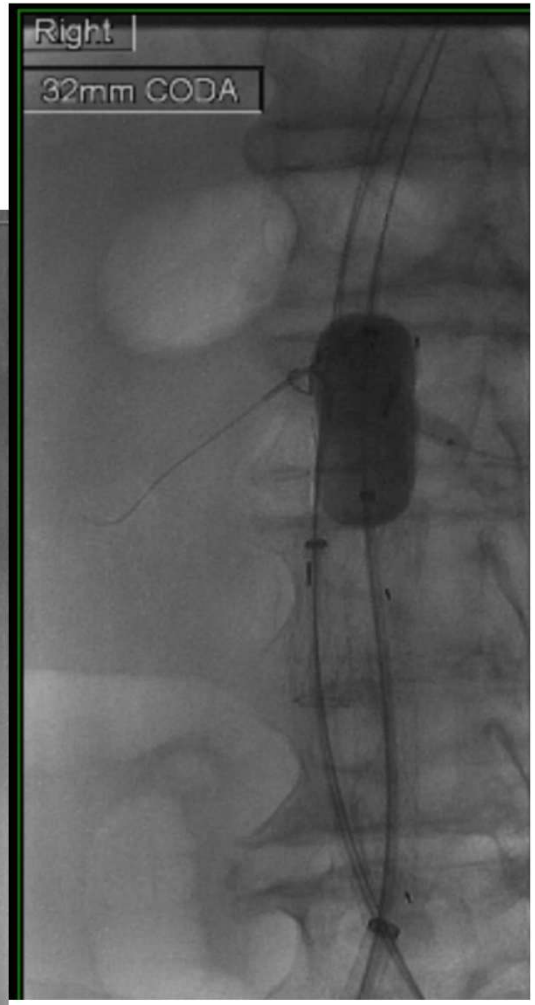
Case 8



Case 9

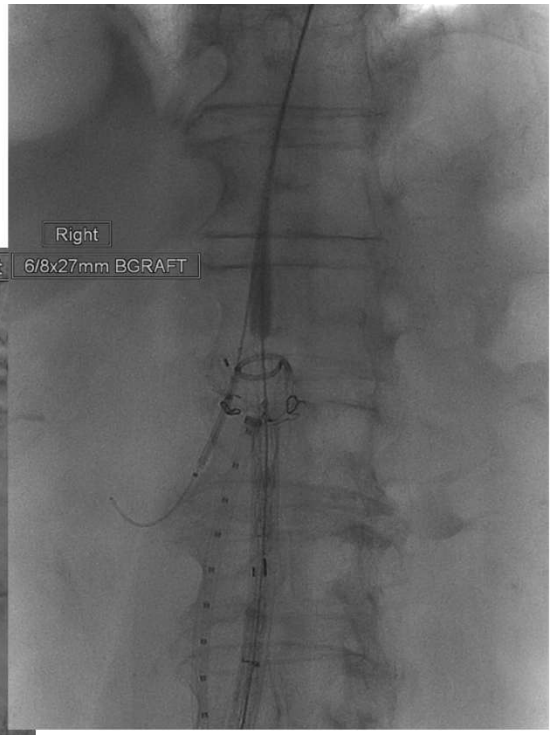


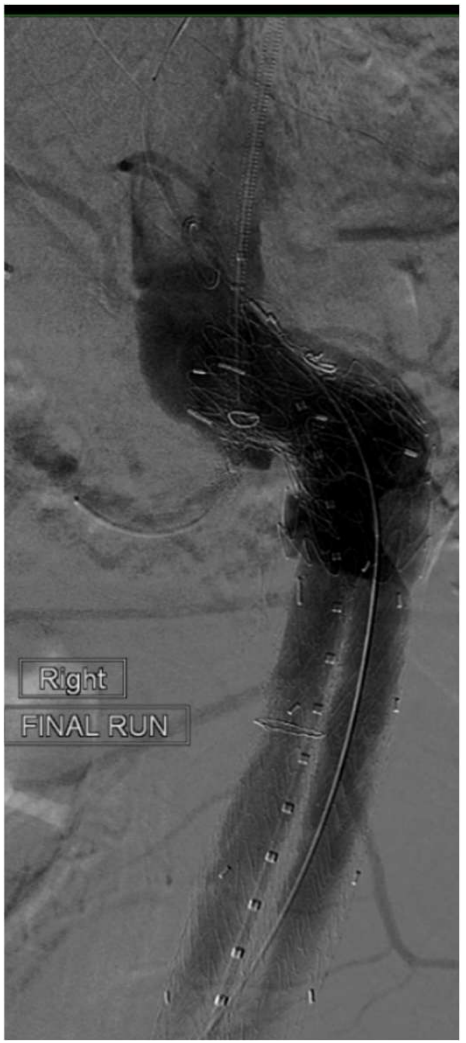




Case 10

Case 11





Experience

- First case was Apr 2024
- 13 cases
- Mean age 84 yo
- Juxta renal AAA
- Mean OR time 105 min
- Femoral access 8/13; axillary/fem 5/13 (pre-loaded wire)
- All perc
- 7/13 bil renal fens/scallop; sma scallops; 6/13 single fens
- Intraop complication; mis-deployment but no impact, couldn’t cannulate one renal but was still perfused, sma partial coverage (was stented)
- One renal accessory thrombosis (Begraft flare)
- No sac progression on follow-up at short term

Conclusion

- Aneurysm do rupture when symptomatic…
- Need a strategy for high-risk patients when aortic urgency
- Need to stay current whatever you do!
- So far, good early result with Gore PMEG and cost is low
- You are welcome to visit us at Royal Columbian Hospital

Wish you a blue sky!