Current management of abdominal aortic aneurysm with horseshoe kidney

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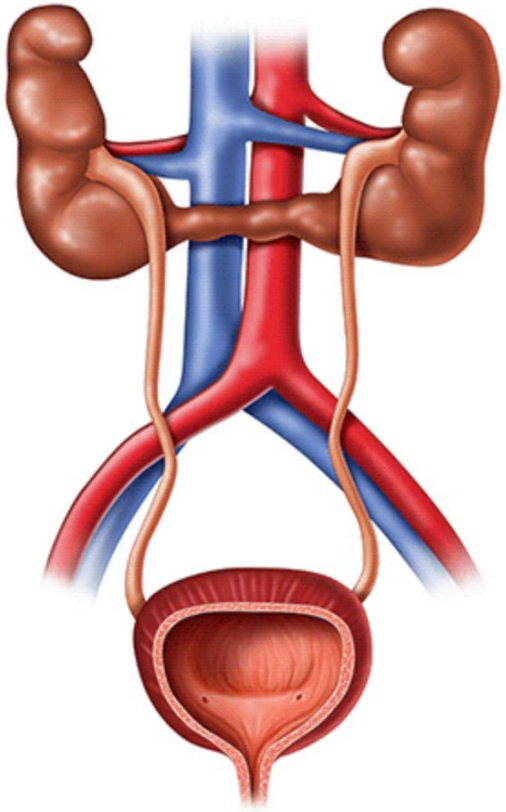
Disclosures

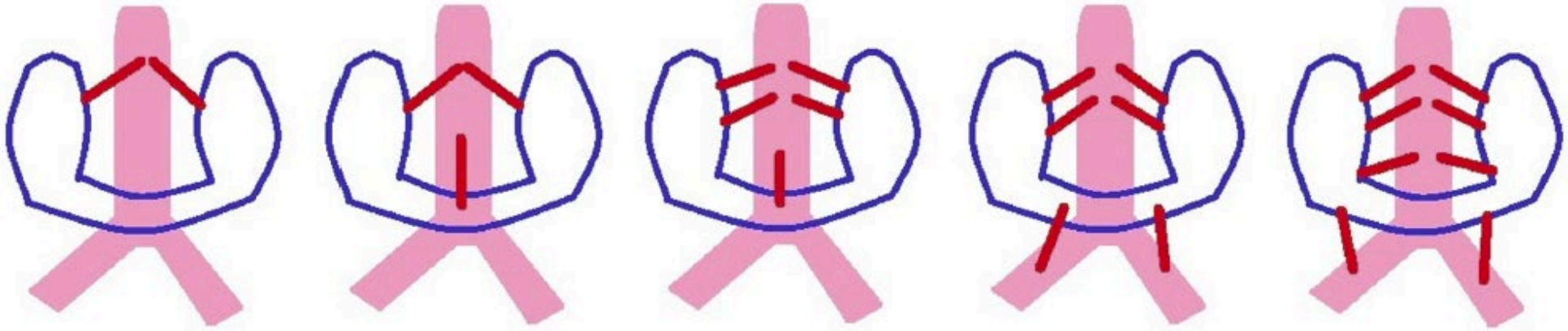
All authors have no conflicts of interest to disclose.

Horseshoe Kidney (HSK)

- Abnormal fusion of (usually inferior) renal poles during fetal development
- Isthmus typically located anterior to aorta and inferior to IMA and contains functional parenchyma (85%) or fibrous tissue (15%)
- Accessory renal arteries may originate from the aorta, mesenteric, and iliac arteries, and supply both the kidneys and isthmus
- Incidence of 0.2% with 2:1 male predominance
- Concomitant presence of HSK and AAA in <1%



Eisendrath Classification (1925)



Type I	**20%**	One renal artery on each side of the horseshoe kidney
Type II	**30%**	One renal artery on each side with an isthmic branch from the aorta
Type III	**15%**	Two renal arteries on each side with an additional branch to the renal isthmus
Type IV	**15%**	Two renal arteries on each side and an additional isthmic branch with one or more originating from the iliac arteries
Type V	**20%**	Multiple renal arteries arising from the aorta, the mesenteric and the iliac arteries

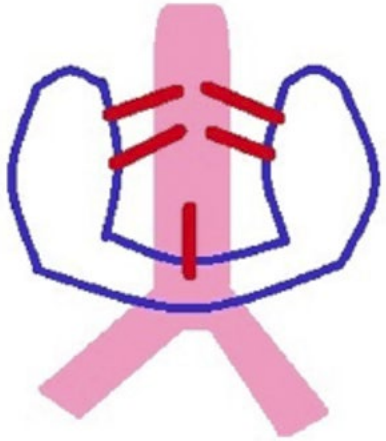
Case 1 – Open

74-year-old male with asymptomatic 6.2 cm bilobed infrarenal AAA with short neck and HSK.

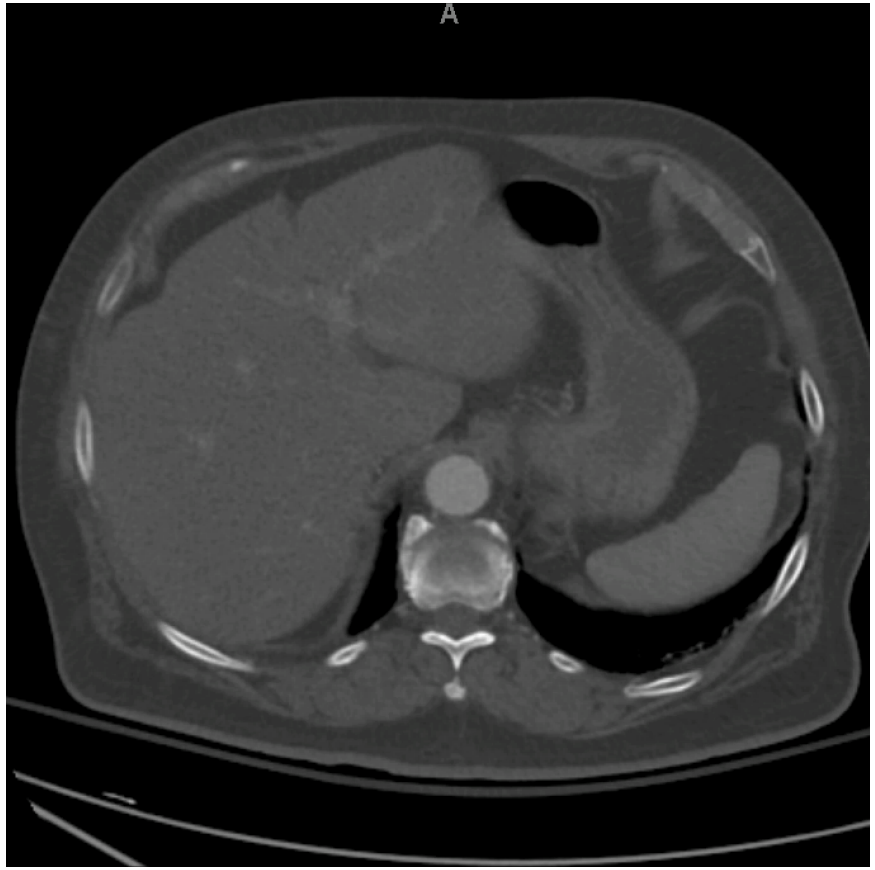
- At least **3 right, 2 left, and 2 isthmus level renal arteries**

Technical Considerations

- Transperitoneal vs. retroperitoneal
- Division of isthmus vs. graft tunneling
- Reimplantation vs. ligation of accessory renal arteries

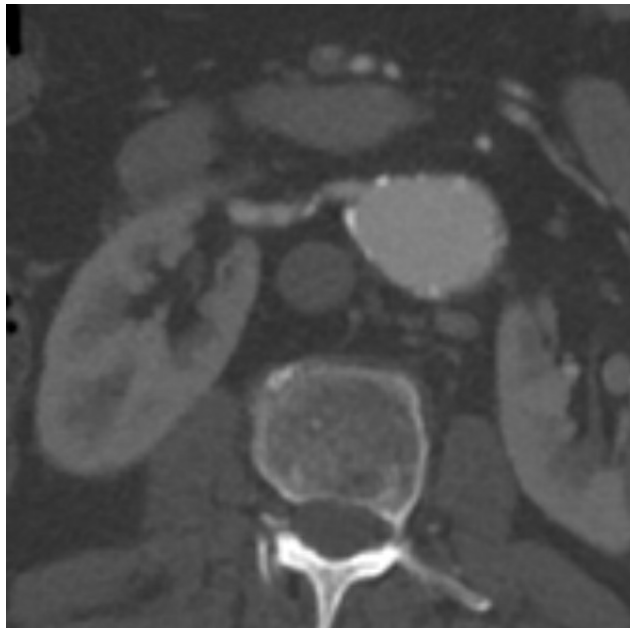


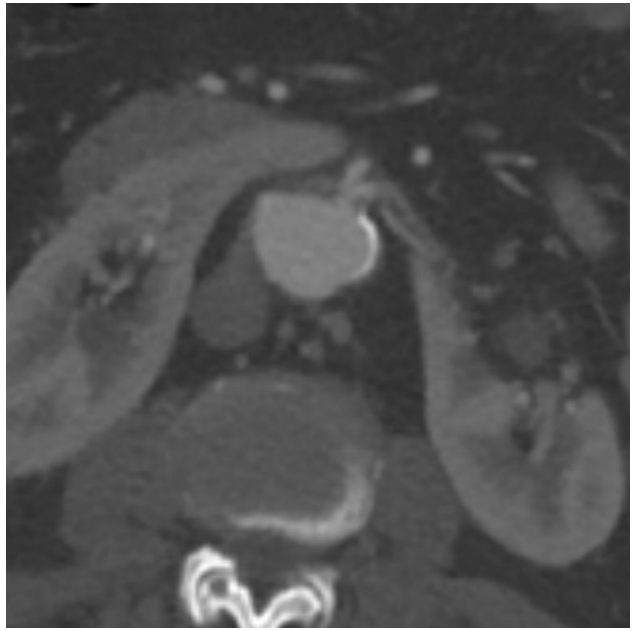
Type III



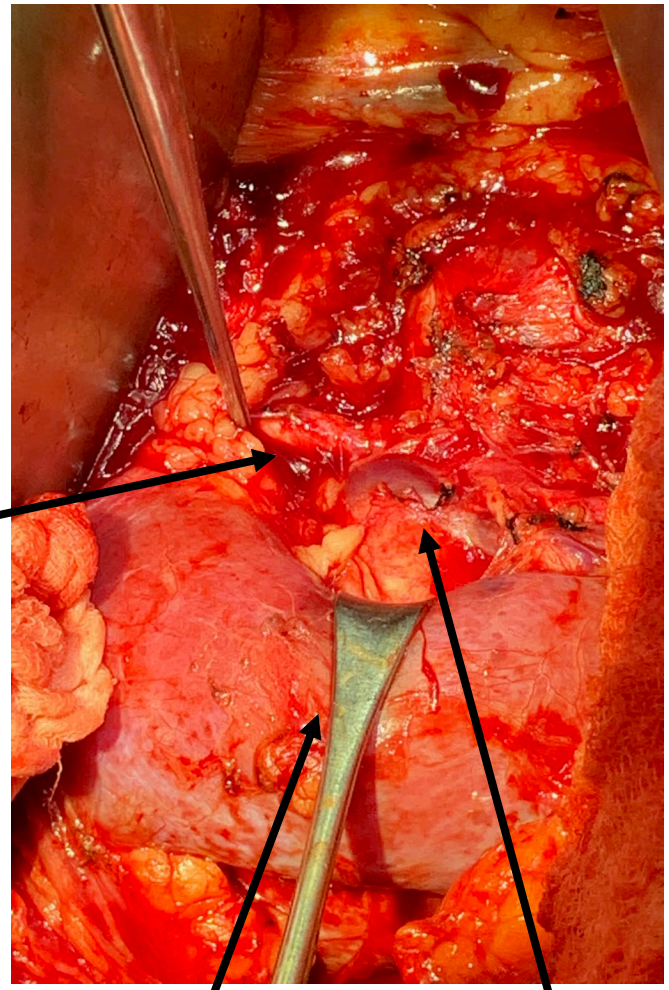
Case 1 – Open

- Open transperitoneal approach with suprarenal clamp
- 18x9 mm bifurcated rifampin-soaked Dacron graft
- Cold perfusion of two accessory renal arteries
- Reimplantation of accessory renal arteries onto each of the iliac limbs

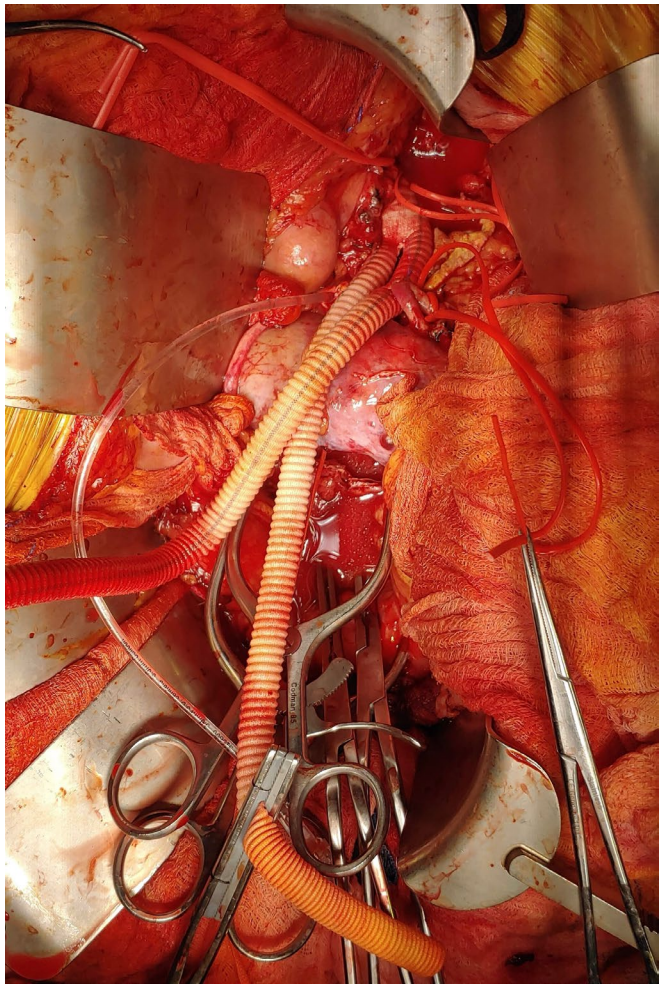




Horseshoe kidney



Cold renal perfusion



Graft tunneling

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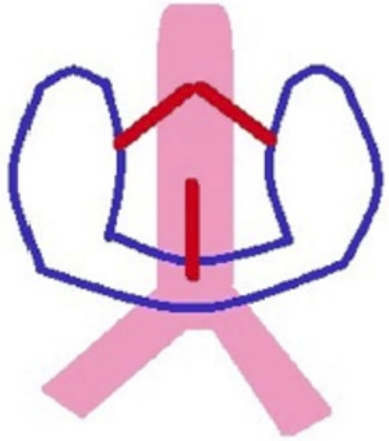
Case 2 – FEVAR

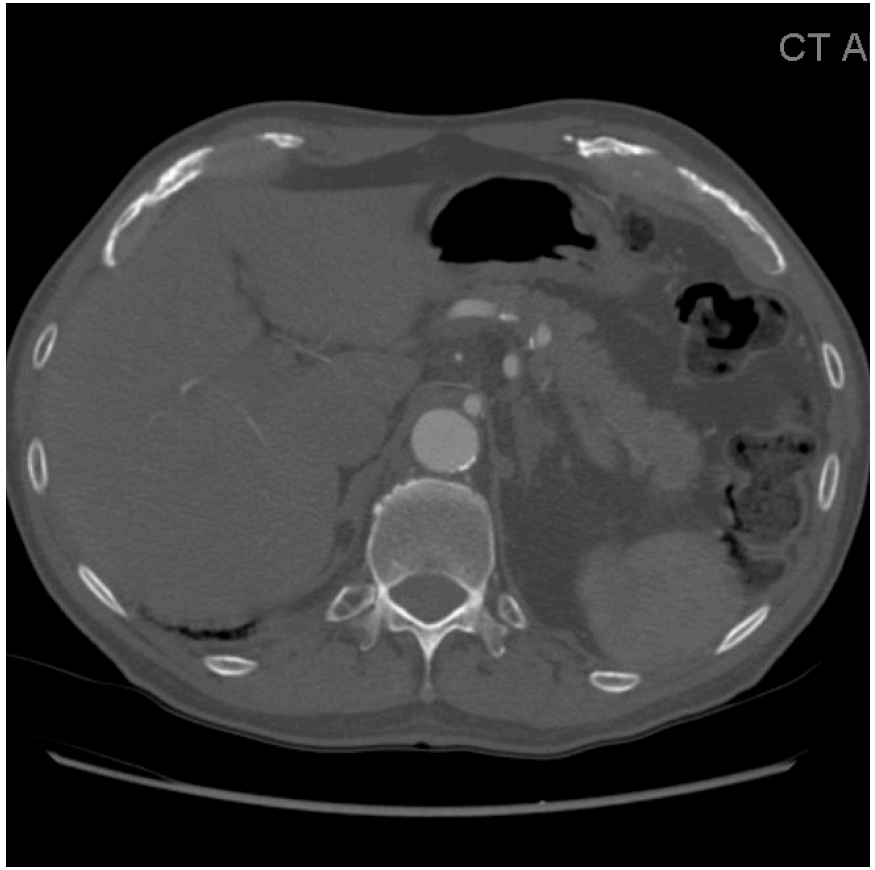
78-year-old male with asymptomatic 6.1 cm infrarenal AAA.

Technical Considerations

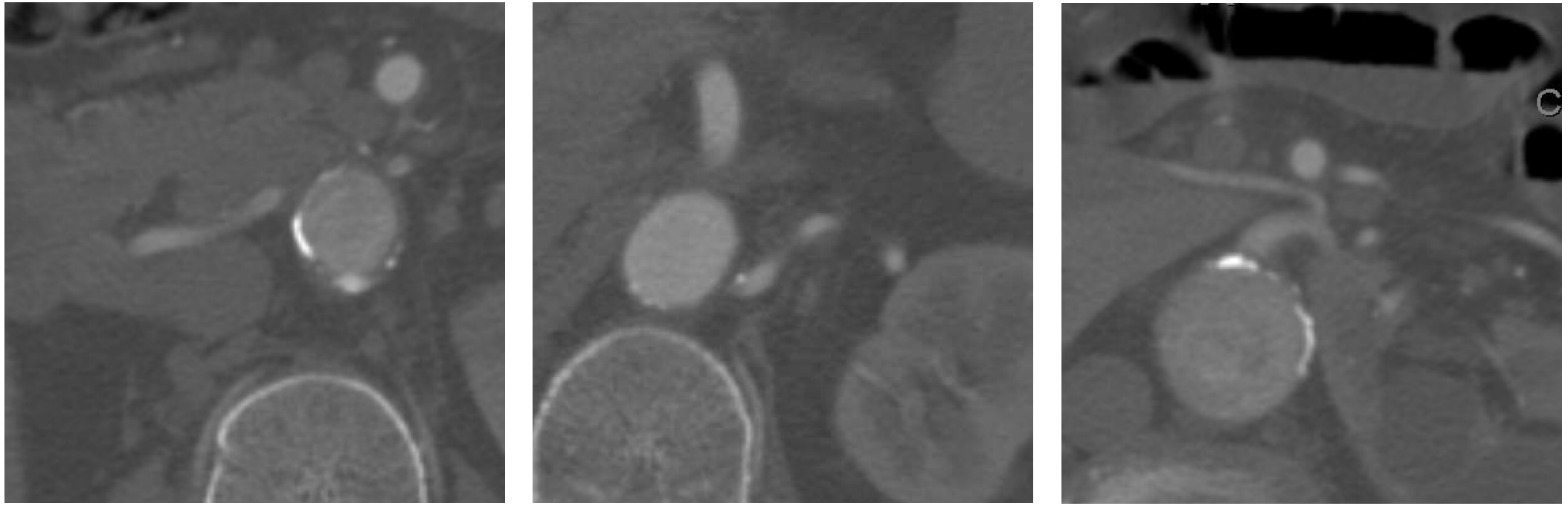
- Open vs. endovascular approach
- Preservation of accessory renal artery



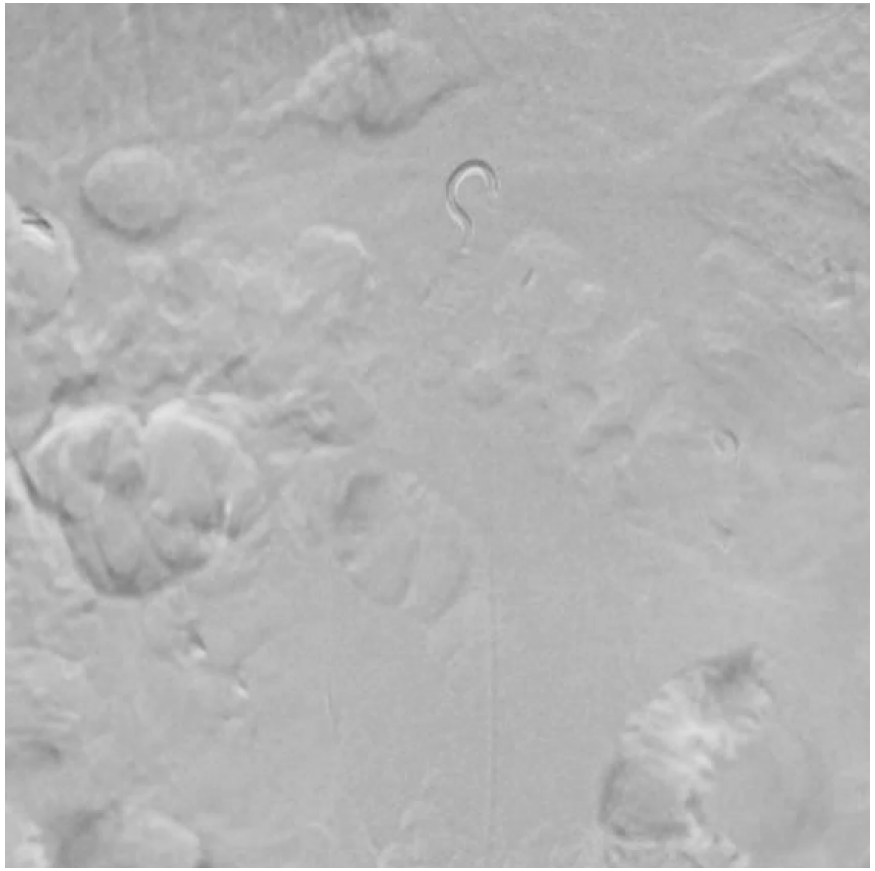
Type II

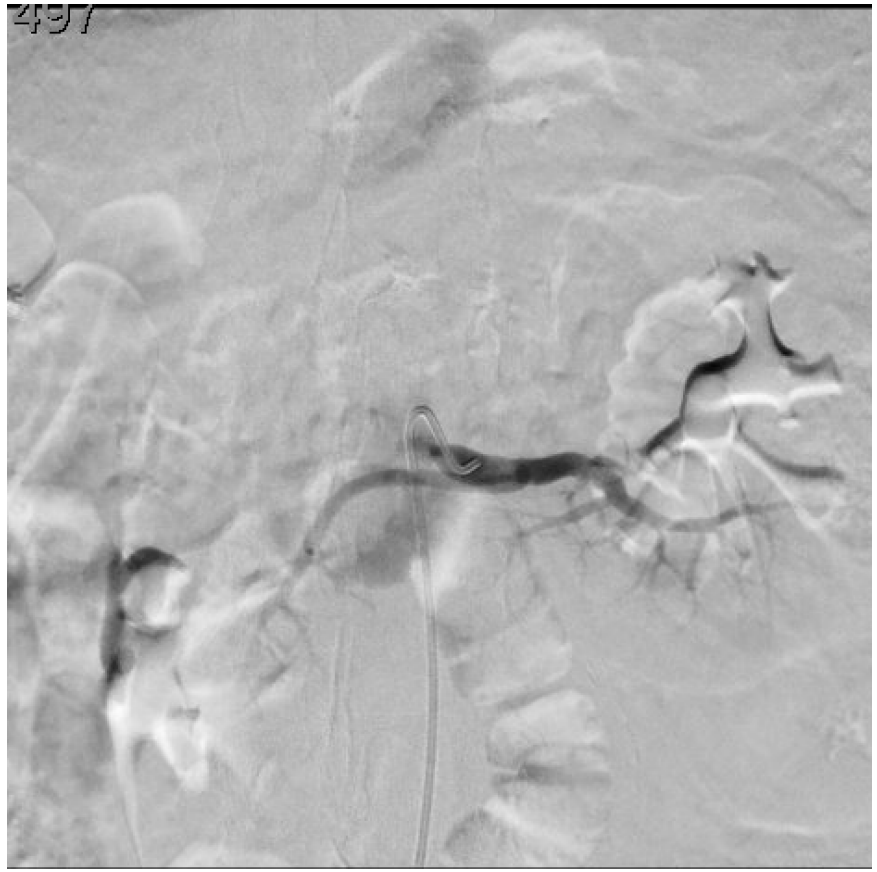


Patent right and left renal arteries with large accessory renal artery off proximal aneurysm sac which bifurcates and feeds both inferior poles



Pre-operative angiography

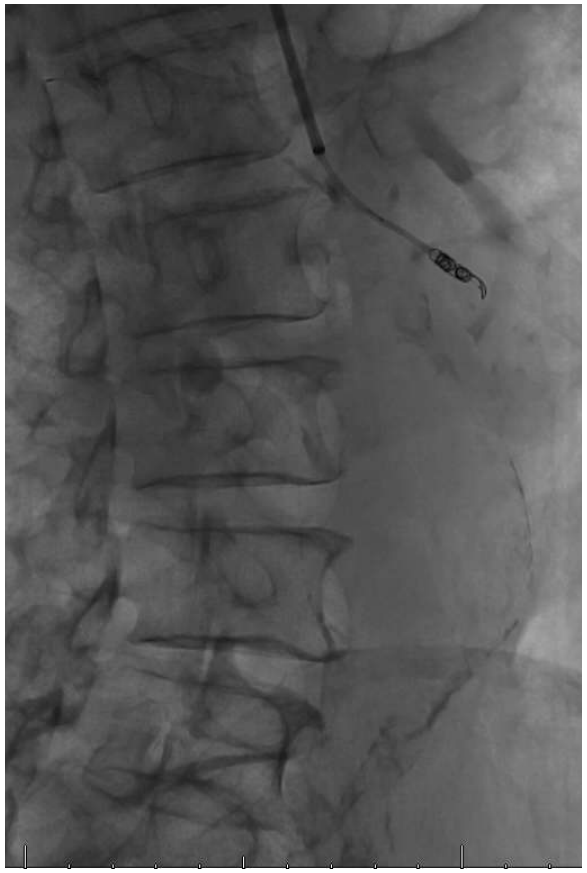




Case 2 – FEVAR

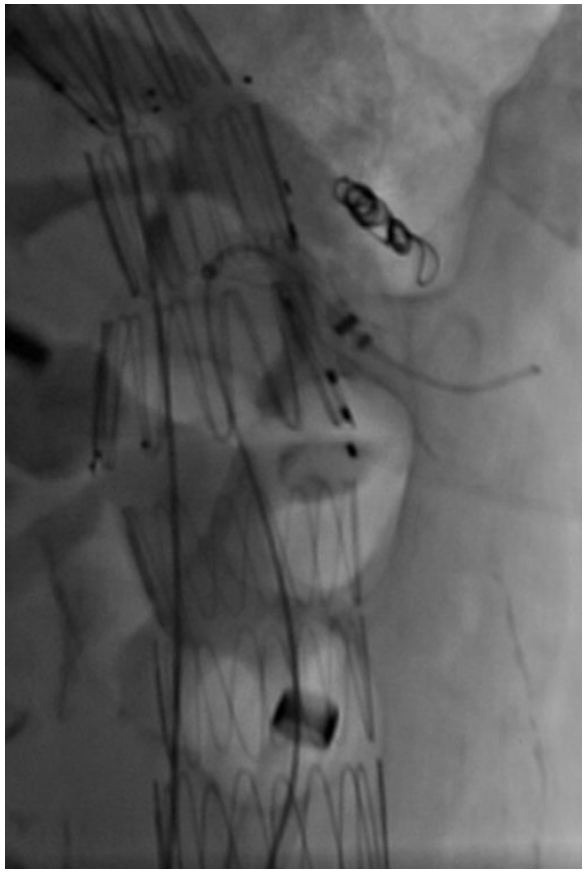
- Percutaneous FEVAR with 32x94 mm proximal Cook Zenith device with single fenestration
- Coil embolization of IMA at level of lowest right renal artery
- Preservation of single accessory renal artery with 6x22 mm iCast stent
- 28x76 mm bifurcated graft with 24x90 mm right and 16x56 mm left iliac limbs

Coil embolization of IMA

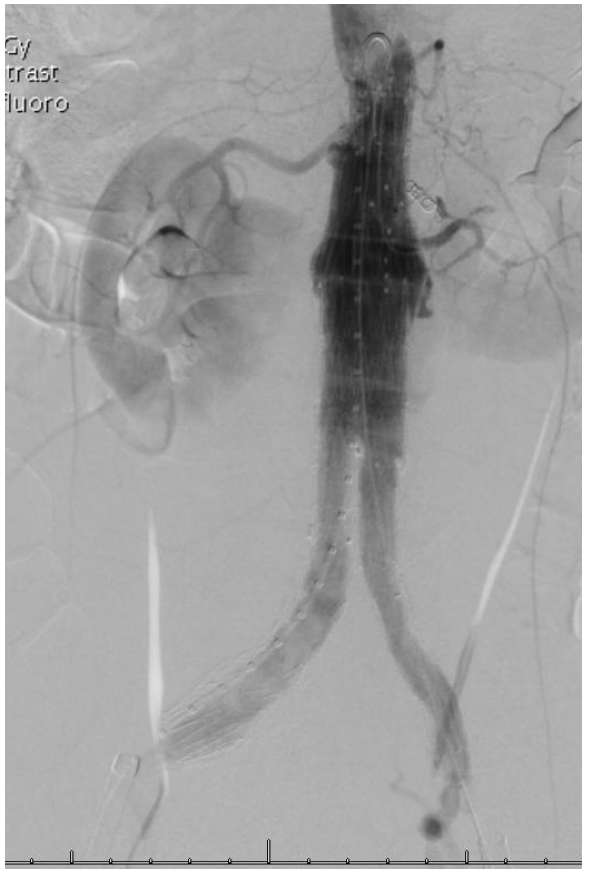


Cannulation of accessory renal

Stenting of accessory renal artery



Completion aortogram



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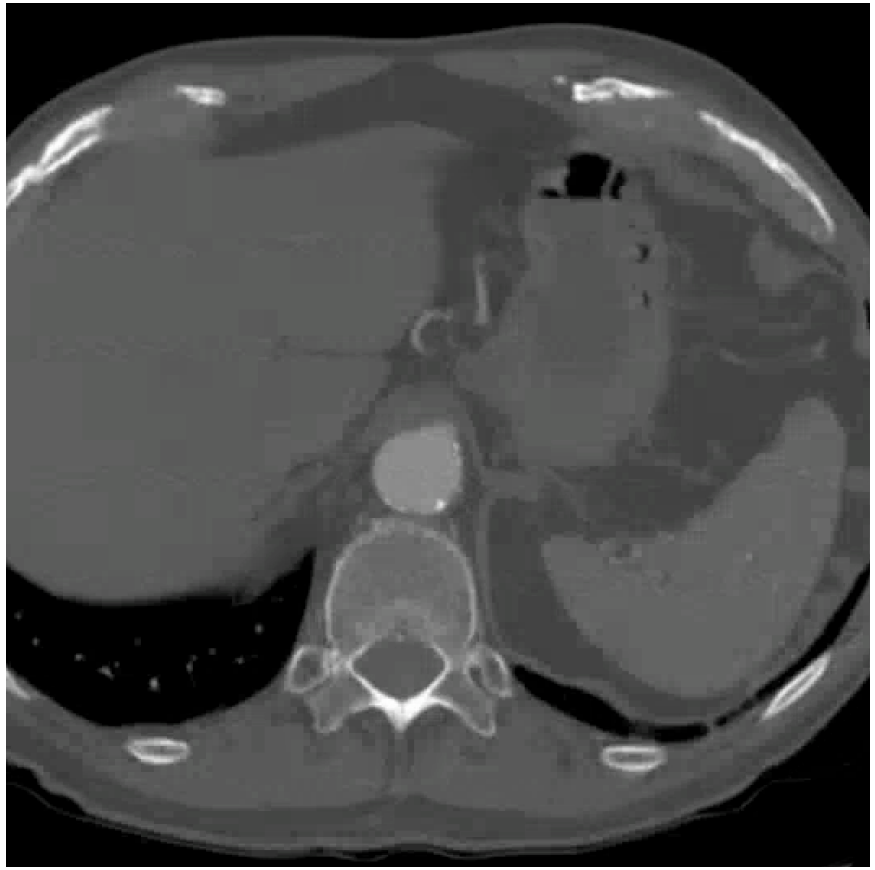
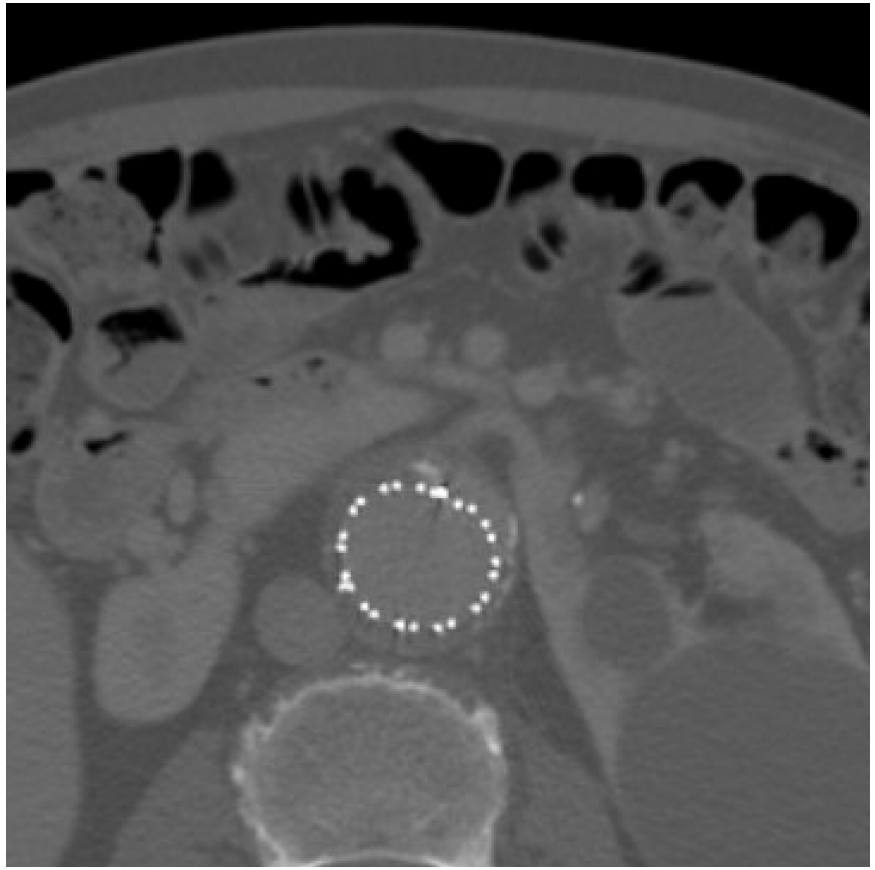
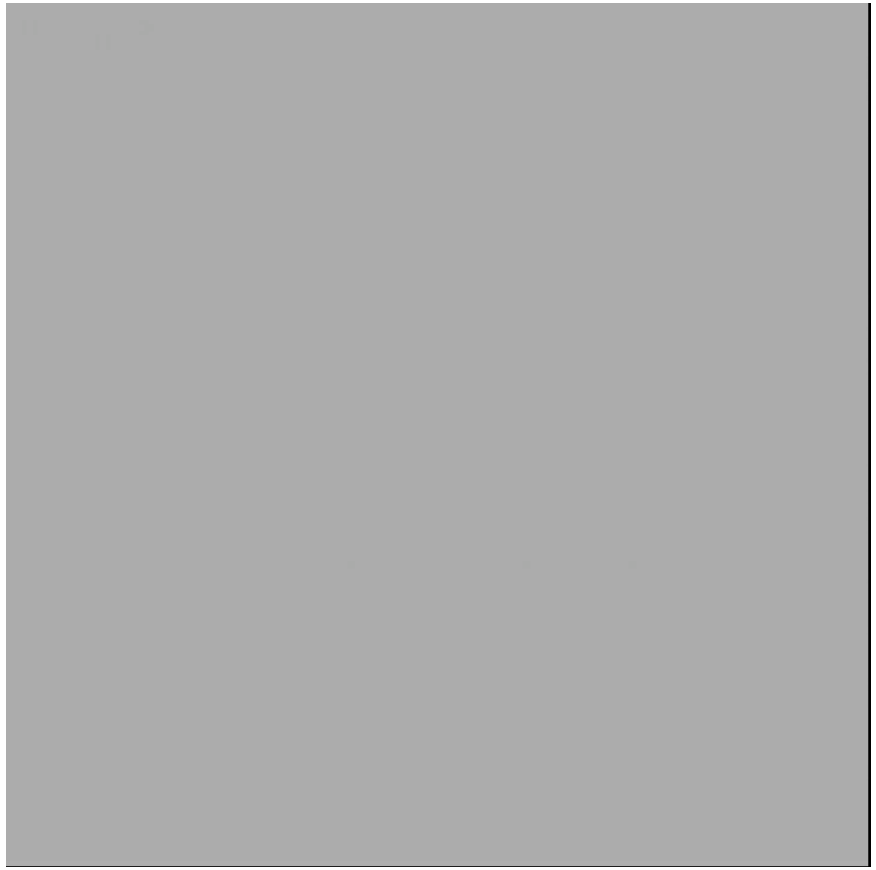
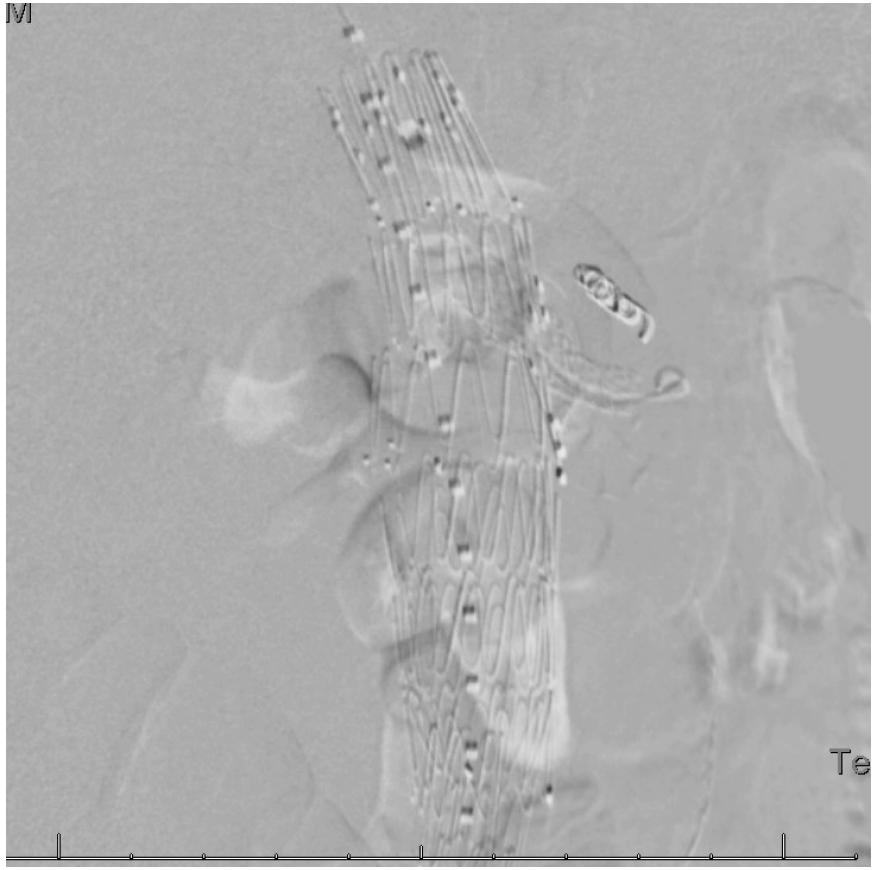
Type III endoleak at 2 months post-op





Stenting of accessory renal artery with 8x38 mm iCast stent





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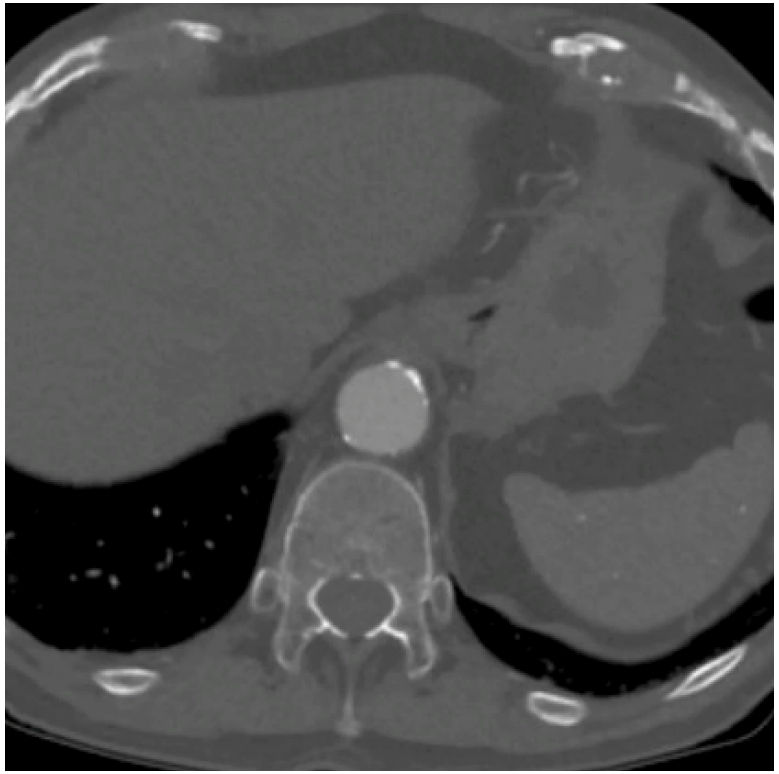
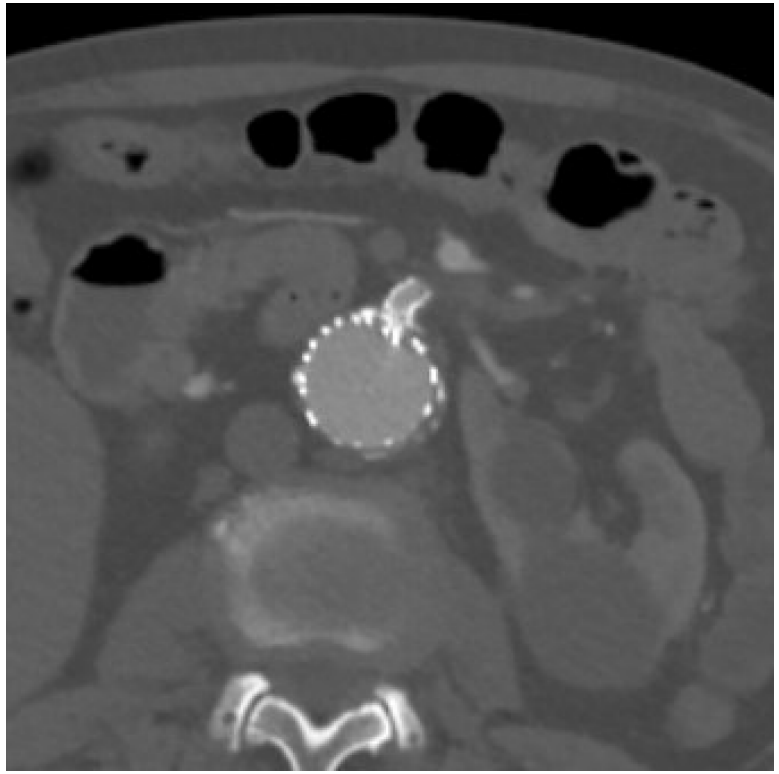
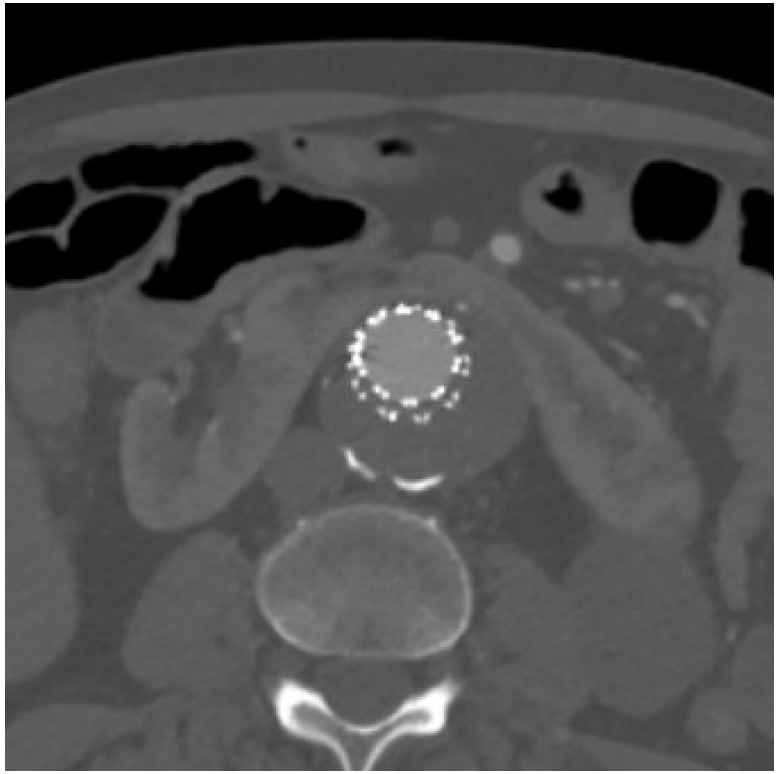
Surveillance CTA at 2 years post-op







Summary

1. Horseshoe kidney is a relatively rare anatomical variant that significantly influences surgical planning for AAA repair.
2. FEVAR is a good option in Type II horseshoe kidney where there is one main accessory renal artery to be preserved, whereas more complex anatomies typically require sacrifice or open repair.
3. Delineation of the vascular anatomy with CTA and angiography is crucial for determining which renal arteries to preserve.
4. In open repair, cold perfusion of the renal arteries can help protect against ischemia.

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Thank you!

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