Managing Accessory Renal Arteries during EVAR

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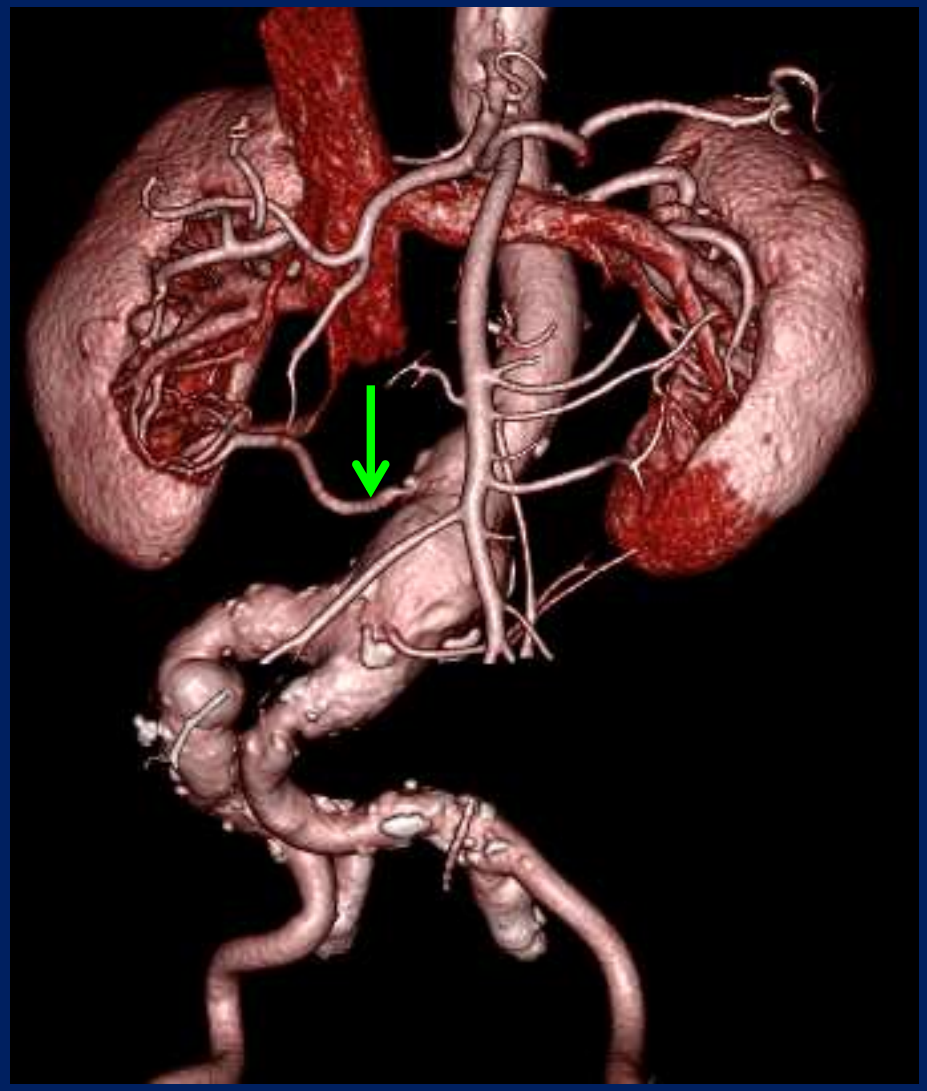
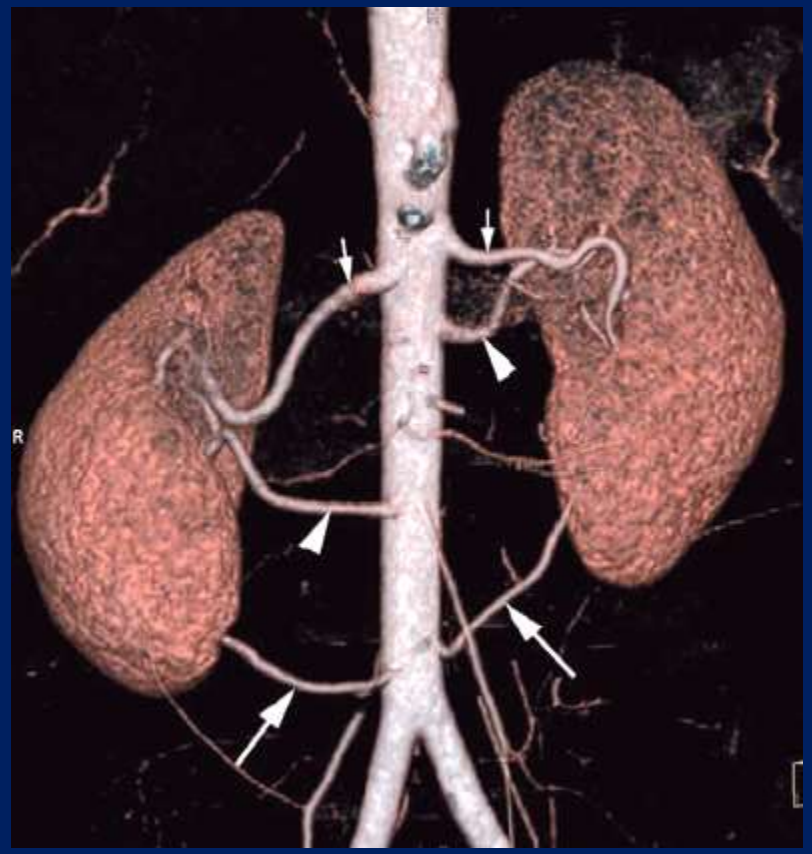
Potential Conflict
Medtronic: consultant, sales training



Accessory Renal Arteries ARAs

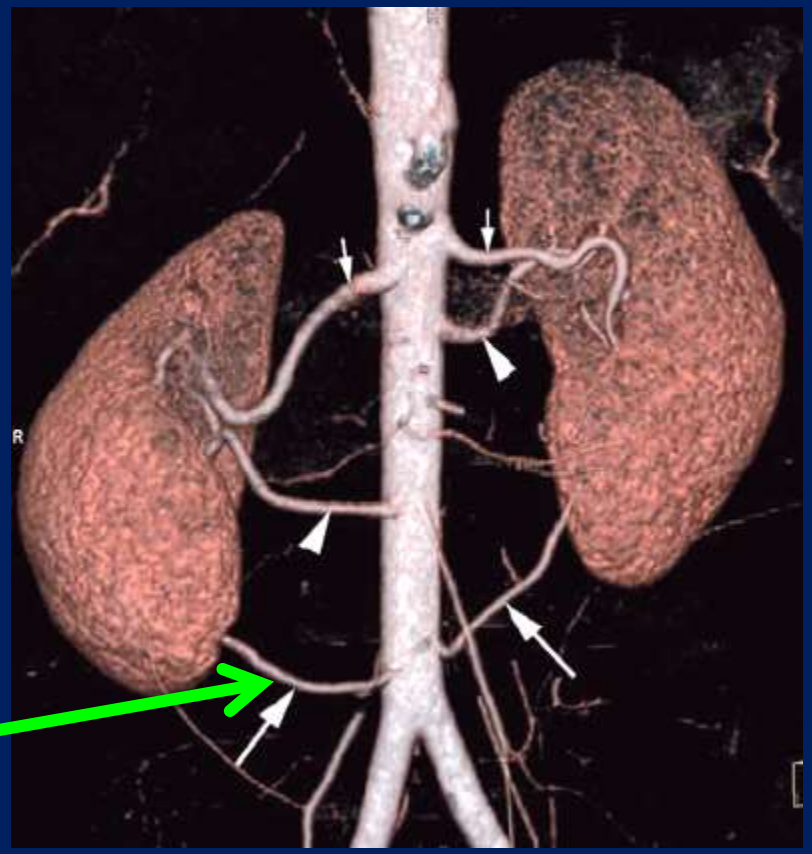
all are accessory



Accessory Renal Arteries ARAs

all are accessory

some are also *polar*



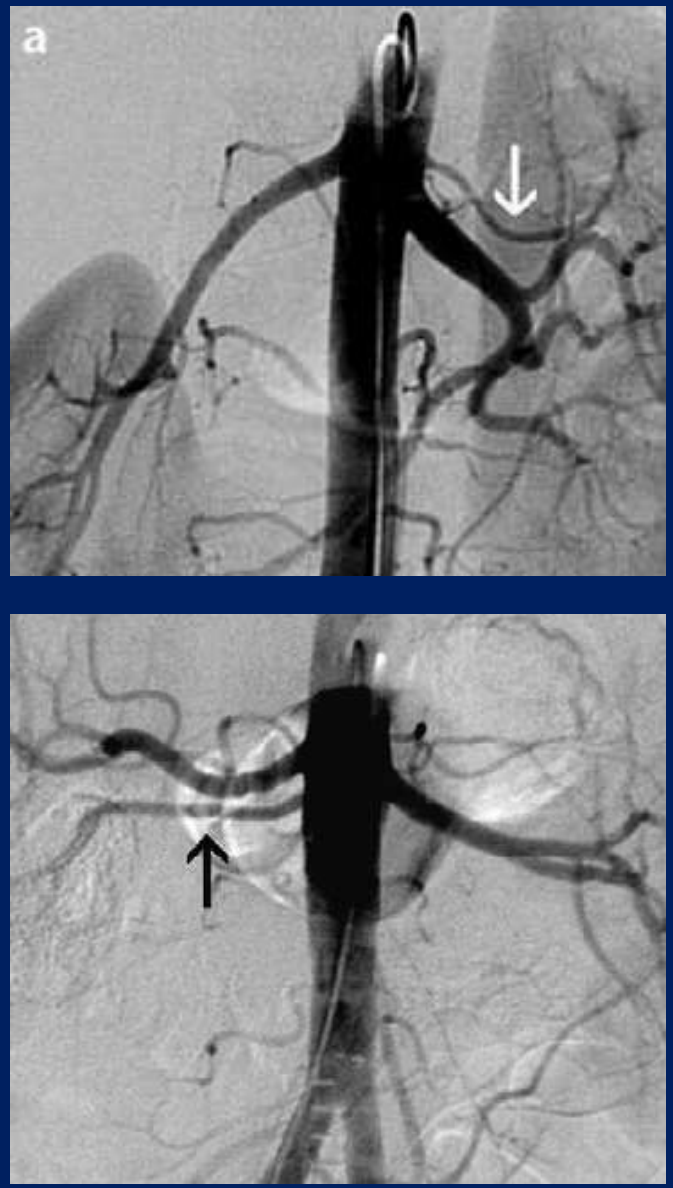
ARAs arise from aorta or iliac arteries anywhere between T11 and L4

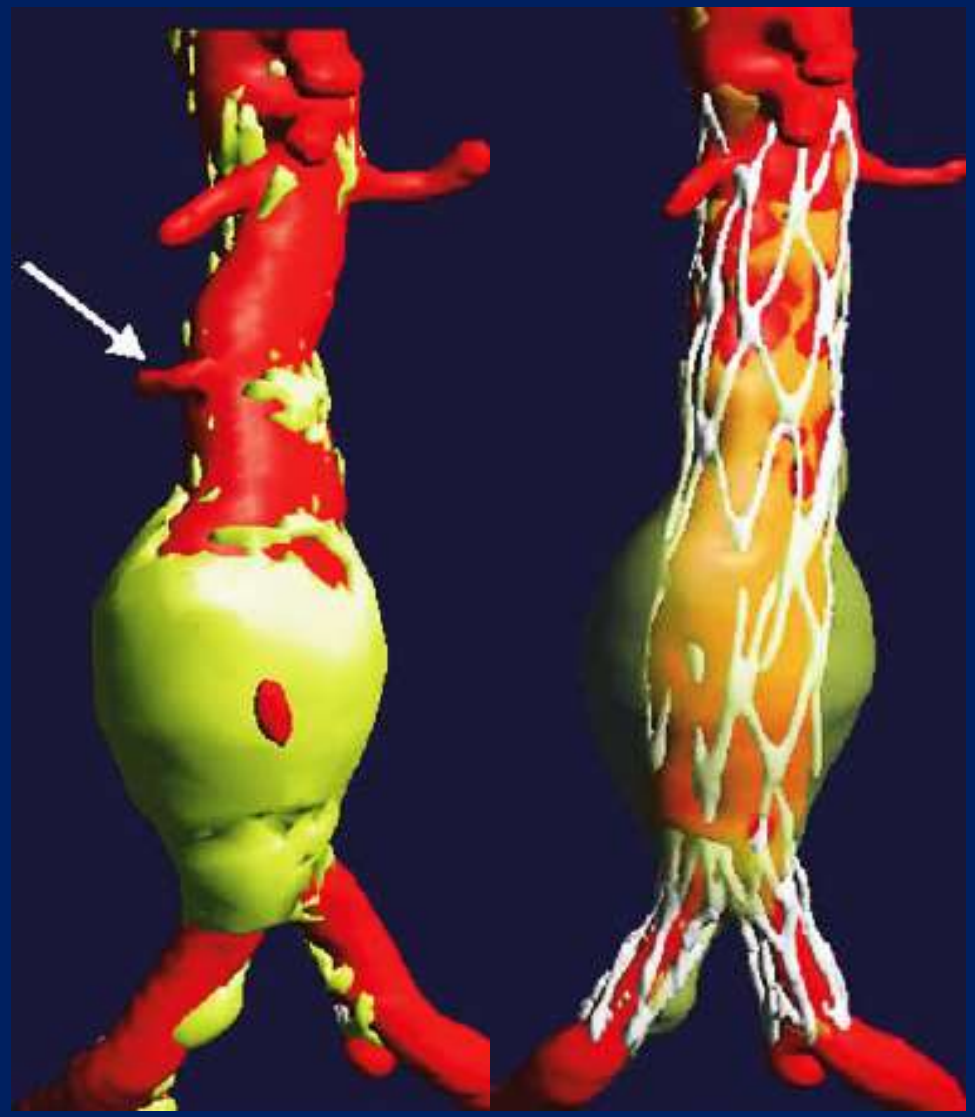
12-25% prevalence in humans

Typically they course through the renal hilum and perfuse the upper or lower parenchyma

Sometimes they enter the pole directly through the cortex = **polar renal artery**

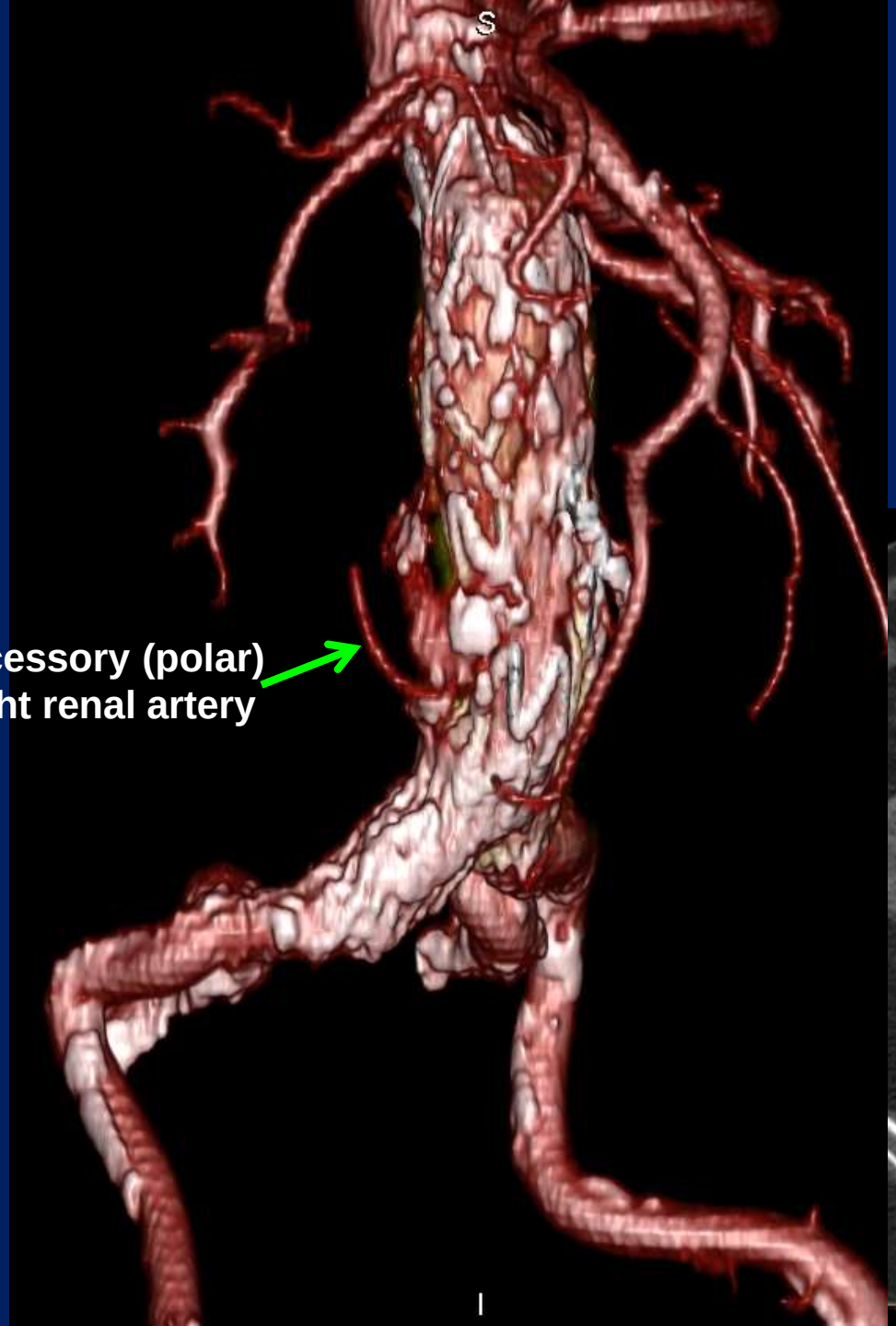
Multiple in 30%



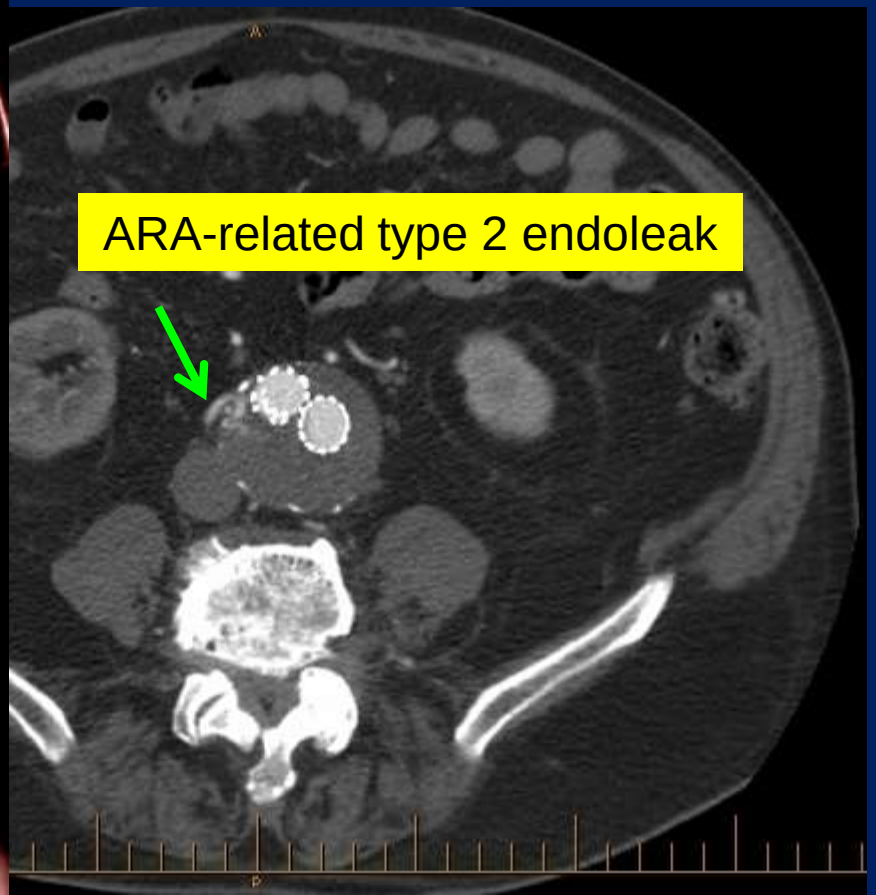


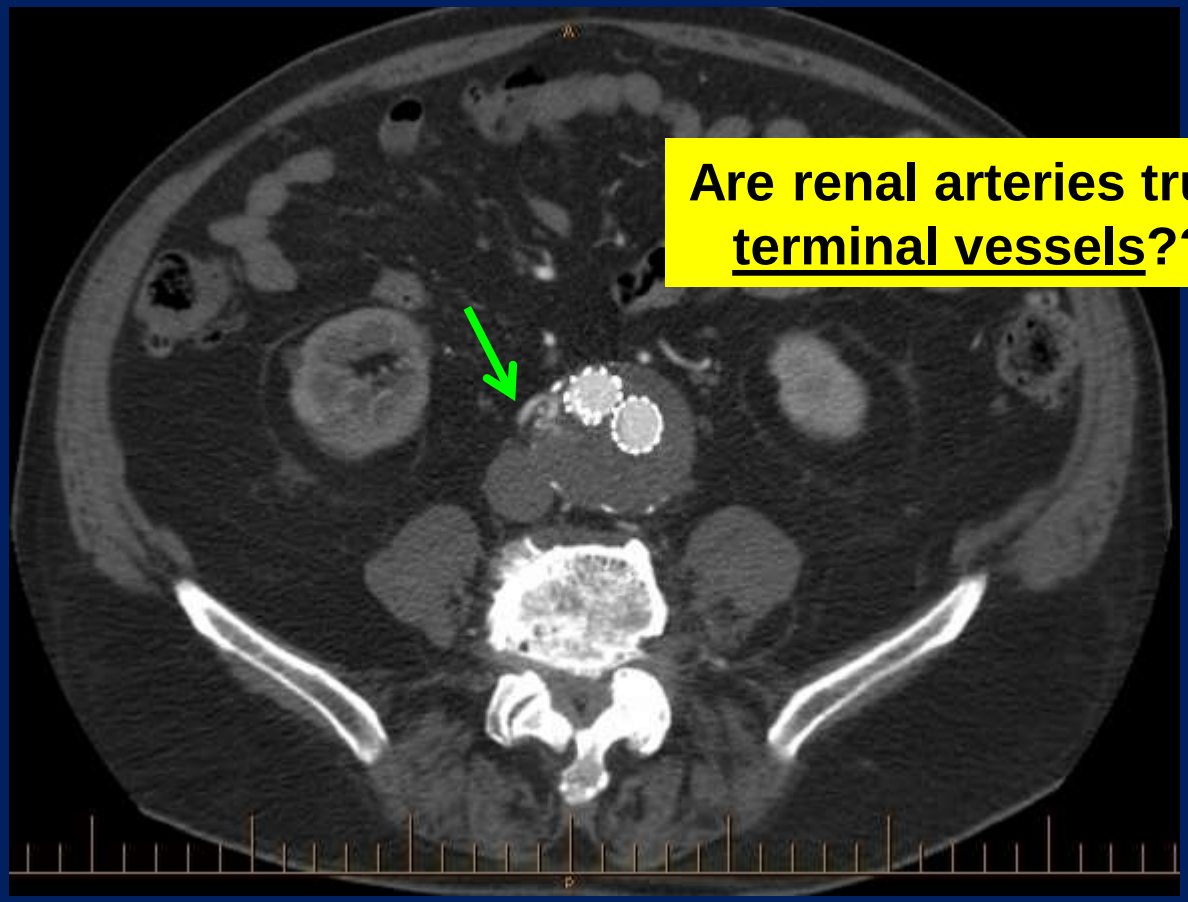
Critical questions on ARAs

- Will stent-graft cover ARA? If so…
- Origin from seal zone (neck) or below?
- Status of main RA (stenosis?)
- Large vessel (>3mm)?
- Does ARA supply >30% of renal mass?
- Potential for type II endoleak…?
- Need for pre-EVAR vessel coiling?



Accessory (polar)
right renal artery




Are renal arteries truly
terminal vessels??

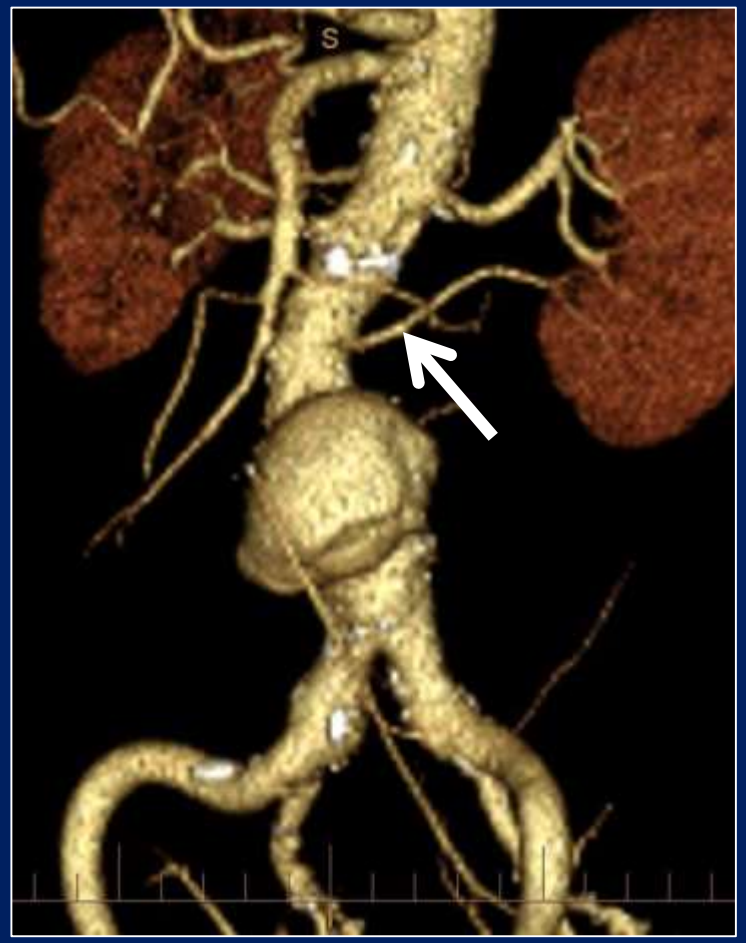
Renal infarctions are common after coverage of an ARA

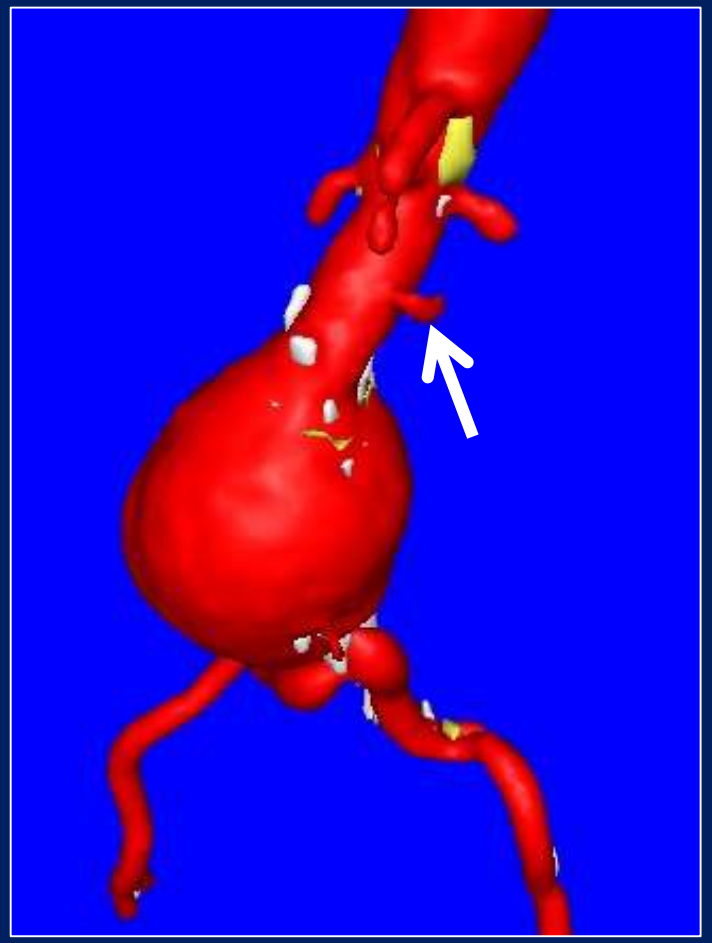
Accessory Renal Artery Coverage

Study	N	Infarct	Failure	Dialysis	↑BP	EL
Karmach	35	5 (20%)	2 (6%)	0 (0%)	0 (0%)	0 (0%)
Aquino	24/26	5 (21%)	1 (4%)	1 (4%)	1 (4%)	1 (4%)
Kim	11/11	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Kaplan	12/17	6 (50%)	1 (8%)	0 (0%)	1 (8%)	0 (0%)
Ferko	1	1 (100%)	0 (0%)	0 (0%)	0 (0%)	ND
Dorfmann	2	2 (100%)	0 (0%)	0 (0%)	0 (0%)	ND
Kaplan	3	3 (100%)	?	0 (0%)	ND	ND

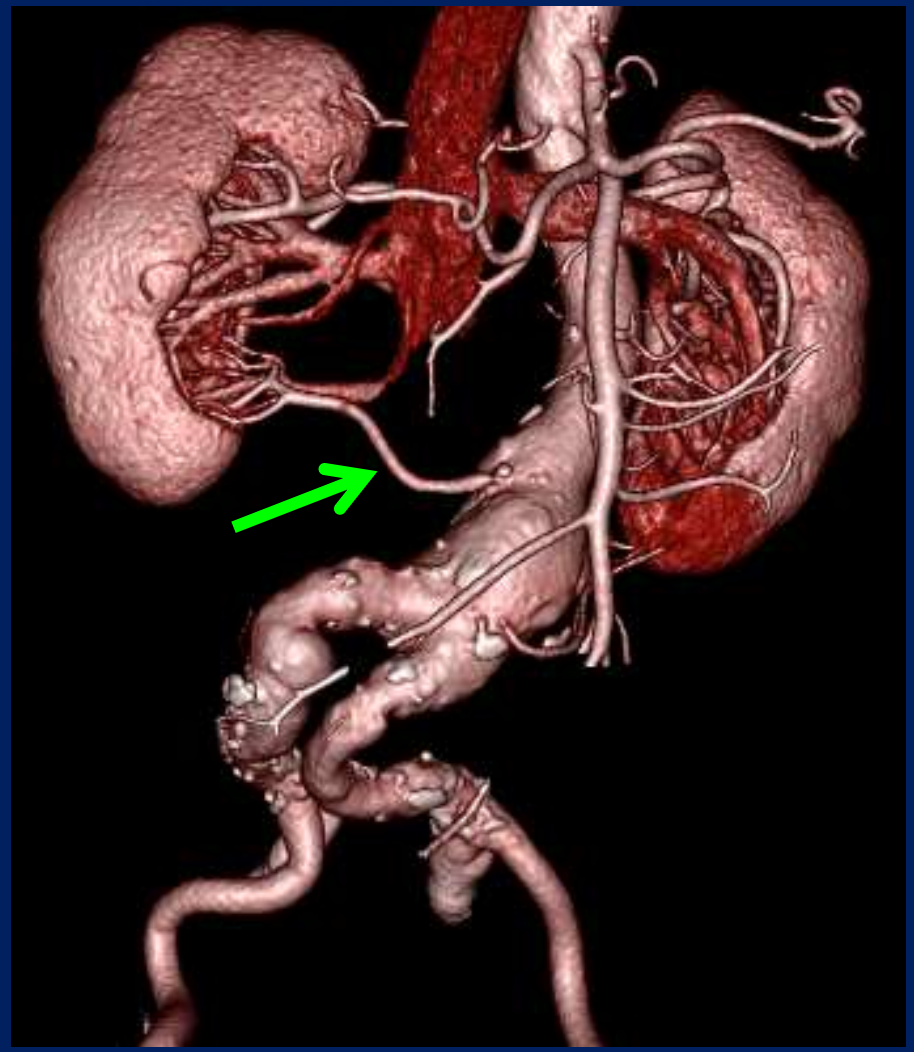
None of the patients underwent accessory renal artery embolization

Situation #1





Situation #2



Outcomes of accessory renal artery occlusion during endovascular aneurysm repair

Jagajan Karmacharya, MD, Shane S. Parmer, MD, James N. Antezana, MD, Ronald M. Fairman, MD, Edward Y. Woo, MD, Omaida C. Velazquez, MD, Michael A. Golden, MD, and Jeffrey P. Carpenter, MD, *Philadelphia, Pa*

Conclusions: Occlusion of accessory renal arteries is not associated with clinically significant signs or symptoms, even in patients with mild or moderate renal insufficiency. Sacrifice of accessory renal arteries most commonly does not lead to detectable renal infarction, either clinically or radiographically. When segmental infarction of the kidney does result, it seems to be well tolerated in this group of patients. Accessory renal arteries were not found to contribute to endoleaks and should not be prophylactically embolized. (J Vasc Surg 2006;43:8-13.)

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BEST EVIDENCE TOPIC – ADULT CARDIAC

Can an accessory renal artery be safely covered during endovascular aortic aneurysm repair?

George A. Antoniou[a,*], Christos D. Karkos[b], Stavros A. Antoniou[c] and George S. Georgiadis[d]

CLINICAL BOTTOM LINE

Infrarenal neck length is a significant anatomic parameter determining the suitability for EVAR. Commonly, clinicians face the dilemma whether one or more ARAs located in the proximal fixation zone should be covered to achieve seal. Current evidence supports the safety of ARA coverage during EVAR when necessary. Even though segmental renal infarction may occur in a considerable number of patients as a result of ARA exclusion, it does not seem to be associated with adverse clinical effects, such as renal failure and change in hypertensive status. The wide range of segmental renal infarction found in the reported studies may be explained by the different diagnostic methods used to assess its presence and extent, including CTA, renal scintigraphy and volumetric analysis of three-dimensional reconstructions of CT scans. Uncertainty exists regarding the impact of ARA coverage on preexisting renal impairment. Subgroup analysis of patients with chronic renal impairment performed by Greenberg *et al.* [2] revealed no differences in renal function when comparing patients with ARA coverage and ARA preservation. The risk of type II endoleak originating from an excluded ARA is negligible.

Long-term results after accessory renal artery coverage during endovascular aortic aneurysm repair

Joshua I. Greenberg, MD, Chelsea Dorsey, MD, Ronald L. Dalman, MD, Jason T. Lee, MD, E. J. Harris, MD, Tina Hernandez-Boussard, PhD, and Matthew W. Mell, MD, *Stanford, Calif*

Conclusions: **This study is the largest to date with the longest follow-up relating to ARA coverage. Contrary to previous reports, renal infarction after ARA coverage is common. Nevertheless, coverage is well tolerated based upon preservation of renal function without additional morbidity. These results support the long-term safety of ARA coverage for EVAR when necessary. (J Vasc Surg 2012;56:291-7.)**

	Covered (n = 40)	*Uncovered (n = 29)*	P *value*
Thirty-day mortality (%)	2.5	0	1[a]
Survival at 24 months	85% (±6.26)	90.1% (±6.98)	.1861[a]
Change in glomular filtration rate (mL/min)	−4.3 (±2.9)	−0.7 (±3.3)	.4
Change in blood pressure meds (#)	1.7 (±0.2)	1.8 (±0.22)	.6069
Renal infarct volume (%)	12.1 ± 1.3	0.5 ± 0.5	<.0001
Endoleak			
Early	13 (32.5)	11 (37.9)	.69
Late	6 (15)	2 (7)	.45
Secondary interventions	6 (15)	5 (17.2)	1.0

Summary of Results:

Long-term results after accessory renal artery coverage during endovascular aortic aneurysm repair

Joshua I. Greenberg, MD, Chelsea Dorsey, MD, Ronald L. Dalman, MD, Jason T. Lee, MD, E. J. Harris, MD, Tina Hernandez-Boussard, PhD, and Matthew W. Mell, MD, *Stanford, Calif*

45 ARAs were covered in 40 patients

Although renal mass is commonly lost, renal function is maintained after ARA coverage

84% of pts with ARA coverage during EVAR had detectable renal infarcts

No persistent type II endoleaks related to ARA

No pt required hemodyalisis

Subgroup analysis on pts with CRI (GFR <60 mL/hr) and patients with solitary kidney showed no difference in GFR change in the covered vs. uncovered ARA cohorts

Mean ARA diameter was 3mm but there was no association between GFR deterioration and increasing ARA size

Does intentional accessory renal artery occlusion during Endovascular Abdominal Aneurysm Repair affect outcomes?

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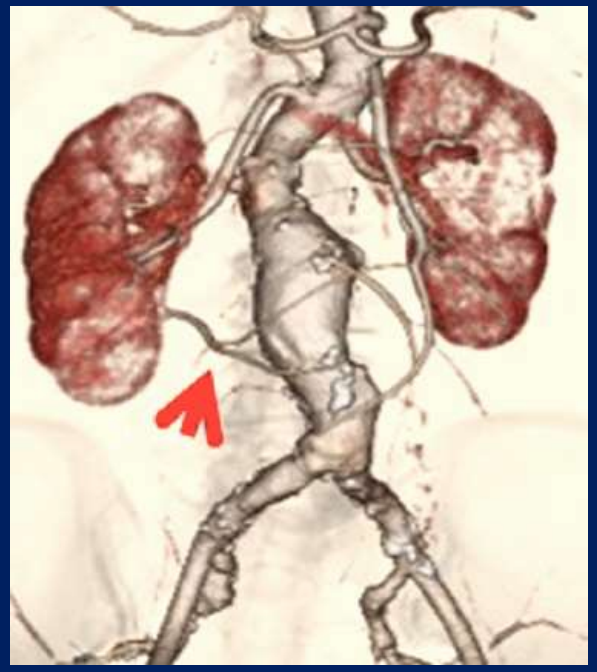
Division of Vascular and Endovascular Surgery, Mayo Clinic, Rochester, MN, Rochester, MN

OBJECTIVES: Accessory renal arteries (ARA) arising from the aortic neck or aneurysm sac may require coverage for successful endovascular aneurysm repair (EVAR). The purpose of this study is to evaluate the early and late outcomes after intentional ARA occlusion during EVAR.
METHODS: We reviewed 684 consecutive patients who underwent EVAR between 1998 and 2008. Patients with ARA were divided into one of two groups: excluded (Group A) or preserved ARA (Group B). End-points were early morbidity and mortality, outcomes for renal function, blood pressure (BP) management, incidence of endoleaks and secondary interventions.
RESULTS: Sixty-seven (10%) patients had 81 ARA. Group A included 27 patients (40%) with 32 excluded ARA arising from the proximal neck (n=15) or aneurysm sac (n=8). One ARA arising from the sac was coil embolized. Forty patients (60%) had 49 preserved ARA (Group B). No early mortalities occurred in either group. Acute renal insufficiency occurred in 1 patient (4%) in group A and none in group B (P=0.23). Mean follow up was 26 months in both groups. Three of the 8 patients (37%) with ARA arising from the aneurysm sac developed type II endoleaks with persistent ARA flow. Of these, 1 required embolization, 1 resolved and 1 remained patent with no aneurysm enlargement. Infarction of a kidney pole was noted in 15 patients (55%) in group A and in none of the patients in group B (P<0.001). Creatine clearance decreased after EVAR equally in both groups (p=0.56). Mean blood pressures were similar in both groups. Freedom from endoleak and secondary interventions was similar in both groups: 80% and 53% for group A and 80% and 87% for group B (p=0.7; p=0.4).

CONCLUSIONS: Intentional accessory renal artery coverage during EVAR is feasible and was not associated with significant changes in renal function or blood pressure management. Large accessory renal arteries arising from the aneurysm sac may require coil embolization to prevent type II endoleak.

Take-Home Messages

- Accessory RAs are common – 12-25%
- ***Stent-graft coverage is well-tolerated in nearly all cases and can be performed with near-impunity even in the face of chronic renal failure***
- ***Related type II endoleaks are extremely rare***
- Large >3mm accessory RAs can be safely covered when necessary



Nishie et al. Surgical Case Reports (2017) 3:58
DOI 10.1186/s40792-017-0334-y

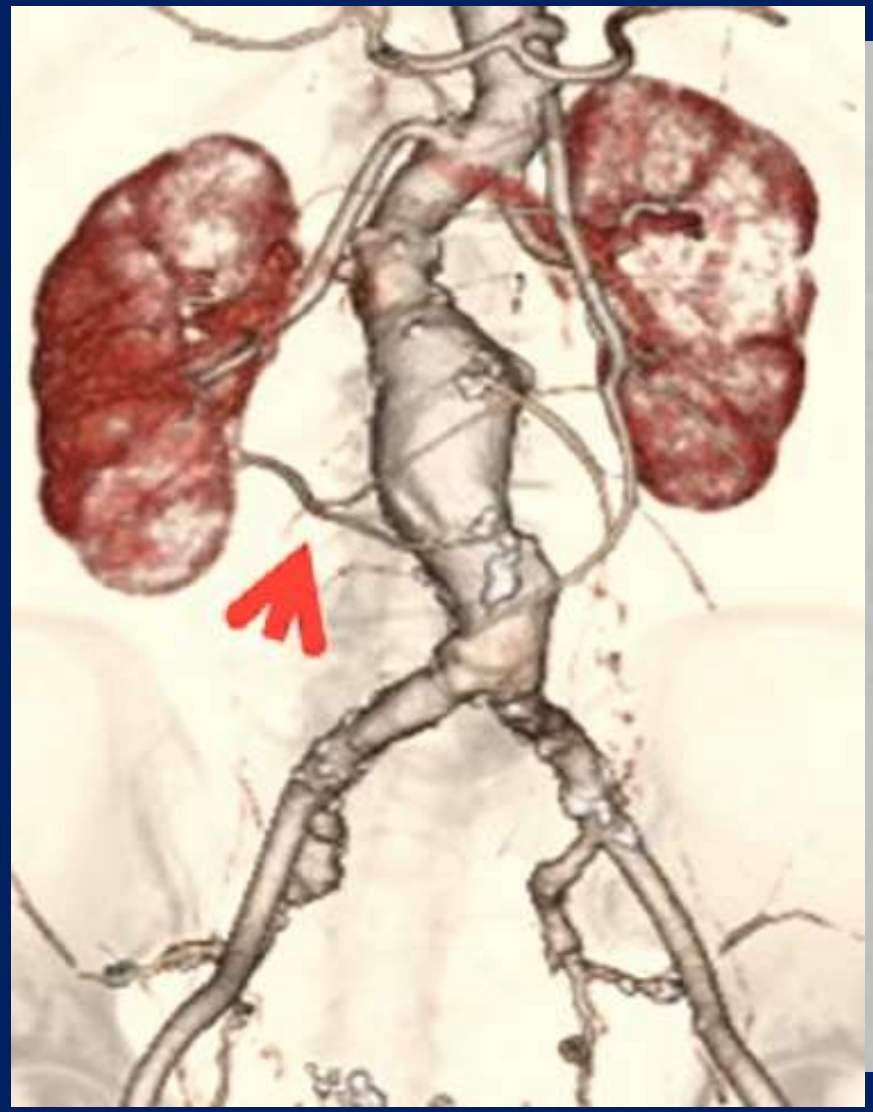
Surgical Case Reports

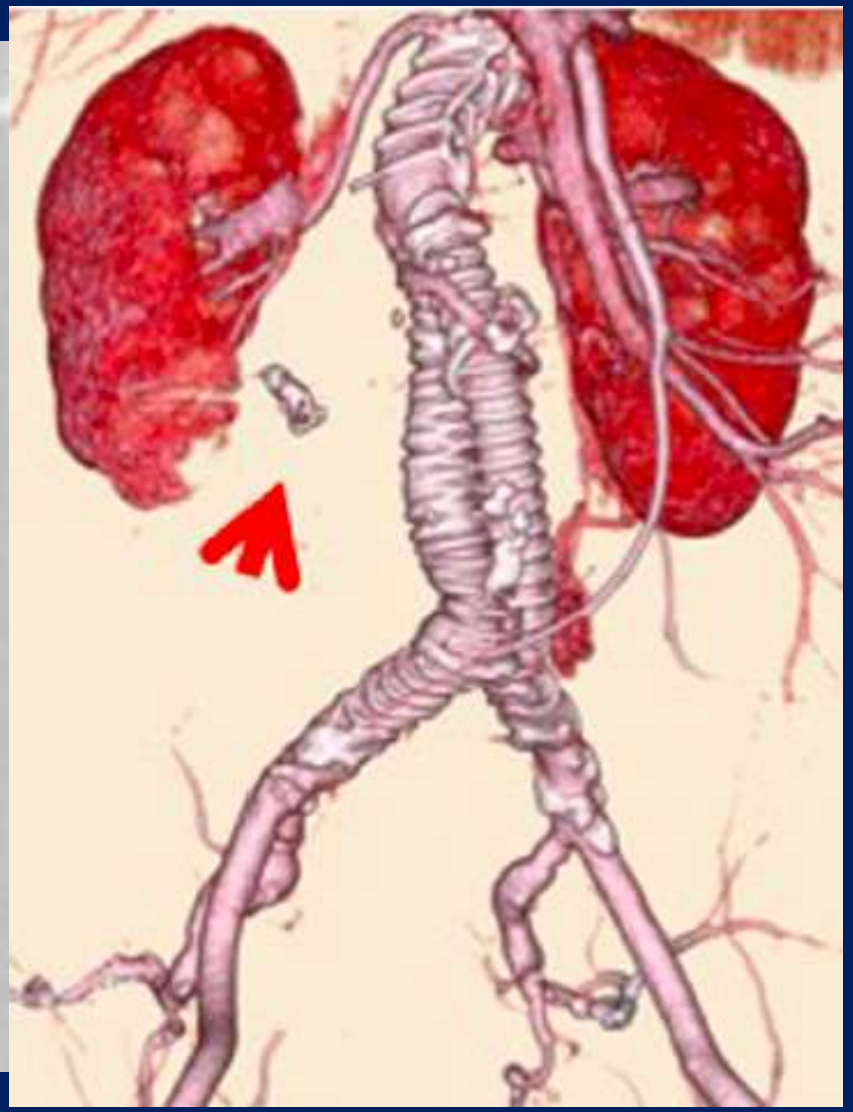
CASE REPORT Open Access

Prophylactic accessory renal artery coil embolization for prevention of type II endoleak following endovascular aneurysm repair: a case report

Ryosuke Nishie[1], Naoki Toya[1,4*], Soichiro Fukushima[1], Eisaku Ito[1], Yuri Murakami[1], Tadashi Akiba[2] and Takao Ohki[3]

- ***Consider pre-EVAR embolization/closure of a large-size ARA that arises below the neck seal area to eliminate potential of a high-flow type II endoleak***





Take-Home Messages

- **If present, main RA stenosis should be treated before covering ARA on same side**