

Endoleaks after EVAR:
Watch and wait or intervene?
RADY 401 Case Presentation

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Patient history and workup

Patient is a 73-year-old female who was found to have AAA at age 67, which was then repaired with a fenestrated endovascular aneurysm repair (FEVAR). Since then she has had annual follow-up CT angiography scans and is presenting this month for her regular follow-up scan. She is currently asymptomatic.

Her prior scans have showed no signs of aneurysm sac growth or endoleaks. She has not needed any interventions since the FEVAR.



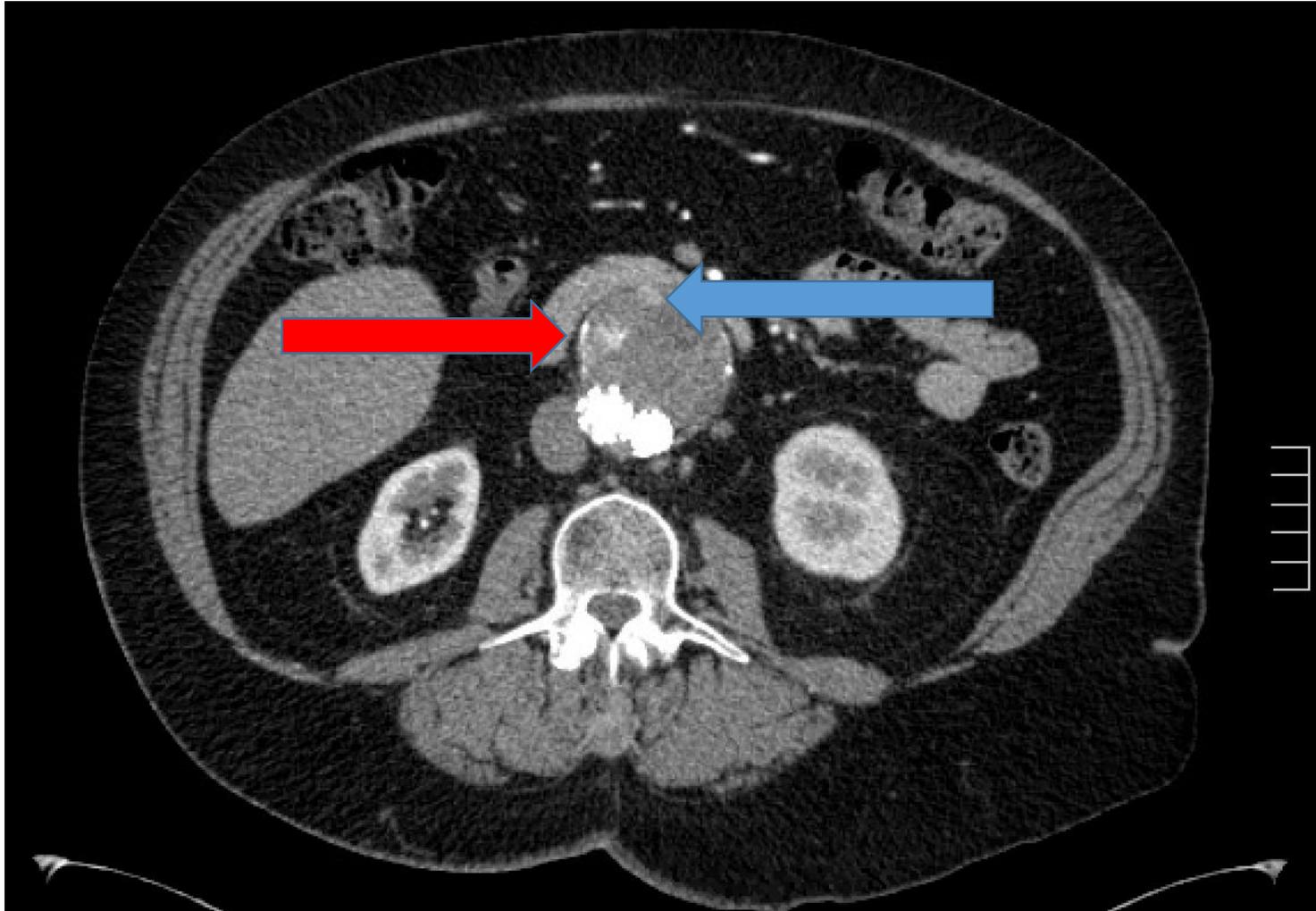
<https://www.navicenthealth.org/VI/endovascular-abdominal-aortic-aneurysm-repair-evar>

Imaging studies: X-ray abdomen



Annual x-ray of abdomen confirmed endograft was in correct position

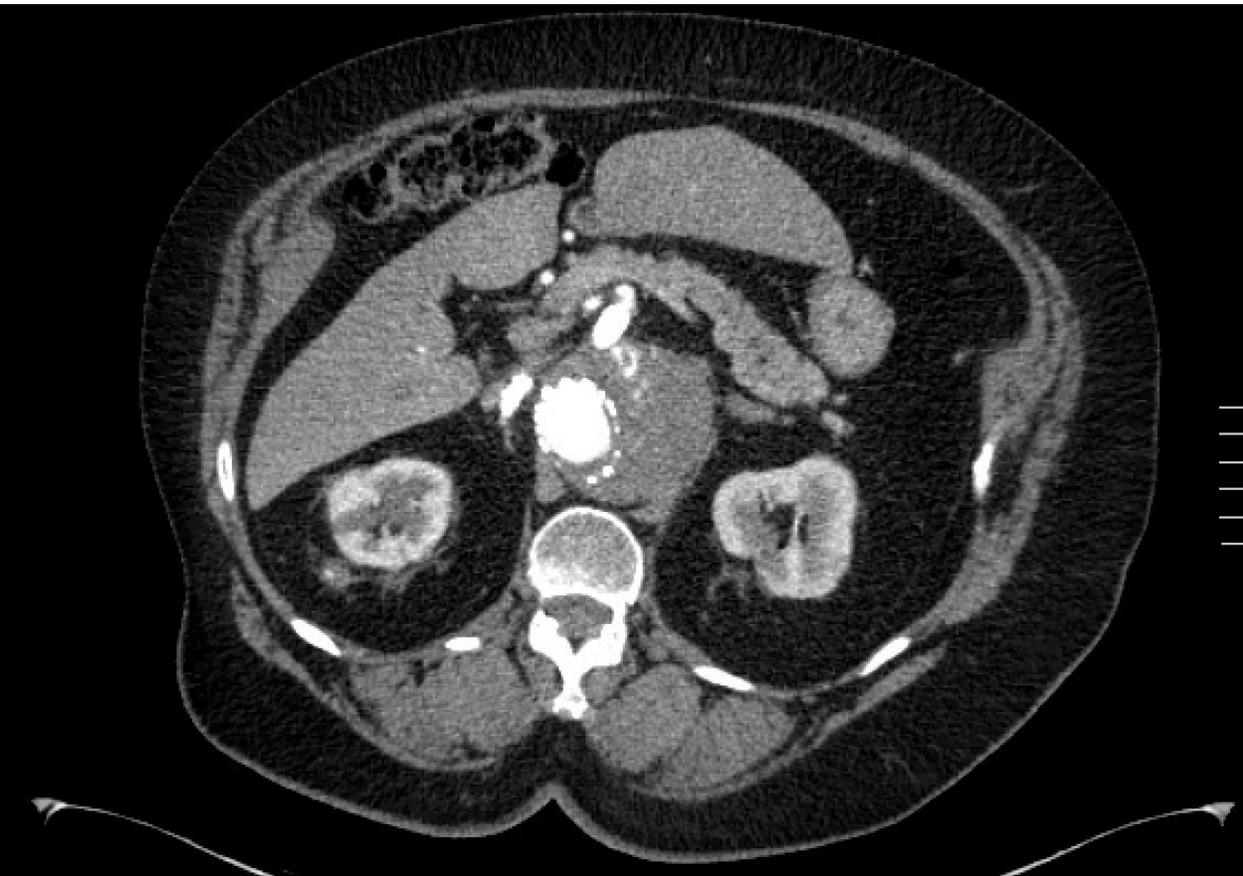
Imaging studies: CT angiography abdomen/pelvis



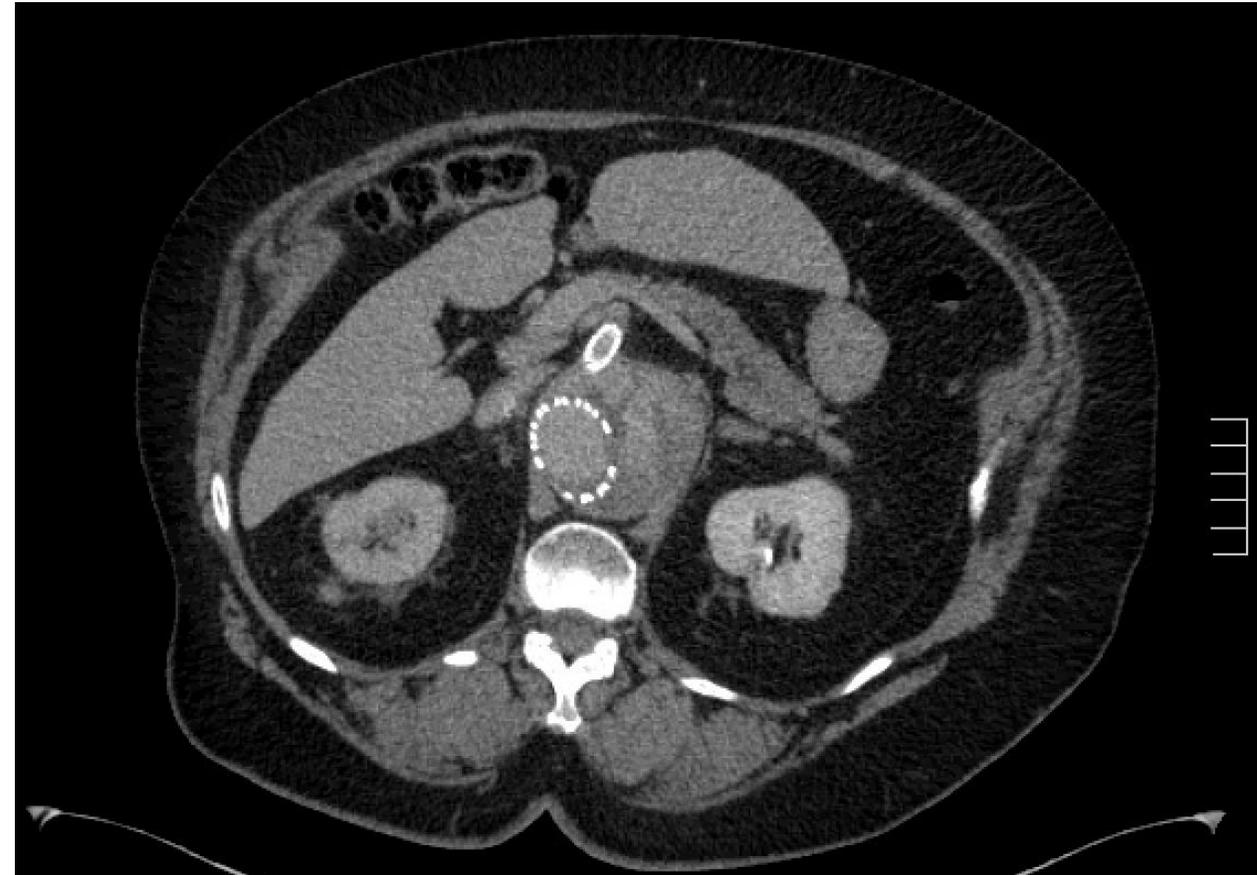
Type II endoleaks seen in IMA (blue arrow) and inferior phrenic artery (red arrow)

Imaging studies: CT angiography abdomen/pelvis

Type II endoleaks seen in IMA and inferior phrenic artery

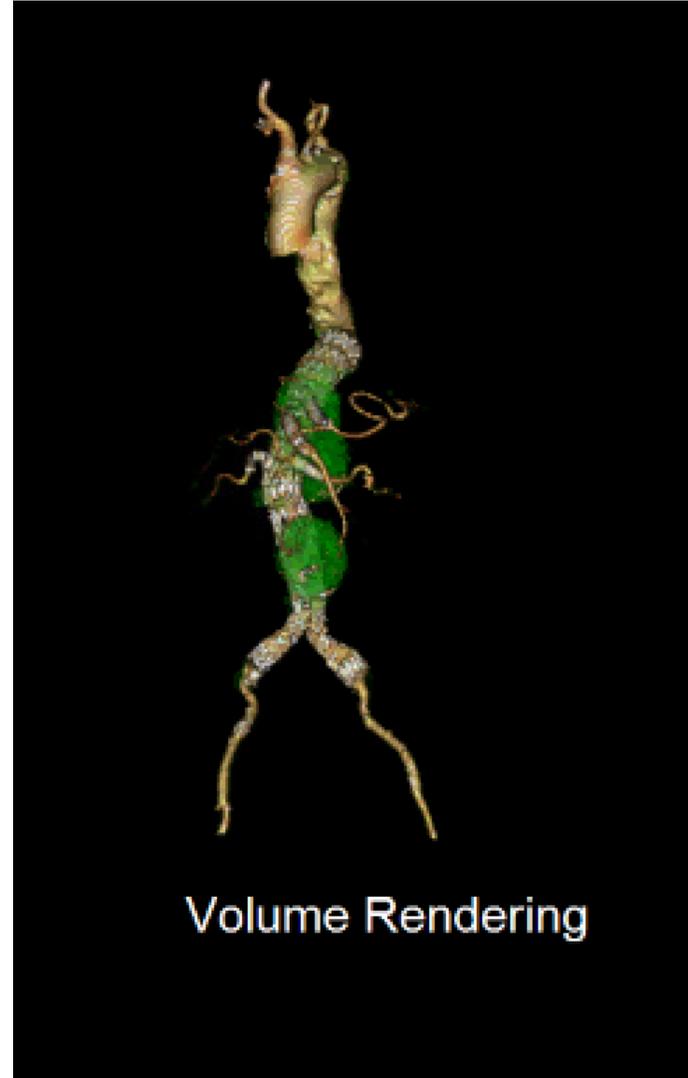
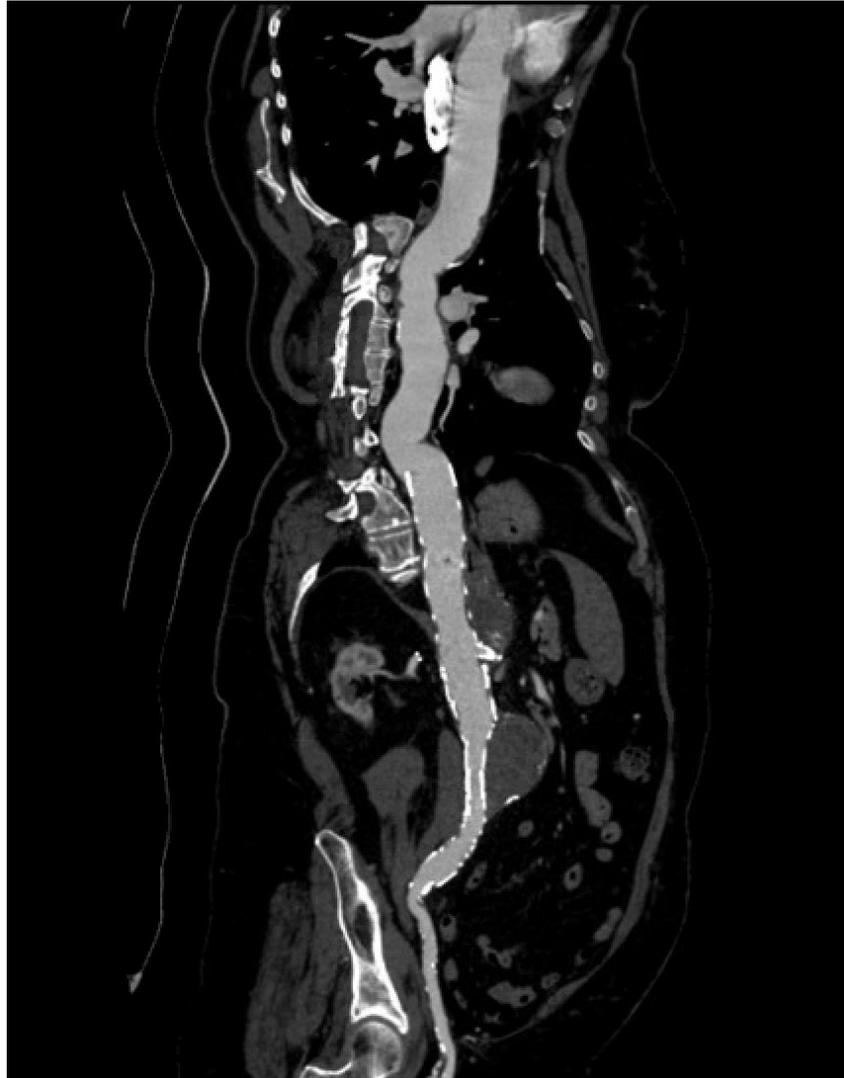


Arterial phase

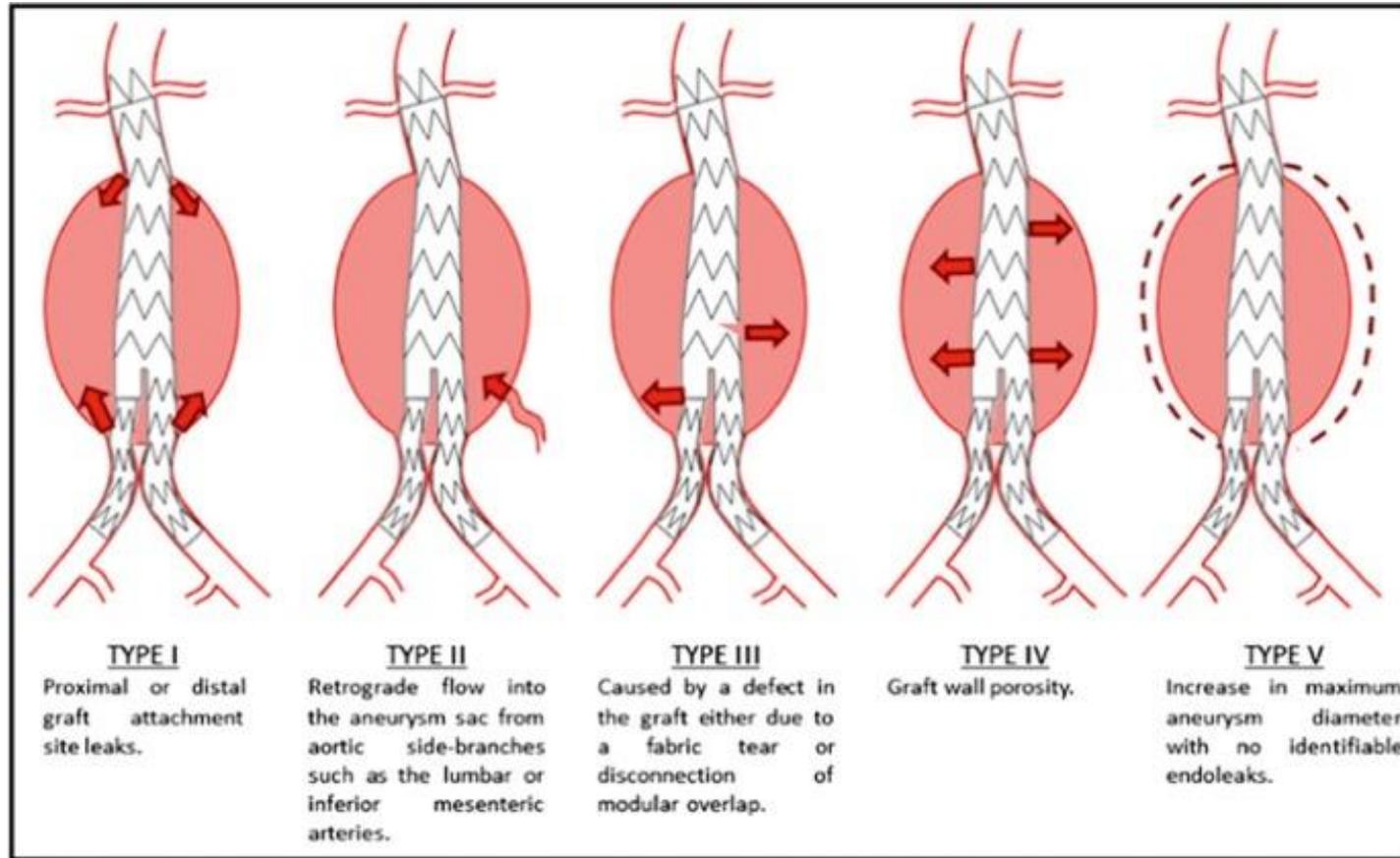


Delayed (venous) phase

Imaging studies: Linear and 3D reconstructions



Endoleaks¹



Our patient

Patient treatment

Type II endoleak -> will continue surveillance²

- Annual CTA and X-ray

Other option: embolize feeding arteries and/or endoleak nidus

- Various approaches – translumbar, transabdominal, intravascular
- Risks vs. benefits
 - Embolization may stop the growth of the aneurysm sac, decreasing risk of rupture of AAA
 - However, repeat interventions may be necessary, and sac may continue to grow

Imaging discussion: ACR Appropriateness Criteria^{®3}

Variant 2: Follow-up for postendovascular repair (EVAR) or open repair of AAA.



Procedure	Appropriateness Category	Relative Radiation Level
CTA abdomen and pelvis with IV contrast	Usually Appropriate	⊕⊕⊕⊕⊕
MRA abdomen and pelvis without and with IV contrast	Usually Appropriate	○
Aortography abdomen	May Be Appropriate	⊕⊕⊕
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	⊕⊕⊕⊕
CT abdomen and pelvis without IV contrast and US aorta abdomen with duplex Doppler	May Be Appropriate	⊕⊕⊕
MRA abdomen and pelvis without IV contrast	May Be Appropriate	○
US aorta abdomen with duplex Doppler	May Be Appropriate	○
CT abdomen and pelvis without IV contrast	May Be Appropriate	⊕⊕⊕
CT abdomen and pelvis with IV contrast	May Be Appropriate (Disagreement)	⊕⊕⊕
X-ray abdomen and pelvis	May Be Appropriate	⊕⊕⊕

Imaging discussion

Straightforward case? Maybe not!

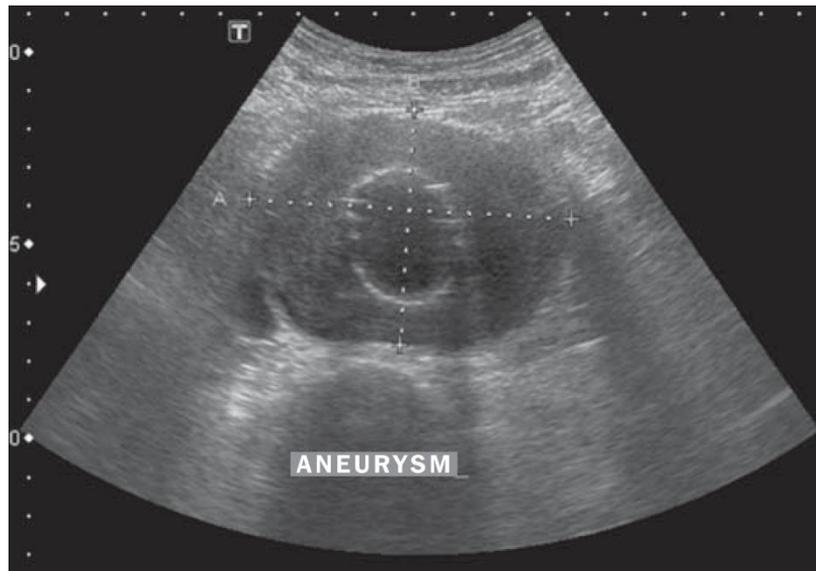
Problems with type II endoleak surveillance:

- Radiation (21-43 mSv)⁴
- Contrast (60 mL)
- Over-intervention
- \$\$\$

Imaging discussion

Proposed alternatives

- Annual US scans⁵
- Contrast-enhanced US⁶
- Surveillance imaging every 2 years instead



Imaging discussion

SIR recommendations for post-EVAR follow-up:⁷

- Measure aortic aneurysm diameter
- Detect and classify all endoleaks
- Detect location and patency of stent graft



Teaching points

- Endoleaks are the most common complication after EVAR or FEVAR for AAA
- Type I endoleaks are rare but need to be fixed
- Type II endoleaks are the most common but there is no consensus for whether or not intervention is necessary, as most people prefer annual surveillance

References

1. England A, Mc Williams R. Endovascular aortic aneurysm repair (EVAR). *Ulster Med J.* 2013;82(1):3–10. PMID 23620623.
2. Tamer W. Kassem, Follow up CT angiography post EVAR: Endoleaks detection, classification and management planning, *The Egyptian Journal of Radiology and Nuclear Medicine*, Volume 48, Issue 3, 2017, Pages 621-626, ISSN 0378-603X, [doi:10.1016/j.ejrn.2017.03.025](https://doi.org/10.1016/j.ejrn.2017.03.025)
3. Francois, CJ, Skulborstad, EP, Majdalany, BS, et al. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm: Interventional Planning and Follow-Up. Available at <https://acsearch.acr.org/docs/70548/Narrative/>. American College of Radiology. Accessed April 21, 2019.
4. Smith-Bindman R, Lipson J, Marcus R, et al. Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. *Arch Intern Med.* 2009;169(22):2078–2086. [doi:10.1001/archinternmed.2009.427](https://doi.org/10.1001/archinternmed.2009.427)
5. Cantador, AA, Siqueira, DED, Jacobsen, OB, Baracat, J, Pereira, IMR, Menezes, FH, & Guillaumon, AT. (2016). Duplex ultrasound and computed tomography angiography in the follow-up of endovascular abdominal aortic aneurysm repair: a comparative study. *Radiologia Brasileira*, 49(4), 229-233. [doi:10.1590/0100-3984.2014.0139](https://doi.org/10.1590/0100-3984.2014.0139)
6. Jawad N, Parker P, Lakshminarayan R. The role of contrast-enhanced ultrasound imaging in the follow-up of patients post-endovascular aneurysm repair. *Ultrasound.* 2016;24(1):50–59. [doi:10.1177/1742271X15627303](https://doi.org/10.1177/1742271X15627303)
7. Walker TG, Kalva SP, Yeddula K, et al. Clinical Practice Guidelines for Endovascular Abdominal Aortic Aneurysm Repair: Written by the Standards of Practice Committee for the Society of Interventional Radiology and Endorsed by the Cardiovascular and Interventional Radiological Society of Europe. *J Vasc Interv Radiol.* 2010;21(11):1632-1655. [doi:10.1016/j.jvir.2010.07.008](https://doi.org/10.1016/j.jvir.2010.07.008)