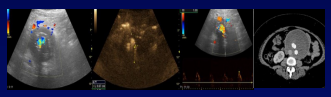
When Can Duplex Ultrasound Fully Replace CT Surveillance After EVAR: When Is CT Surveillance Necessary?



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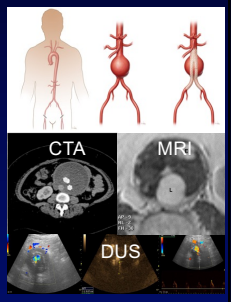
Wednesday, November 20th, 2024 5:54-5:59PM
Session 46: More Short Hot New Topics Related to Aortic Disease

Disclosures

- None

Endovascular Aneurysm Repair

- EVAR is the dominant treatment strategy for infrarenal AAA repair in the US.
  - *70% - 80% elective*
  - *30% - 45% rupture*
- Postoperative surveillance is mandatory to ensure durability.
  - *imaging (CT, DUS, MRI, etc.)*

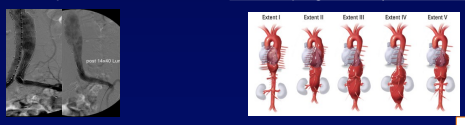


EVAR Failure Modes

- EVAR Reintervention ~20-30% @ 5-10 years postop

Early or Late Endoleak | Migration | Infection

Limb Kink/Compression/Thrombosis | Disease progression (local/remote)



Columbo et al. J Vasc Surg. 2019

EVAR Surveillance & Guidelines

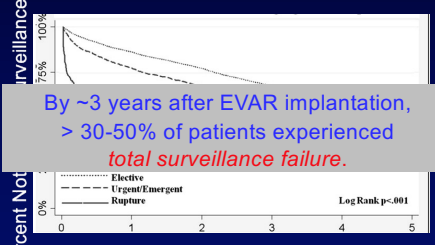
- Guidelines have different recommendations
- Evidence level modest/poor
- Role of DUS/CEUS poorly defined
- No clear scenario when DUS supplants CT

If no endo… …image in 12 months (contrast CT or DUS)

Wanhainen et al. Eur J Vasc Endovasc Surg. 2024

EVAR Loss to Follow-Up

- N = 19,962 Medicare Beneficiaries [2001-2008]



By ~3 years after EVAR implantation, > 30-50% of patients experienced *total surveillance failure*.

Schanzer et al. J Vasc Surg. 2015
Wanken et al. Circulation 2020

CT vs. DUS EVAR Surveillance

CT

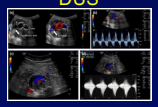
Benefits

-Sensitivity & Specificity for EL
- IFU
- Regulators
- Less variation

Risks

- High cost
- XRT
- Renal risk

DUS



- Low cost
- No XRT
- Low renal risk

-Sensitivity & Specificity for EL
- Non-IFU
- Regulators
- High variation

CEUS improves sensitivity

Zajem et al. J Vasc Surg 2018

ESSEA Trial

N = 500 patients, prospective, multicenter trial [2010-2015]

Primary outcome = diagnostic accuracy of DUS for 'major AAA-related morphological abnormality' [MARMA]

(T1/3EL, ≥70% limb stenosis, T2EL + ≥2mm sac growth, any sac growth ≥ 5mm)

Overall DUS Outcomes

Sensitivity = 39% (95%CI 29-48)

Specificity = 92% (95%CI 90-95)

Sensitivity in detecting MARMA = 71%

Sensitivity in detecting T2EL + 2-5mm sac growth = 11%

Sensitivity in detecting T2EL + ≥ 5mm sac growth = 45%

Sensitivity in detecting T1/3 EL = 29% (vs. other studies >80%!)

CEUS in 13% of cases

Sensitivity for MARMA = 36% (95%CI 14-61) vs. 94% Cochrane Review

Jean-Baptiste et al. Circ Cardiovasc Imaging 2020
Karthikesalingram et al. Br J Surg 2012
Abraha et al. Cochrane Database Syst Rev 2017

When is DUS OK after EVAR?

Since no Level I evidence and publication uncertainty

↓

Need to define characteristics of DUS surveillance populations with good long-term outcome

↓

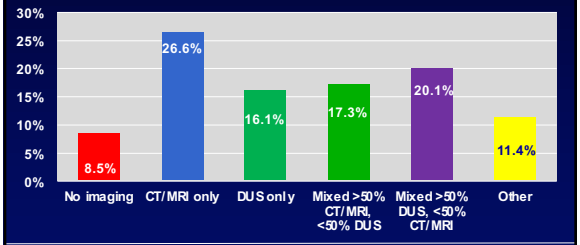
Patient, Anatomic and AAA Morphological Variables need to be factored into the analysis

↓

Need large sample size given groups & event rates

EVAR Imaging after 1st Year

- N = 12,199 VQI patients with Medicare Claims Match

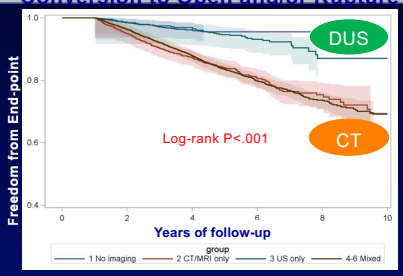


#Patients	N = 953	N = 2,976	N = 1,808	N = 1,937	N = 2,253	N = 1,272
Follow-up Time (Median)	2.9 Years	4.1 Years	4.2 Years	5.2 Years	5.3 Years	4.3 Years

- Excluded deaths within first postop year - 2003-2016 linked pts since need up to 2-year window for VQI 1-year follow-up timepoint

Blecha et al. Ann Vasc Surg. 2024

Freedom From Aorta Related Re-intervention, Conversion to Open and/or Rupture



Estimated risk of composite outcome

	Group 1 None	Group 2 CT/MRI only	Group 3 US only	Group 4-6 Mixed
2 years	1.4%(0.3-7.3%)	5.0%(3.0-8.2%)	1.5%(0.2-11.1%)	3.7%(2.3-6.0%)
5 years	4.5%(2.6-7.8%)	16.0%(13.5-18.9%)	5.4%(3.0-9.7%)	16.5%(14.7-18.5%)
10 years	*	30.7%(21.6-42.4%)	13.0%(7.9-21.1%)	30.8%(26.8-35.2%)

Blecha et al. Ann Vasc Surg. 2024

EVAR Surveillance: Patient Characteristics

'DUS only' post-EVAR surveillance associated with:

- elective, older, lower BMI, male patients with smaller AAA (<6cm) without concurrent iliac aneurysm

Blecha et al. Ann Vasc Surg. 2024

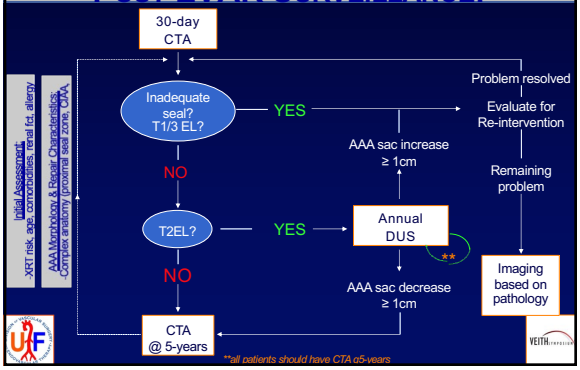
EVAR Surveillance: Endoleak & Sac Change

'DUS only' post-EVAR surveillance associated with:

no endoleak at 1-year follow-up &
>5mm decrease in AAA sac diameter

Blecha et al. Ann Vasc Surg. 2024

Decision-Algorithm for Post EVAR Surveillance:



Summary

- Early and Late Complications of EVAR mandate continuous monitoring.
- EVAR surveillance missing in up to 50% patients after 3 years.
- Societal guidelines differ in surveillance recommendations.
- No clear consensus on EVAR imaging type/frequency.
- Surveillance protocols should be individualized to the patient & scenario, as well as institutional experience.

RCT?

Conclusions

- DUS can safely supplant CT imaging in selected patients. (no endoleak, normal BMI, sac regression at 1-year)
- CT required if sac growth on DUS (despite no endoleak) and/or evidence of endoleak.

Unresolved Questions:

- Role of intervention for T2EL with sac expansion.
- Long-term outcomes of risk-stratified surveillance strategies.
- **Future Research Needs**:
  - Investigate methods to improve ultrasound sensitivity & specificity.
  - Develop standardized imaging protocols & sonographer training programs.
  - Assess whether surveillance adherence impacts AAA-related mortality.

***Takeaway**: Optimizing surveillance remains vital to improve EVAR outcomes and minimize rupture risk*

Thank You