

Surgery UNIVERSITY OF TORONTO Vascular Surgery

An Algorithm For Diagnosing And Treating Challenging Endoleaks After F/B EVAR For TAAAs

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Conflicts of Interest

- Cook Canada Consultant, Proctor and Speaker

Endoleak Classification
Reporting standards for endovascular aortic repair of aneurysms involving the renal-mesenteric arteries
Oderich G et al. (J Vasc Surg 2021;73:45-52S.)

- Ia: Proximal attachment
- Ib: Distal attachment
- Ic: Sidebranch attachment
- II: Retrograde (Lumbars, IMA, ...)
- IIIa: Attachment aortic-aortic or aortic-bifurcated or bifurcated-iliac limb component
- IIIb: Fabric tear, or fracture
- IIIc: Attachment aortic side branch or side branch-side branch component
- IV: Graft porosity
- V: Endotension

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Endoleak Classification

- Branched TAAA Repair

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Endoleak Incidence FEVAR

Long-term outcomes after fenestrated endovascular aortic repair for juxtarenal aortic aneurysms
(J Vasc Surg 75:1164:2022)

Magnus Sveinsson, MD,^{a,b} Björn Sonesson, MD, PhD,^b Thorarinn Kristmundsson, MD, PhD,^{b,c} Nuno Dias, MD, PhD,^b and Timothy Resch, MD, PhD,^{b,d} Helsingborg and Malmö, Sweden; and Copenhagen, Denmark

- 94 Patients followed for median of 89 months
- 37 patients required 70 re-interventions at a mean of 21+/- 3.7 months
- 61% detected on Routine surveillance
- 39% to restore TV patency, 16% for endoleaks, 29% other and 17% graft limb related

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Re-intervention free survival

All cause mortality

Follow-up (months)

Outcomes of target vessel endoleaks after fenestrated-branched endovascular aortic repair

Jussi M. Kärkkäinen, MD, PhD et al. (J Vasc Surg 2020;72:445-55.)

- 382 patients 2007-2017
- 195 FEVARs 187 TAAA 981 fenestrations, 223 Branches
- 52 TV endoleaks in 41 patients (10%)
- Branch endoleaks more common but more spontaneously resolved (79%)
- Risk factors Aortic diameter \geq 30 mm, 4 or more targeted vessels, TAAA and Physician Modified grafts
- 4 of Primary endoleaks required immediate re-intervention, 7 of 8 required later intervention
- 2 of Secondary endoleaks required intervention



Outcomes of target vessel endoleaks after fenestrated-branched endovascular aortic repair

	All target vessel endoleaks (N = 52)	Primary target vessel endoleak (n = 41)	Secondary target vessel endoleak (n = 11)	P value
Target vessel endoleak types				
Type IC endoleak	10 (19)	6 (15)	4 (36)	.18
Type IIC endoleak	41 (79)	35 (85)	6 (55)	.04
Type IIIB endoleak	1 (2)	0 (0)	1 (9)	.21
Endoleaks requiring reintervention				
Type IC endoleak	8/10 (80)	4/6 (67)	4/4 (100)	
Type IIC endoleak	15/41 (37)	9/35 (26)	6/6 (100)	
Type IIIB endoleak	1/1 (100)	0	1/1 (100)	
Fenestration	22/58 (58)	12/28 (43)	10/10 (100)	
Directional branch	2/4 (50)	1/3 (33)	1/1 (100)	

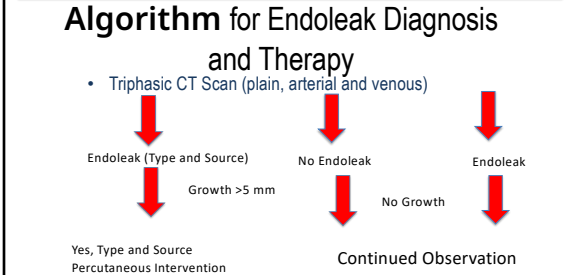


Modalities for Evaluating Endoleaks After B/FEVAR

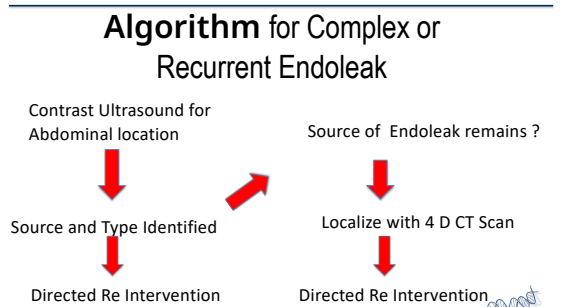
- Contrast CT Scanning
- Duplex Ultrasound
 - Excellent to follow abdominal portion
- Contrast Ultrasound
 - Assists with Source of Endoleaks (Lumbar vs. proximal or distal)
- 4 D CT Scanning
 - Rapid Scanning over specific areas to identify source of Endoleaks



Algorithm for Endoleak Diagnosis and Therapy



Algorithm for Complex or Recurrent Endoleak



Utility of 4D CT in endoleak characterization after advanced endovascular aortic repair

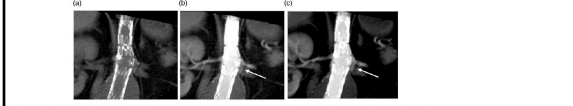


Figure 2. 4D CT with unenhanced (a) and early contrast enhanced phases (b and c) demonstrating early contrast enhancement below the left renal stent consistent with a Type 3c leak (white arrows).

- Large radiation dose
- Used for recurrent and complex endoleaks for therapeutic planning



Endoleak Therapy

Reporting standards for endovascular aortic repair of aneurysms involving the renal-mesenteric arteries (Vasc Surg 2021;73:45-52S.)

Therapy

- Ia: Proximal attachment → Extend Stent
- Ib: Distal attachment → Extend Stent
- Ic: Sidebranch attachment → Extend Stent
- II: Retrograde (Lumbar, IMA, ...) → Re Line stent
- IIIa: Attachment aortic-aortic or aortic-bifurcated or bifurcated-iliac limb component → Re line/Flair
- IIIb: Fabric tear, or fracture → Re line/Flair
- IIIc: Attachment aortic side branch or side branch-side branch component → Re line/Flair
- IV: Graft porosity → Re Line
- V: Endotension → Re Line

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Endoleak Therapy

• Branched TAAA Repair

Extend branch Re Line with additional stent

Solution:

- If can re enter branch then reline
- If not snare and remove stent, leave in sac and then Re line

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Conclusions

- Endoleaks primary reason for re-intervention
- Fenestrations have fewer leaks but less likely to resolve and require re-intervention
- Long term patient follow up will identify late endoleaks and allow intervention when required