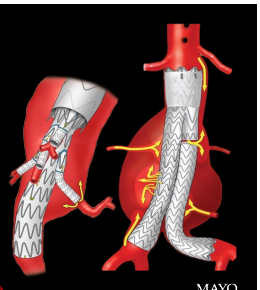
Update on optimal management of endoleaks: Key points of recent review

Bernardo C. Mendes MD
Associate Professor of Surgery
Advanced Endovascular Aortic Program
Division of Vascular and Endovascular Surgery
Mayo Clinic, Rochester MN



VEITH SYMPOSIUM 2024

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DISCLOSURES

All fees paid to Mayo Clinic

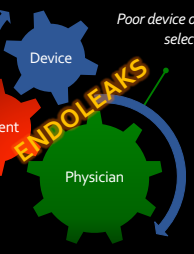
- WL Gore, Cook Medical
  - Research funding, consulting
- Cook Medical, Medtronic
  - Aortic advisory board
- Artivion
  - Consulting

EVAR FAILURE

Inadequate fixation
Migration
Integrity issues
Fractures
Fabric tears

Poor device or treatment selection

Inadequate neck
Angulation
Thrombus, calcium
Tortuosity
Occlusive Disease
Progression of disease



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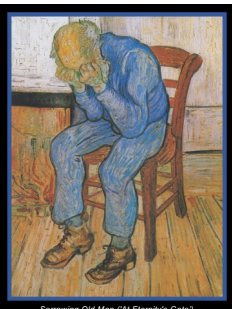
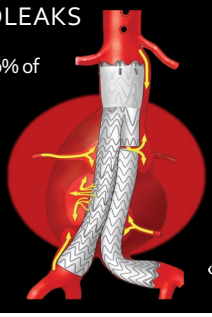


Sorrowing Old Man ('At Eternity's Gate')
Vincent Van Gogh 1890
Kroller-Muller Museum, Otterlo, Netherlands

ENDOLEAKS

Up to 30% of EVARS



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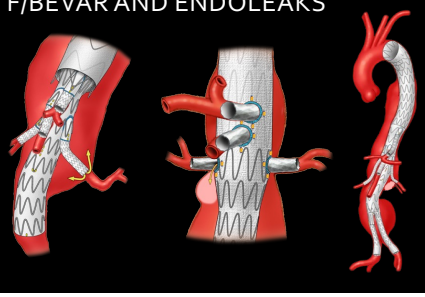
F/BEVAR AND ENDOLEAKS

40-50% of F/BEVARS



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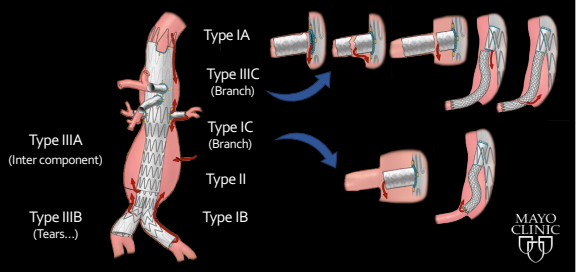
ENDOLEAK CLASSIFICATION



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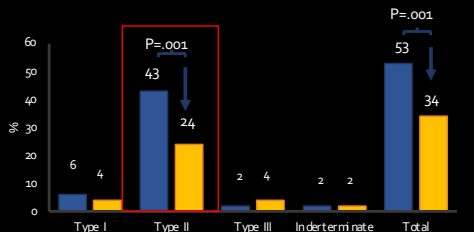
Secondary interventions after fenestrated/branched aneurysm repairs are common and nondetrimental to long-term survival

Sara L. Zettervall, MD, MPH,[a] Emanuel R. Tenorio, MD, PhD,[b] Andres Schanzer, MD,[c] Gustavo S. Oderich, MD,[b] Carlos H. Timaran, MD,[d] Darren B. Schneider, MD,[e] Matthew Eagleton, MD,[f] Mark A. Farber, MD,[g] Warren J. Gasper, MD,[h] Adam W. Beck, MD,[i] and Matthew P. Sweet, MD, MS,[a] on behalf of the U.S. Fenestrated and Branched Aortic Research Consortium,[a] *Seattle, Wash; Houston and Dallas, Tex; Worcester and Boston, Mass; Philadelphia, Pa; Chapel Hill, NC; San Francisco, Calif; and Birmingham, Ala*

- 1681 patients
- 385 (23%) had reinterventions
  - 101 (26%) more than one reintervention
  - Higher rates of aortic dissection
- 57% due to endoleaks
- 10% stenosis / occlusions

Zettervall S et al (ARC) JVS 2022

ENDOLEAKS AND CHRONIC DISSECTION



Tenorio E et al (ARC) JVS 2020

JAMA Surgery | Review

Management of Endoleaks After Elective Infrarenal Aortic Endovascular Aneurysm Repair
A Review

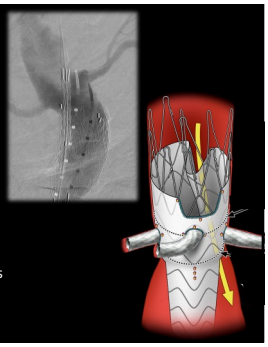
Sebastian Cifuentes, MD; Bernardo C. Mendes, MD; Armin Tabiei, MS; Salvatore T. Scali, MD; Gustavo S. Oderich, MD; Randall R. DeMartino, MD, MS

- Review of articles 2002-2022
- Summary of current evidence
- Not a lot of news… but some common sense

Cifuentes S et al JAMA Surg 2023

TYPE I ENDOLEAKS

- Higher risk of rupture - 4-8% in two years
- Primarily related to the anatomy at time of index repair
- Treatment is primarily endovascular
  - Balloon
  - Cuffs
  - Fenestrated conversion
  - Endoanchors
  - Coil/glue
  - Challenging for previous F/BEVAR grafts
  - Explantation



Immediate type Ia endoleak

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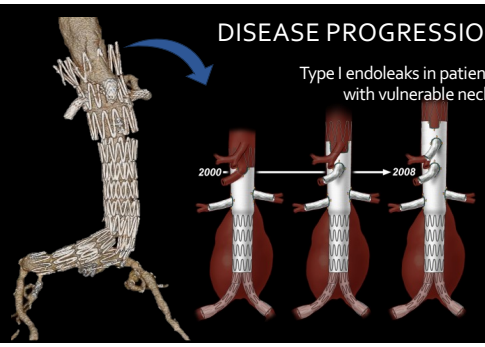
Late type Ia endoleak

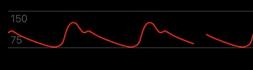
DISEASE PROGRESSION

Type I endoleaks in patients with vulnerable necks

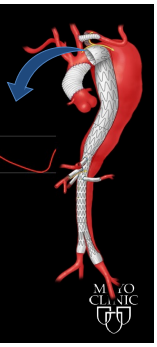


IMMEDIATE TYPE I ENDOLEAKS

- Concern for maintenance of high arterial pressure in the aneurysm sac



- Translating, in theory, into similar or increased risk of aneurysm rupture



2009…

SVS practice guidelines for the care of patients with an abdominal aortic aneurysm: Executive summary

Elliot L. Chaikof, MD, PhD,[a] David C. Brewster, MD,[b] Ronald L. Dalman, MD,[c] Michel S. Makaroun, MD,[d] Karl A. Illig, MD,[e] Gregorio A. Sicard, MD,[f] Carlos H. Timaran, MD,[g] Gilbert R. Upchurch Jr, MD,[h] and Frank J. Veith, MD,[i] *Atlanta, Ga; Boston, Mass; Palo Alto, Calif; Pittsburgh, Pa; Rochester, NY; St. Louis, Mo; Dallas, Tex; Ann Arbor, Mich; and Cleveland, Ohio*

Type I endoleak occurs in the absence or loss of complete sealing at the proximal (Type 1A) or distal (Type 1B) end of the stent graft. Type I endoleak is associated with significant pressure elevation in the sac and has been linked to a continued risk of rupture. Every attempt should be made to resolve Type I endoleaks noted at the time of EVAR before the patient leaves the intervention suite. On occasion, small persistent Type I endoleaks may be observed and if endovascular intervention has been unsuccessful, the only alternative is surgical conversion.

Type I endoleaks should be treated.

Level of recommendation:	Strong
Quality of evidence:	High

2018…

The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm

Elliot L. Chaikof, MD, PhD,[a] Ronald L. Dalman, MD,[b] Mark K. Eskandari, MD,[c] Benjamin M. Jackson, MD,[d] W. Anthony Lee, MD,[e] M. Ashraf Mansour, MD,[f] Tara M. Mastracci, MD,[g] Matthew Mell, MD,[b] M. Hassan Murad, MD, MPH,[h] Louis L. Nguyen, MD, MBA, MPH,[i] Gustavo S. Oderich, MD,[j] Madhukar S. Patel, MD, MBA, ScM,[k,l] Marc L. Schermerhorn, MD, MPH,[a] *and* Benjamin W. Starnes, MD,[i] *Boston, Mass; Palo Alto, Calif; Chicago, Ill; Philadelphia, Pa; Boca Raton, Fla; Grand Rapids, Mich; London, United Kingdom; Rochester, Minn; and Seattle, Wash*

Whereas a small endoleak may seal and can be observed, it is preferable that when a type I endoleak is identified at the time of repair, every attempt should be made to treat it before the conclusion of the procedure. Balloon molding of the proximal seal zone, placement of a proximal cuff, and endostaples have all been used with varying degrees of success.[643] Endostaples may reduce the risk of endograft migration and a type IA endoleak, but long-term data are limited.[643,644]

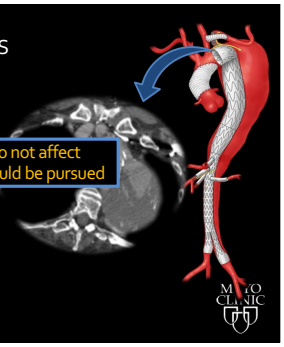
Other options for type IA endoleak treatment include embolization with coils or glue,[645,646] proximal extension with a chimney approach,[376] and conversion to a fenestrated endograft.[370] A type IB endoleak is treated with distal extension of the iliac limb if repeated angioplasty fails to eliminate the endoleak. It may be necessary to extend the endograft to the external iliac artery with coil occlusion of the HA. Conversion to open repair should be considered in the presence of a persistent type IA endoleak.[647]

We recommend treatment of type I endoleaks.	
Level of recommendation	1 (Strong)
Quality of evidence	B (Moderate)

IMMEDIATE TYPE I ENDOLEAKS

- Direct therapy is advised for type Ia endoleaks detected on completion angiogram
- Additional interventional procedures often challenging or not possible
- Open conversion highly morbid
- Fenestrated conversion technically demanding

Therapies that do not affect definitive repair should be pursued



Select early type IA endoleaks after endovascular aneurysm repair will resolve without secondary intervention

Thomas F. X. O'Donnell, MD, Michael R. Corey, MD, Sarah E. Deery, MD, Gregory Tsougranis, BS, Rohit Maruthi, BS, W. Darrin Clouse, MD, Richard P. Cambria, MD, *and* Mark F. Conrad, MD, MMSc, *Boston, Mass*

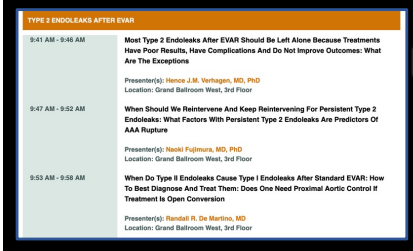
J Vasc Surg 2018

1484 EVAR patients

- 122 patients (8%) with type Ia endoleak
  - Balloon, cuff, Palmaz stent or endoanchors
- 43 patients (35%) had persistent endoleaks
  - At 1 month, 16 (13%) persisted
  - At 1 year, 6 (6%) persisted
- 3 ruptures (2.4%)
- Overall survival similar

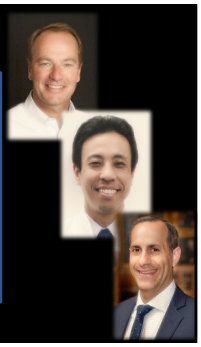
Extensive neck calcification
Only independent predictor of persistent type Ia endoleak

TYPE II ENDOLEAKS

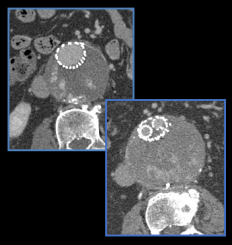


TYPE 2 ENDOLEAKS AFTER EVAR

9:41 AM - 9:46 AM	**Most Type 2 Endoleaks After EVAR Should Be Left Alone Because Treatments Have Poor Results, Have Complications And Do Not Improve Outcomes: What Are The Exceptions** Presenter(s): Hence J.M. Verhagen, MD, PhD Location: Grand Ballroom West, 3rd Floor
9:47 AM - 9:52 AM	**When Should We Reintervene And Keep Reintervening For Persistent Type 2 Endoleaks: What Factors With Persistent Type 2 Endoleaks Are Predictors Of AAA Rupture** Presenter(s): Naoki Fujimura, MD, PhD Location: Grand Ballroom West, 3rd Floor
9:53 AM - 9:58 AM	**When Do Type II Endoleaks Cause Type I Endoleaks After Standard EVAR: How To Best Diagnose And Treat Them: Does One Need Proximal Aortic Control If Treatment Is Open Conversion** Presenter(s): Randall R. De Martino, MD Location: Grand Ballroom West, 3rd Floor



TYPE II ENDOLEAKS



- Most common / 50% of endoleaks
- Less aggressive intervention
  - 5 → 10 mm growth
- More aggressive investigation
  - Rule out type I or III endoleaks
- Extremely rare to cause rupture or to progress to type I

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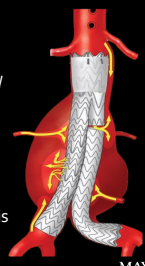
CONCLUSION



- Endoleaks continue to plague patients after EVAR / FBEVAR
- Management has become less aggressive over time…
- …but indications for reinterventions are still led by endoleaks
- Precise diagnosis of the endoleak type and source is the most critical aspect in reintervention planning and prevention of rupture

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