



Innovative Type 2 Endoleak Obliteration Via Collateral Networks: Technical Tips

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Techniques for Managing Type 2 Endoleaks

Vascular

The natural history of type 2 endoleaks after endovascular aneurysm repair justifies conservative management

Mark Agalar^{1,2}, Anand Wilkins^{1,2} and Bernard S Wilson^{1,2}

An Algorithm for Diagnosis and Treatment of Type II Endoleaks and Endostentum after Endovascular Aneurysm Repair

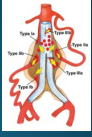
Brian G. Rubin, MD, Leopoldo Morillo, MD, and Juan C. Parodi, MD, St. Louis, MO

Diagnosis and Management of Type 2 Endoleaks After Endovascular Aneurysm Repair

Michael S. Green, MD, PhD, F. Eugene P. Caplan, MD, S. Wilson Thompson, MD, and Ronald A. Pearson, MD

Improved results using Onyx glue for the treatment of persistent type 2 endoleak after endovascular aneurysm repair

Christopher J. McCarthy, MD^{1,2}, Thomas S. Ross, MD^{1,2}, Mark E. Conroy, MD, PhD^{1,2}, Paul S. Cheng, MD^{1,2}, Richard C. Grottel, MD^{1,2}, and Christopher J. Bracco, MD^{1,2}, St. Louis and



Jan et al. J Vasc Med Biol

- 80% of T2ELs resolve spontaneously within the first 6 months following an EVAR
- some controversy regarding management
- Indication for intervention for Type 2 EL include rapid enlargement of the sac > 5 mm over 6 months.

Techniques for Managing Type 2 Endoleaks

- o **Endovascular**: embolization either with plugs, glue, coils or more recently liquid embolic agents of feeding branch with or without sac embolization
 - o Transarterial (feeding vessel + endoleak cavity embolization technique)
 - o Translumbar
 - o Transcaval
 - o Trans graft from within the stent graft
 - o Perigraft arterial sac embolization (PASE)
- o **Ultrasound-Guided** Direct Transabdominal Embolization
- o **Laparoscopic** or video-assisted mini-laparotomy with clipping of lumbar and/or inferior mesenteric
- o Conversion to **open procedure**

no one way to deal with T2 EL

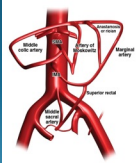
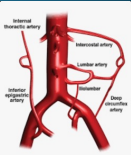
Trans-arterial Pathways to Endoleaks

SMA Pathways: middle colic, left colic, connect to the IMA

Pelvic and Iliac Pathways: Deep Circumflex Iliac Artery, Iliolumbar Artery, and the 4th lumbar artery

Sacral Pathways: lateral sacral and medial sacral approaches

CFA and Internal Iliac Connections: pathway from the CFA to the obturator artery, Internal Iliac Artery, and then branching into the Superior Gluteal Artery

Preoperative Planning

- **Contrast-enhanced spiral CT scan** (3-mm cuts, dynamic scanning), and obtaining delayed images 5 minutes after contrast administration to look for feeders
- **Contrast angiography** is the definitive test to establish the etiology of an endoleak
- Patient's anatomy may be more readily treated with one modality than another
- **Determine the characteristics of the leak**
 - *Single vessel* - serves as ingress and egress for the leak. Flow travels into the leak during systole, swirls around, and exits during diastole (i.e. IMA)
 - *Collateral endoleak* - more complex, flow enters and exits the leak from different vessels


Technique for Transarterial Embolization

- **IMA and lumbar endoleaks** - treated by retrograde transfemoral approach
 - For the **IMA, SMA is selectively cannulated** with 4- or 5-French catheter
 - 1.7 F 156 or 167 cm French micro catheter negotiated through **Riolan's arcade** to reach IMA origin
 - For **lumbar arteries**, 5- French catheter (cobra) is positioned at the iliolumbar origin
 - Feeding vessel is identified on DSA
 - Road map imaging and intra arterial vasodilators
 - 1.7 F microcatheter is used to catheterize as close to the lumbar artery as possible for subsequent embolization*

* Ozdemir BA


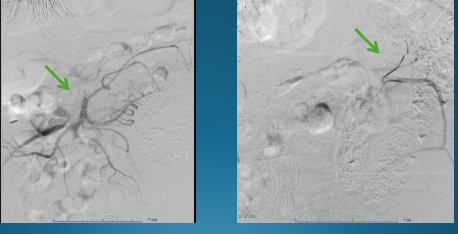
Choice of Embolization Agent

- Available Agents
 - Microcoils
 - glue
 - liquid embolic agents
 - plugs
 - Ethylene vinyl alcohol copolymer (Onyx)
 - Non-Onyx glue treatment included Gelfoam pellets combined with Thrombin, Bioglu, and/or n-butyl-2-cyanoacrylate
- Most important- embolic agent compatible with micro catheter



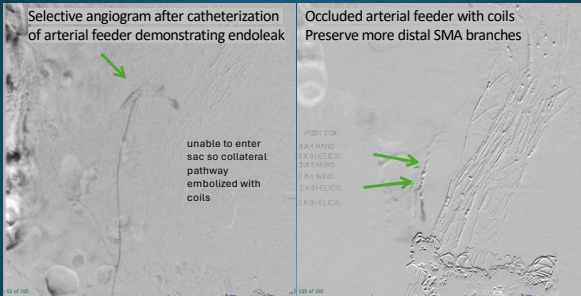
CASE

- 2009 EVAR AAA Talent 5.8 cm AAA
- 2019 Type II and IB endoleak - sac enlargement from 5.2 to 6.9 cm over 1 year, Right Iliac extension, coil hypogastric
- 2021 EVAR of Visceral Aorta using a fenestrated endograft and 4 visceral artery endoprosthesis
- 2022 Repair of Type Ib and type II endoleak with coil embolization of the aortic sac/ left iliac limb extension using a cuff
- 2023 Type IIa endoleak repair (AAA Sac 8.7 x 10 cm)

SMA → IMA

CFA access → Destination sheath advanced up to the SMA stent graft
 C2 catheter to select the SMA → DSA angiogram
 Leftward proximal branch was identified - contributing collateral to the IMA
 Microcatheter and wire advanced to distal branch. DSA confirmed branch which extended up into the IMA into the sac



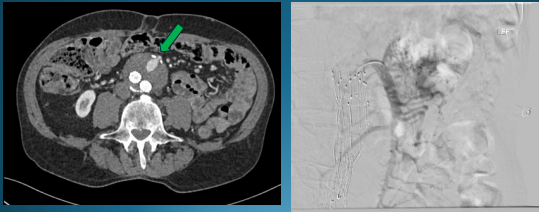
Selective angiogram after catheterization of arterial feeder demonstrating endoleak

unable to enter sac so collateral pathway embolized with coils

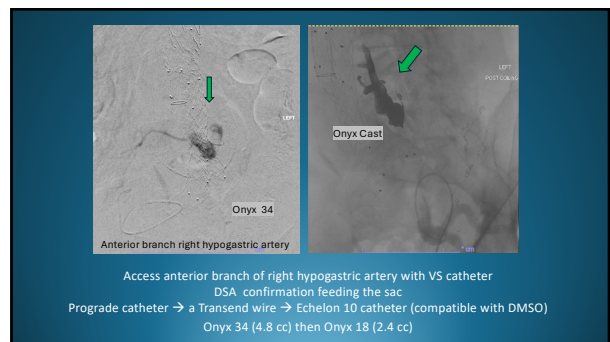
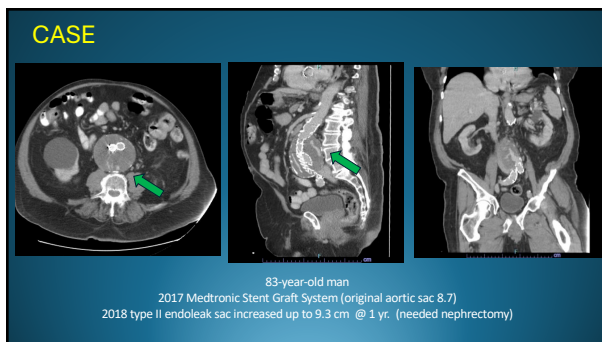
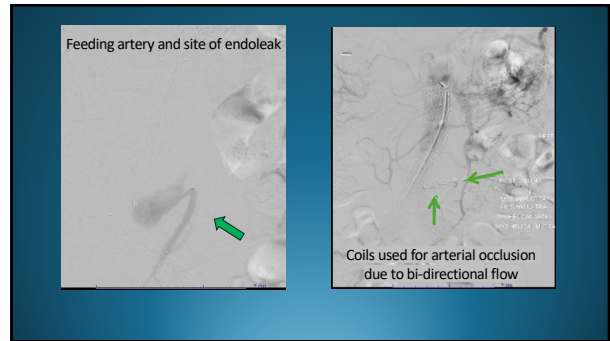
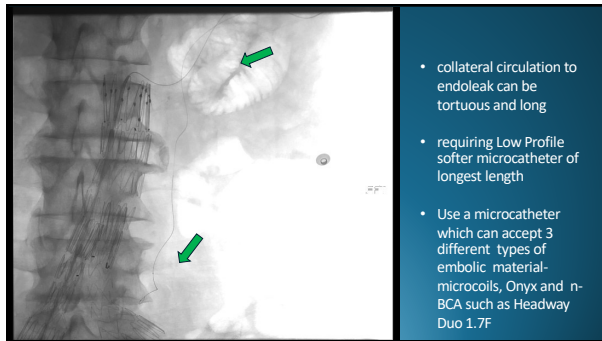
Occluded arterial feeder with coils
 Preserve more distal SMA branches

CASE

83 y. o. male
 2018 : EVAR AAA Zenith (5 cm) No leak
 2022: **Enlarging Aortic Sac:** 56 mm with Type 2 endoleak, IMA



C2 catheter was used to select the SMA
 DSA → identify proximal branch



Conclusions

- Careful assessment of the aortic sac and origin of the endoleak with dynamic CTA
- Treat other sources of endoleak before addressing Type 2.
- Most Type 2 Endoleaks can be managed conservatively
- Tailor the approach to the patient's anatomy
- Transarterial embolization with a variety of materials can be used safely
- Different approaches to T2EL are complementary
- Type 2 Endoleak obliteration has a limited success rate and repeat interventions are often necessary