

**Type I Endoleak After EVAR:  
Wait and See or What is Best  
Option?**

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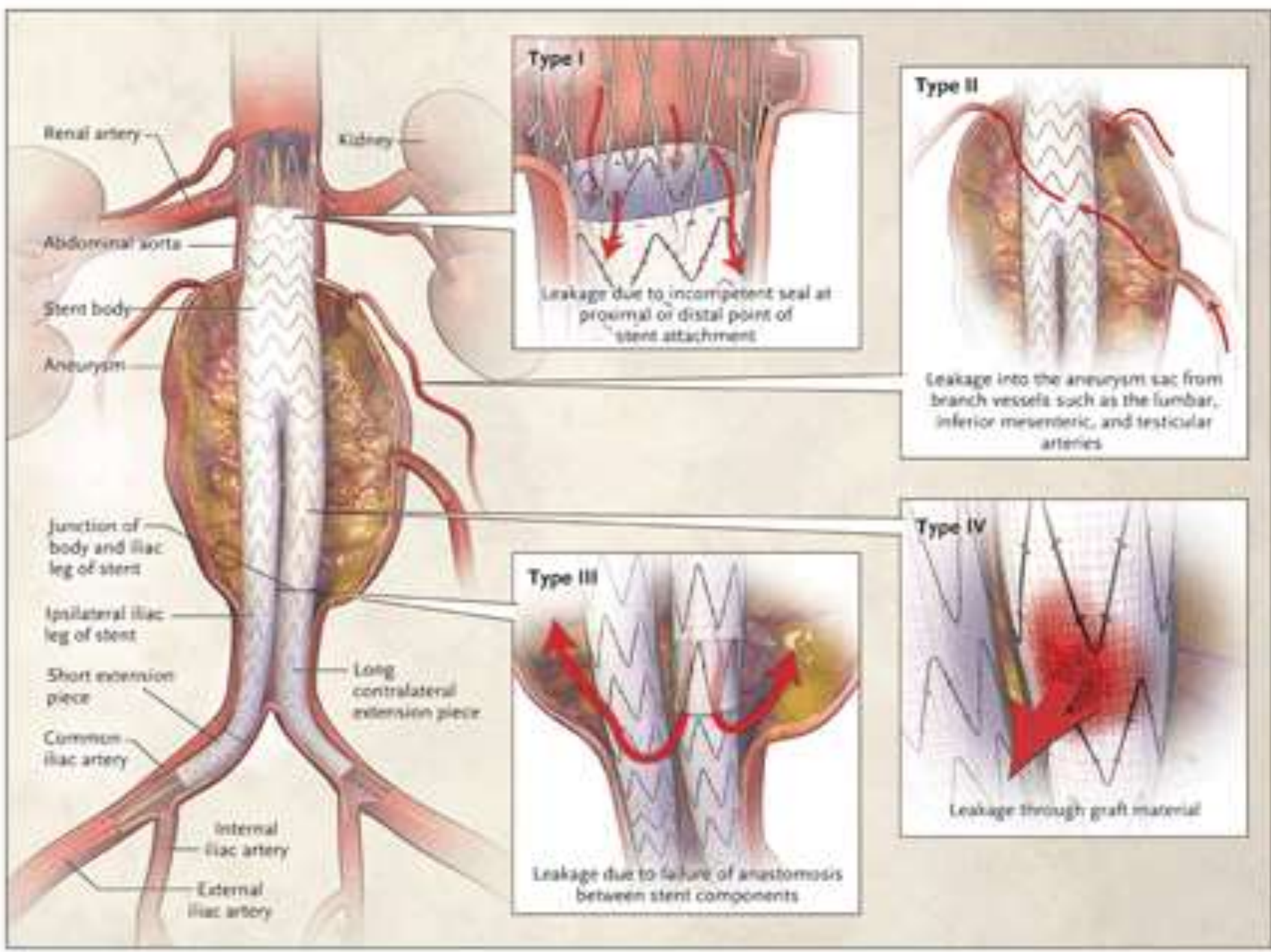
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# Endoleak

*“A condition associated with endoluminal vascular grafts defined by the persistence of blood flow outside the lumen of the endoluminal graft but within an aneurysm sac or adjacent vascular segment being treated by the graft.”*



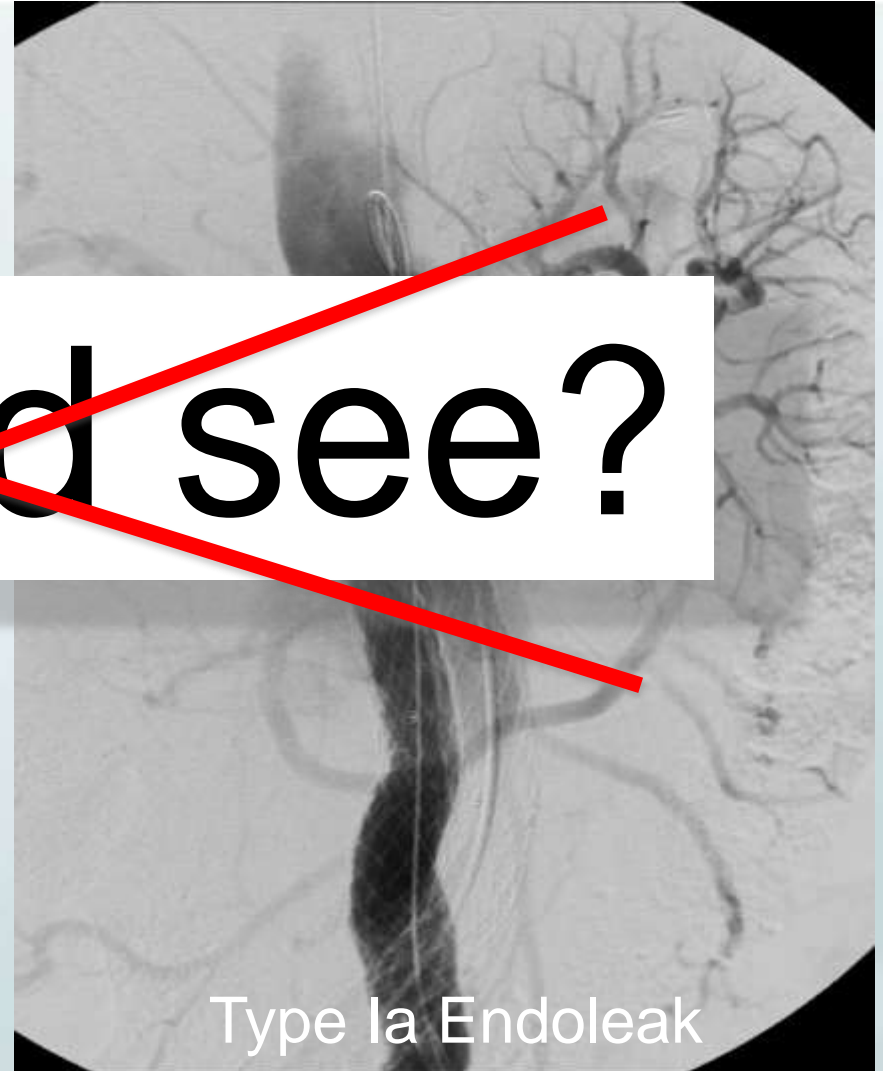


# Type I Endoleak

- Type Ia Endoleak –  
leak at the proximal  
s

~~Wait and see?~~

- Type Ib Endoleak –  
leak at the distal seal  
zone



# Type 1a Endoleaks

- Risk factors
- Intraop maneuvers
- Extensions
- Palmaz Stent
- Chimneys
- fEVAR
- Endoanchor
- Embolic agents
- Explant
- No intervention?

# Predictive Factors for Type I Endoleaks

Sampaio, et al. *Ann Vasc Surg* 2004;18:621-8.

- Type I leaks in 4% (8 / 202 patients)
- Associated with:
  - Neck calcification
  - AAA size
  - Proximal neck coverage
  - Neck angulation

# Neck Angulation Predicts Adverse Outcome

Sternberg, et al. 2002;35:482-6.

148 consecutive Endovascular AAA repairs

Adverse events associated with

neck angulation > 40 degrees:

Death

Acute conversion to open repair

Aneurysm expansion

Device migration

**Type I endoleak**

# Intraoperative Maneuvers

- Balloon 'molding'
- Proximal extension cuff
- Palmaz stent
- Endoanchors



# Balloon Molding

RAO 37°  
CRAN 10°  
FD 19.0 inch

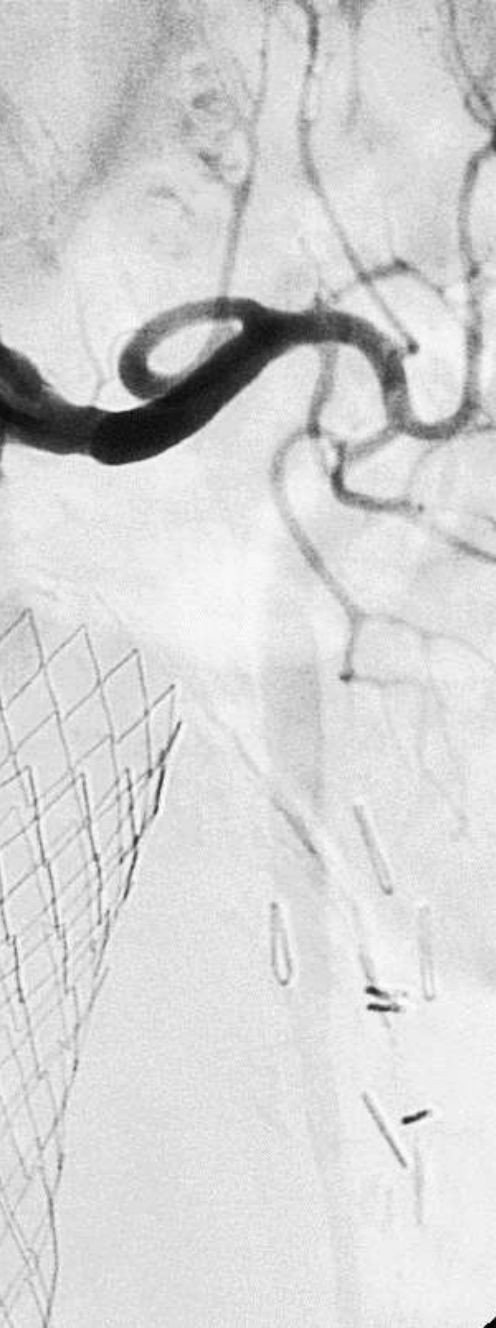
TYPE I ENDOLEAK



32mm CODA

0:00  
2:33  
10:50:10



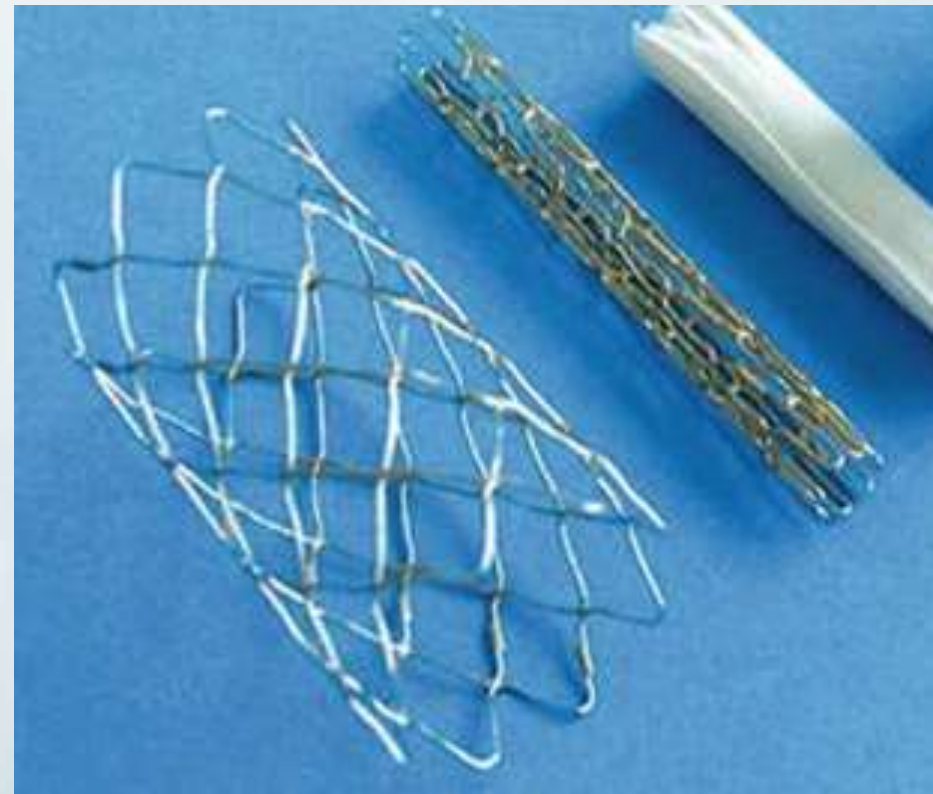




# Palmaz XL Stent



P3010, P4010, P5010





# Palmaz XL Stent Placement

Arthurs, et al. (CCF). *Ann Vasc Surg.* 211; 25: 120-6.

- 31 patients treated with Palmaz stents to treat Type 1 leak at initial EVAR
  
- No patient developed Type 1 leak in follow-up (53 months)
  
- No graft migration despite
  - Shortened neck length
  - Shortened seal zone



# Use of 'Parallel' Grafts to Salvage EVAR With Type 1 Leak

Donas, et al. 2015 *J Vasc Surg*



EVAR

(94%)

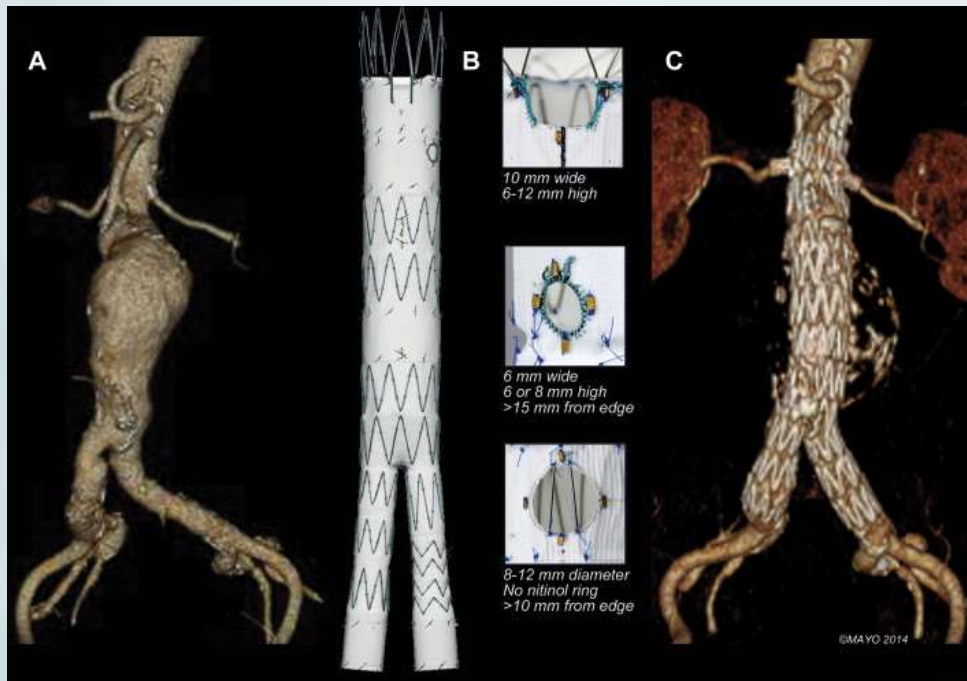
key grafts: 97%

100%

ment and rupture,  
zation

# Fenestrated EVAR for Type 1 Leaks?

- Limitations:
  - Neck length
  - Length of main body of EVAR device



# EndoAnchors



OD

# EndoAnchors in Type 1 Leaks

## ANCHOR Trial

Jordan, et al. 2015 (abstract at SAVS)

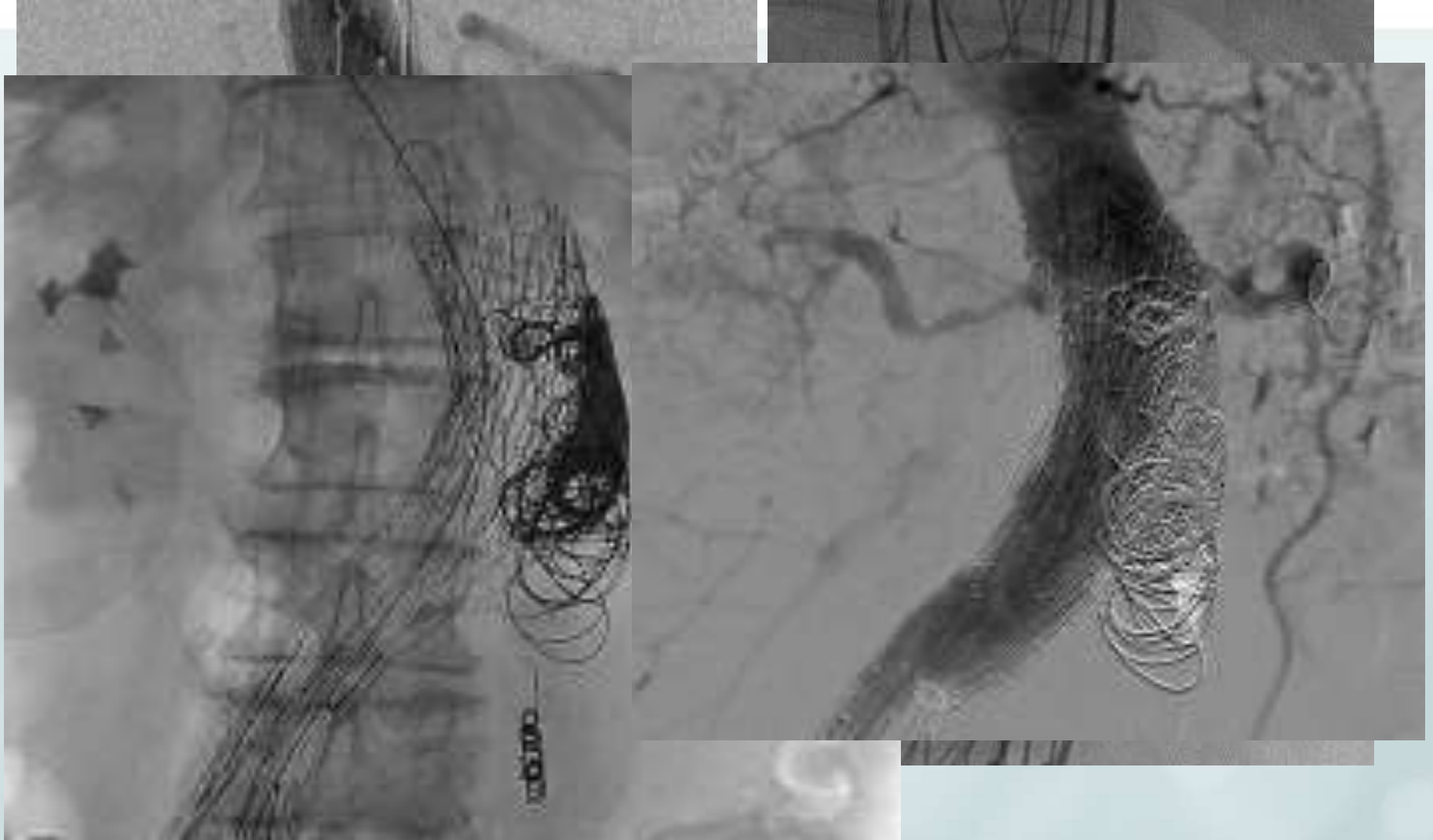
- ANCHOR trial
  - Aptus HeliFX EndoAnchors
- 201 patients enrolled
  - 109 at time of initial EVAR
  - 92 remote from initial EVAR
- 94.5% technical success
- Endoleaks identified in 13% on CT scan
  - ie, device / procedure failure
- Short neck was predictive of failure

# Coils/Glue for Type 1 Endoleaks

- Maldonado, et al. *J Vasc Surg.* 2003
- 13 patients treated with nBCA
  - N-butyl cyanoacrylate
- 1 pt. with embolization to IMA and subsequent colon ischemia
  - ‘Not felt to be related to embolic agent’
- 12 of 13 remained sealed at 6 months mean follow-up



# Coils/Glue for Type 1 Leaks



# Device Explant



# EVAR Explant

Turney, et al. (CCF) J Vasc Surg. 2014

- 100 patients
- Average 41 months from time of implant
- Overall mortality 17%
  - 10% for elective
  - 37% for nonelective
  - 57% for ruptured AAA
- Indications for explant:
  - Endoleak 82%
    - 40% Type 1
  - Infection 13%
  - Acute thrombosis 4%

# Can We Take a Wait and See Approach with Type Ia Endoleak?

# Observation of Type 1 Leaks

Goncalves, et al. Euro JVS. 2014

- 15 patients: observation of Type 1a leaks at completion angio
- 8/15 had resolved within one week
  - One pt ruptured 2 days post-op
- All resolved by 4 months
- No recurrences at 22 mos mean follow-up



# Outcomes of Persistent Type 1 Endoleak

Millen, et al. J Vasc Surg. 2015;61:1185-91.

- 209 consecutive patients in 2 years
- Completion angio: 21% (44) with Type 1
  - 33 (75%) had persistent Type 1 despite:
- Adjunctive maneuvers:
  - Moulding balloon: 27
  - Balloon + Palmaz stent: 1
  - Palmaz: 1
  - Cuff: 1

# Outcomes of Persistent Type 1 Endoleak

Millen, et al. J Vasc Surg. 2015;61:1185-91.

- 11 with intraop resolution: no recurrence
  - 27 months mean follow-up
- 33 with persistent Type 1
  - 94% resolved at first follow-up
  - One treated with Onyx
- Type 1 leaks may be observed in selected patients

# Summary

## Type 1a Endoleaks

- Avoidance if possible!
- Intra-op adjuncts can often solve the problem
- Coils, glue, EndoAnchors sometimes effective
- fEVAR, chEVAR can sometimes be helpful in very challenging anatomy where adjuncts fail
- Open conversion should only be needed rarely, and is a very morbid procedure

*Wait and see approach possible in some cases of small Type I endoleak at time of procedure*