23RD INTERNATIONAL EXPERTS SYMPOSIUM
CRITICAL ISSUES in aortic endografting 2019
LIVERPOOL UNITED KINGDOM MAY 23-24

Type 2 Endoleak: Is it really a problem? Is there a solution?

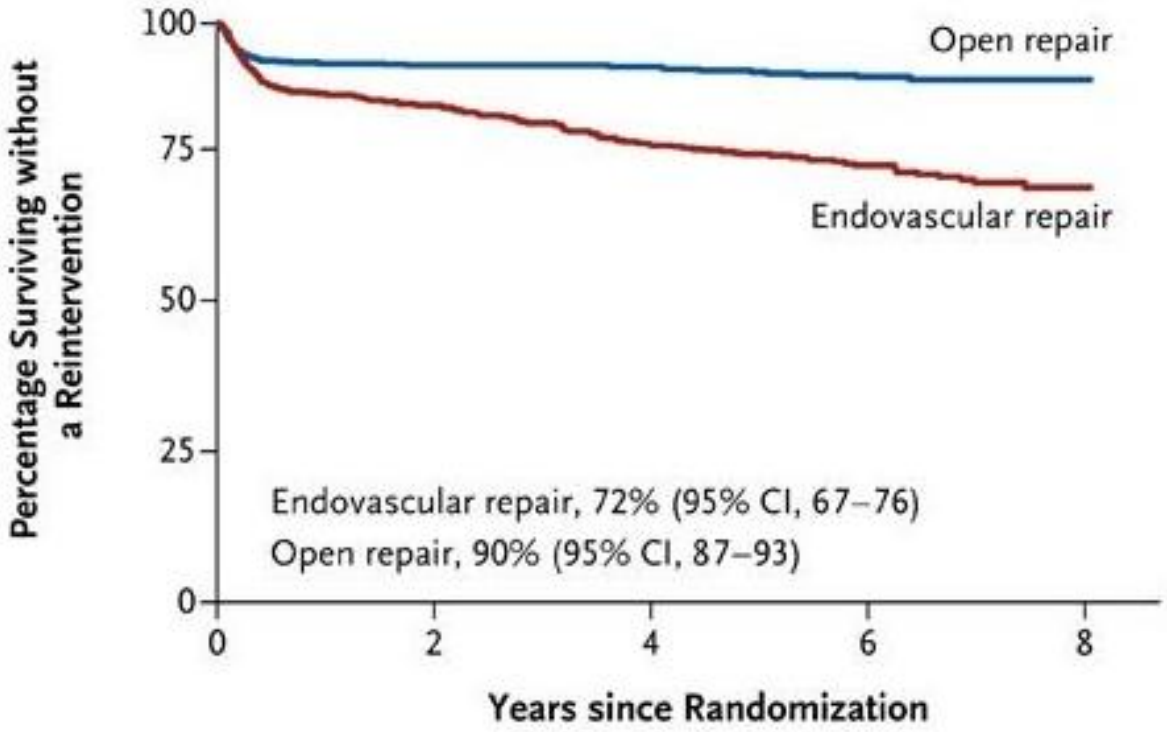
Shaneel Patel
Vascular SpR + Clinical Research Fellow, Liverpool

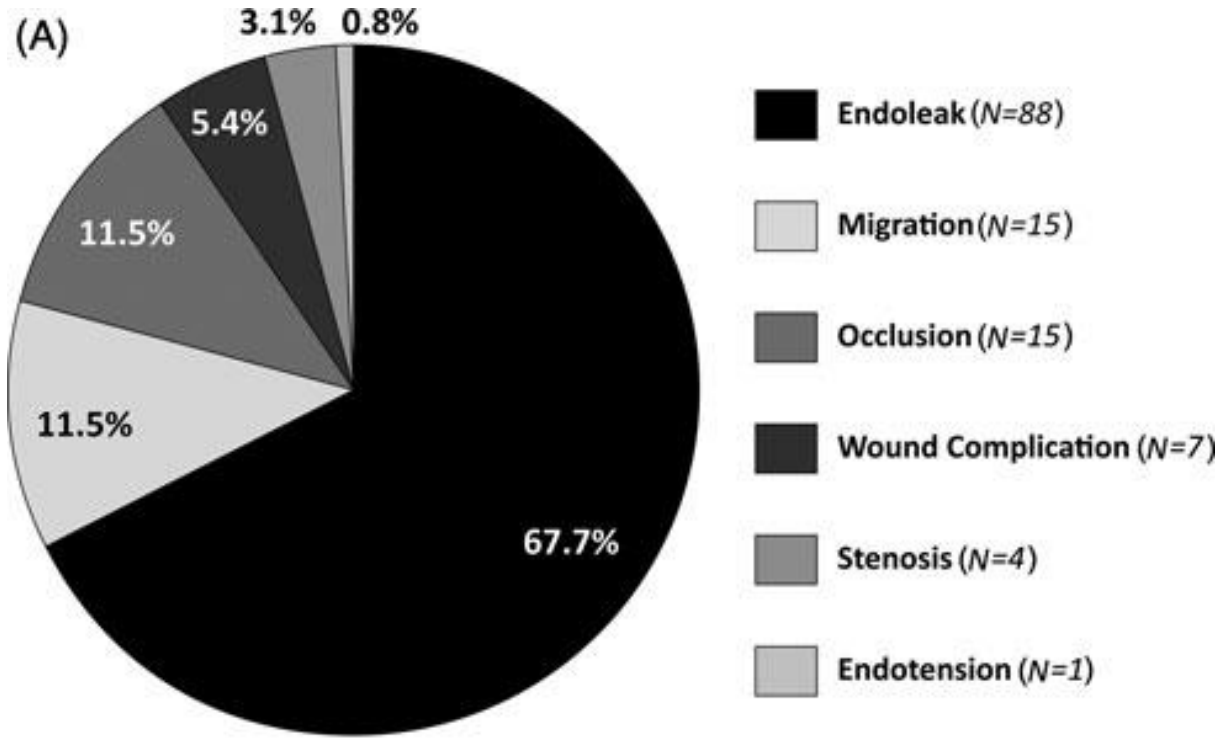
www.critical-issues-congress.com

Disclosures - Nil

EVAR has significant re-intervention rate

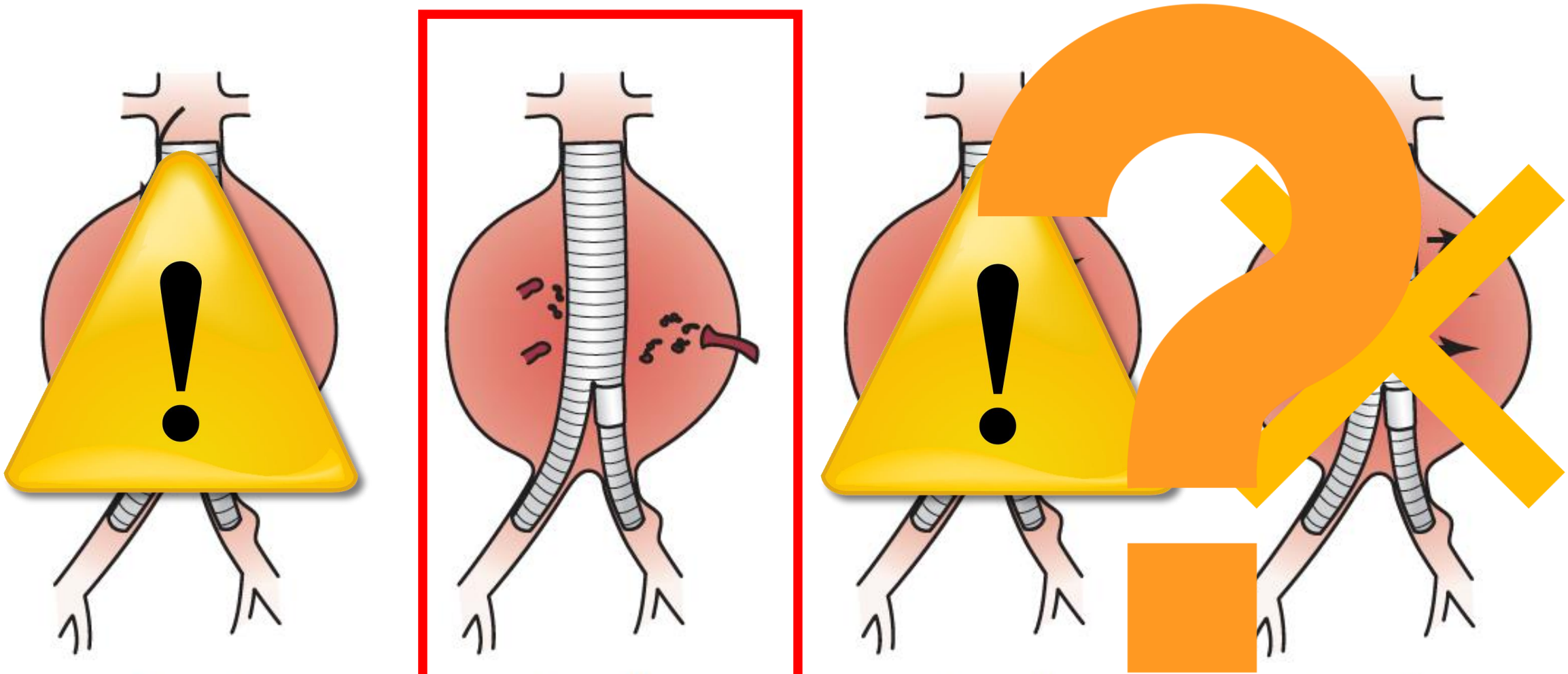
EVAR 1 midterm analysis, NEJM 2010





Causes of re-intervention after EVAR in a cohort of 558 patients

Al-Jubouri et al, Ann Surg 2013;258:652–658


Type I
Type II
Type III
Type IV

Critical Issues around Type II Endoleaks

How common are they now?

Are they really a problem?

Which interventions can we offer?

Do these interventions work?

Incidence of type II Endoleaks

UK EVAR randomised controlled trials: long-term follow-up and cost-effectiveness analysis
Patel et al, HTA Assessment Jan 2018; Vol.22;No.5

	No. of Type II Endoleaks (no of patients followed up)	%
EVAR - 1	146 (1252)	**11.7**
OVER	139 (881)	**15.8**
DREAM	73 (351)	**20.8**
ACE	77 (299)	**25.8**

Systematic review

Type II endoleak after endovascular aneurysm repair

D. A. Sidloff[1], P. W. Stather[1], E. Choke[1], M. J. Bown[1,2] and R. D. Sayers[1]

[1]Vascular Surgery Group, Department of Cardiovascular Sciences, University of Leicester, and [2]Leicester National Institute for Health Research Cardiovascular Biomedical Research Unit, Leicester, UK

Correspondence to: Mr D. A. Sidloff, Vascular Surgery Group, Department of Cardiovascular Sciences, University of Leicester, Leicester LE2 7LX, UK (e-mail: ds343@le.ac.uk)

British Journal of Surgery 2013; 100:1262-1270

32 studies published between 1994 and 2012

1515 T2ELs in 14,794 patients **= 10.2%**

35% resolve spontaneously

Editor's Choice — Type II Endoleak: Conservative Management Is a Safe Strategy CME

D.A. Sidloff [a,*], V. Gokani [a], P.W. Stather [a], E. Choke [a], M.J. Bown [b], R.D. Sayers [a]

[a] Vascular Surgery Group, Department of Cardiovascular Sciences, University of Leicester, Leicester, UK
[b] NIHR Leicester Cardiovascular Biomedical Research Unit, University of Leicester, Leicester, UK

EJVES 2014 48;4:391-399

Local series of consecutive EVARs

n = 904

1995 - 2013

Median follow-up 3.6 years (1.5-5.9)

Number of T2ELs = 175 (19%)

54% self-resolved within 6 months

Table 3. Type II endoleak distribution by device models.

Device	Type II endoleak (n = 175) No. (%)	No type II endoleak (n = 598) No. (%)	p
Cook Zenith	91 (52)	304 (51)	0.8
Cook Trifab	15 (8.6)	52 (8.7)	1.0
Medtronic endurant	18 (10)	54 (9)	0.6
Talent	18 (10)	57 (9.5)	0.6
Anaconda	2 (1)	14 (2.3)	0.5
Gore excluder	24 (14)	79 (13.2)	0.9
Edwards lifepath	2 (1)	2 (0.3)	0.2
Cook uni iliac	—	9 (>1)	—
Local device	—	5 (>1)	—

Multivariate analysis – No independent RFs for T2ELs

T2EL is NOT a graft-related problem,
it is an inherent failure of the EVAR concept

Critical Issues around Type II Endoleaks

How common are they now?

10-25% of all EVAR. Up to 50% self-resolve.

Are they really a problem?

Which interventions can we offer?

Do these interventions work?

Rate and Predictability of Graft Rupture After Endovascular and Open Abdominal Aortic Aneurysm Repair

Data From the EVAR Trials

Wyss et al, Annals of Surgery 2010, 252(5), 805-812

EVAR 1 and EVAR 2 cases combined

n=848

Mean f/u – 4.8yrs

27 ruptures after EVAR

"Previous complications" on CT increased the risk of rupture

adjusted HR 8.83 (95% CI 3.76-20.76) P<0.0001

"Previous complications" = Cluster of:

- Type 1 EL
- **Type 2 + aneurysm expansion (≥5mm)**
- Type 3 EL
- Migration
- Kinking

Is a Type II Endoleak after EVAR a Harbinger of Risk? Causes and Outcome of Open Conversion and Aneurysm Rupture during Follow-up

C. J. van Marrewijk, G. Fransen, R. J. F. Laheij, P. L. Harris,[2] J. Buth[*1] and for the EUROSTAR Collaborators

EJVES 2004; 24,128-137

EUROSTAR registry

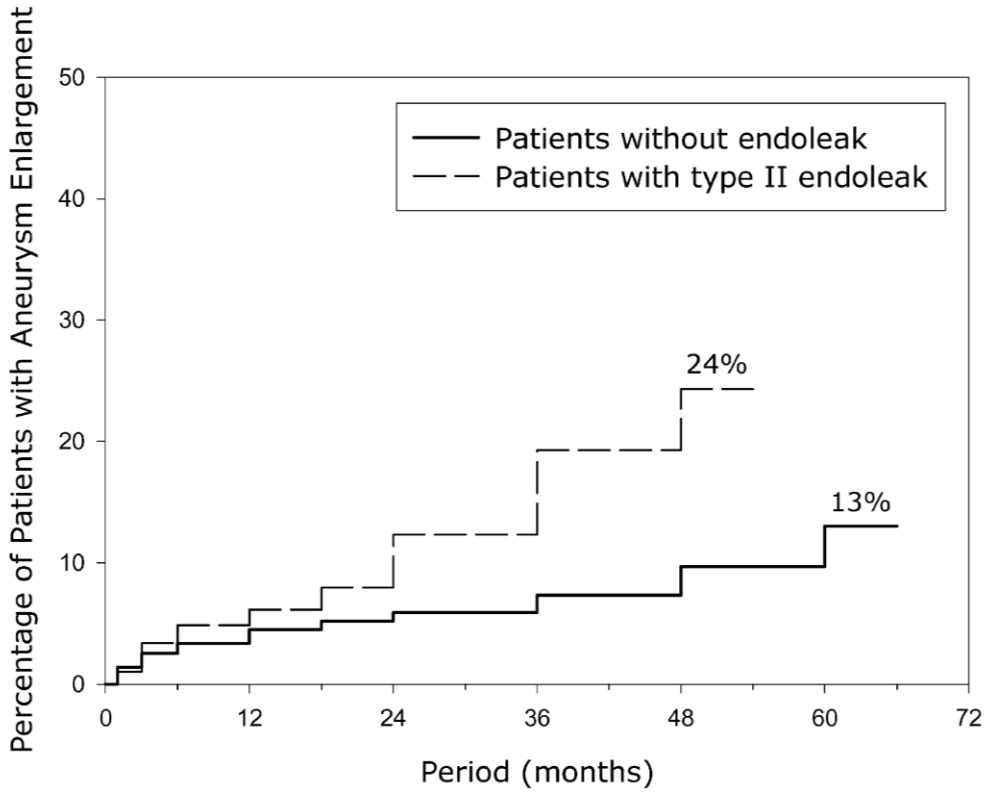
(114 European Institutions)

1996-2002

3595 EVARs

320 isolated T2EIs (9%)

1.2% rupture rate at 3 years



T2EIs associated with:
- Aneurysm expansion

T2ELs NOT associated with:
- Rupture
- Aneurysm-related mortality

Type II endoleak with or without intervention after endovascular aortic aneurysm repair does not change aneurysm-related outcomes despite sac growth

Joy Walker, MD,[a] Lue-Yen Tucker, BA,[b] Philip Goodney, MD,[c] Leah Candell, MD,[d] Hong Hua, MD,[e] Steven Okuhn, MD,[e] Bradley Hill, MD,[f] and Robert W. Chang, MD,[g] *San Francisco, Oakland, Santa Clara, and South San Francisco, Calif; and Lebanon, NH*

J Vasc Surg 2015, 62(3), 551-561

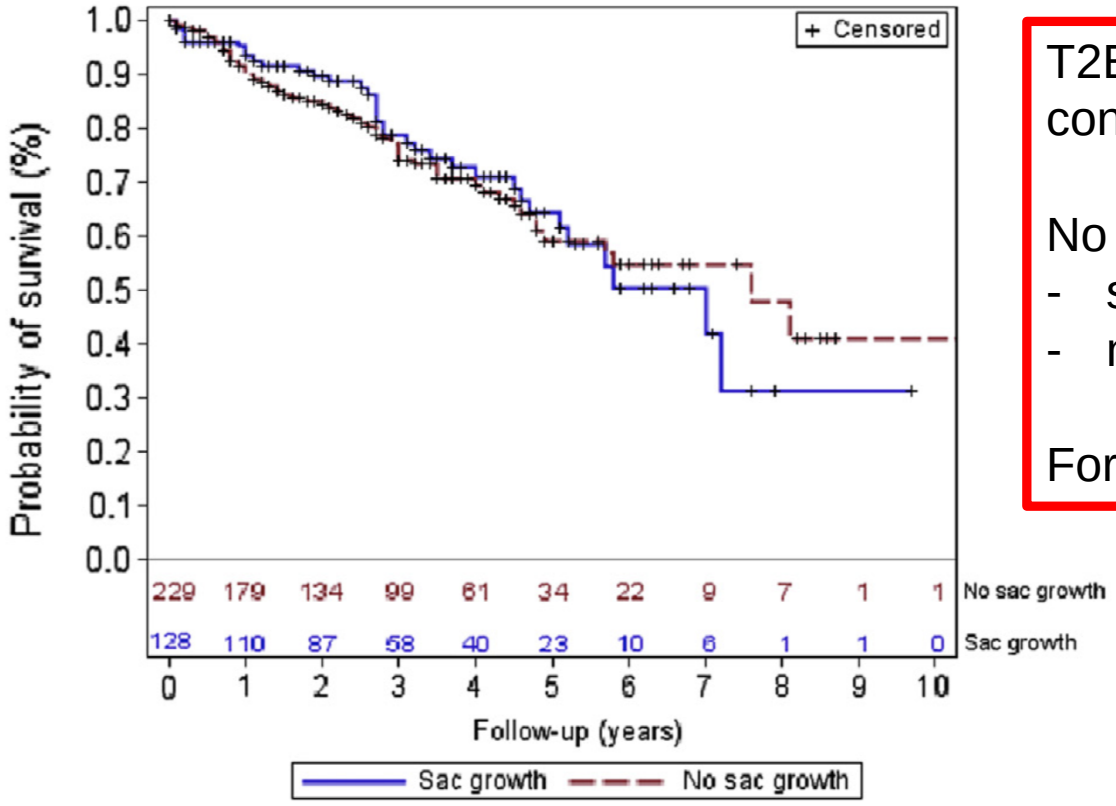
US Registry data

2000-2010

1736 patients, 3 yr f/u

474 T2ELs (27.3%)

0 ruptures with isolated T2EL



T2ELs treated conservatively:

No difference between:
- sac growth group
- no sac growth group

For overall survival

Systematic review

Type II endoleak after endovascular aneurysm repair

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British Journal of Surgery 2013; 100:1262-1270

32 studies published between 1994 and 2012

1515 T2ELs in 14,794 patients **= 10.2%**

35% resolve spontaneously

Rupture in cases of isolated type II EL <1%

(57% of these T2EL cases were associated with aneurysm expansion)

Aneurysm expansion is a poor marker of risk with Type II EL

Critical Issues around Type II Endoleaks

How common are they now?

10-25% of all EVAR. Up to 50% self-resolve.

Are they really a problem?

Largely no. Difficult to predict rupture.

Which interventions can we offer?

Do these interventions work?

Endovascular embolization

(coils/glue/thrombin)

Vessel ligation

Open or Lap

Open Conversion

Trans-Lumbar access (direct aneurysm puncture)

Endovascular embolization

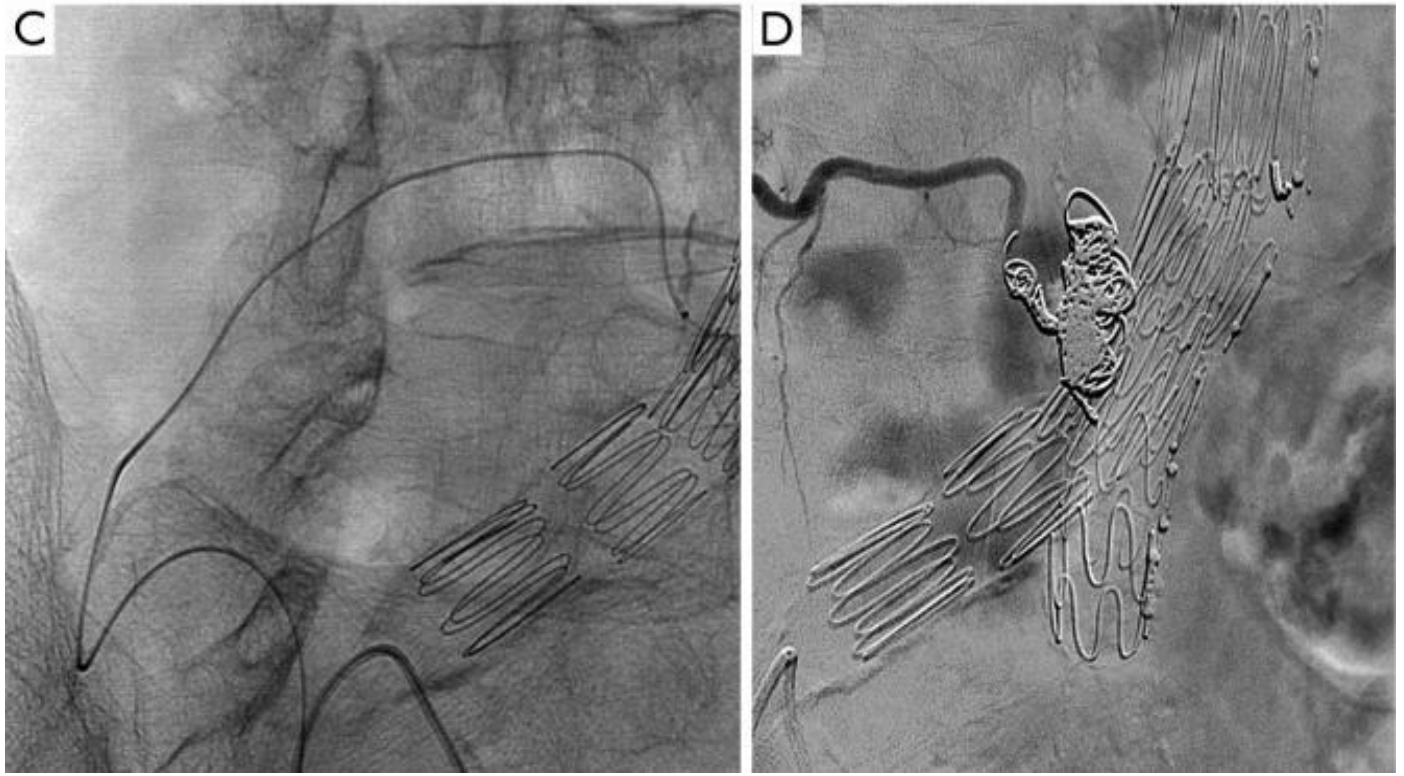
(coils/glue/thrombin)

Vessel ligation

Open or Lap

Open Conversion

Trans-arterial access (SMA/Internal Iliac)



Endovascular embolization

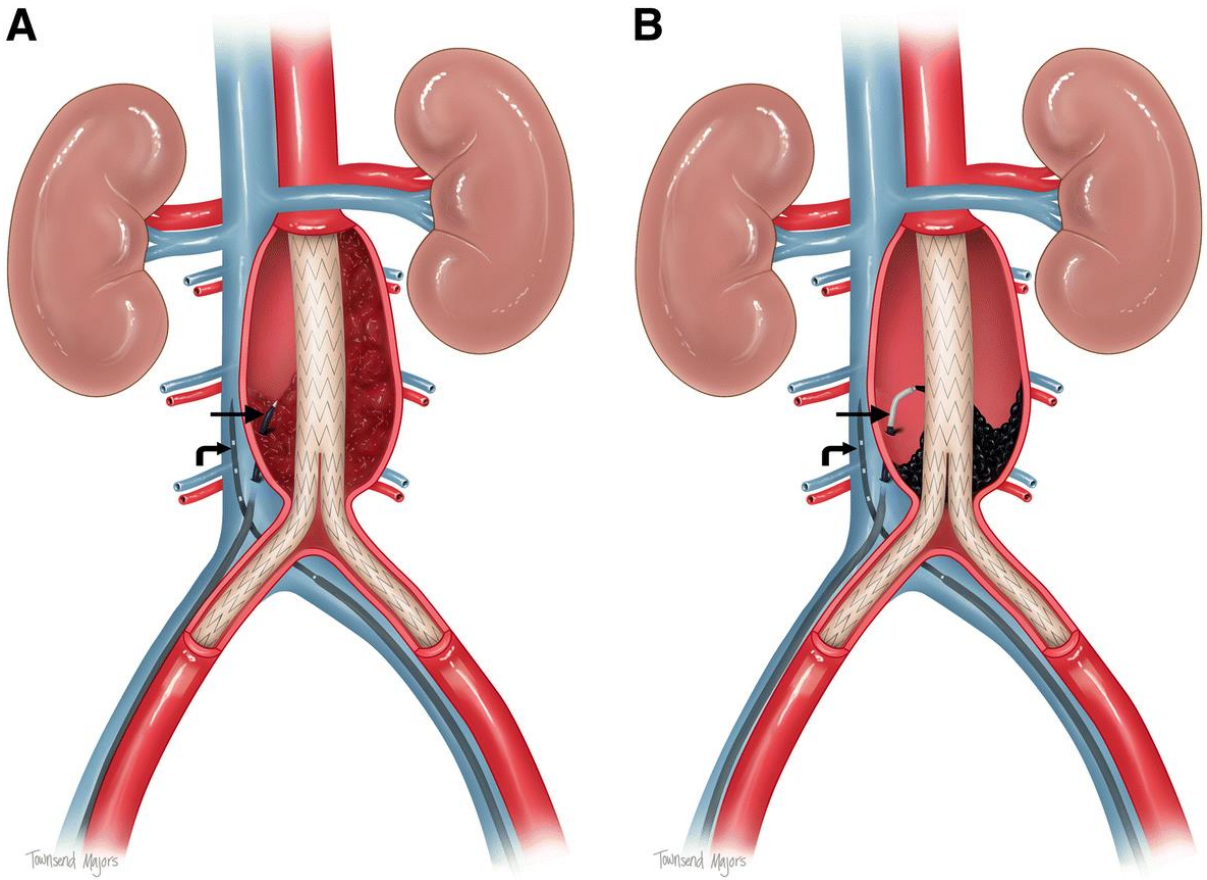
(coils/glue/thrombin)

Vessel ligation

Open or Lap

Open Conversion

Trans-caval access



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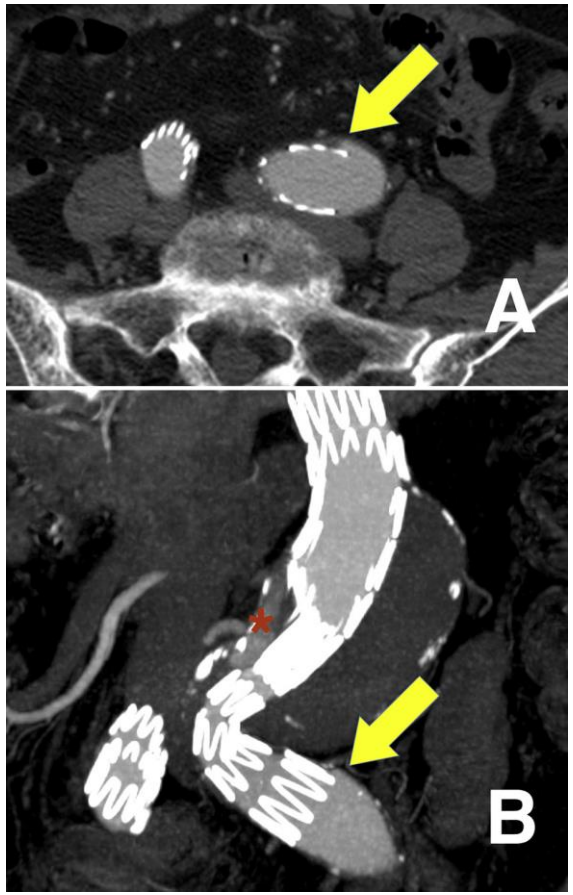
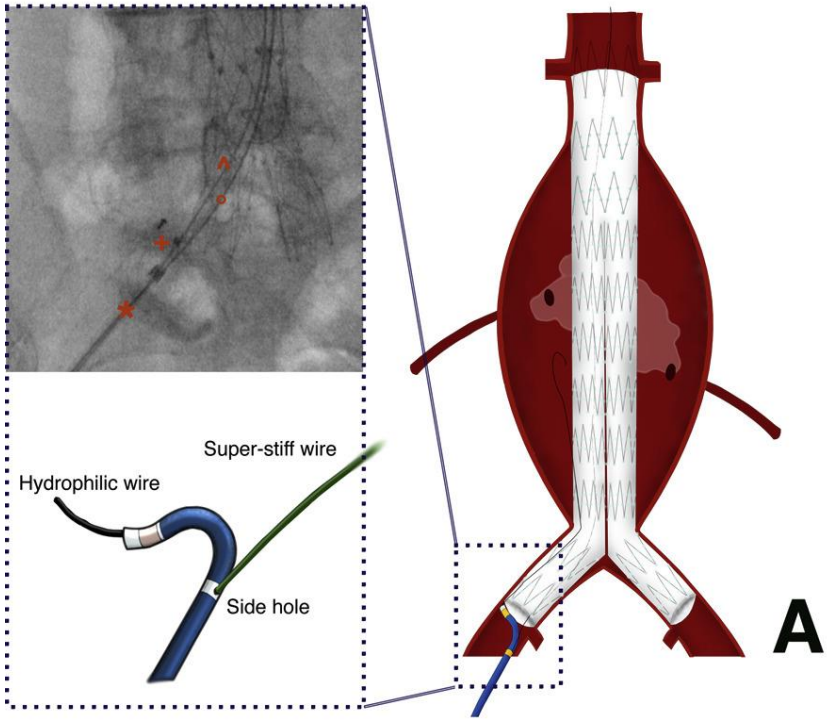
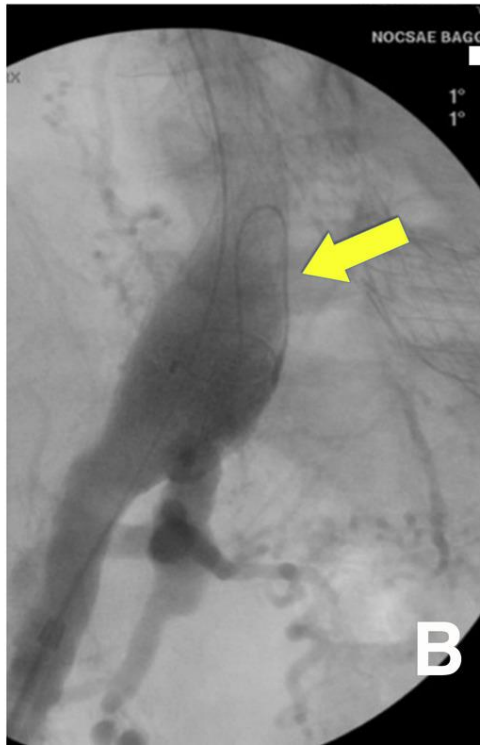


Trans-seal access





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Endovascular and Open.

Do these interventions work?

Type II endoleak with or without intervention after endovascular aortic aneurysm repair does not change aneurysm-related outcomes despite sac growth

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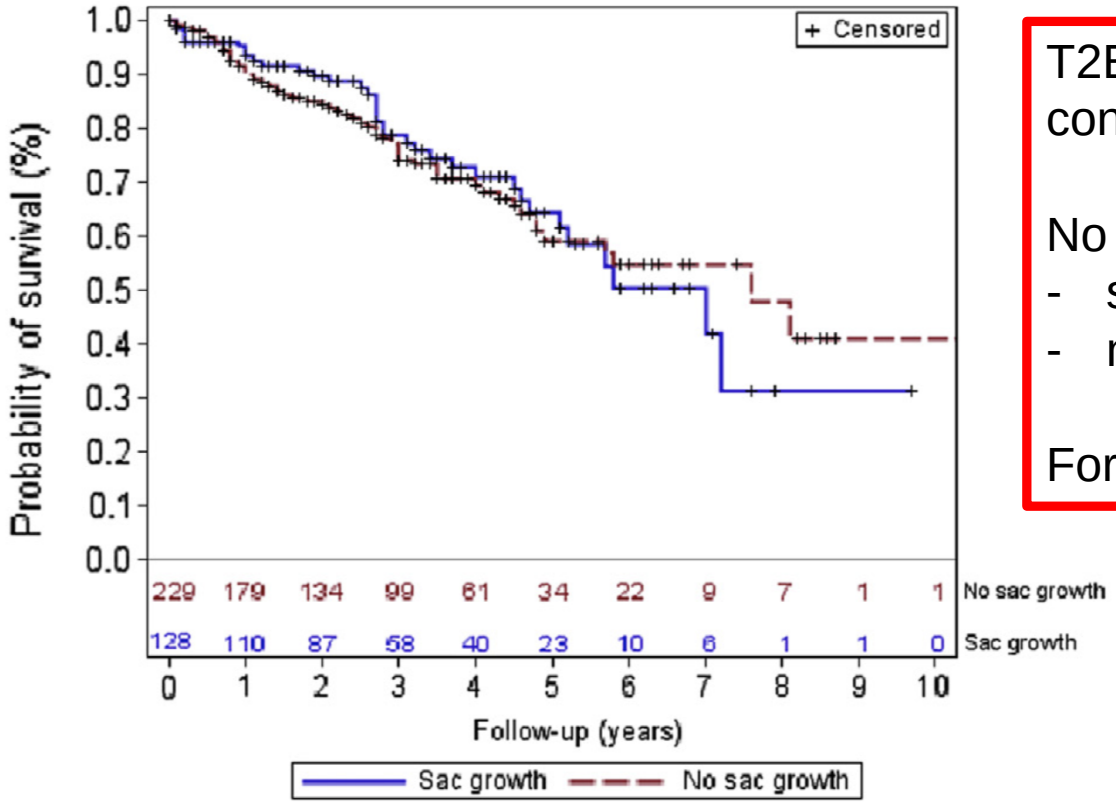

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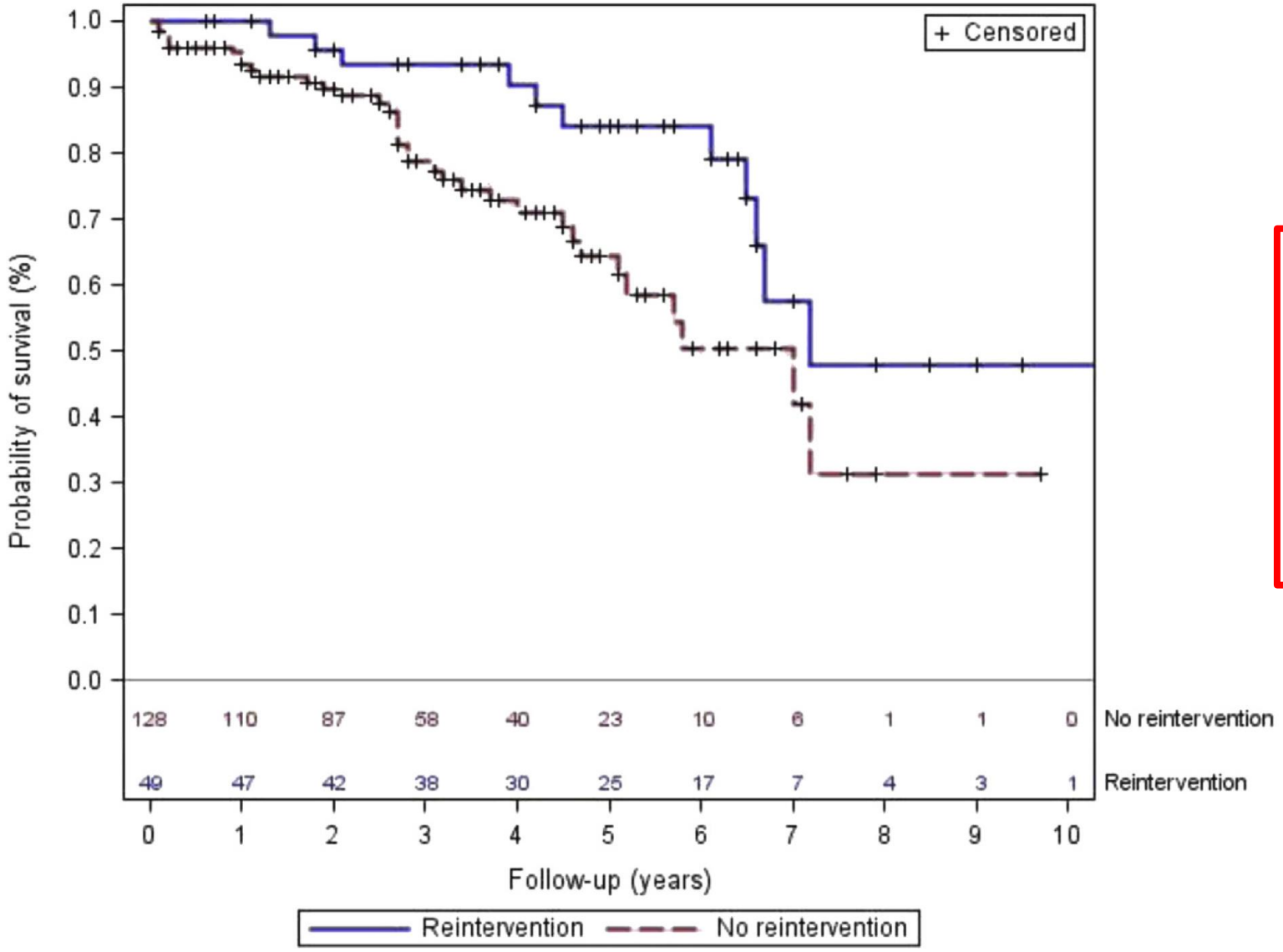

In patients with isolated T2EL and aneurysm size increase:

Reintervention group versus No reintervention:

- Equivalent survival (p=0.57)

J Vasc Surg 2015;62(3):551-561

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May 23 & 24 - LIVERPOOL - UNITED KINGDOM

Current Evidence Is Insufficient to Define an Optimal Threshold for Intervention in Isolated Type II Endoleak After Endovascular Aneurysm Repair

Alan Karthikesalingam, MA, MRCS[1]; Sri G. Thrumurthy, MRCS[1]; Dan Jackson, PhD[2]; Edward Choke, PhD, MRCS[3]; Robert D. Sayers, MD, FRCS[3]; Ian M. Loftus, MD, FRCS[1]; Matt M. Thompson, MD, FRCS[1]; and Peter J. Holt, PhD, FRCS[1]

JEVT 2012 19(2), 200-208

Meta analysis

10 studies and 231 isolated T2ELs

Grouped:

1) Conservative management, n=71

2) Selective treatment, n=104
(>5mm sac expansion, persistence beyond 6 months)

3) Aggressive n=56
(any T2EL)

No difference between groups for :

- Reducing sac expansion

- Increasing sac regression

Incidence of rupture 0%
(median f/u 30 months)

Systematic Review and Meta-Analysis of the Outcome of Treatment for Type II Endoleak Following Endovascular Aneurysm Repair

Klaas H.J. Ultee [a,f], Stefan Büttner [a,f], Roy Huurman [a], Frederico Bastos Gonçalves [a,b], Sanne E. Hoeks [c], Wichor M. Bramer [d], Marc L. Schermerhorn [e], Hence J.M. Verhagen [a,*]

[a] Department of Vascular Surgery, Erasmus MC University Medical Centre, Rotterdam, The Netherlands
[b] Hospital de Santa Marta, CHLC & NOVA Medical School, Lisbon, Portugal
[c] Department of Anaesthetics, Erasmus University Medical Centre, The Netherlands
[d] Medical Library, Erasmus MC, University Medical Centre, Rotterdam, The Netherlands
[e] Department of Surgery, Division of Vascular and Endovascular Surgery, Beth Israel Deaconess Medical Centre and Harvard Medical School, Boston, MA, USA

EJVES 2018 56(6), 794-807

59 studies

1073 patients with persistent type II EL who underwent intervention

Majority (73.8%) of cases were for aneurysm expansion

Presented outcomes of different treatments individually

Ultee et al EJVES 2018 56(6), 794-807

Intervention	Primary technical success (%)
Overall	87.9
Transarterial embolization	84.0
Translumbar embolization	98.7
Transcaval embolization	93.3
Ligation of vessels (Surgical)	98.1

Cases	Clinical success (%) – f/u range 6-46/12
Overall	68.4
As defined by decreasing/stable aneurysm size	78.4
As defined by no leak on scanning	67.5

Peri-procedural complication rate of 4%

AAA-related mortality after intervention for Type II Endoleak is 1.8%

Critical Issues around Type II Endoleaks

How common are they now?

10-25% of all EVAR. Up to 50% self-resolve.

Are they really a problem?

Largely no. Difficult to predict rupture.

Which interventions can we offer?

Endovascular and Open.

Do these interventions work?

Not very well, although currently we're not using relevant measures of success and we don't have long-term data.

Editor's Choice — European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms

Wanhainen et al 2019 EJVES 57,8-93

Recommendation 88

Re-intervention for Type II endoleak after endovascular abdominal aortic aneurysm repair should be considered in the presence of significant aneurysm growth (see Recommendation 87), primarily by endovascular means

Class	Level	References
IIa	C	[499]

THIS IS TOO AGGRESSIVE

Let's leave ALL isolated T2ELs with aneurysm expansion alone

(Closely monitor for Type I and III endoleaks)

Thank you