EVAR Patients On Anticoagulation Have Increased Mortality, Endoleaks, Sac Expansion And Reinterventions: From A Meta-Analysis Of >35,000 Patients

George Antoniou

Consultant Vascular Surgeon

Manchester University NHS Foundation Trust

No relationships with commercial companies.

Information presented in this lecture is based on evidence.

EVAR is commonly used:

- In the elderly
- In individuals with cardiovascular co-morbidities
- In individuals on anticoagulation treatment for other clinical conditions

- Number of individuals who take anticoagulation treatment has increased in recent years[1]
- Shift from traditional anticoagulation agents to newer direct oral anticoagulants[2]

1. Hutchens R et al. Antithrombotic Therapy in Atrial Fibrillation Management in Western Australia: Temporal Trends and Evidence-Treatment Gaps. Heart Lung Circ. 2021;30:955-962.
2. Kotecky A, et al. Current trends in the use of anticoagulant pharmacotherapy in the United Kingdom are changes on the horizon? Expert Opin Pharmacother. 2021;22:1061-1070.

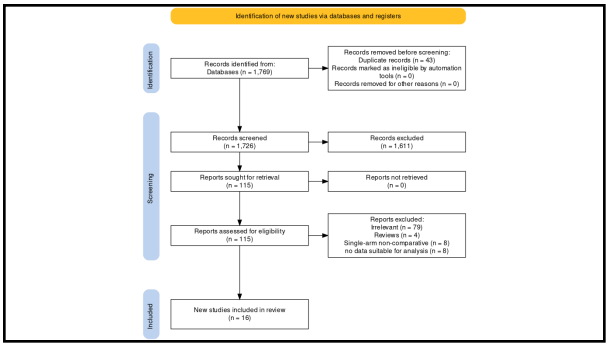
Hypothesis

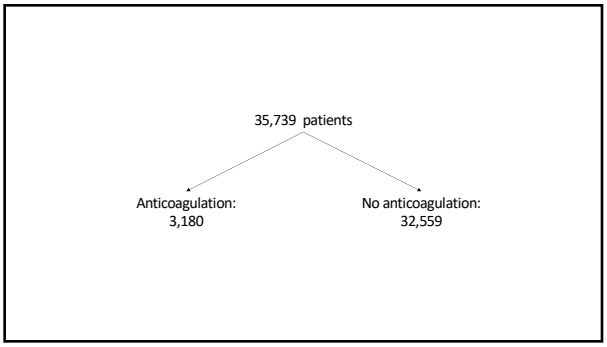
Individuals who undergo EVAR and are on anticoagulation may have:

- Increased incidence of endoleak
- Increased risk of sac expansion
- Increased rate of reintervention
- Increased rate of AAA rupture
- Increased rate of AAA-related mortality

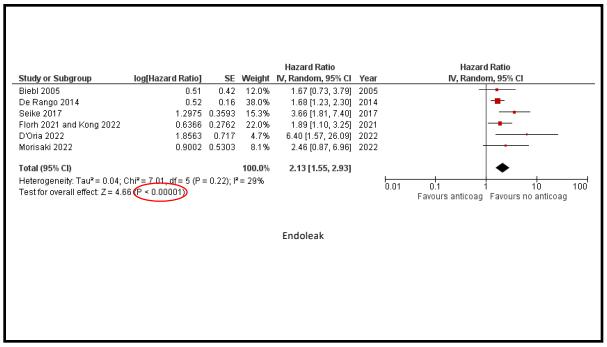
To test our hypothesis:

- Systematic review of the world literature
- Eligible studies reported comparative outcomes of standard EVAR in patients taking therapeutic anticoagulation versus those not on such treatment
- Time to event data meta-analysis

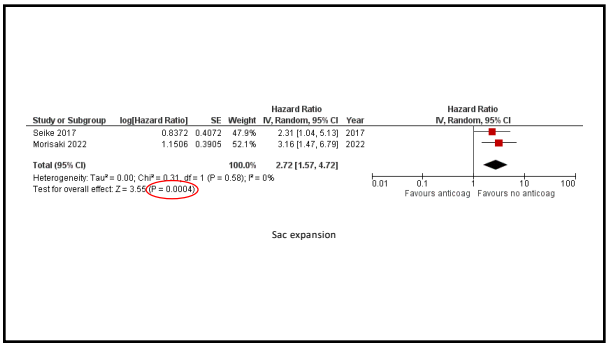




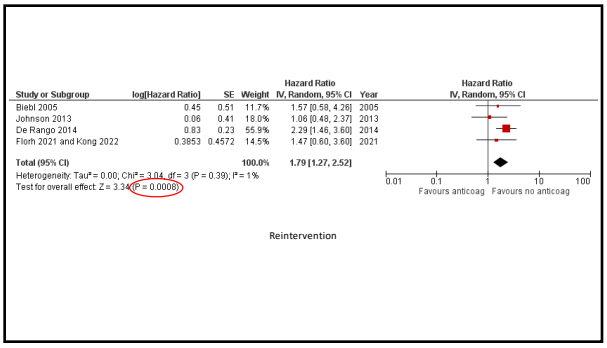
Author, journal, year	Country	Design	Anticoagulant agent	Recruitment period	No of patients (anticoagulation / control)	Follow-up
Fairman, J Vasc Surg, 2002	USA	Prospective	Warfarin	NR	36 / 196	Mean 18 months
Biebl, J Endovasc Ther, 2005	USA	Retrospective	Warfarin	1999-2003	21 / 161	Mean 16.3±12.6 months
Robadilla, J Vasc Surg, 2010	USA	Prospective	Warfarin	2000-2007	24 / 103	Mean 2.14 years
Abullarango, J Vasc Surg, 2010	USA	Retrospective	Warfarin	1999-2007	70 / 525	Median 34.8 months (range 6.4-121.2)
Johnson, J Vasc Surg, 2013	USA	Retrospective	Warfarin	2003-2011	68 / 295	Mean 29 months
De Rango, Eur J Vasc Endovasc Surg, 2014	Italy	Retrospective	VKA + Heparin	1997-2011	103 / 1,306	Mean 64.3±45.2 months
Wild, Ann Vasc Surg, 2014	UK	Retrospective	Warfarin	2006-2011	45 / 362	Median 48.5 months (range 14-85.2)
Lal, J Vasc Surg 2015	USA	Retrospective	Warfarin	2002-2008	42 / 397	Mean 6.2±2.4 years
Seike, Interact Cardio Vasc and Thor Surg, 2017	Japan	Retrospective	Warfarin	2007-2013	29 / 180	Mean 37±12 months
Marcos, J Vasc Surg, 2017	Spain	Prospective	NR	2003-2011	9 / 78	Mean 41.5 months
Kumar, Ann Vasc Surg, 2017	Australia	Retrospective	Warfarin	2009-2013	68 / 625	NR
Castelli, Rev Argent Cardiol, 2018	Argentina	Retrospective	Warfarin/Dabigatran	2009-2014	33 / 308	Median 16 months (range 3-33)
Flohr, J Vasc Surg, 2021	USA	Administrative database VQI	Warfarin + DOAC	2013-2019	2,303 / 27,480	12-months
D'Oria, Cardiovasc Path, 2022	Italy	Retrospective	Warfarin	2010-2013	12 / 76	Median 4.3 years (IQR 1.4-7.2)
Kong, J Vasc Surg, 2022	USA	Administrative database VQI	Warfarin + DOAC	2003-2017	301 / 301	Mean 1.12±0.63 years
Morisaki, J Vasc Interv Radiol, 2022	Japan	Retrospective	NR	2007-2019	16 / 166	Median 18 months



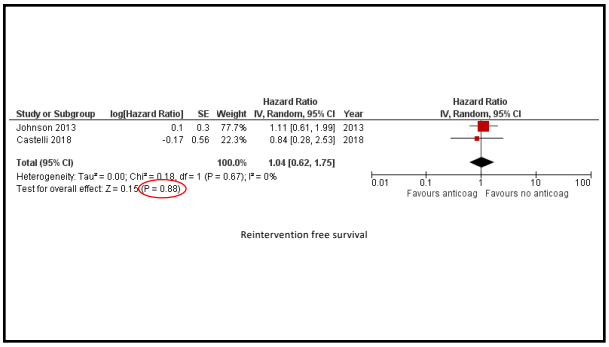
Endoleak



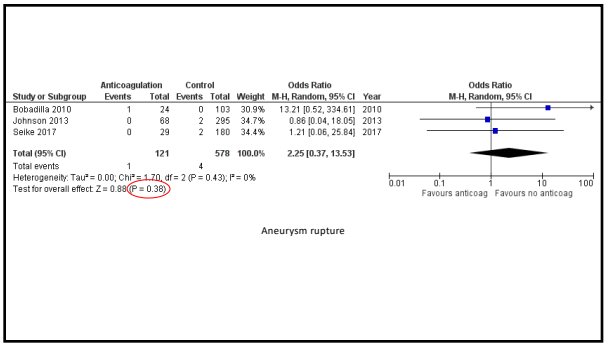
Sac expansion



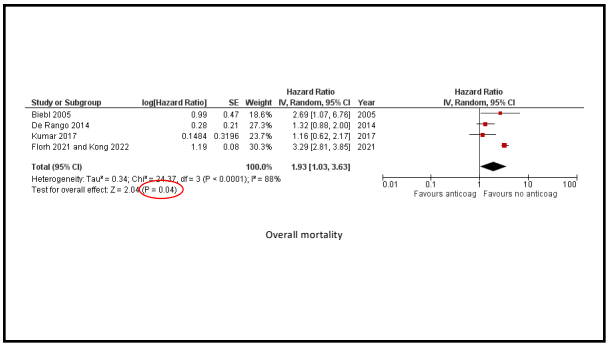
Reintervention



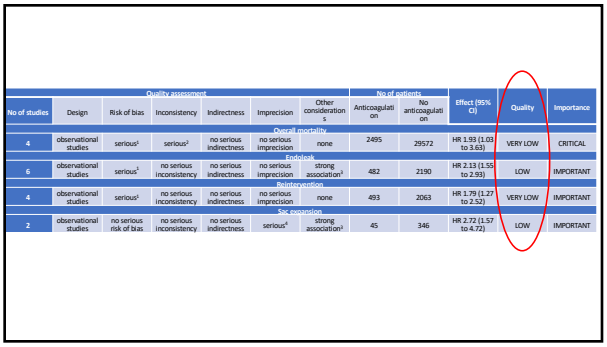
Reintervention free survival



Aneurysm rupture



Overall mortality



Quality assessment							No of patients		Effect (95% CI)	Quality	Importance
No of studies	Design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Anticoagulation	No anticoagulation			
Overall mortality											
4	observational studies	serious[1]	serious[2]	no serious indirectness	no serious imprecision	none	2495	29572	HR 1.93 (1.03 to 3.63)	VERY LOW	CRITICAL
Endoleak											
6	observational studies	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	strong association[3]	482	2190	HR 2.13 (1.55 to 2.93)	LOW	IMPORTANT
Reintervention											
4	observational studies	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	493	2063	HR 1.79 (1.27 to 2.52)	VERY LOW	IMPORTANT
Sac expansion											
2	observational studies	no serious risk of bias	no serious inconsistency	no serious indirectness	serious[4]	strong association[3]	45	346	HR 2.72 (1.57 to 4.72)	LOW	IMPORTANT

Take home messages

- Anticoagulation may be a poor prognostic factor after standard EVAR.
- Patients receiving anticoagulation treatment may have worse clinical outcomes than those not receiving such treatment.
- Implications in decision making and patient consenting.
- Intensified post-EVAR follow-up should be considered in patients on anticoagulation treatment.
- Anticoagulation should be included in research on risk prediction building and modelling.
- The effects of direct oral anticoagulants compared to other anticoagulant agents should also be the focus of future research.