Renal decline after aneurysm repair

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Disclosures

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General Electric: consultancy, trial steering committee

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TRAVEL, BURSARIES, AWARDS, PRIVATE GRANTS

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Contents

1) Acute Renal Injury (or AKI)

2) Long-term Renal Injury

EVAR & Acute Kidney Injury

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Incidence	
Incidence	**19%**
Mostly transient	**87%** → baseline
Primary risk factor	**low eGFR**

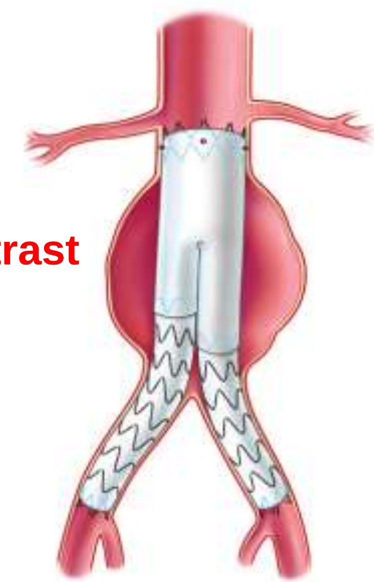
Saratzis et al. Ann Vasc Surg. 2016;31
Saratzis et al. EJVES 2016;51
Saratzis et al. CJASN 2015; 10

Implications	
Short term mortality	HR: **4.8** (95% CI: 2.3-5.6)
Long term mortality	HR: **2.4** (95% CI: 1.4-3.1)
Long term CV events	HR: **3.8** (95% CI: 2.8-5.1)

Saratzis et al. EJVES 2015;49
Saratzis et al. CJASN 2015;10
Saratzis et al. AJN 2016;15

Saratzis et al. Kidney International 2017

Contrast



Renal artery related complications:
Coverage of accessory renal arteries
Occlusion of orifice
Dissection or stenosis

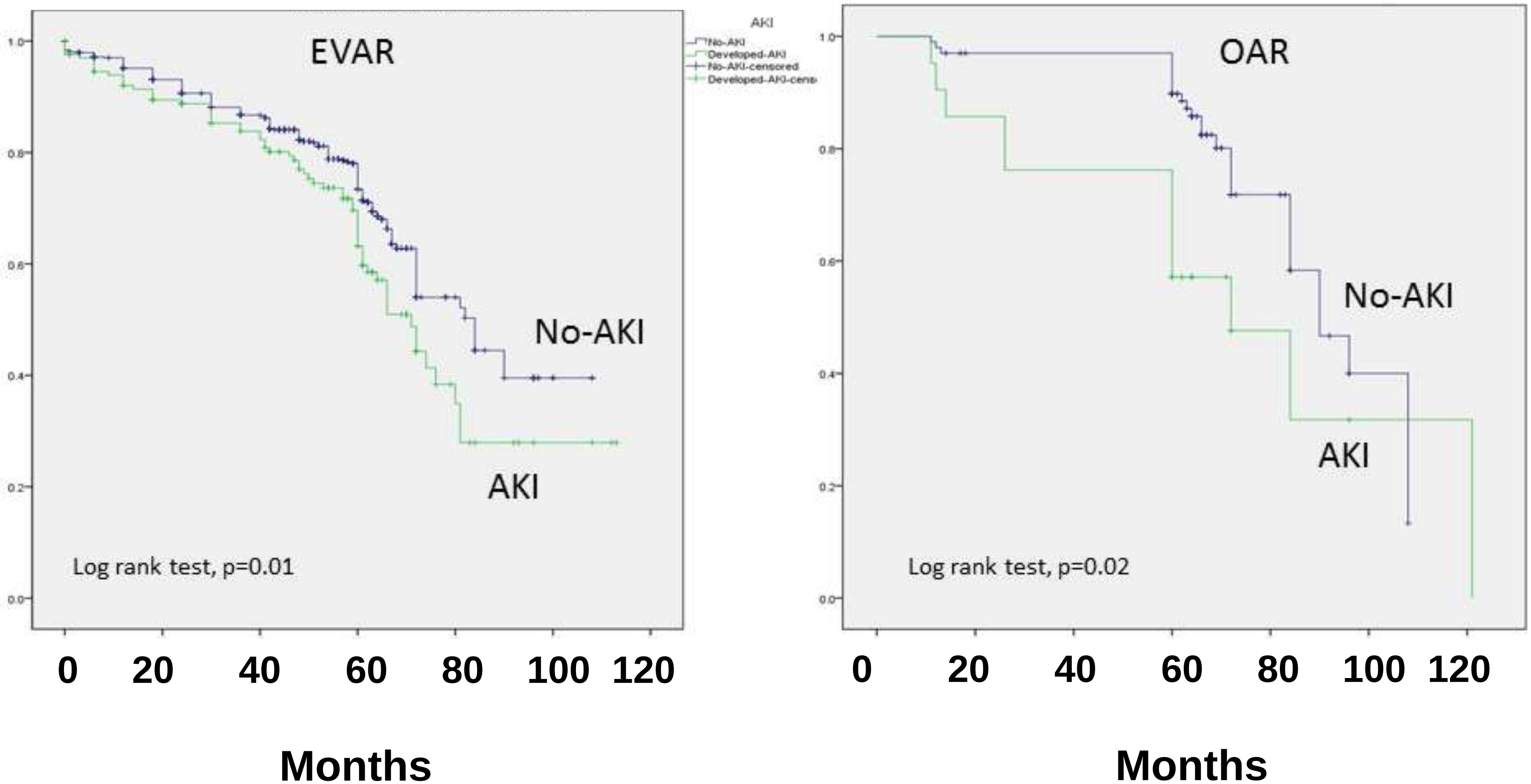
Endo-graft:
inflammatory response to
implantation of a foreign body

Aneurysm sac:
inflammatory infiltrate

Lower limbs excluded from circulation (45-120 minutes): Ischaemia-reperfusion injury

Impact of AKI on survival

2 x more likely to die @ 8 years



950 EVARs & 412 OARs → 8.5 years

Saratzis et al. AJN 2015

Causes of renal injury

… in the **LONG term**

Renal artery disease (atheromatosis)
Cardiovascular co-morbidities & **IHD**
Cardio-renal syndrome
Uncontrolled **hypertension**
Repeat exposure to **contrast**

Saratzis A, et al. JEVT 2013; 20:315-30

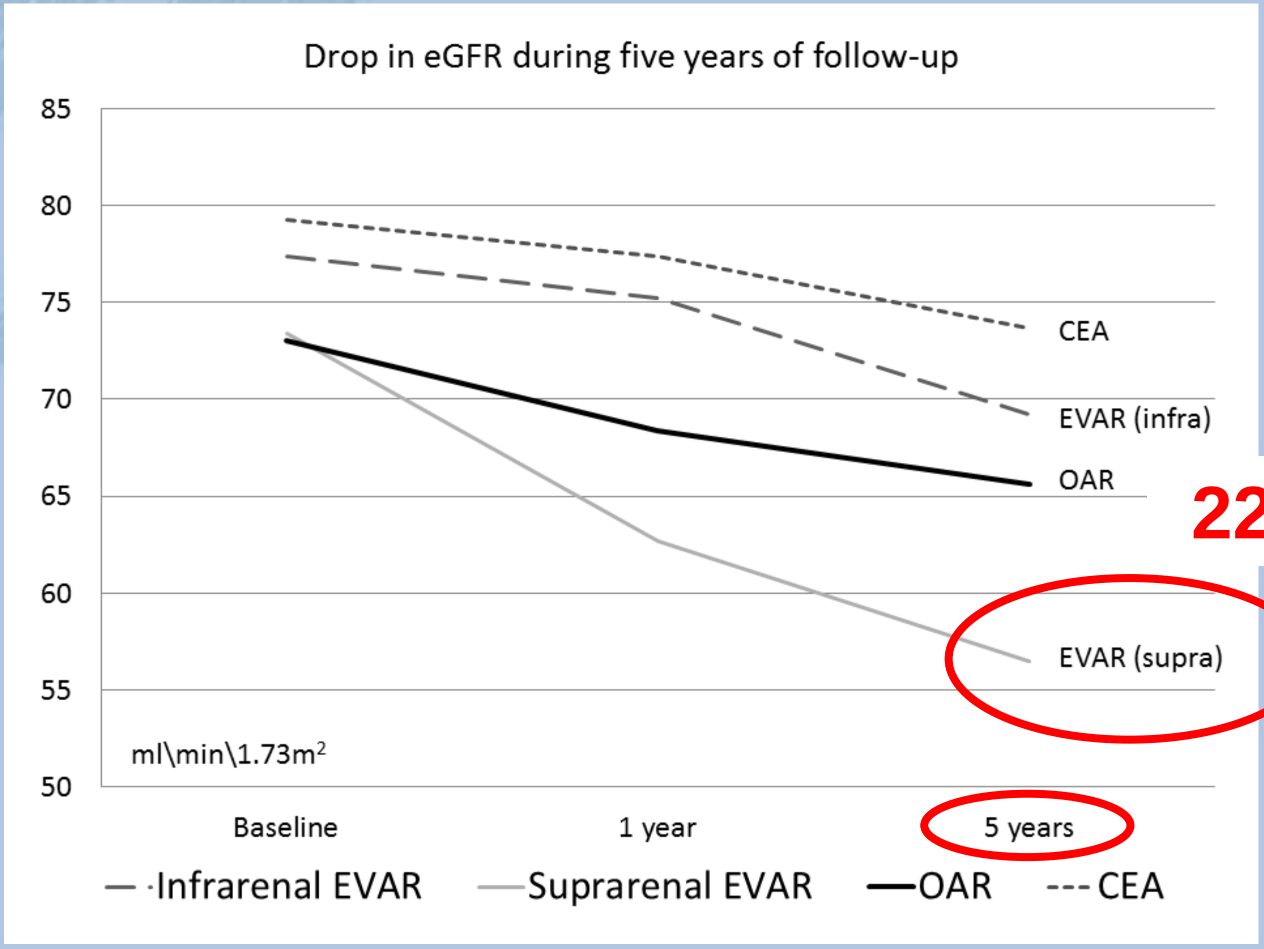
Evidence gap

Do patients undergoing **EVAR** have a more **significant drop in LONG term renal function** compared to non-AAA patients?

Does that actually impact on **outcome**?

What happens to eGFR long term?

Elective EVARs against carotid patients → 121 cases



22 % drop

Saratzis A et al. CJASN 2015; 10

Methods

- **Group 1: 1,329 patients** from **Framingham HS** with abdominal **CTs** and **10 year FU** with **eGFR**
- **Group 2: 1,014 EVARs** & **315 OARs** (2002 → 2010)
- Nested case-matching (**eGFR** & **age**)
- Follow up for 10 years

Framingham Heart Study
A Project of the National Heart, Lung, and Blood Institute and Boston University

Study design

2004 — **2015**

Framingham controls

Nested case – matching for **GFR** & **age**

2002 — **2015**

EVAR (elective)

Open aneurysm repair (elective)

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Baseline characteristics

Variable	EVAR	OAR	Framingham	P
Age, years	73±7	74 ±7	75±2	0.473
Male sex	97%	92%	97%	0.102
Smoking	22%	17%	11%	0.058
Hypertension	81%	75%	70%	0.071
COPD	15%	12%	8%	0.493
MI	7%	12%	6%	0.377
Diabetes	3%	6%	14%	0.080
ACE-inhibitor therapy	37%	38%	33%	0.890
Antiplatelet therapy	92%	100%	90%	0.072
Statin therapy	82%	80%	65%	0.086
Baseline eGFR, ml/kg/1.73 m2	68±16	71±12	74±9	0.956

No significant **differences** in the prevalence of **smoking**, **diabetes**, **hypertension**

Cardiovascular & FU profiles…

Variable	EVAR	OAR	Framingham	P
Framingham risk score	18%	12%	17%	0.732
Renal artery stenosis	7%	5%	7%	0.123
CT with contrast during FU	2	1	3	0.091
Micro-embolic in renal parenchyma	1%	1%	0	0.083

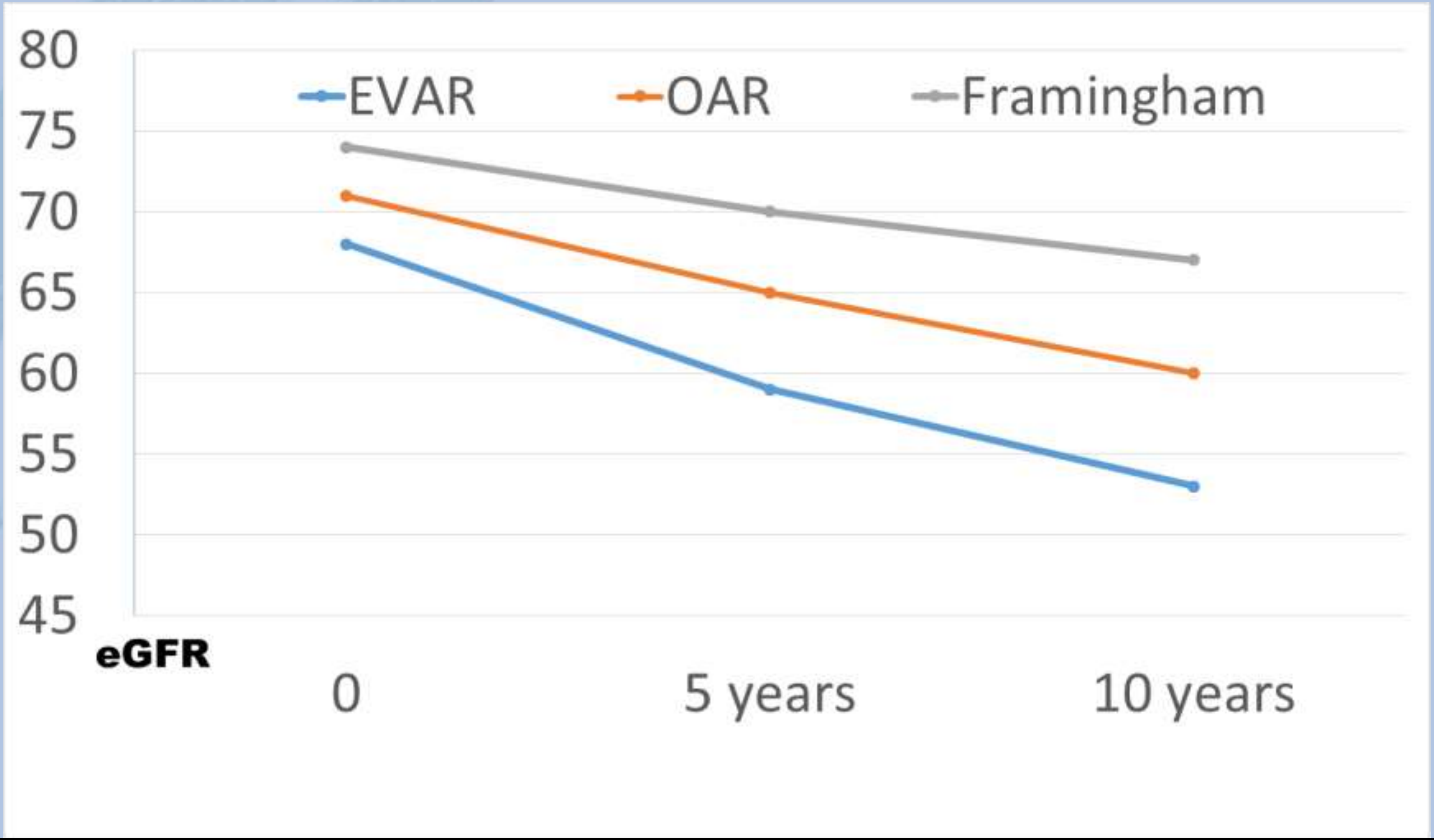
..**no** significant **differences**

Mean annual decline in eGFR:

0.7±0.3 ml/min/1.73m^2 for **non-AAA**

1.4±0.6 for **EVAR**

1.1±0.7 for **OAR** *(p<0.001)*



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Multivariate analyses

EVAR associated with **eGFR drop>30% at 10 years**

(**OR: 2.4**, 95% CI: 1.3-4.1, $p=0.03$)

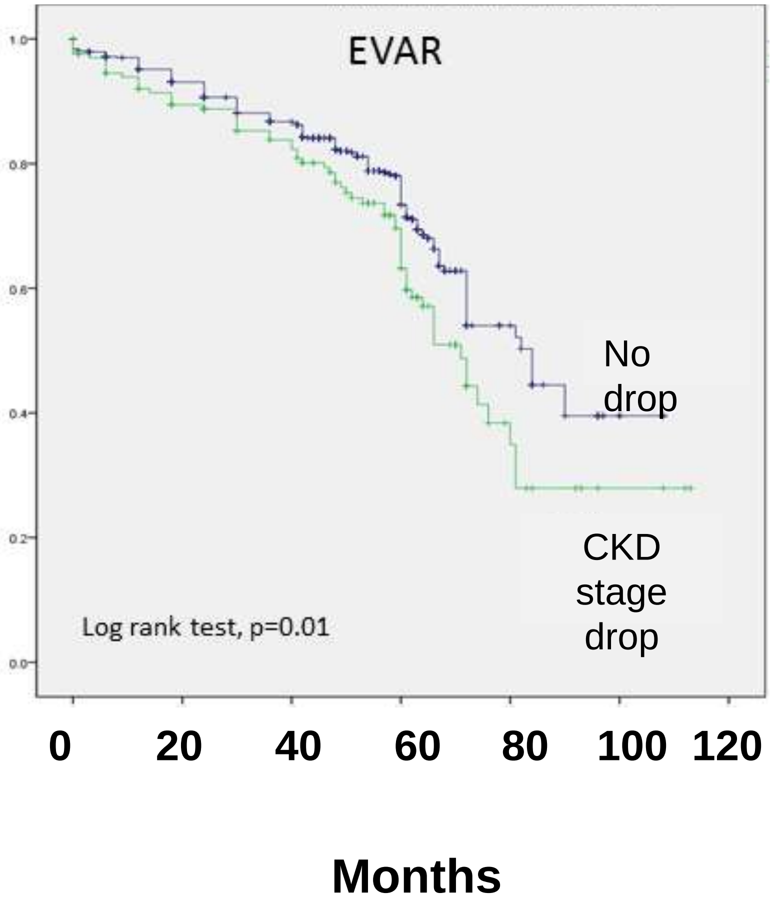
Adjusted for age, sex, statin, BP, CT follow-up

EVAR associated with **higher CKD stage at 10 years**

(**OR: 3.4**, 95% CI: 1.1-4.8, $p<0.001$)

Adjusted for age, sex, statin, BP, CT follow-up

Impact of long term renal injury



Conclusions

- Patients undergoing EVAR develop a steep decline in long-term renal function

- Need to improve surveillance protocols to address this:

Better BP control
Offer ACEi/ARBs
Regular GFR measurements
Control of CV parameters
antiPLTs

- Future research → identify pts @ highest risk

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