

**Mid- and long-term renal function outcomes after
elective EVAR vs. OR: do we really know enough on
which treatment is superior**

Athanasios D. Giannoukas MD, MSc(Lond.), PhD(Lond.), FEBVS
Professor of Vascular Surgery

Faculty of Medicine, School of Health Sciences, University of Thessaly, Greece

Chairman, Dept. of Vascular Surgery, University Hospital of Larissa

Larissa, Greece



Disclosure

Speaker name: **Athanasios Giannoukas**

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest

Patients undergoing EVAR:

Pros:

- No ischemic insult of aortic from cross-clamping
- Less peri-operative haemorrhage
- Less intra-operative hypotension

Cons:

- Potential nephrotoxicity of intravenous (iv) contrast intra-operative
- Potential risk of renal artery embolization during endovascular manipulation
- Lifelong imaging follow up may be needed with CTA using iv contrast

Adriaensen, et al Radiology 2002; 224: 739-47.
Greenberg RK, et al. J Vasc Surg 2004; 39: 1219-28.
Cao P, et al. J Cardiovasc Surg (Torino) 2010; 51: 53-69.

Zeebregts CJ, et al. Br J Surg 2004; 91: 563-8.
Ilyas S, et al. Clin Radiol 2015; 70: 183-96.

Patients undergoing OSR:

Pros:

- No contrast media nephrotoxicity

Cons:

- Ischemic insult of aortic from cross-clamping
- Direct manipulation of the abdominal aorta may lead to the disruption of lipid-laden plaques and subsequent embolization into the renal vasculatur
- Peri-operative haemorrhage
- Intra-operative hypotension

Pini R, et al. J Vasc Surg 2016; 63: 305-13.

Grant SW, et al. Eur J Vasc Endovasc Surg 2012; 43: 182-7.

Aim:

Direct comparison of EVAR *vs* OSR *burden on renal function during follow up* in the intermediate and long term post-operative period.

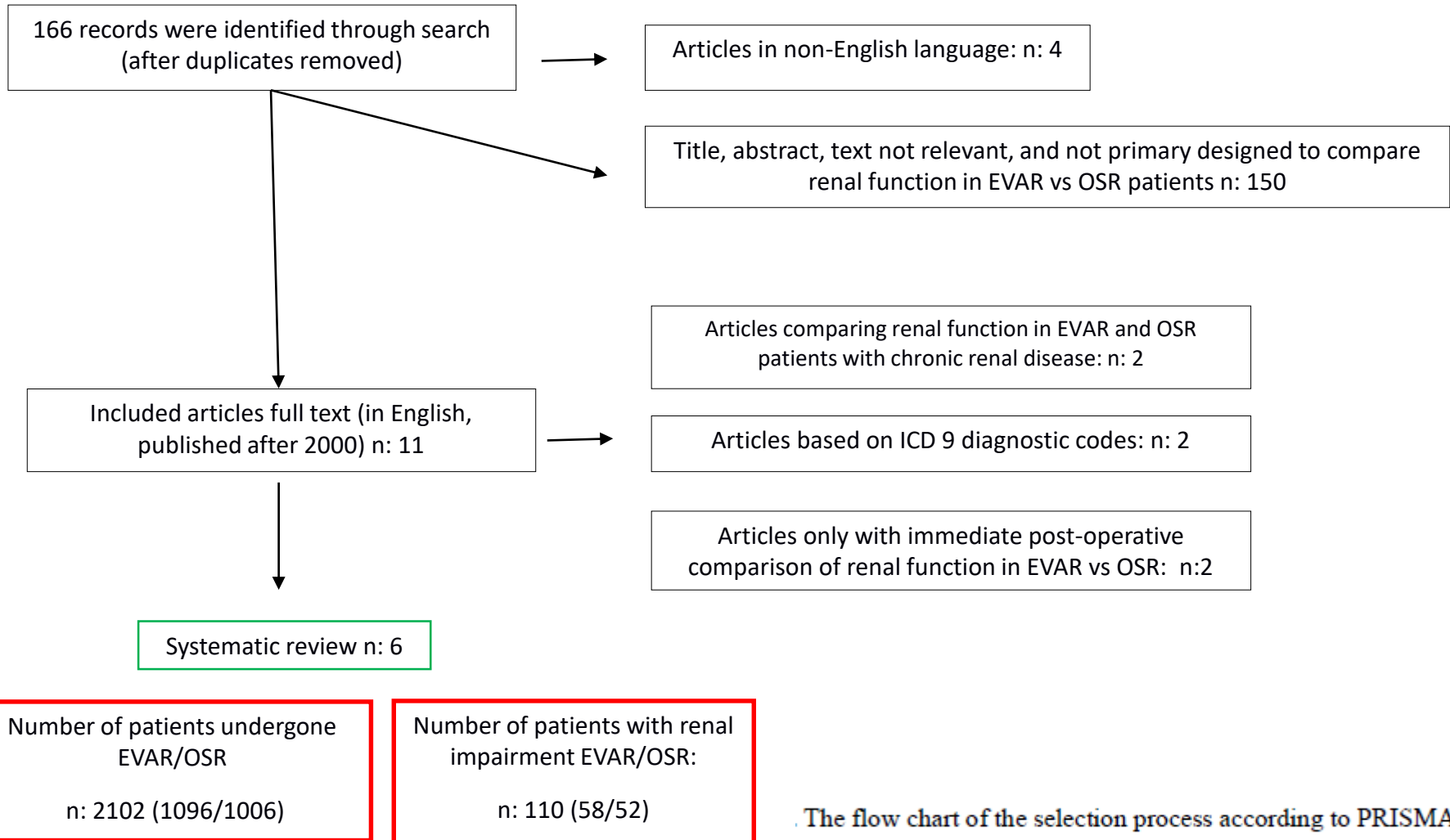
Study design:

Systematic review of the literature

Inclusion criteria:

- English literature from 2000 to July 2016
- Direct evaluation and comparison of renal function impairment in patients after **elective** OSR and EVAR
- Including **only** mid- and long term follow up
- Renal impairment was defined as decrease of GFR or eGFR > 20% in comparison to pre-operative level

PRISMA



The flow chart of the selection process according to PRISMA

Quality Assessment of the studies

Author	Selection bias	Performance bias	Detection bias	Attrition bias	Selective reporting bias
Mills et al.	Low risk	High risk	High risk	High risk	High risk
Brown et al.	Low risk	Low risk	High risk	High risk	High risk
Antonello et al.	High risk	Low risk	High risk	High risk	High risk
DeBruin et al.	Low risk	Low risk	High risk	High risk	High risk
Saratzis et al.	High risk	Low risk	High risk	High risk	High risk
Martin-Gonzalez et al.	Low risk	Low risk	High risk	High risk	High risk

Figure 2. Risk of bias summary in the analysed studies.

	Mills et al.		Brown et al.		Antonello et al.		DeBruin et al.		Saratzis et al.		Martin-Gonzal et al.				
	EVAR	OSR	EVAR	OSR	EVAR	OSR	EVAR	OSR	EVAR	OSR	EVAR	OSR	EVAR	OSR	Total patients
Patients	103	120	509	463	160	243	95	94	180	45	49	41	1096	1006	
Age	73.2	72.4	73.8	73.6	72.3	72.3	69.4	68.6	71.4	71	70.5	68			
AAA diameter	58	59	64	65	61	59	59.6	59.9	63	67	54.4	54.7	62	60.1	
Sex (males)	99	105	459	421	159	198	87	85	152	38	46	38	90.6% (993)	91% (915)	90% (1908/2102)
HT	83	100	NA	NA	126	198	59	53	156	39	33	29	77.8% (457/587)	81.2% (419/543)	77.5% (876/1130)
DM	15	15	44	55	56	69	9	10	16	4	7	4	13.4% (147/1096)	15.6% (157/1006)	14.4% (304/2102)
HL	69	68	NA	NA	49	75	44	54	106	27	32	22	51% (300/587)	45.3% (246/543)	48.3% (546/1130)
CAD	46	51	NA	NA	85	84	35	46	NA	NA	26	17	46.8% (192/410)	39.7% (198/498)	42% (390/908)
PAD	NA	NA	NA	NA	NA	NA	NA	NA	22	9	11	21	14.4% (33/229)	34.8% (30/86)	20% (63/315)
Smoking	27	47	107	99	117	154	56	43	76	19	32	17	37.8% (415/1096)	37.6% (379/1006)	37.77 (794/2102)
COPD	NA	NA	NA	NA	76	49	23	14	NA	NA	18	11	38.4% (117/304)	19.5% (74/378)	28% (191/682)
CVD	NA	NA	NA	NA	22	28	13	6	28	6	7	3	14.4% (70/484)	10% (43/423)	12.4% (113/907)

	EVAR	Open repair	Prevention of CIN
Mills <i>et al.</i>	CTA at 1, 6, and 12 months and then annually thereafter	Annual follow-up duplex	NA
Brown <i>et al.</i>	NA	NA	NA
Antonello <i>et al.</i>	CTA at 1, 6, and 12 months and then annually thereafter	Annual follow-up duplex	N-acetylcysteine (NAC), 600 mg orally twice a day for 1 day before and 2 days after EVAR
De Bruin <i>et al.</i>	CT at 6months, 1 year, 18months and 2 years. In the 3 years at the discretion of the surgeon whether to acquire additional CT scans	NA	NA
Saratzis <i>et al.</i>	CTA at 1, 6, and 12 months and then annually thereafter	Annual follow-up duplex	1.2 g of oral N-acetylcysteine pre-op 24 hours. Nonsteroidal anti-inflammatory drugs and Metformin were discontinued for at least 1 week and 2 days pre-op respectively. For patients with eGFR >60, iv fluids (0.9% saline, 2 mL/kg/h) on the day of the operation. Patients with an eGFR <60 units were admitted 1 day before and received iv fluids
Martin-Gonzalez <i>et al.</i>	CT scans are performed during follow-up at years 1 and 3 (when eGFR is >60 mL/min/1.73 m ²) and ultrasound is performed annually	Annual follow-up duplex	NA

- The incidence of renal impairment in mid- and long-term after AAA repair was: **5.2% (110/2102)**
- The incidence of renal impairment was not negligible and not different after AAA repair with both treatments
EVAR patients (5.3%; 58/1096) vs. OSR patients (5.2%; 52/1006)

	EVAR				OSR			
	GFR pre-op	GFR post op	GFR follow up	GFR Follow up decrease	GFR pre-op	GFR post op	GFR follow up	GFR Follow up decrease
Mills <i>et al.</i>	71.3±30.7	70.6±31.6	65.5±29	5.8	70.9±25.5	62.5±28.1	66.5±30.7	4.4
Brown <i>et al.</i>	64.8±16.5	NA	NA	1.13	65.1±17.8	NA	NA	1.00
Antonello <i>et al.</i>	91.5±9.1	86.5±8.2	NA	NA	94.8±8.1	89.5±8.2	NA	NA
De Bruin <i>et al.</i>	70.8±16.4	NA	66.0±21.1	0.9	71.0±15.6	NA	69.6±20.4	0.6
Saratzis <i>et al.</i>	76±25	76±27	72±25	4.4	76±29	72±29	72±25	5.5
Martin-Gonzalez <i>et al.</i>	81	NA	NA	NA	87	NA	NA	NA

*1st and 3rd eGFR; 2nd and 6th MDRD (Modification of Diet in Renal Disease) eGFR, 4th and 5th CKD-EPI (Chronic Kidney Disease Epidemiology Collaboration) eGFR.

Conclusion

- Lack of solid evidence to prove the superiority of OSR over EVAR regarding the renal function insult in the intermediate and long term post-operative follow up
- It appears that renal impairment is not unlikely after both interventions
- It is reasonable within the context of good medical practice to monitor the renal function of all patients for long periods after AAA repair, regardless of the type of intervention

LIVE 2018
Leading Innovative Vascular Education

Organized by:
 Institute of Vascular Diseases (IVD), Greece

In collaboration with:
 Hellenic Society of Vascular and Endovascular Surgery

 Stony Brook University Medical Center, New York, USA

May 24-26 2018

Conference and Cultural Center of the University of Patras
Patras, GREECE

<http://www.live2018.gr>

Thank you



European Venous Forum

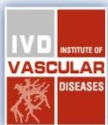
19th Annual Meeting

28-30 June 2018

Royal Olympic Hotel
Athens, Greece

www.europeanvenousforum.org

In cooperation with:



Institute of Vascular Diseases



Hellenic Phlebological Society



Balkan Venous Forum

