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REVIEW

The Impact of Suprarenal Fixation on Renal Function Following Endovascular Abdominal Aortic Aneurysm Repair: Meta-analysis Based on Estimated Glomerular Filtration Rate

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WHAT THIS PAPER ADDS

Renal injury after endovascular aneurysm repair (EVAR) is an important short and long-term complication. Suprarenal fixation devices may amplify the loss of renal function due to the presence of stents and other fixation mechanisms at the renal artery orifice. Data from previous studies are conflicting regarding the exact incidence of renal dysfunction after suprarenal fixation EVAR. This meta-analysis shows that when using appropriate outcome measures (glomerular filtration rate, GFR), the 1 year renal decline between supra- and infrarenal EVAR fixation is similar. However, over 5 years, suprarenal fixation may accelerate renal decline. Long-term data using GFR as an outcome measure are needed in the future.

Background: Endovascular abdominal aortic aneurysm (AAA) repair (EVAR) is currently used routinely to treat AAA. Suprarenal fixation (SRF) of EVAR grafts can lead to renal dysfunction. A meta-analysis of studies using estimated glomerular filtration rate (eGFR) as a measure of renal injury to assess the effect of SRF on renal function was performed.

Methods: An electronic search was carried out to identify all articles that reported on renal injury following SRF versus infrarenal fixation (IRF) EVAR, and 24 studies were identified. Formal meta-analysis was used to assess eGFR drop at 1 and 5 years. The primary outcome measure was a drop in eGFR >20% at 1 year; secondary measures included eGFR drop >20% at 5 years and "renal dysfunction" based on the definition used in each publication.

Results: Five series reported eGFR reduction >20% at 1 year. The weighted odds ratio (OR) was 1.53 (95% CI 0.67–3.51, $p = .31$, $I^2 = 53.2\%$); 9.3% for SRF versus 7.4% for IRF. One study reported eGFR based renal dysfunction at 5 years: OR 1.77 (95% CI 1.04–3.02, $p = .03$); 16.9% for SRF versus 10.3% for IRF. Nineteen series reported some form of renal dysfunction (5287 SRF vs. 4386 IRF patients, mean follow up: 20.5 months, range 72 h to 5 years). The weighted OR was 1.32 (95% CI 1.01–1.71, $p = .03$, $I^2 = 28.4\%$); 5.1% for SRF versus 4.6% for IRF. "Renal dysfunction" definitions varied greatly and were based on creatinine or other inaccurate methods.

Conclusion: EVAR using SRF does not lead to a significant drop in renal function at 1 year, based on eGFR. Long-term results are limited. Authors should report long-term renal injury using eGFR and not inaccurate arbitrary measures, which are currently common in the literature.

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INTRODUCTION

Abdominal aortic aneurysm (AAA) constitutes a significant health problem and remains a common cause of cardiovascular mortality despite advances in surgical care.[1–3] Endovascular AAA repair (EVAR) is now used in routine clinical practice as the outcomes have proven similar or superior to traditional open repair in the short and medium term.[4–6] However, migration and endoleak pose a significant threat to the longevity of EVAR.[7–10] Suprarenal fixation (SFR) of EVAR stent grafts has therefore been devised to

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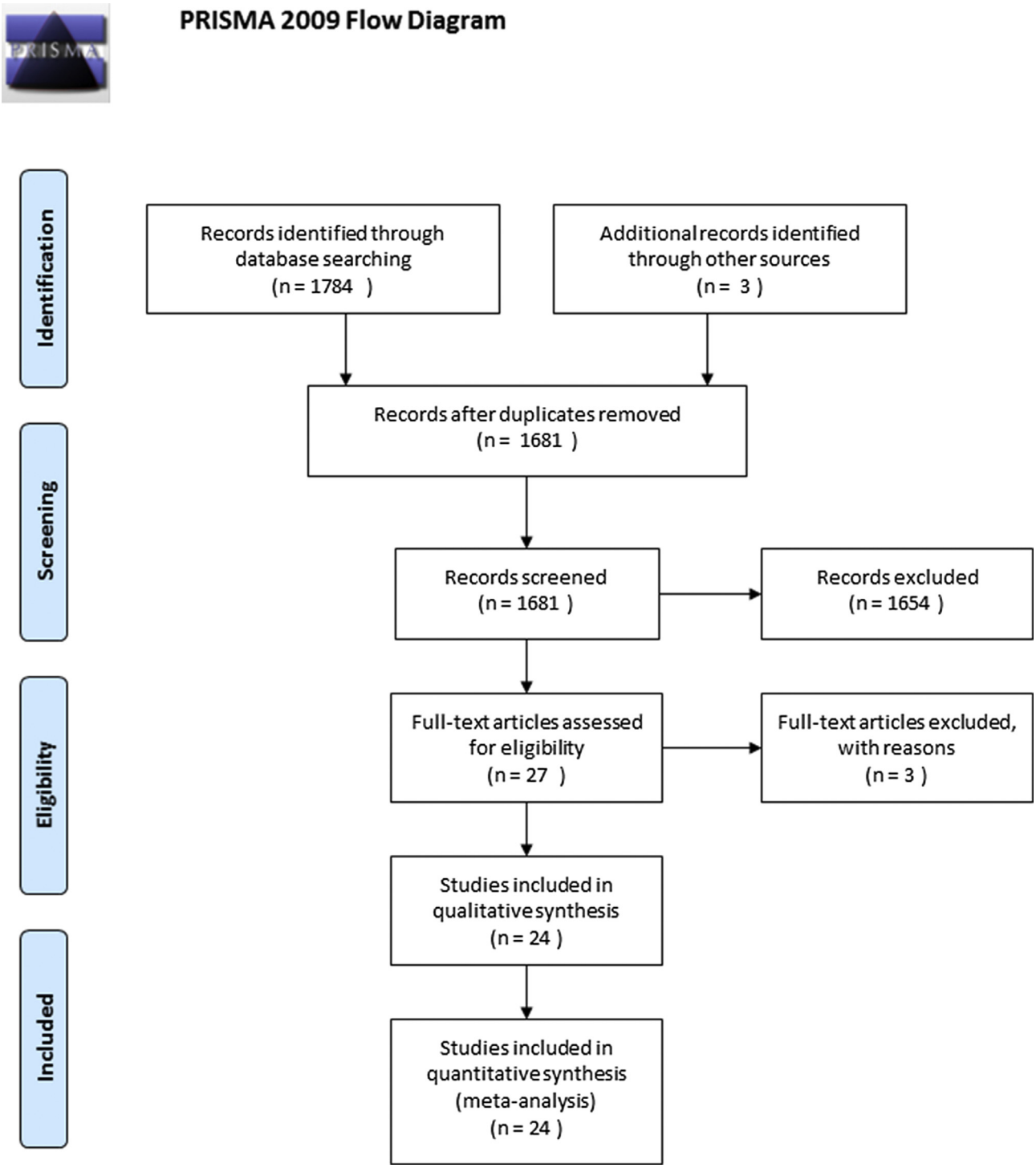

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) chart.

prevent stent graft migration or endoleak by enhancing the fixation of the stent graft at the proximal aortic neck.[7] EVAR devices bearing these SFR modalities, usually in the form of suprarenal bare stents, anchors, or barbs, are now used routinely.[7,11–14]

It is logical to assume that the presence of bare metal stents at the orifice of the renal arteries may be associated with a decrease in renal function.[15–18] Various studies have examined the effects of suprarenal versus infrarenal stent grant fixation on renal function after elective EVAR. Most were retrospective cohort studies, some were retrospective analyses based on prospectively collected data, and only a small minority was prospective in nature. These studies have shown conflicting results.[19,20]

The majority of the currently available series investigating renal function after SFR EVAR had a follow up of up to 1 year. Some studies included creatinine clearance (CrCl; based on the Cockroft–Gault formula) or serial serum

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