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REVIEW

Systematic Review and Meta-analysis of Long-term survival After Elective Infrarenal Abdominal Aortic Aneurysm Repair 1969–2011: 5 Year Survival Remains Poor Despite Advances in Medical Care and Treatment Strategies

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WHAT THIS PAPER ADDS

The key findings of this study are that 5 year survival after elective infrarenal AAA repair is 69% and that this value has not improved over the period 1969–2011. A larger aneurysm diameter at the time of surgery was associated with poorer 5 year survival. This 5 year survival figure is disappointingly poor; patients diagnosed with a Dukes B colorectal cancer can expect better 5 year survival. More needs to be done to address the shortfall in survival to ensure that patients who can now reasonably expect to survive major aortic surgery live long enough to justify what remains a significant intervention.

Background: Improved critical care, pre-operative optimization, and the advent of endovascular surgery (EVAR) have improved 30 day mortality for elective abdominal aortic aneurysm (AAA) repair. It remains unknown whether this has translated into improvements in long-term survival, particularly because these factors have also encouraged the treatment of older patients with greater comorbidity. The aim of this study was to quantify how 5 year survival after elective AAA repair has changed over time.

Methods: A systematic review was performed identifying studies reporting 5 year survival after elective infrarenal AAA repair. An electronic search of the Embase and Medline databases was conducted to January 2014. Thirty-six studies, 60 study arms, and 107,814 patients were identified. Meta-analyses were conducted to determine 5 year survival and to report whether 5 year survival changed over time.

Results: Five-year survival was 69% (95% CI 67 to 71%, $I^2 = 87\%$). Meta-regression on study midpoint showed no improvement in 5 year survival over the period 1969–2011 (log OR −0.001, 95% CI −0.014–0.012). Larger average aneurysm diameter was associated with poorer 5 year survival (adjusted log OR −0.058, 95% CI −0.095 to −0.021, $I^2 = 85\%$). Older average patient age at surgery was associated with poorer 5 year survival (adjusted log OR −0.118, 95% CI −0.142 to −0.094, $I^2 = 70\%$). After adjusting for average patient age, an improvement in 5 year survival over the period that these data spanned was obtained (adjusted log OR 0.027, 95% CI 0.012 to 0.042).

Conclusion: Five-year survival remains poor after elective AAA repair despite advances in short-term outcomes and is associated with AAA diameter and patient age at the time of surgery. Age-adjusted survival appears to have improved; however, this cohort as a whole continues to have poor long-term survival. Research in this field should attempt to improve the life expectancy of patients with repaired AAA and to optimise patient selection.

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INTRODUCTION

Over recent decades, there has been a consistent improvement in the short-term mortality associated with elective repair of infrarenal aortic aneurysms (AAA). These improvements have followed general developments in surgical technique and peri-operative procedures,[1] the advent of endovascular surgery,[2–7] improvements in critical care and vascular anaesthesia, and the centralization of aortic surgery to specialist teams with high operative caseload.

The decision to repair an AAA requires consideration of the risk of rupture without surgery, the peri-operative risk of death, and the patient's overall life expectancy; balanced with the patient's own preference. As the aim of AAA repair is to prolong life through the prevention of rupture, surgery should only be performed if the risk of rupture without surgery outweighs the peri-operative risk of surgery itself, in patients whose life expectancy is long enough to result in long-term benefit. It is therefore perhaps unsurprising that short-term operative mortality has been the primary focus of most outcomes research reporting the results of AAA repair. However, longer-term mortality continues to be concerning in the years that follow surgery,[8] as patients with AAA have considerable cardiovascular risk factors compared with the wider population.[9,10]

It remains unknown whether improvements in the peri-operative safety of AAA repair have translated to improved 5 year survival following surgery. Long-term survival critically influences the cost-effectiveness of AAA repair,[2] and is a key measure to justify surgical intervention at a population level. Understanding trends in published results will clarify whether long-term survival is an appropriate therapeutic target for further research. The aim of this study was to quantitatively summarise the evidence for 5 year survival after elective infrarenal AAA repair to assess whether improvements in peri-operative practice have translated into better long-term mortality over time.

METHODS

An electronic search of all English-language literature was performed using the Embase and Medline databases, covering the years 1950—2013, in accordance with Preferred Items for Reporting of Systematic Reviews and Meta Analyses (PRISMA) guidelines (Fig. 1). The free-text search terms "abdom*," "aortic aneurysm," "abdom*aort*," "AAA," "surger*," "surgical*," "repair*," "surviv*,"

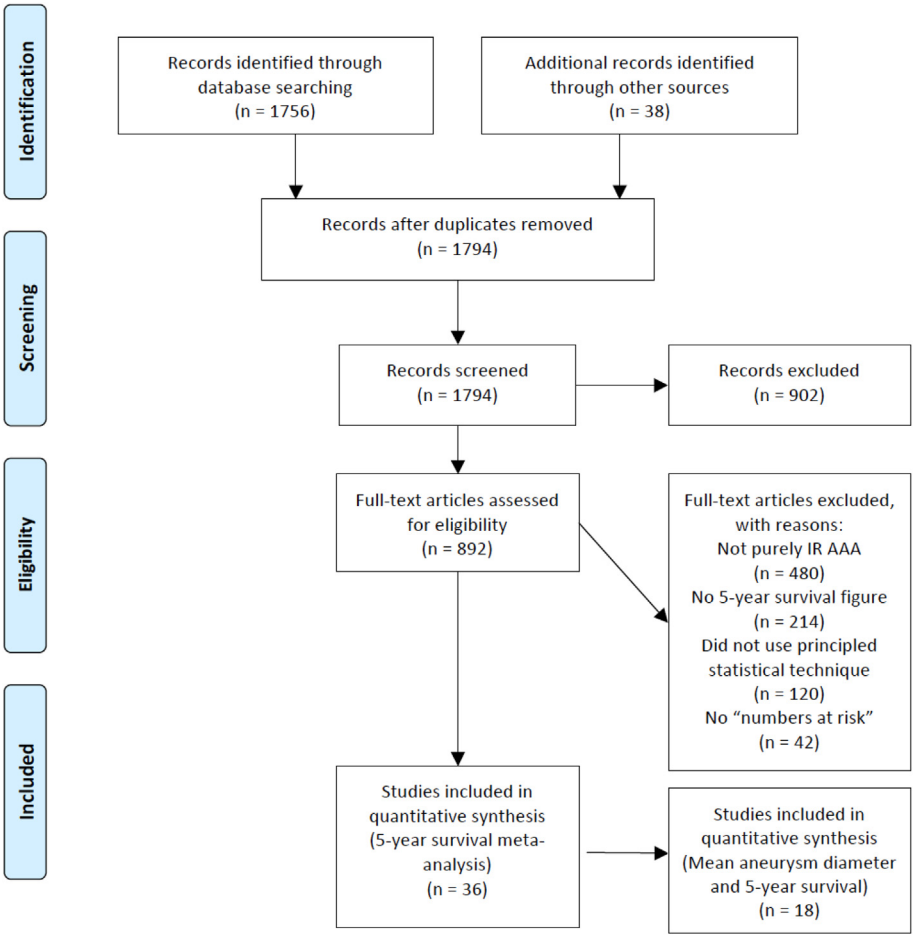

Figure 1. PRISMA diagram.