

## **Cardiovascular Events After Endovascular Aneurysm Repair versus Open Surgical Repair: A Systematic Review and Meta-Analysis of Randomized Controlled Trials**

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### **Objectives**

Randomized controlled trials (RCTs) have shown a reduction in short-term mortality with endovascular aneurysm repair (EVAR) compared to open surgical repair (OSR) but failed to demonstrate a long-term mortality advantage. Our study aims to determine if this loss of mortality benefit could be attributed to differences in cardiovascular events.

### **Methods**

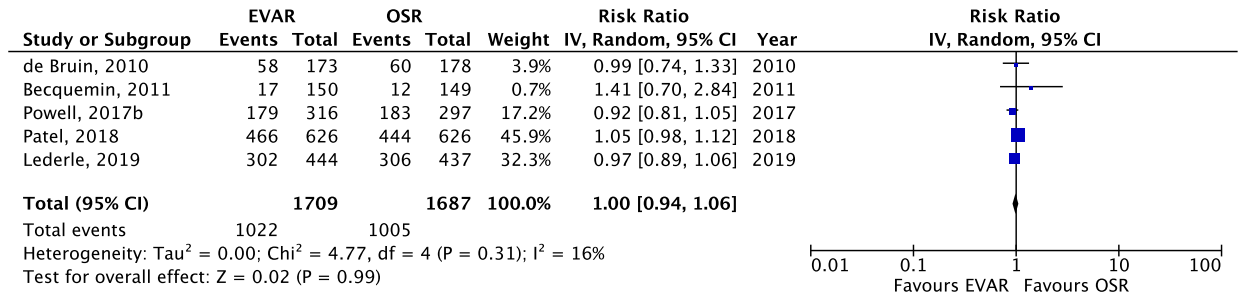
We searched MEDLINE, PUBMED, EMBASE, and Web of Science from inception to November 2019 for RCTs comparing EVAR and OSR for AAA treatment. Title and abstracts, full texts, and study quality assessment was done by two independent reviewers. Risk of bias was assessed using the Cochrane Collaboration tool for RCTs. Pooled risk ratios (RR) with 95% confidence intervals [CI] were calculated using random-effects and heterogeneity was assessed using the  $I^2$  statistics.

### **Results**

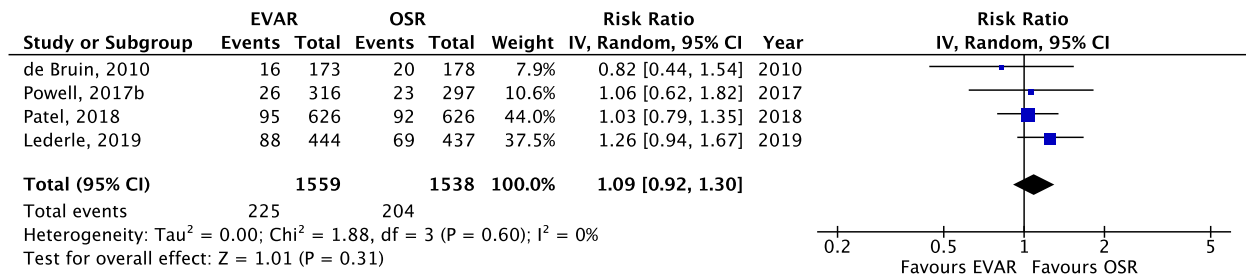
Our search identified 5204 studies, of which 99 full texts were screened, and 52 studies included. Inter-rater agreement was excellent for final study inclusion ( $k=0.88$ ). Overall, the risk of bias was moderate. Patients treated with EVAR had a significantly lower short-term mortality (RR 0.63 [0.41, 0.98]). The totality of evidence on cardiovascular mortality (3 studies; 1265 patients, RR 0.61 [0.16, 2.25]) did not rule out large differences in mortality in either direction. There were no statistically significant differences in long-term all-cause mortality (5 studies; 3396 patients, RR 1.00 [0.94, 1.06], figure 1) and cardiovascular mortality (4 studies; 3094 patients, RR 1.09 [0.92, 1.30], figure 2), although for the later the point estimate shifted in the other direction.

### **Conclusion**

Postoperative cardiac complications are frequent after abdominal aortic aneurysm (AAA) repair and most events are asymptomatic. More data is needed to inform if the loss of mortality benefit at long-term follow-up with EVAR compared to OSR could be explained by higher cardiovascular mortality risk in the EVAR group due to prognostically important asymptomatic and undetected cardiovascular events.



**Figure 1.** Forest plot of long-term mortality in randomized controlled trials comparing EVAR and OSR in AAA treatment



**Figure 2.** Forest plot of long-term cardiovascular mortality in randomized controlled trials comparing EVAR and OSR in AAA treatment