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# Laparoscopic surgery for elective abdominal aortic aneurysm repair

Lindsay Robertson<sup>1</sup>, Sandip Nandhra<sup>2</sup><sup>1</sup>Department of Vascular Surgery, Freeman Hospital, Newcastle upon Tyne, UK. <sup>2</sup>Department of Vascular Surgery, Health Education North East, Durham, UK**Contact:** Lindsay Robertson, Department of Vascular Surgery, Freeman Hospital, Newcastle upon Tyne Hospitals NHS Foundation Trust, High Heaton, Newcastle upon Tyne, NE7 7DN, UK. [lindsay.robertson@nuth.nhs.uk](mailto:lindsay.robertson@nuth.nhs.uk), [lindsay.robertson@ed.ac.uk](mailto:lindsay.robertson@ed.ac.uk).**Editorial group:** Cochrane Vascular Group.**Publication status and date:** New, published in Issue 5, 2017.**Citation:** Robertson L, Nandhra S. Laparoscopic surgery for elective abdominal aortic aneurysm repair. *Cochrane Database of Systematic Reviews* 2017, Issue 5. Art. No.: CD012302. DOI: [10.1002/14651858.CD012302.pub2](https://doi.org/10.1002/14651858.CD012302.pub2).

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## ABSTRACT

### Background

Abdominal aortic aneurysm (AAA) is an abnormal dilatation of the infradiaphragmatic aorta that is equal to or greater than 30 mm or a local dilatation of equal to or greater than 50% compared to the expected normal diameter of the artery. AAAs rarely occur in individuals under 50 years of age, but thereafter the prevalence dramatically increases with age, with men at a six-fold greater risk of developing an AAA than women. Prevalence of AAA has been reported to range from 1.3% in women aged 65 to 80 years to between 4% and 7.7% in men aged 65 to 80 years.

There is evidence that the risk of rupture increases as the aneurysm diameter increases from 50 mm to 60 mm. People with AAAs over 55 mm in diameter are therefore generally referred for consideration of repair, as the risk of rupture exceeds the risk of repair. The traditional treatment for AAA is open surgical repair (OSR) which involves a large abdominal incision and is associated with a significant risk of complications. Two less invasive procedures have recently become more widely used: endovascular aneurysm repair (EVAR) and laparoscopic repair. EVAR is carried out through sheaths inserted in the femoral artery in the groin; thereafter, a stent graft is placed within the aneurysm sac under radiological image guidance and anchored in place to form a new channel for blood flow. Laparoscopic repair involves the use of a laparoscope which is inserted through small cuts in the abdomen and the synthetic graft is sewn in place to replace the weakened area of the aorta. Laparoscopic AAA repair falls into two categories: hand-assisted laparoscopic surgery (HALS), where an incision is made to allow the surgeon's hand to assist in the repair; and total laparoscopic surgery (TLS). Both EVAR and laparoscopic repair are favourable over OSR as they are minimally invasive, less painful, associated with fewer complications and lower mortality rate and have a shorter duration of hospital stay.

Current evidence suggests that elective laparoscopic AAA repair has a favourable safety profile comparable with that of EVAR, with low conversion rates as well as similar mortality and morbidity rates. As a result, it has been suggested that elective laparoscopic AAA repair may have a role in treating those patients for whom EVAR is unsuitable.

### Objectives

To assess the effects of laparoscopic surgery for elective abdominal aortic aneurysm repair.

The primary objective of this review was to assess the perioperative mortality and operative time of laparoscopic (total and hand-assisted) surgical repair of abdominal aortic aneurysms (AAA) compared to traditional open surgical repair or EVAR. The secondary objective was to assess complication rates, all-cause mortality (> 30 days), hospital and intensive care unit (ICU) length of stay, conversion and re-intervention rates, and quality of life associated with laparoscopic (total and hand-assisted) surgical repair compared to traditional open surgical repair or EVAR.

## Search methods

The Cochrane Vascular Information Specialist (CIS) searched the Specialised Register (last searched August 2016) and CENTRAL (2016, Issue 7). In addition the CIS searched trials registries for details of ongoing or unpublished studies. We searched the reference lists of relevant articles retrieved by electronic searches for additional citations.

## Selection criteria

Randomised controlled trials and controlled clinical trials in which patients with an AAA underwent elective laparoscopic repair (total laparoscopic repair or hand-assisted laparoscopic repair) compared with either open surgical repair or EVAR.

## Data collection and analysis

Studies identified for potential inclusion were independently assessed for inclusion by at least two review authors.

## Main results

One randomised controlled trial with a total of 100 male participants was included in the review. The trial compared hand-assisted laparoscopic repair with EVAR and provided results for in-hospital mortality, operative time, length of hospital stay and lower limb ischaemia. The included study did not report on the other pre-planned outcomes of this review. No in-hospital deaths occurred in the study. Hand-associated laparoscopic repair was associated with a longer operative time (MD 53.00 minutes, 95% CI 36.49 to 69.51) than EVAR. The incidence of lower limb ischaemia was similar between the two treatment groups (risk ratio (RR) 0.50, 95% confidence interval (CI) 0.05 to 5.34). The mean length of hospital stay was 4.2 days and 3.4 days in the hand-assisted laparoscopic repair and EVAR groups respectively but standard deviations were not reported and therefore it was not possible to independently test the statistical significance of this result. The quality of evidence was downgraded for imprecision due to the inclusion of one small study; and wide confidence intervals and indirectness due to the study including male participants only. No study compared laparoscopic repair (total or hand-assisted) with open surgical repair or total laparoscopic surgical repair with EVAR.

## Authors' conclusions

There is insufficient evidence to draw any conclusions about effectiveness and safety of laparoscopic (total and hand-assisted) surgical repair of AAA versus open surgical repair or EVAR, because only one small randomised trial was eligible for inclusion in this review. High-quality randomised controlled trials are needed.

## PLAIN LANGUAGE SUMMARY

### Laparoscopic surgery for abdominal aortic aneurysm

#### Background

An abdominal aortic aneurysm (AAA) is an abnormal widening of the abdominal aorta, the main artery supplying blood to the organs in the abdomen and lower part of the body. Between 4% and 7% of men over 65 years of age have an AAA, but it is less common in women. Aneurysms over 55 mm in diameter carry a high risk of rupture which can lead to death; approximately 60% of people with a ruptured AAA die before reaching hospital. People with AAAs over 55 mm are generally referred for repair, as the risk of rupture exceeds the risk of repair. There are three methods of repairing an AAA: surgery, endovascular aneurysm repair (EVAR) and laparoscopic repair. Surgery involves making a large cut in the abdomen, after which the abdominal aorta is exposed and opened and a synthetic graft (tube) is sewn in place to replace the weakened area of the aorta. EVAR involves making a cut in the groin area, after which a stent graft is inserted in collapsed form and opened inside the aneurysm under x-ray guidance and held in place with a stent. Laparoscopic repair or 'keyhole' AAA surgery is carried out by making very small cuts in the patient's abdomen, after which a fine telescope (a laparoscope) is inserted through these cuts and the synthetic graft is sewn in place. The benefits of EVAR and laparoscopic repair are that they require smaller incisions, are less painful, have fewer complications, a lower mortality rate and shorter hospital stay than surgical repair. Current evidence suggests that EVAR is the preferred approach for AAA repair. However laparoscopic AAA repair has been suggested as a safe and effective alternative in treating those patients for whom EVAR is unsuitable. This review aimed to assess the effects of laparoscopic surgery for abdominal aortic aneurysms.

#### Study characteristics and key results

One randomised controlled trial (current until August 2016), studying 100 male participants and comparing hand-assisted laparoscopic repair with EVAR, was included in this review. No in-hospital deaths occurred during the study. The trial showed that hand-assisted laparoscopic repair took longer to perform than EVAR but there was no difference in the number of patients with reduced blood flow to the leg following either treatment.

#### Quality of evidence

At present, there is a lack of randomised controlled trials examining the comparative effectiveness and safety of laparoscopic repair of AAA. The quality of the available evidence was imprecise due to the inclusion of one small study and wide confidence intervals; and indirect because the study includes male participants only.

**Conclusions**

Further research is required before conclusions can be made.