



EDITORIALS

Endovascular or open repair for ruptured abdominal aortic aneurysm?

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The endovascular approach is better for patients and more cost effective for payers

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The three year results of the IMPROVE trial, in the related article by the IMPROVE Trial Investigators (doi:10.1136/bmj.j4859),¹ will change clinical practice in favour of endovascular repair for patients with suspected ruptured abdominal aortic aneurysms (AAA). It is important to stress, however, that long term trials of endovascular compared with open surgery have reported diverging results for patients with ruptured or intact aneurysms.

The IMPROVE trial randomised 613 patients with a clinical diagnosis of ruptured AAA to a strategy of primary endovascular repair—contingent on suitable anatomy—or an open surgical strategy. Previously reported analyses of outcomes at 30 days² and one year³ found no difference in survival between the groups, the primary outcome. But there were other advantages to endovascular repair, including a greater likelihood of discharge to home (94% v 77%; $P<0.001$) at 30 days,² lower costs,^{2,3} and a shorter average length of hospital stay at one year (17 v 26 days; $P<0.001$).³

The new three year results are convincing.¹ The above advantages of endovascular repair have now transformed into a true survival benefit (the hazard ratio for mortality between three months and three years was 0.57, 95% confidence interval 0.36 to 0.90), leading to lower mortality at three years (48% v 56%). The higher quality of life among survivors in the endovascular group is a further benefit that translates to better overall cost effectiveness. Reintervention rates were similar between the two groups.

The vascular surgeons in the UK and Canada have performed yet another large trial of excellent quality. About half of eligible patients were randomised, despite the obvious difficulties of performing a randomised trial in critically ill patients, often in severe pain and with traumatised relatives. More flexible legislation on consent in the UK and Canada made this possible and is laudable. The demands of securing fully informed consent before randomisation, as required in Sweden, can make this kind of research impossible. Supported by ethical oversight in both Canada and the UK, these authors were able to use a two

stage consent process that secured brief initial consent followed by full consent after surgery. The study design was ideal, and only two patients in each group were lost to follow-up.

The potential benefits of endovascular treatment of ruptured AAA could be even greater than shown in the IMPROVE trial. In an earlier report from the same investigators, only 36% of participants were managed under local anaesthesia,² about half the proportion reported by experienced centres, thus probably representing a learning curve.⁴ In an observational analysis of data from IMPROVE, patients managed with local anaesthesia had lower mortality than those managed with general anaesthesia (adjusted odds ratio 0.27, 95% confidence interval 0.10 to 0.70),⁵ though there are confounders in this non-randomised comparison.

The EVAR1 trial of open compared with endovascular repair in 1252 patients with intact abdominal aortic aneurysm recently reported 15 year follow-up data.⁶ The early advantage of endovascular repair had disappeared by six months, and from eight years onward the open repair group had better survival. The endovascular group had increased risk of aneurysm rupture and cancer, affecting late total as well as aneurysm specific mortality. The 15 year results of the EVAR1 trial and the three year results of the IMPROVE trial can both be regarded as long term results as mean survival after rupture is much shorter.⁷

How should we reconcile the relevance of these conflicting results for emergency and elective surgery? In the emergency setting of a ruptured AAA, we need to operate a “damage control” strategy to save a life in immediate danger. The “perfect” becomes the enemy of the “good.” In the elective setting, patients and their surgeons have a longer term perspective. A 65 year old man in Sweden has a life expectancy of about 19 years. An operation associated with harm after eight years of follow-up is not good enough. The evidence gives a clear message to tailor treatment depending on the patient and the presentation.

Prevention is always better than cure, and the most effective way to prevent ruptured AAA is to avoid smoking. In one large

cohort study, current smoking at baseline was associated with a sixfold increase in the risk of AAA for men (hazard ratio 6.55) and an 11-fold increase in risk for women (10.97).⁸ Second best is early recognition and repair of aneurysms before rupture. In the large UK MASS trial, screening older men with ultrasonography reduced mortality from ruptured AAA by about 50%.⁹ Long term results from that trial,¹⁰ along with later meta-analyses,¹¹ showed that even all cause mortality rates can be reduced by ultrasound screening. Similar results were reported from the Swedish national screening programme.¹²

Does a haemodynamically stable patient with a ruptured AAA benefit from transport to a centre that can offer both open and endovascular repair? Probably, but this issue was not covered by IMPROVE trial. How should we treat those with hostile anatomy today, when alternatives to open surgery exist, such as fenestrated endovascular grafts, available off the shelf? These and other remaining questions should be dealt with in future studies.

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