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[Intervention Review]

Controlled hypotension versus normotensive resuscitation strategy for people with ruptured abdominal aortic aneurysm

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ABSTRACT

Background

An abdominal aortic aneurysm (AAA) is the pathological enlargement of the aorta and can develop in both men and women. Progressive aneurysm enlargement can lead to rupture. The rupture of an AAA is frequently fatal and accounts for the death from haemorrhagic shock of at least 45 people per 100,000 population. The outcome of people with ruptured AAA varies among countries and healthcare systems, with mortality ranging from 53% to 90%. Definitive treatment for ruptured AAA includes open surgery or endovascular repair. The management of haemorrhagic shock is crucial for the person's outcome and aims to restore organ perfusion and systolic blood pressure above 100 mmHg through immediate and aggressive fluid replacement. This rapid fluid replacement is known as the normotensive resuscitation strategy. However, evidence suggests that infusing large volumes of cold fluid causes dilutional and hypothermic coagulopathy. The association of these factors may exacerbate bleeding, resulting in a 'lethal triad' of hypothermia, acidaemia, and coagulopathy. An alternative to the normotensive resuscitation strategy is the controlled (permissive) hypotension resuscitation strategy, with a target systolic blood pressure of 50 mmHg to 100 mmHg. The principle of controlled or hypotensive resuscitation has been used in some management protocols for endovascular repair of ruptured AAA. It may be beneficial in preventing blood loss by avoiding the clot disruption caused by the rapid increase in systolic blood pressure; avoiding dilution of clotting factors, platelets and fibrinogen; and by avoiding the temperature decrease that inhibits enzyme activity involved in platelet and clotting factor function. This is an update of a review first published in 2016.

Objectives

To compare the effects of controlled (permissive) hypotension resuscitation and normotensive resuscitation strategies for people with ruptured AAA.

Search methods

The Cochrane Vascular Information Specialist searched the Specialised Register (August 2017), the Cochrane Register of Studies (CENTRAL (2017, Issue 7)) and EMBASE (August 2017). The Cochrane Vascular Information Specialist also searched clinical trials databases (August 2017) for details of ongoing or unpublished studies.

Selection criteria

We sought all published and unpublished randomised controlled trial (RCTs) that compared controlled hypotension and normotensive resuscitation strategies for the management of shock in patients with ruptured abdominal aortic aneurysms.

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Data collection and analysis

Two review authors independently assessed identified studies for potential inclusion in the review. We used standard methodological procedures in accordance with the *Cochrane Handbook for Systematic Review of Interventions*.

Main results

We identified no RCTs that met the inclusion criteria.

Authors' conclusions

We found no RCTs that compared controlled hypotension and normotensive resuscitation strategies in the management of haemorrhagic shock in patients with ruptured abdominal aortic aneurysm that assessed mortality, presence of coagulopathy, intensive care unit length of stay, and the presence of myocardial infarct and renal failure. High quality studies that evaluate the best strategy for managing haemorrhagic shock in ruptured abdominal aortic aneurysms are required.

PLAIN LANGUAGE SUMMARY

Controlled hypotension versus normotensive resuscitation strategy for people with ruptured abdominal aortic aneurysm

Background

An abdominal aortic aneurysm (AAA) is a swelling (aneurysm) of the aorta, the main blood vessel that leads away from the heart and through the abdomen to the rest of the body. It can develop in both men and women. A growing aneurysm can burst (rupture), which leads to massive blood loss and shock. It is frequently fatal and accounts for the death of at least 45 people per 100,000 population.

One option to fix a ruptured AAA is to open the abdomen and place a tube graft in the aorta (open repair); the second approach is to place a stent graft inside the aorta through the large artery in the thigh (femoral artery; endovascular repair).

This review focused on the initial management of bleeding and low blood pressure caused by the ruptured aneurysms, also known as haemorrhagic shock. Patients are generally given intravenous (giving medicines or fluids through a needle or tube inserted into a vein) saline solutions in the emergency room or surgery centre to restore circulatory volume.

Rapid fluid replacement immediately restores normal blood pressure. It is known as the normotensive resuscitation strategy and can lead to an increase in bleeding because the clot can be removed and coagulation factors in the blood can be diluted. An alternative approach is the controlled (permissive) hypotension resuscitation strategy. This strategy consists of fluid replacement, the use of drugs, or both, to keep systolic blood pressure between 50 mmHg and 100 mmHg, until the aneurysms can be repaired with open surgery or endovascular repair. This strategy might work because it does not introduce a large volume of cool saline solution and consequently avoids the outcomes listed above.

Study characteristics and key results

We searched for evidence that directly compared strategies to manage haemorrhagic shock and to restore normal blood pressure initially, and during surgery, in patients with ruptured AAA. Our searches up to August 2017, did not identify any randomised controlled trials (clinical studies where people are randomly put into one of two or more treatment groups; one of which is the control group) meeting our criteria. Studies are needed to help emergency physicians, vascular surgeons, and anaesthesiologists choose the best option for treating haemorrhagic shock caused by ruptured abdominal aortic aneurysms.

Quality of the evidence

We found no randomised controlled trials that met our criteria.