Ruptured Aortic Aneurysm

When the aorta ruptures spontaneously, rather than as the result of trauma, it is usually in an aortic aneurysm. Rupture of an aortic aneurysm should not be confused with aortic dissection. Progressive aneurysm enlargement can lead to rupture and massive internal bleeding, which is a fatal event unless timely repair can be achieved. [1]

The aorta is such a large blood vessel that, if it ruptures, death is very rapid, although the process might be slow enough to permit emergency surgery. However, time is of the essence. The ideal management is to repair the aneurysm before rupture occurs. Often there is no knowledge of the presence of an aneurysm and the first sign is rupture, rapid exsanguination and death.

Epidemiology

Ruptured abdominal aortic aneurysms (AAAs) cause 12,000 deaths per year; 8,000 of these are infra-renal. [2] Women are much less frequently affected.

Risk factors

The presence of an aneurysm is a risk for rupture. [3, 4] The larger the lesion, the more likely it is to bleed; aneurysms over 6 cm have a 25% annual risk of rupture. [2] Smoking and hypertension are additional risks.

Presentation

A dissecting or ruptured aneurysm usually presents with pain and collapse.

Thoracic aortic aneurysm (TAA)

- It will cause chest pain that may be indistinguishable from acute myocardial infarction in terms of nature and distribution.
- Haemoptysis can occur.
- If bleeding occurs into the mediastinum, it can cause cardiac tamponade and rapidly be fatal. The patient will probably never reach hospital alive and the diagnosis is made post-mortem.

Abdominal aortic aneurysm (AAA)

- Ruptured AAA presents with a classical triad of pain in the flank or back, hypotension and a pulsatile abdominal mass; however, only about half have the full triad.
- The patient will complain of the pain and may feel cold, sweaty and faint on standing.
- Other common symptoms include syncope and vomiting.

Examination

- A patient with a ruptured aneurysm at any level is likely to look pale and unwell and to be cold and sweaty.
- The pulse will be rapid, weak and thready. Hypotension is common.
- With a ruptured AAA there may well be a pulsatile mass in the vicinity of the bifurcation of the aorta. This is a few centimetres above the umbilicus and a little to the left.
- It may be tender and a bruit may be audible. Bleeding causes peritoneal irritation and it may appear as an acute abdomen.
- Occasionally the presentation can be atypical - eg, intestinal obstruction from haematoma or an apparent irreducible inguinal hernia.
Differential diagnosis

- The differential diagnosis for a ruptured TAA is that of chest pain, especially myocardial infarction with cardiogenic shock but also massive pulmonary embolism.
- The differential diagnosis for ruptured AAA involves other causes of abdominal pain, including acute abdomen.

Investigations

If an aneurysm is ruptured, investigations need to be swift and pertinent.

Laboratory studies

- **FBC: NB:** if there has not been time for haemodilution then haemoglobin will be normal. Anaemia is present in less than half of patients. Around 80% have a white cell count of $10 \times 10^9/L$ or more.
- **Group and rapid cross-match:** whilst arranging surgery.
- **Baseline biochemistry of U&Es:** should be performed.

Radiology

- **CXR:** for a TAA the CXR may well show an enlarged base of aorta.
- **Plain abdominal X-ray:** for an AAA this will show the lesion in about 75%, as it is often calcified.
- **Portable ultrasound:** this examination may be helpful but there is not time for detailed assessment. If there is strong suspicion of a ruptured aneurysm then immediate surgery may be the investigation of choice.
- **Other investigations:** CT angiography will confirm the diagnosis. MRI and angiography are an alternative but, practically, more time-consuming so probably only suitable for the stable patient.

ECG

- **ECG:** is important in patients presenting with chest pain.

Management

**This is a surgical emergency.**

- Get large bore intravenous access as soon as possible and preferably before hospital.\[5\]
- Group and cross-match. Large supplies of blood and blood products, including platelets and fresh-frozen plasma, should be readily available.
- Arrange theatre immediately.
- The aim of surgery in an unstable patient is to secure surgical proximal aortic control without disturbing any tamponade effect provided by extra-aortic structures or haematoma.
- Resuscitation of hypovolaemic shock may require surgery to stem the bleeding rather than satisfactory resuscitation before induction of anaesthesia. Therefore an experienced anaesthetist is essential.
- The leaking or ruptured piece of aorta is replaced by a prosthetic graft. Techniques previously used in elective surgery for pre-ruptured aneurysms, such as stent graft therapy, are now being used in patients with ruptured aneurysms, with encouraging results.\[6\]
- Emergency endovascular aneurysm repair has been used successfully to treat ruptured AAA, proving that it is feasible in selected patients. A Cochrane review found insufficient data to evaluate the relative benefits and risks of endovascular treatment for ruptured AAA when compared with open repair.\[1\]

Complications

Complications include:

- Acute kidney injury.
- Multi-organ failure.
- Respiratory problems, including respiratory failure and pneumonia.
Prognosis

No more than one in three patients with a ruptured aortic aneurysm will reach hospital alive; 20% of those who do, fail to reach theatre. Delay in diagnosis is likely to result in death. Factors associated with an increased likelihood of poor outcome include increasing age of the patient, failure of initial resuscitation to increase the blood pressure and pre-operative cardiac arrest.

Further reading & references


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