Immediate
Management of
Patient with
Ruptured aneurysm: **ISRCTN 48334791**
Open www.improvetrial.org
Versus
Endovascular repair

Trial Management Committee:

Janet Powell (Chairperson)
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Michael Sweeting, Simon Thompson, statisticians
Pinar Ulug, Clinical Trial Manager
Richard Grieve, Health Economist
Matt Thompson
Roger Greenhalgh
Ray Ashleigh, Radiologist

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Prof Ian Roberts (Chairperson)
Prof Sir Peter Bell
Anne Cheetham (Patient Representative)
Prof Janet Powell
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Trial supported by the NIHR Health Technology Assessment
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In addition, the following are members of the trial applicants committee: Bruce Braithwaite, Nick Cheshire, Taj Hassan, Simon Howell, Fionna Moore, Tony Nicholson, Chee Soong, Alison Walker

Rationale and Objectives

Without intervention ruptured AAA is fatal and the overall mortality exceeds 85%. About half of patients with ruptured aneurysms die in the community. Half of those patients arriving in Accident & Emergency do not reach the operating theatre alive. Among the patients who reach the operating theatre (for open surgical repair under general anaesthesia), only half will leave hospital alive. These stark figures have changed little over the last 50 years. In England there are about 1300 open surgical repairs for ruptured aneurysm each year, with 30-day and in-hospital mortality being similar at 47-8%. Further, the annual incidence of ruptured aneurysm is increasing in both men and women. Routine practice is to direct patients suspected of having a ruptured AAA directly to the operating theatre for open repair, without pre-operative CT scan.

The in-hospital care of these patients is costly, as many days are spent in the intensive care unit (a mean of 3.5 days for uncomplicated cases & 9.5 days in complicated cases) and the average hospital stay is long. Recuperation after discharge following open surgery for ruptured aneurysm can take up to 6 months, with further impact on the resources of the family, social care and general practice.

The operative mortality benefit of endovascular (versus open) surgical repair has been proved for the elective treatment of AAA. Similarly, the operative mortality for endovascular repair of ruptured AAA may be much lower than for conventional open repair. Systematic reviews, based on the selective patient series which have been published, indicate that the 30-day and in-hospital mortalities may be between 21 and 26%. The reduced hospital stays reported for endovascular repair of ruptured AAA also means that the in-hospital and 1-year costs of treating ruptured aneurysms by endovascular repair may be up to 40% lower than for treatment by open repair.

The principal question to be addressed is: "Can a strategy of preferential endovascular repair of ruptured AAA, versus the current practice of open repair, significantly reduce the 30-day & in-hospital mortality of ruptured AAA, from the >45% for open repair only to 30% for an endovascular first approach?"

Other outcomes which will be assessed in a multi-centre randomised trial include:

24-hour, and 1-year mortality, complications and re-interventions related to ruptured AAA repair in 1 year, other major morbidity (stroke, myocardial infarction, renal or respiratory failure) in 1 year, diagnostic accuracy, patient disposal, costs, quality of life and cost-effectiveness. 5-year follow-up for mortality and cost-effectiveness modelling also will be undertaken. The Hardman index will be used for case-mix adjustment and CT scans will be assessed in a core laboratory, so that modelling of which patients benefit from endovascular repair can be undertaken.

The Patient Cohort

Information will be recorded (form 1) for all patients with a clinical diagnosis of ruptured AAA made in hospital (Accident & Emergency, Emergency Care or Vascular Unit).

The trial will include <u>all</u> non-moribund patients, age >50 years, with a hospital diagnosis of ruptured AAA. This will include patients transferred from other hospitals with a diagnostic CT scan: these patients <u>must</u> be randomised before the anatomical suitability for endovascular repair has been decided at the trial hospital.

Randomisation will be stratified by participating centre and gender.

For every patient randomised to normal care and open repair, one patient will be randomised to a strategy of endovascular repair.

Baseline data are minimal, but information for ECG ischaemia (from either 3 or 12 lead ECG), loss of consciousness, haemoglobin, creatinine & age are essential to calculate the Hardman index for each randomised patient (forms 1 & 2).

Patient Exclusions

Patients with known connective tissue disorders (e.g. Marfan syndrome) where endovascular repair may not be beneficial.

Patient with known previous repair of an abdominal aortic aneurysm, because procedures either open or endovascular are likely to be very complex and there are no guidelines for anatomical restriction to repair.

Deeply unconscious or moribund patients since the chances of recovery are minimal.

When patients, other than the above, are excluded the reasons must be recorded on form 1 (log of aneurysm ruptures).

Patient consent

Consent legislation varies from country to country (even within the UK). In England, Wales and Northern Ireland, patients, who are too ill to give rapid, informed consent, can be randomised under the Mental Capacity Act. The Act does not apply in Scotland, but here verbal telephone consent from next of kin or welfare guardian is permitted.

For All Eligible Patients

1. Assess patient's ability to consent:

    i. Where patient **is** able to consent, please read the pre-operative information sheet to the patient (p.7&8)
    ii. Where patient is **not** able to consent, please seek consent from available relatives or welfare guardian (Scotland), carer (England & Wales). In Scotland if relatives or welfare guardian are not present, consent may be obtained by telephone.
    iii. If patient is **not** able to consent and there is no available person to give consent on their behalf, in England and Wales, complete the Emergency Enrolment form (p.9)

2. Discuss participation with patient or other giving consent on their behalf

3. For consented (including those under the Mental Capacity Act in England & Wales) patients, please complete Patient Eligibility and telephone The Sealed Envelope on 44-20-7099-3937 for randomised treatment outcome.

4. England, Wales & N Ireland ethics approval 08/H505/173, Scotland 08/MRE00/90

The following information sheet is to be read to the patient in England, Wales & Northern Ireland

You have a life-threatening condition where a major blood vessel has burst in your tummy. You need major surgery (an operation) on your tummy to repair the blood vessel and try to save your life.

Pause whilst the doctor waits for the patient to respond

There are two methods of doing this operation. The standard method involves cutting open your tummy and replacing the burst blood vessel.
The second is a new 'keyhole' technique that involves re-lining the bleeding blood vessel through the artery in your groin: this requires a special X-ray scan first and may lead to a slight delay with this treatment.

We do not know which treatment is best. So, we would like your permission to enter you in to a trial where we choose at random which operation you have.

The urgency of the situation means that we will discuss in detail what has happened after your operation.

You are under no obligation to take part in this study. If you decline, your care will not be compromised and you probably will have the standard open operation rather than the new treatment.

A different information sheet & consent form is available for Scotland

The actual information sheets are to be printed on participating hospital's headed paper with contact details of the local Principal Investigator

IMPROVE Trial
Consent form for England, Wales & Northern Ireland

I……have
(insert name of person taking consent)

read the statement overleaf to…….
insert name and underline status of person (patient/relative/carer) giving consent

Verbal/written consent has been given for……..to be entered into the IMPROVE trial. *Insert name of patient*

Signed Date
(patient/relative/carer)

Signature of person taking consent Date

Title

The actual consent forms will be printed on non-carbon copy required (NCR) paper and will be delivered to the participating site during the site initiation visit (following local approval of the trial).

IMPROVE Trial

Emergency enrolment form for England, Wales & Northern Ireland
Enrolment when patient/relative/carer consents unavailable

I……
(insert name of person enrolling patient)

agree the diagnosis of ruptured abdominal aortic aneurysm in

……..
insert name of patient

The patient cannot give informed consent and no relatives or carers are available for immediate consultation.

Signature of enroller Date

Title

Witnessed: I agree that verbal/written consent cannot be obtained for this patient.

Name of witness

Signature

Title

The actual emergency enrolment forms will be printed on non-carbon copy required (NCR) paper and will be delivered to the participating site during the site initiation visit (following local approval of the trial).

Form 1

Patient Log & Eligibility for Randomisation for all patients with a hospital clinical diagnosis of ruptured AAA

(5 Sections)

1 Centre and patient identifiers

Site ID ☐☐

Patient initials ☐☐☐

Date of Birth ☐☐ ☐☐ ☐☐ dd/mm/yy

Age (if dob unavailable) ☐☐ years

Gender male ☐ female ☐

Postcode where patient collected if known ☐☐☐☐ ☐☐☐

Section 2 is essential for randomised patients only

2 Details of *this* hospital episode

Date of admission ☐☐ ☐☐ ☐☐ dd/mm/yy

Time of admission ☐☐ ☐☐ hh:mm

Mode of arrival at hospital
- Ambulance from home ☐
- Ambulance from another hospital ☐
- Self/other ☐

Diagnosis of AAA rupture (*tick **all** that apply*)
- Clinical assessment ☐
- With an Ultrasound scan ☐
- Other (eg transfer with CT scan) ☐

Admission blood pressure:

Systolic ☐☐☐ mm Hg

Diastolic ☐☐☐ mm Hg

Acute Myocardial Ischaemia? on 3 or 12 lead ECG — Yes ☐ No ☐

Did the patient lose consciousness before randomisation? — Yes ☐ No ☐

See over page for Sections 3, 4 and 5

3 Checklist to exclude ineligible patients
(*if any **yes** is ticked the patient is excluded*).

This patient has had a previous AAA repair	Yes ☐	**No** ☐
This patient has a Marfanoid syndrome	Yes ☐	**No** ☐
This patient is moribund	Yes ☐	**No** ☐

Eligible patient

Other exclusions, give reasons:

……

4 Consent (*including* Mental Capacity Act enrolment)

Has consent for randomisation been obtained? **Yes** ☐ **No** ☐

If **yes:**

Written: From the patient ☐ From Relative//Carer ☐

Verbal: From the patient (witnessed by relative/carer/nurse/other) ☐

Other: Emergency Enrolment under Mental Capacity Act ☐

If you have a completed & signed consent *or* emergency enrolment form :
Call 020 7099 3937 for randomisation

Study No: 3873; Investigator No: _____

If **no:**

Refusal ☐

Unobtainable *(Scotland and where Mental Capacity Act does not apply)* ☐

If NO, do not randomise

5 Randomisation details

Treatment allocated (*tick **one** only*): CT & EVAR if possible ☐

Open repair ☐

Patient randomisation number ☐☐☐☐

Please, write patient randomisation ID on either the consent form *or* emergency enrolment form

Form 2

Baseline patient data and imaging details

1 *General baseline information*

Admission haemoglobin (*to **one** decimal point*) ☐☐.☐ g/dl

Admission creatinine ☐☐☐ µmol/l

Acute ischaemia demonstrated or reported on admission ECG
Yes ☐ No ☐

Total volume of iv fluid given before patient arrived in theatre ☐☐.☐ litres

Where possible please split by:

Pre-hospital ☐☐.☐ litres

A&E ☐☐.☐ litres

CT scan (dicom format) sent to core laboratory Yes ☐ No ☐

Patient identification log* completed for flagging? Yes ☐ No ☐
(*See your Principal Investigator Site file)

Lowest recorded blood pressure before transfer to either CT or theatre:

systolic ☐☐☐ mmHg

diastolic ☐☐☐ mmHg

2 CT Scanning

Patient received CT Scan? Yes ☐ No ☐

If yes: At the trial hospital ☐ **If no, go to Form 3**

At a different hospital ☐

Date of CT scan: ☐☐ ☐☐ ☐☐ dd/mm/yy

Patient arrived alive in CT scan Yes ☐ No ☐

Time of arrival ☐☐ ☐☐ hh:mm

Blood pressure on arrival:

systolic ☐☐☐ mmHg

diastolic ☐☐☐ mmHg

Summary of CT findings:

AAA confirmed	Yes ☐	No ☐
Rupture observed	Yes ☐	No ☐
Suitable for EVAR	Yes ☐	No ☐

If **not** suitable for EVAR, tick all reasons that apply:

Neck ☐
Iliacs ☐
Access ☐
Other ☐

If **no** AAA, give any other obvious diagnosis:

……..

Form 3

Operation data

Date of operation: ☐☐ ☐☐ ☐☐ dd/mm/yy

Patient sent to: (*tick **one** only*)
theatre ☐ endovascular suite ☐

Patient arrived alive for aneurysm repair Yes ☐ No ☐

Time of arrival in theatre/endovascular suite ☐☐ ☐☐ hh:mm

Blood pressure on arrival :
systolic ☐☐☐ mm Hg
diastolic ☐☐☐ mm Hg

Was supracoeliac balloon inflated? Yes ☐ No ☐

Anaesthesia:
Initiated procedure with: LA ☐ GA ☐
GA used later Yes ☐ No ☐

Procedure (*tick **one** only*):
EVAR ☐
EVAR Converted to open ☐
Open repair ☐
No AAA op, palliation ☐
Other ☐

If **other**, specify procedure/diagnoses

……

Graft type (*tick **one** only*)
Tube ☐
Bifurcated ☐
Aortouni-iliac ☐

Graft manufacturer/type (optional): _____

Volume of contrast used in procedure ☐☐☐ ml

Was Fem-fem crossover also performed ? Yes ☐ No ☐

Blood products used:

Blood	☐☐	units
Platelets	☐☐	units
Fresh frozen plasma	☐☐	units

Clinicians present:

Surgeon ☐ Radiologist ☐ Both ☐

Patient left theatre alive Yes ☐ No ☐

Time out of theatre ☐☐ ☐☐ hh:mm

Patient sent to (*tick **one** only*):

Recovery ward ☐ ITU/HDU ☐ Routine ward ☐

Following Operation

1. Please complete Form 4 of the CRF.

2. When the patient is awake and fully aware, discuss with them the trial, providing them with the appropriate "Post-operative Patient Information" form (EVAR – template p17-23 or Open Repair – template p24-29). Re-consent the patient for continued participation in the trial (template p 30).

3. For patients who survive the treatment but do not regain consciousness, consent for continued participation in the trial is still required (after approximately 10 days). A relative or carer should be identified as a Consultee, discuss with them the trial, providing them with the appropriate Post-operative Information form and Consultee Assent form (EVAR or Open Repair). Where no relative/carer/welfare guardian is available, a trained Consultee from you hospital should be asked to consider the post-operative consent.

4. Send the general or family practitioner the letter (p31) regarding the patient's treatment and participation in the trial.

5. Patient details are obtained to enable "flagging" for eventual date and cause of death with national information services.

6. DICOM copy of pre-operative CT scan to be anonymised and sent to core laboratory at Imperial College (Charing Cross), UK.

7. The number of organ systems supported on ITU/HDU/CCU is calculated from respiratory (ventilation), cardiovascular (eg ECG monitor, CVP line, iv fluids), renal (replacement therapy), neurological, gastrointestinal (parenteral or enteral nutrition), dermatological. This number is used to estimate costs of care on specialist units. Please report the maximum number of systems reported in any one day.

Post-operative Patient Information after Endovascular Repair

Summary

You have suffered a ruptured abdominal aortic aneurysm. This is a condition where the main blood vessel in your tummy has swollen over many years and burst causing extensive bleeding. Many patients with your condition do not survive to reach hospital alive. Of those that reach hospital alive only 50% will survive the operation to repair the aorta and stop the bleeding.

Until recently there was only one way to repair the ruptured aneurysm. This involved major surgery with a large cut in the tummy and replacement of the diseased aorta with a plastic (Polyester) tube (open surgery). Recent technical advances have made it possible to re-line the ruptured aorta using a stent introduced through two small cuts in the groin (endovascular repair). However, at present we do not know which of the treatments is best for people with your condition.

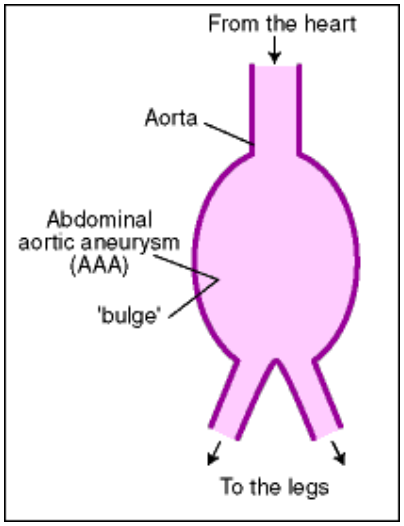
You have been enrolled in a trial involving a number of specialist UK hospitals. The trial compares the two techniques for repair of ruptured abdominal aortic aneurysm in many patients. When you were admitted to hospital you consented to receive either open surgery or endovascular repair. The treatment was randomly allocated so we did not know which treatment you were to receive until you entered the trial. You received an endovascular repair, and we shall advise your GP of this when you leave hospital.

You are under no obligation to continue in the study and you may withdraw any time without giving a reason. If you withdraw from the study, your care will not be compromised and you will be offered standard follow-up. Most surgeons suggest at least yearly scans and clinic visits following endovascular repair to ensure it continues to work effectively.

If you wish to remain in the trial you will be asked to attend two clinic appointments and 2 CT scans in the first post-operative year and will be required to reply to two questionnaires (see schedule).

What is an AAA?

An aneurysm is a localised, balloon-like stretching of a weakened artery (blood vessel) wall. Although this can happen to any artery in the body, the most commonly affected vessel is the aorta which is the main central artery in the body. It carries blood from the heart down through the chest and abdomen (stomach) and branches out to all of the body's major organs. A normal aorta is about 1.5-2.5cm (¾ -1 inch) in diameter.



This diagram shows what your aorta looks like with an aneurysm

Aortic aneurysms are often silent with no obvious symptoms. However, about 1 in 4 patients will experience some symptoms such as tenderness in the chest or stomach area, back pain and/or reduced blood flow to their legs. When an abdominal aortic aneurysm increases in size, and particularly when the diameter is 5.5cm (2 ¼ inches) or greater, there is an increasing risk that the artery wall will leak or even burst. This is known as a "rupture" and leads to dangerous bleeding inside the body.

Ruptured abdominal aortic aneurysm

A ruptured aneurysm can be associated with severe pain in the stomach or back area, a rapid heart beat, a pulsing sensation in the stomach and skin feeling "cold and sweaty". Only 2 in 10 people survive an aortic aneurysm rupture and just half of all patients manage to get to a hospital at all. About 12000 people die from ruptured aneurysms in U.K. every year.

What causes an abdominal aortic aneurysm?

Aortic aneurysm can occur when the wall of the aorta has been damaged and weakened by one or more of the possible risk factors such as:

• Smoking
• High blood pressure
• Atherosclerosis - build up of fatty deposits leading to deterioration of the artery wall and loss of elasticity
• Inherited aortic wall weakness / family history
• Age

Infection and injury are also thought to be possible causes for the artery to expand and form an aneurysm.

Who gets an abdominal aortic aneurysm?

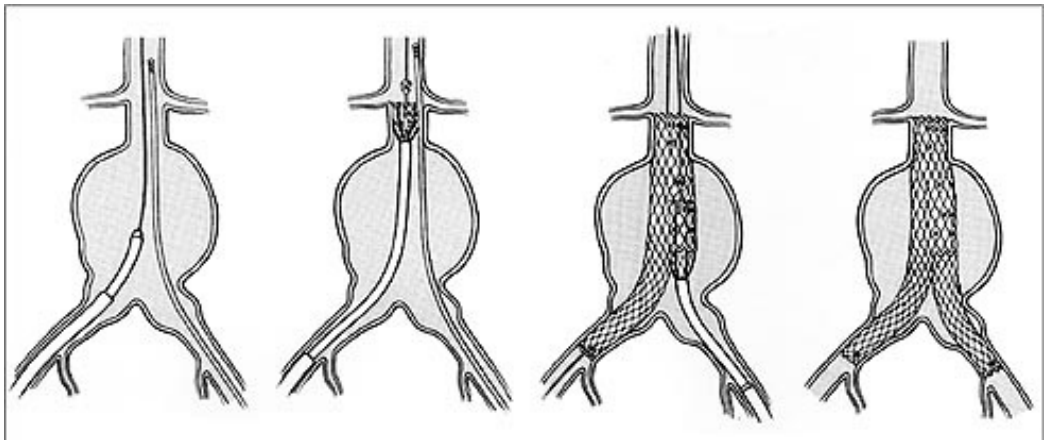
Aneurysms occur in approximately 1 in 20 men over the age of 65. They are four to five times more common in men than women. There is also an increased risk of a younger man developing an aneurysm if his father, mother or brother has been diagnosed with the condition.

What is Endovascular stent-graft repair (EVAR) of an abdominal aortic aneurysm?

EVAR was developed in the early 1990s by surgeons in the Ukraine and Argentina as a less invasive alternative to open aneurysm repair. The procedure is carried out by a specialised team sometimes including both Vascular Surgeons and Interventional Radiologists. As the patient can be given a local anaesthetic instead of a general anaesthetic, the repair can be carried out either in an operating theatre or in an angiography suite in the Radiology Department.

A small cut is made in each groin to allow access to the femoral arteries and catheters are passed through these arteries into the aneurysm. Using X-ray for guidance, the synthetic endovascular stent-graft is passed through the catheters up to the aneurysm and positioned at the top and bottom of the diseased part of the aorta. The main body of the graft is located in the aorta and the legs extend down from the main body into the iliac arteries. The stent-

graft is then expanded inside the aneurysm and fastened in place by metal stents to form a new stable channel for blood flow and seals off (excludes) the aneurysm. The graft strengthens the weakened aorta wall and prevents the aneurysm from rupturing.



This diagram shows the catheter being passed up through the aneurysm and then the stent –graft being passed up through the catheters. It is positioned at the top and bottom parts of the aneurysm and expanded to fasten in place.

There may be a need for additional endovascular or surgical procedures before, during or after the main procedure in order to complete the EVAR deployment successfully. These may include stents in the iliac arteries, “blocking off” of selected arteries or bypass grafting. Endovascular repair usually takes 2 to 3 hours to complete. During this period the correct positioning of the graft requires further X-ray studies and hence exposure to further radiation.

Most patients will spend time in a High Dependency or Intensive Care unit and will remain in hospital for a total of 4-6 days. It is possible to return to normal activity within 4 to 6 weeks. Because the long term results of endovascular repair have not yet been established, it is required that patients attend routine follow-up visits at the hospital for the rest of their life. They also need to have a CT scan every year to monitor the status of both the old aneurysm and the endovascular stent-graft.

What are the risks and complications with treatment?

Ruptured aortic aneurysm is an immediately life threatening procedure. Without an operation patients do not survive. Consequently operations to save patients lives are associated with major complications. These include heart attack, stroke, kidney failure or chest problems, and can be fatal. In a minority of cases, there may be a small amount of new bleeding or the new graft in your aorta may move slightly and threaten the integrity of the repair.

Computed Tomography (CT) scan

This permits your doctors to see how well the new graft in your aorta is working. In order to obtain a CT scan, the patient has to lie flat on his / her back in the CT scanner and extend both arms above the head. The scanner reviews the patient's body and breaks it down into a series of "slices"; the thickness of which can be chosen at the beginning of the scan. These "slices" are then used to build a picture of the inside of the body and the thinner the slices, the greater the amount of detail and information that can be obtained. This will allow your doctors to check that there is no renewed bleeding and that the graft is staying in its original position. The CT scan will expose you to some radiation, but this radiation is unlikely to increase your risk of developing cancer.

Follow-up schedule

	Endovascular repair
Clinic visit	3 months after operation 12 months after operation
CT scan	3 months after operation 12 months operation
Questionnaire	3 months after operation 12 months after operation
Hospital notes review	Up to 5 years after operation
Health status check	Beyond 12 months

Will my taking part in this study be kept confidential?

If you agree to continue in this trial, some parts of your medical records and the data collected for the study will be looked at by authorised persons from the team organising the research. They may also be looked at by representatives of regulatory authorities and by authorised people to check that the study is being carried out correctly. The NHS Information Centre and NHS Central Register may use this information to help contact you and provide information about your health status. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

Who has reviewed this study (the IMPROVE trial)?

The Health Technology Assessment programme of the National Institute for Health Research is supporting this study. The study has received a favourable ethical opinion for conduct by the Berkshire Research Ethics Committee and the Scotland A Research Ethics Committee.

What if something goes wrong?

Imperial College London (the trial Sponsor) holds insurance policies which apply to this study. If you experience harm or injury as a result of taking part in this study, you will be eligible to claim compensation without having to prove that Imperial College is at fault. This does not affect your legal rights to seek compensation.

If you are harmed due to someone's negligence, then you may have grounds for a legal action. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been treated during the course of this study then you should immediately inform the Chief Investigator *(Professor Janet T. Powell) and local Principal Investigator, whose contact details have been provided on page 1.* The normal National Health Service complaints mechanisms are also available to you. If you are still not satisfied with the response, you may contact the Imperial College Joint Research Office .

Further information

If you have any questions about the study, please speak to your study nurse or doctor, who will be able to provide you with up to date information about the procedures involved.

If you would like to read more about this trial you can contact:

Name:

Telephone/ Email:

Study website: www.improvetrial.org

ClinicalTrials.gov Identifier: NTC00746122 www.clinicaltrials.gov

Post-operative Patient Information after Open Surgery

Summary

You have suffered a ruptured abdominal aortic aneurysm. This is a condition where the main blood vessel in your tummy has swollen over many years and burst causing extensive bleeding. Many patients with your condition do not survive to reach hospital alive. Of those that reach hospital alive only 50% will survive the operation to repair the aorta and stop the bleeding.

Until recently there was only one way to repair the ruptured aneurysm. This involved major surgery with a large cut in the tummy and replacement of the diseased aorta with a plastic (Polyester) tube (open surgery). Recent technical advances have made it possible to re-line the ruptured aorta using a stent introduced through two small cuts in the groin (endovascular repair). However, at present we do not know which of the treatments is best for people with your condition.

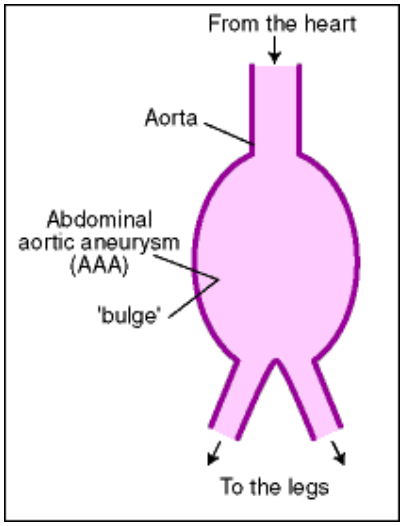
You have been enrolled in a trial involving a number of specialist UK hospitals. The trial compares the two techniques for repair of ruptured abdominal aortic aneurysm in many patients. When you were admitted to hospital you consented to receive either open surgery or endovascular repair. The treatment was randomly allocated so we did not know which treatment you were to receive until you entered the trial. You received an open repair, and we shall advise your GP of this when you leave hospital

You are under no obligation to continue in the study and you may withdraw any time without giving a reason. If you withdraw from the study, your care will not be compromised and you will be offered standard follow-up. In your case this usually comprises one or two clinic visits post-operatively.

If you wish to remain in the trial you will be asked to attend two clinic appointments in the first post-operative year and will be required to reply to two questionnaires (see schedule). We also shall ask for your permission to review your hospital notes for up to 5 years after your operation.

What is an AAA?

An aneurysm is a localised, balloon-like stretching of a weakened artery (blood vessel) wall. Although this can happen to any artery in the body, the most commonly affected vessel is the aorta which is the main central artery in the body. It carries blood from the heart down through the chest and abdomen (stomach) and branches out to all of the body's major organs. A normal aorta is about 1.5-2.5cm (¾ -1 inch) in diameter.



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Ruptured abdominal aortic aneurysm

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What causes an abdominal aortic aneurysm?

Aortic aneurysm can occur when the wall of the aorta has been damaged and weakened by one or more of the possible risk factors such as:

• Smoking

• High blood pressure

• Atherosclerosis - build up of fatty deposits leading to deterioration of the artery wall and loss of elasticity

• Inherited aortic wall weakness / family history

• Age

Infection and injury are also thought to be possible causes for the artery to expand and form an aneurysm.

Who gets an abdominal aortic aneurysm?

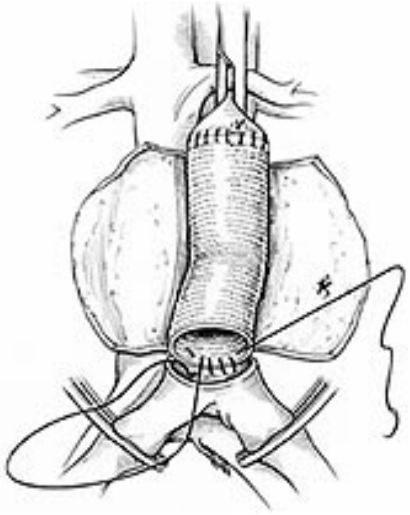
Aneurysms occur in approximately 1 in 20 men over the age of 65. They are four to five times more common in men than women. There is also an increased risk of a younger man developing an aneurysm if his father, mother or brother has been diagnosed with the condition.

How is abdominal aortic aneurysm diagnosed?

As an aneurysm is often symptom free, it is frequently diagnosed by chance when a patient is being examined for another problem or undergoing an x-ray or ultrasound scan for a different reason. Alternatively, a patient may visit their doctor due to stomach or back pain which needs to be investigated. An ultrasound scan is a very good way to tell if there is an aneurysm present and how large it is. This is a quick and painless procedure, which is commonly used for scanning pregnant women, where a hand-held scanning device is passed over the skin on the stomach using special gel. The resulting sound waves are used to build pictures of the internal organs which can be used to diagnose and follow the changes in size of an aneurysm. If an aneurysm is suspected, a doctor or hospital consultant will refer the patient to hospital for an ultrasound scan. An alternative method for the detection of aneurysms is called a CT scan (computerised tomography). This involves being placed inside a sophisticated X-ray scanner. A CT scan is the best way to confirm the aneurysm has ruptured.

What is open surgical repair of an abdominal aortic aneurysm?

This method of aortic aneurysm repair was developed in the mid-1950s. It is a major operation carried out by Vascular Surgeons in an operating theatre and the patient is given a general anaesthetic. A large cut, starting from just below the chest, is usually made lengthways to the abdomen to expose the aorta and clamps are temporarily placed above and below the aneurysm to shut off the blood flow through the vessel and stop the bleeding. Blood flow to the legs is interrupted while the aorta is clamped. This is not usually a problem as heparin is given to prevent the blood from clotting. The aneurysm is cut open and any blood clot or debris is removed from within it. The artificial graft is then sewn onto the blood vessel at the top and bottom of the aneurysm sac where there is no disease, so that it lies within what was the inside of the aneurysm. When the clamps have been removed and blood flow is re-established without any leaks, the wall of the aneurysm is closed over the graft to protect it. Patients will require a blood transfusion during or after the operation to replace several litres which is typically lost during the procedure although this amount may be much greater in difficult or prolonged operations. The surgery usually takes 2 – 3 hours to complete.



This diagram shows an artificial graft being sewn into the artery inside the aneurysm.

Hospital stay, recovery time and follow-up:

Most patients will spend several days or longer after an open repair in an Intensive Care Unit (ICU). They will remain in hospital for a total of 7-10 days or more. Full recovery from a major operation of this type can typically take up to 3-6 months. Long term complications after a successful repair are

comparatively rare. The grafts are known to last for 20-30 years and so patients do not need further follow-up appointments beyond twelve months after a successful repair for aneurysm rupture.

What are the risks and complications associated with open surgical repair?

Ruptured aortic aneurysm is an immediately life threatening procedure. Without an operation patients do not survive. Consequently operations to save patients lives are associated with major complications, which include heart attack, stroke, kidney failure, chest and wound problems.

Follow-up schedule for continued participation in the trial

	Open surgery
Clinic visits	3 months after operation 12 months after operation
Questionnaires	3 months after operation 12 months after operation
Hospital note review	Until 5y after operation

Will my taking part in this study be kept confidential?

If you agree to continue in this trial, some parts of your medical records and the data collected for the study will be looked at by authorised persons from the team organising the research. They may also be looked at by representatives of regulatory authorities and by authorised people to check that the study is being carried out correctly. The NHS Information Centre and NHS Central Register may use this information to help contact you and provide information about your health status. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

Who has reviewed this study (the IMPROVE trial)?

The Health Technology Assessment programme of the National Institute for Health Research is supporting this study. The study has received a

favourable ethical opinion for conduct by the Berkshire Research Ethics Committee and the Scotland A Research Ethics Committee.

What if something goes wrong?

Imperial College London (the trial Sponsor) holds insurance policies which apply to this study. If you experience harm or injury as a result of taking part in this study, you will be eligible to claim compensation without having to prove that Imperial College is at fault. This does not affect your legal rights to seek compensation.

If you are harmed due to someone's negligence, then you may have grounds for a legal action. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been treated during the course of this study then you should immediately inform the Chief Investigator *(Professor Janet T. Powell) and local Principal Investigator, whose contact details have been provided on page 1.* The normal National Health Service complaints mechanisms are also available to you. If you are still not satisfied with the response, you may contact the Imperial College Joint Research Office .

Further information

If you have any questions about the study, please speak to your study nurse or doctor, who will be able to provide you with up to date information about the procedures involved

If you would like to read more about this trial you can contact:
Name:
Telephone/ Email:
Study website: www.improvetrial.org
ClinicalTrials.gov Identifier: NTC00746122 www.clinicaltrials.gov

IMPROVE Trial

Post-operative consent form for England, Wales & Northern Ireland

The post-operative information sheet dated 5th March 2010 (version 4.1) **has been read by:**

……

<insert name of patient>

They have agreed to their continued participation in the IMPROVE Trial.

……

<patient signature / initials>

They have also agreed to their personal data being kept for up to 5 years. Further information about their health status may be obtained from NHS Information Centre and NHS Central Register.

……

<patient signature / initials>

Signed **Date**
(patient)

Signature of person taking consent Date

Title/Name

When completed, original to be kept in medical notes, one copy for patient, one copy for investigator site file

Emergency AAA Trial – GP Information

The standard treatment for ruptured abdominal aortic aneurysm (AAA) has been open surgery. However, recent evidence from small studies suggests that patients may benefit from minimally invasive endovascular repair. A UK multicentre randomised trial was commenced in 2009 to establish whether a policy of EVAR could really reduce the in-hospital mortality of ruptured AAA

Your patient …….. has been enrolled in the trial. They presented with ruptured abdominal aortic aneurysm on ……. and consented to the trial. They were randomised to open / endovascular repair and underwent surgery at ……. hospital.

Follow-up schedule

	Open surgery	**Endovascular repair**
Clinic visit	1-3 months post-op 12 months post-op	1-3 months post-op 12 months post-op
CT scan	Not required	1-3 months post-op 12 months post-op
Questionnaire	1-3 months post-op 12 months post-op	1-3 months post-op 12 months post-op

Form 4

Hospital discharge and death form for primary admission

Was patient discharged from hospital alive? Yes ☐ No ☐

If **yes**:

Date of discharge ☐☐ ☐☐ ☐☐ dd/mm/yy

Patient discharged to (tick **one**)

Home	☐
Another hospital – Routine bed	☐
Another hospital – ITU/HDU*	☐
Nursing home	☐
Residential home	☐
Sheltered accom.	☐
Other	☐

If transferred to another hospital:

Date of discharge ☐☐ ☐☐ ☐☐ dd/mm/yy

If **no:**

Date of death ☐☐ ☐☐ ☐☐

*** If ITU at another hospital please obtain ITU discharge form and complete a further Form 5 wherever possible**

All patients who survive AAA repair must be approached for post-operative consent before discharge from the trial hospital.

Form 5

Critical care resources used in primary admission

For second and each subsequent admission please complete a separate Form 5

	Care level ITU = 1 HDU = 2 CCU = 3	Organ systems supported use 0-6 score	Date
Day 1	☐	☐	☐☐ ☐☐ ☐☐ dd/mm/yy
Day 2	☐	☐	
Day 3	☐	☐	
Day 4	☐	☐	
Day 5	☐	☐	
Day 6	☐	☐	
Day 7	☐	☐	
Day 8	☐	☐	
Day 9	☐	☐	
Day 10	☐	☐	
Day 11	☐	☐	
Day 12	☐	☐	
Day 13	☐	☐	
Day 14	☐	☐	

Maximum intra-abdominal pressure recorded on ITU or HDU (Optional) ☐☐☐

Days in intensive care ☐☐

Days in high dependency ☐☐

Days on routine ward ☐☐☐

Other specialist care provided

Renal replacement therapy Yes ☐ No ☐

Days on coronary care unit ☐☐

Was percutaneous coronary intervention necessary? Yes ☐ No ☐

Days on stroke unit ☐☐

Form 6

Summary of re-interventions

For each further procedure please complete a separate Form 6

Further interventional procedures on primary admission

Return to **endovascular suite** for reintervention? Yes ☐ No ☐

Treatment coexisting condition unrelated to AAA? Yes ☐ No ☐

If **yes**:

Date: ☐☐ ☐☐ ☐☐ dd/mm/yy

Time in endovascular suite ☐☐☐ mins

OR

Return to **operating theatre** for re-intervention or treatment of coexisting condition ? Yes ☐ No ☐

If **yes:**

Date: ☐☐ ☐☐ ☐☐ dd/mm/yy

Time in operating theatre ☐☐☐ mins

Reason for further intervention:

Control bleeding	Yes ☐	No ☐
Limb ischaemia	Yes ☐	No ☐
Mesenteric ischaemia	Yes ☐	No ☐
Abdominal compartment syndrome	Yes ☐	No ☐

Other (*give main reason*)

……..

Follow Up

1. Patients who have been discharged following operation will be required to attend outpatient follow up appointments according to local hospital practice.

2. Within 3 months post-operation the patient will be asked to attend an outpatient appointment where follow up information will be obtained (forms found in 3 month follow up folder):
   - EuroQol form completed
   - "Health Resources" questionnaire will be supplied for UK patients to complete at home
   - Patients with endovascular repair will have a CT scan
   - Any re-interventions between the operation and the 3 month follow up session should be recorded on Form 7 of the CRF. Please also complete Form 6 for each intervention and Form 5 for each hospital stay

3. At 12 months post-operation the patient will be asked to attend a further outpatients appointment where follow up information will be obtained (forms found in 12 month follow up folder):
   - EuroQol form completed
   - "Health Resources" questionnaire will be supplied for UK patients to complete at home
   - Any re-interventions between the 3 month follow up and the 12 month follow up session should be recorded on Form 8 of the CRF. Please also complete Form 6 for each intervention and Form 5 for each hospital stay

   Please note that copies of any 12-month CT scan images are <u>not</u> required to be sent to the trial office.

Form 7

1-3 month follow-up form

Form 7 completion date: ☐☐ ☐☐ ☐☐ dd/mm/yy

1. For patients leaving hospital after EVAR

Has a 1-3 month* CT scan been obtained? Yes ☐ No ☐

* **flexible** timeline; follow-up CT can be obtained anywhere between 1-3 months post aneurysm repair, depending on your hospital's standard EVAR surveillance protocol.

If **yes**, has a copy of the scan been sent to the core laboratory for endoleak analysis? Yes ☐ No ☐

2. For *all* patients

Is patient still alive? Yes ☐ No ☐

If **no**, date of death if known: ☐☐ ☐☐ ☐☐ dd/mm/yy

3. Aneurysm-related resources since discharge after primary admission

Re-intervention to support AAA repair Yes ☐ No ☐

For each further re-intervention, please complete an additional Form 6

If **yes** give principal reason

……

Adjunct Endovascular Procedure	☐
Conversion to Open Repair	☐
Adjunct abdominal surgery	☐
Distal angioplasty	☐
Distal surgery	☐
Other	☐

4. Out-patient & in-patient visits to trial hospital– (aneurysm related only)

Outpatient visits, give total number ☐☐

Date of in-patient admission ☐☐ ☐☐ ☐☐ dd/mm/yy

Date of discharge/death ☐☐ ☐☐ ☐☐ dd/mm/yy

Inpatient stay (including day case =1) ☐☐☐ days

Number of days on ITU ☐☐

Form 8

12 month follow-up form

Form 8 completion date: ☐☐ ☐☐ ☐☐ dd/mm/yy

1.For *all* patients

Is patient still alive? Yes ☐ No☐

If If **no**, date of death if known: ☐☐ ☐☐ ☐☐ dd/mm/yy

Please note that copies of any 12-month CT scan images are not required to be sent to the trial office.

2.Aneurysm-related resources

Re-intervention to support AAA repair Yes ☐ No ☐

For each further re-intervention, please complete an additional Form 6

If **yes** give principal reason

……

- Adjunct Endovascular Procedure ☐
- Conversion to Open Repair ☐
- Adjunct abdominal surgery ☐
- Distal angioplasty ☐
- Distal surgery ☐
- Other ☐

3.Out-patient & in-patient visits to trial hospital– (aneurysm related only)

Outpatient visits, give total number ☐☐

Date of in-patient admission ☐☐ ☐☐ ☐☐ dd/mm/yy

Date of discharge/death ☐☐ ☐☐ ☐☐ dd/mm/yy

In-patient stay (including day case =1) ☐☐☐ days

Number of days on ITU ☐☐