Complex Endovascular Aneurysm Repair (EVAR)
(Fenestrated EVAR / Branch EVAR)

Introduction

The vascular team has developed this booklet to give you some information on the process of having your aortic aneurysm repaired and your expected recovery after discharge.

Take your time reading the booklet; it is important that you feel able to take an active role in your recovery.

Our aim is to inform you about what to expect in hospital and prepare you for your recovery at home. It is not meant to replace discussion between you and your doctor.

What is an Abdominal Aortic Aneurysm?

An abdominal aortic aneurysm, (also known as AAA or triple A) is a wide, weakened part in your aorta - the largest artery in your body that carries blood to your abdomen, pelvis and legs. The aorta extends upwards from the heart in the chest (ascending thoracic aorta) then curves like a candy cane (aortic arch) downwards through the chest area (descending thoracic aorta) into the abdomen (abdominal aorta). The aorta delivers oxygenated blood pumped from the heart to the rest of the body. The most common area for an aneurysm to form in the aorta is in the abdomen, specifically, the segment below the kidneys.

However, sometimes the aneurysm may extend close to or above the renal arteries, causing the aneurysm to be classed as a complex aortic aneurysm. Safe and durable repair of these aneurysms requires a very different pathway.

National Vascular Registry

It is important that we retain information about patients who undergo vascular surgery, including the repair of abdominal aortic aneurysms, in order to help improve surgical services.

We therefore ask all patients undergoing AAA treatment (or their nearest relative) to give permission for their personal information to be stored on the National Vascular Registry (NVR). Analysis of data on the NVR, including the results of AAA surgery, enables us to monitor and compare the performance and quality of services throughout the country.

Although the database is a national system, strict data governance means personal details on the NVR can only be accessed by staff involved directly in an individual's treatment.

Patient information is confidential and is not passed on to third parties other than healthcare professionals directly involved in an individual's care.

If you have any queries about this then please discuss these and your decision to consent with the surgeon involved in your care.

DVLA advice on driving

Car or motorcycle driving licence holders (GROUP 1 ENTITLEMENT)
If you hold a car or motor cycle licence you will need to inform the DVLA if your abdominal aortic aneurysms reach **6 cm** in diameter. Licensing will be permitted subject to annual review.

Driving may continue after satisfactory blood pressure control or surgical treatment, without evidence of further enlargement. There should be no other disqualifying condition.
An aortic diameter of 6.5cm or more disqualifies you from driving.

Bus, Coach, or Lorry, driving licence holders (GROUP 2 ENTITLEMENT)
If you hold a bus, coach or lorry driving licence **(VOC-LGV/PCV)**, you will be disqualified from driving if the aortic diameter is 5.5cm or more. Driving may continue after satisfactory surgical treatment, unless other disqualifying condition.

If you require further information please contact the DVLA

Why repair an AAA?

Reasons an abdominal aortic aneurysm repair may be performed include the following:

- To prevent rupture
- To relieve symptoms
- Life-saving surgery if the aneurysm has gone on to rupture

Even though the risk of rupture increases beyond 5.5cm, the decision to repair it will still depend on the individual's balance of risks to operating versus leaving it alone and not operating. In some individuals with co-existing severe medical conditions surgery is not recommended if the risks of surgery are prohibitively dangerous.

There are two approaches to abdominal aortic aneurysm repair. The traditional surgical procedure for AAA repair is called the 'open repair'. An alternative less invasive procedure is the Endo-Vascular Aneurysm repair (EVAR). The choice of technique depends on your fitness for surgery and the anatomy of the aneurysm (the size and shape of the artery). Your surgeon will have discussed this with you. This information booklet is about the Endovascular repair (EVAR) for complex aneurysms.

Potential benefits of having an EVAR

Endo-Vascular means 'inside the blood vessels', therefore the advantage of having an EVAR is that there is no large cut in your tummy (abdominal surgery). This technique is therefore generally safer than the traditional open operation and you will normally only spend 5 – 7 days in hospital with a short stay in the High dependency Unit (HDU). A potential disadvantage to having an EVAR is that some patients have to undergo a further procedure at a later stage to refine the initial procedure but this is almost always done using a minimally-invasive/keyhole approach.

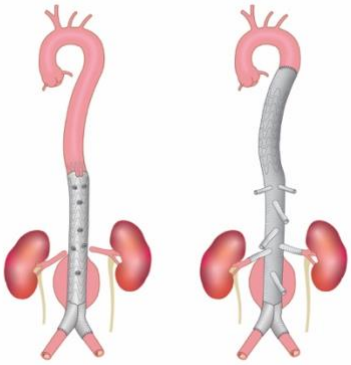
How is EVAR performed?

The procedure is performed in the operating theatre under a general anaesthesia (you will be asleep). The surgeon may make a number of incisions which may include each groin and below your right or left collar bone to access the aorta. Next a number of wires are passed up inside the aorta via the arteries and a stent-graft passed over the wires into the aneurysm. Throughout all of this x-rays are used to guide the placement of the stent-graft and imaging (angiograms) performed to be certain of the correct position. Once in the correct position the stent-graft is deployed and allowed to open up inside the aorta sealing off the aneurysm.

Your blood will then flow through the graft and smaller stents are then inserted into the fenestrations (pre-planned windows) or branches into your arteries to keep them patent (open). The cuts in your groins or under the collar bones will be closed with dissolvable stitches. Most stent-grafts are made up of three components that are designed to interlock with each other inside the aorta to keep it in place and replace the diseased aorta.

Your operation may be staged? (More than one operation)

In some cases (where the aneurysm involves the aorta in the chest) it is necessary to do more than one operation, which may take 2 or 3 procedures. This approach is used to diverting the blood flow from different vessels to stop ischaemic complications occurring due to poor blood supply. We may also operate on one section of the aorta and let your body adapt before progressing to a second stage. This staged approach to repair is commonly used to reduce the risk of paralysis or weakness of the legs due to poor blood supply to the spinal cord which carries signals to your legs from the brain and from the legs back to the brain. Whether your operation requires one or more stages will be discussed at your assessment by your vascular consultant.



After the operation

Endovascular surgery for complex AAA may take between 3 – 6 hours and patients will go to HDU for at least one night to be monitored. Depending on the complexity of the surgery the patient may have to maintain a lying position of 30 degrees for 24 – 48 hours to reduce the risk of problems related to poor blood supply to the spinal cord (spinal cord ischaemia).

Risks of the procedure

As with any surgical procedure, potential problems can occur during and after aortic aneurysm surgery. These fall into two categories: generalized complications and local complications. Both types of complication can prolong the stay in hospital and may be fatal if they are severe enough. The risk of death within 30-days of an EVAR for a complex aneurysm is 2%.

Generalised complications

This means problems that occur away from the site of the operation, and happen because a major operation under general anaesthesia has been performed.

The commonest types of generalized complications usually occur in the heart or lungs. They take the form of angina (chest pain), irregular heart rhythm, heart attacks and chest infections. In the majority of patients, especially those having a planned operation, these complications can be successfully treated.

Impairment of kidney function can occur because of either blood clot in the kidney arteries or as a result of the contrast used during the placement of the stent-graft. This is usually temporary and will be monitored closely with regular blood tests. The risk of permanent damage to the kidneys requiring life-long kidney dialysis is less than 1%.

Spinal cord ischaemia occurs due to poor blood supply to the spinal cord and can lead to permanent or temporary leg paralysis or weakness. This type of complication is more likely to occur after EVAR for complex aneurysms involving the chest and the abdomen (thoraco-abdominal aneurysms) and a staged approach to repair may be used in order to reduce the risk. The risk of spinal cord ischaemia for thoraco-abdominal aneurysms is 2%.

Another generalized complication that can occur with any operation is deep venous thrombosis (DVT). To help reduce the risk of DVT, anti-embolic graduated compression stockings may be used, providing there is no evidence of hardening of the arteries in the legs. Most patients also receive a daily tiny injection whilst in hospital to reduce the risk of blood clots forming. After your operation you will be encouraged to move around as early as possible.

Local complications

This means problems related to the site of the operation.

- Occasionally replacement of the major artery in the abdomen can lead to impairment of the blood supply to part of the colon (colonic ischemia). If this becomes very severe then further surgery can be necessary to remove the damaged colon and a colostomy formed to prevent further complications. This is normally permanent.

- Blood supply to your legs can be affected during or after the operation and limb ischemia (loss of blood flow to the legs/feet) occurs. Following your operation your legs and feet will be monitored for any signs of lack of blood flow. Occasionally further surgery may be required to rectify this problem. Rarely this may result in loss of a limb (amputation).

- Very rarely after EVAR an infection can develop in the artificial graft. If this does occur it can be a major problem and will probably lead to further surgery to fix the problem or treatment with long-term antibiotics. Antibiotics will be given at the start of the operation and sometimes for one or two doses after the operation to help reduce the risk of infection.

- Physiotherapy will also be started shortly after the operation to prevent secretions accumulating in the chest and help reduce the risk of chest infections.

- Endovascular stent grafts can sometimes leak blood through the areas where the graft components join together. This can allow blood to leak back into the aneurysm sac and this is also the case with back-bleeding into the aneurysm through small arteries feeding the

aneurysm sac. These are called endoleaks. Some of these endoleaks go away by themselves and are not dangerous, but others need to be treated. Endoleaks can even occur years after your procedure.

Your vascular consultant will explain your risks depending upon your specific medical condition. It is important that you discuss any concerns you may have with your vascular surgeon before the operation.

What happens before the procedure?

If you smoke, you should stop as soon as possible, ideally at least 9 weeks before your operation. This will help improve your chances of a successful recovery and improve your overall health status. If you require further information the vascular nurse specialists can talk to you and provide further support.

Your Consultant or a senior member of his team (registrar) will explain the procedure to you and offer you the opportunity to ask any questions that you might have about the procedure.
Inform them of any of the following:

- If you are sensitive to, or are allergic to any medications, latex, iodine, tape, contrast dyes or any anaesthetic agents (local or general)
- All medications (prescribed, over the counter or herbal supplements) you are taking.
- If you have a history of bleeding disorders.

If you are taking medications that thin your blood (such as Aspirin,clopidogrel, warfarin, rivaroxaban or apixaban) it may be necessary for you to stop taking these medications prior to your operation. Again, the consultant looking after you will give you instructions about which ones to stop or continue.

If you are having a planned AAA repair the following investigations will be required, this will help give the vascular consultant information he needs to make a decision on the best procedure with as fewer risk of complications for you.

- CT Scan
- Bloods – especially looking at your blood count and kidney function
- Echocardiogram - looking at your heart
- Respiratory function test - looking at your lungs
- Cardio-Pulmonary Exercise Test (CPET) – which is done on a bike to assess your fitness for surgery.

Further investigation may also be needed depending on your personal medical history.
As part of your pre-operative assessment you will be seen by a consultant anaesthetist who will explain about the type of anaesthesia you will be having.

COVID-19

A recent COVD-19 infection increases your risk of lung complications or death if you have an operation under general anaesthetic. This risk reduces the longer it is since the infection. After 7 weeks the risk is no higher than someone who has not had COVID-19. However, if you still have symptoms the risk remains high. The risk may also depend on your age , overall health and the type of surgery you are having.

You must follow instructions to self-isolate and take a COVID-19 test before your operation. You will have a PCR test done prior to your surgery. If you have had COVID-19 7 weeks before the operation you should discuss the risks and benefits of delaying it with your surgeon.

Day of surgery

- You will be asked to not eat or drink anything for eight hours before the procedure, generally after midnight.
- You will be asked to remove any jewellery or other objects that may interfere with the procedure. Please DO NOT bring valuables or large amounts of money into hospital. The hospital will not accept responsibility for any loss or damage caused during your stay.
- You will be asked to remove your clothing and will be given a gown to wear.
- You will be asked to empty your bladder prior to the procedure.
- You will be seen by your vascular Consultant or registrar and the procedure explained to you again. You will be asked to sign a consent form - please ensure you read this carefully and ask any questions you may have. An anaesthetist will also see you to explain the anaesthetic technique.

What happens during the procedure?

An intravenous (IV) line will be started in your arm or hand. Additional catheters may be inserted in your neck and wrist to monitor the status of your heart and blood pressure, as well as for obtaining blood samples.

You will be positioned on the operating table lying on your back.
The anesthetist will continually monitor your heart rate, blood pressure, breathing and blood oxygen level during the surgery. Once you are sedated, a breathing tube will be inserted through your throat into your lungs and you will be connected to a ventilator, which will breathe for you during surgery.

A urinary catheter will be inserted into your bladder - this allows us to monitor the function of your kidneys.

Skin over the surgical site will be shaved and cleaned with an antiseptic solution and a sterile drape positioned to keep the operation as clean as possible.

Once all the tubes and monitors are in place, the surgery can begin.

Once the surgeon is happy with the operation, the incisions will be sutured together and covered with a dressing.

What happens after the procedure?

After the procedure you may be taken to the recovery room before being taken to HDU to be closely monitored. You may be connected to monitors that will constantly display your heart tracing, blood pressure readings, breathing rate and your oxygen level.

Once you have recovered from anaesthesia, your nurse will assist you to cough and take deep breaths every two hours. This may be uncomfortable due to soreness, but it is extremely important that you do this in order to keep mucous from collecting in your lungs and possibly causing pneumonia.

You will receive pain medication as needed and you will usually start to drink and eat straight after your EVAR.

Helping you plan for discharge home

Preparing for home should start as early as possible. Discharge is usually planned for between 2-3 days after the operation. It is a good idea to have someone to help look after you for a while. Some patients choose to live with a member of their family for a short time. Think about the tasks, or activities you do, which may be difficult, especially if you have a caring role for someone else. Stocking up on frozen or tinned food items means you don't need to go shopping immediately.

If there are complications with your recovery you may need to stay in hospital a little longer.

What can I expect when I get home?

Recovery times vary and it can take several weeks to feel fully 'back to normal'. This depends on your health and level of activity before surgery. Your wounds may be red at first but will gradually fade over six months or so. You can wash normally with mild soap and water when you have a bath or a shower. If your wound becomes red, sore or is oozing please let your GP know, as this could be a sign of an infection.

Managing Pain

Your hospital doctor will prescribe pain medicines to use at home. If you are taking pain killers 3 or 4 times a day then try taking them at the same times each day for 3-4 days. They are more effective this way. Try getting up and moving around, this may ease the pain.

Medication

Whilst you are in hospital there may be some changes to your regular medication. Please check the names of medication you are being discharged home with. If you are unsure what they are for then please ask a doctor looking after you before you go home. Your doctor may recommend you take a medication to lower your cholesterol (statin) and a drug to help thin your blood (aspirin or clopidogrel). This is thought to help the blood flow through your arteries more easily and reduce your risk of heart attacks and stroke.

Sleeping and feeling tired

It is normal to feel tired for several weeks after your operation and you may feel low in spirits. You will probably find it beneficial to have a short sleep in the afternoon for a few weeks until your body gradually recovers from the surgery and your level of activity increases. It is good for you and your family to be aware of this and not to worry.

Diet/appetite and bowel movement

It can take a few weeks for your appetite and diet to return to normal and to regain any weight you may have lost in hospital. Try taking smaller regular meals and eat what you fancy when you want to until your appetite returns back to normal. You may find your bowel motions take time to become more regular again. This is usual after surgery because of pain killers and poor mobility.

Mobility, hobbies and activity

Don't overdo any activity, as it should be gradually increased. It's important you don't lift heavy objects or push heavy objects for 2-3 months. You may resume gentle sports, such as golf or crown green bowling when you feel comfortable to do so.

Taking regular exercise such as a short walk combined with rest is recommended for the first few weeks which you can gradually increase. Taking on light household chores, and gentle walks around your house is a good starting point in the early few weeks.

Building up your strength & stamina exercise routine

Here are some tips for building up your strength and stamina for the first few weeks after your surgery.

Week 1 - Walk gently around the house, stand up straight avoiding crouching over; sit down when you begin to feel tired. You will probably feel like having an afternoon nap.

Week 2 - Take a couple of 5 minute small walk around your house or garden. Take an afternoon nap, if needed.

Week 3 - Take a couple of short 10 minute walksaround the house, garden or outside (if you feel strong enough) in the morning and afternoon. Take a nap in the afternoon if needed.

Week 4 - Take a 20 minute walk, at least twice a day. You may also still need a daily nap.

Driving

For safety and insurance reasons patients are advised not to drive for 4 weeks after their operation. If you are in doubt, you should check with your GP and insurance company. If you drive a bus or lorry for a living, you will need to let the DVLA know that you have had your AAA repaired.

You may drive when you are able to perform an emergency stop without discomfort and this is usually 4-8 weeks after the operation.

Working

When to return to work will depend on the type of job that you do. Most people need to wait 4-6 weeks before returning to work, and may work shorter hours for a few weeks, before increasing to your normal hours. Your HR or occupational health department will be able to advise you on a phased return to work program.

Sex

You can resume your sex life when you feel comfortable. If you experience problems, your GP may be able to provide treatment to help.

Complications and what to look out for:

Occasionally complications can occur due to the nature of the operation. Bruising and swelling around the wounds may be troublesome but should take 4-6 weeks to settle. Infection can happen and usually settles with antibiotic therapy. If you think that there is something wrong with your wound at home contact your GP.

Aches and twinges may be felt for up to 6 months following surgery.

Occasionally there are numb patches in the skin which will improve over the following months.

Notify your GP if you have any of the following:

- Fever and/or chills
- Redness, swelling, bleeding or other drainage from the incision site
- Increase in pain around the incision
- Pain in your legs when walking
- Continued poor appetite
- Continued upset bowel movements.

When to get urgent medical help:

Rarely complications can warrant urgent medical treatment; this may not be directly related to your surgery. Seek immediate help if you experience any of the following:

- Your stitches come apart.
- Your incision is swollen, red and hot to touch or has pus coming from it.
- If you develop sudden pain or numbness in your legs that does not get better within a few hours, or your feet become very cold or turn pale or blue.
- You have severe pain in your chest, abdomen or side.
- You have severe chest pain or trouble breathing that is getting worse over time.
- You suddenly feel light headed and have trouble breathing.
- Any shortness of breath or pains in your chest.

If you need to go back to hospital, it is best to ask someone to take you.

If you have any other concerns or questions during your recovery at home you can contact the vascular discharge helpline on; 0121 424 2879. This is an answer machine service which is listened to 3 times a day, Mon - Fri except bank holidays by the vascular clinical nurse specialist. One of the

team will aim to call you back the same day. Make sure you leave your name, telephone number and hospital or NHS number if you know it.

Long- term follow-up

Recovery after an EVAR is fairly quick; you may be seen in the vascular outpatient clinic 4-6 weeks after discharge. Remember to bring a list of any queries you might have with you.

Part and parcel of the EVAR treatment involves lifelong follow up with X-rays and ultrasound scans to ensure that the stent-graft remains safe and sound. This will be done in a specialist nurse-led clinic and if any concerns arise then the surgeon looking after you will be involved as necessary.

Looking after yourself

Aneurysms are often caused by arterial disease or atherosclerosis also known as 'hardenings of the arteries. There are certain factors that make people more at risk from atherosclerosis of peripheral vascular disease. These include:

- Age
- Smoking
- High blood pressure
- High cholesterol
- Diabetes
- Being overweight
- Lack of exercise

Part of your medical treatment will be to reduce these risk factors.

Stop Smoking

Smoking is a major risk for arterial disease and having a fatal heart attack or stroke. It also increases the chances of getting a chest infection and slows your recovery. We can help you to stop smoking and refer you to our smoking cessation nurse, who may suggest tablets or patches to help you quit. Alternatively you can get support from your practice nurse at your GP surgery or most local chemists provide smoking cessation services.

Eat Healthily

Being overweight reduces your general mobility and can slow your recovery. Eat well, according to your appetite. Concentrate on low-fat foods and try to include your 5 portions of fruit and vegetables a day.

Exercise

Exercise can boost your immune system and improve recovery. Take regular exercise or short walks every day as we have previously suggested. Take a nap if needed. As you recover try to increase your activity.

General information

The operation may sound complicated but it is an everyday procedure for us. It is important that you understand your condition and treatment options, if you still have any queries please do not hesitate to ask.

If you have any concerns or questions after your discharge from hospital you can call the **Vascular Discharge Helpline on 0121 424 2879**
One of the vascular nurse specialist team will aim to call you back the same day.

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If you have any queries about this then please discuss these and your decision to consent with the surgeon involved in your care.

Additional sources of information:

The Vascular Surgical Society of Great Britain and Ireland web site (http://www.vssgbi.org) has further information on vascular surgical procedures.

http://www.circulationfoundation.org.uk/ The Circulation Foundation provides information on all common vascular diseases and their treatments. Their aim is to provide an educational service and is not designed to offer specific medical advice.

Accessibility

To view this information in a different language or use text-to-speech reader visit **www.uhb.nhs.uk,** click the yellow and black circular icon in the bottom right of the web page to open the ReachDeck toolbar and then use the search bar to search by the name of the leaflet. If you require this information in another format such as braille, please email **interpreting.service@uhb.nhs.uk**.

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