

Patient information factsheet

Pulmonary vein isolation (PVI) ablation

Your doctor has recommended you have the above procedure.

This factsheet has been written to help you understand what is involved. If there is anything you do not understand, or you are unsure why you need this treatment, please ask a member of your healthcare team who will be happy to explain further.

To help you understand this factsheet please refer to our “how the heart works” factsheet first. This is available on: www.uhs.nhs.uk or ask a member of your healthcare team.

What is pulmonary vein isolation (PVI) ablation?

Pulmonary vein isolation is a procedure used to stop abnormal electrical signals in your heart that cause heart rhythm problems. It is a form of cardiac ablation.

Your doctor has advised you to have this procedure as your atrial fibrillation (AF) has proved difficult to treat with medication. The aim is to regulate your heart rate and provide relief from the symptoms you have been experiencing.

About atrial fibrillation (AF)

The type of rhythm disturbance you have is called atrial fibrillation (AF). It is one of the most common types of arrhythmia. It causes an irregular and often abnormally fast heart rate.

What causes AF?

Atrial fibrillation happens when abnormal electrical impulses suddenly start firing in the atria. These impulses override the heart's natural pacemaker, which can no longer control the rhythm of the heart. This causes you to have a highly irregular heartbeat.

When the heart beats normally, its muscular walls tighten and squeeze (contract) to force blood out and around the body. They then relax so the heart can fill with blood again. This process is repeated every time the heart beats. In atrial fibrillation, the heart's upper chambers (atria) contract randomly and sometimes so fast that the heart muscle cannot relax properly between contractions. This reduces the heart's efficiency and performance. In many patients with atrial fibrillation it has been found that the extra electrical signals responsible start in the area around the pulmonary veins on the left side of the heart.

About your anticoagulant medication

The atria are said to be fibrillating when they beat too quickly and irregularly. During this time they are unable to completely empty all of the blood they receive into the ventricles below. This can cause blood to pool and potentially clots can form. Therefore, to prevent you being at an increased risk of stroke your doctor may prescribe you anticoagulant (blood-thinning) medication called warfarin or an alternative. You must continue to take your anticoagulant after the procedure. Your doctor will discuss this with you before your procedure.

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The PVI procedure

There are four pulmonary veins that carry blood from the lungs back to the left atrium. Where the two types of tissue from the atrium and veins meet is where the extra electrical signals that cause AF originate.

Pulmonary vein isolation is a catheter ablation technique where the doctor uses an energy source, either radiofrequency energy (heat) or cryo (cold) energy to destroy this small area of tissue and form scar tissue. The resulting scar tissue blocks the extra electrical signals from the pulmonary veins reaching the left atrium, so the area can no longer generate or conduct the fast, irregular impulses.

This procedure is usually performed while you are awake, under a local anaesthetic, with sedation which will help you to relax. However in some cases you will have a general anaesthetic and therefore be asleep during the procedure.

X-ray screening is used during the procedure so if you think you may be pregnant you should let us know before the procedure.

Different techniques

There are two types of catheter ablation technique:

- **Radiofrequency (RF) ablation** is the use of (heat) radiofrequency energy to make small point to point lesions to the left atrium wall around the pulmonary veins.
- **Cryoablation** is the cold (cryo) energy applied via a balloon to the entrance of each pulmonary vein. This is applied as a 'single shot method' which allows the doctor to isolate all pulmonary veins at once.

Both are effective treatments for pulmonary vein isolation. Your doctor will explain in more detail which technique is most appropriate for you.

Success rate

The PVI ablation procedure may not be successful on the first attempt. Your doctor will discuss the success rates with you on an individual basis, before you sign your consent form.

The full benefit of the ablation procedure is not usually felt immediately - most patients require about three months to become completely symptom-free.

If the procedure is unsuccessful it may be possible to repeat it later.

Risks of the procedure

Pulmonary vein isolation ablation is a safe procedure, however as with any procedure, there are potential risks. Your individual risk of complications will be identified and will be fully explained by the doctor before you have your procedure. If you are known to have underlying coronary heart disease the procedural risks are slightly increased. Most risks outlined can be treated and are rarely life-threatening.

- **Bruising and bleeding:** this is common in the groin following the procedure. This usually disappears within a week and does not cause a problem.
- **Blood vessel damage:** Occasionally, the catheter electrodes can accidentally damage the blood vessels when being inserted. The risk of this happening to you is between 2% and 4%. Serious injury to the blood vessels requiring a surgical procedure to repair the damage is extremely rare and occurs in less than 1% of patients.

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- **Cardiac tamponade:** Occasionally the catheter electrodes may puncture the heart muscle causing blood to collect around the heart. If this happens the doctor may need to insert a drain to remove the blood. The risk of this happening to you is between 1 and 2%.
- **Pulmonary embolism, or deep vein thrombosis (DVT):** the risk of developing blood clots in the legs (DVT) or heart that travel to the lungs (pulmonary embolism) is extremely rare, less than 1%.
- **Transient ischaemic attack (TIA) / cerebrovascular accident (CVA) - commonly called a stroke:** The brain cells in the part of the brain served by the affected blood vessel die of lack of oxygen and nutrients due to the vessel being blocked. Symptoms can be slurred speech, limb/ facial weakness and loss of memory or recall depending on the area of the brain affected. The difference between a TIA and CVA is the duration of your symptoms. (Less than 48 hours is usually classified as a TIA). The risk is about 0.5%
- **Pulmonary vein stenosis:** If the pulmonary veins are narrowed by scar tissue then blood flow through the veins may become restricted, leading to potential breathing difficulties. This risk is very rare in cryoablation but can occur in about 0.2 - 0.4% cases of RF ablation.
- **Diaphragm paralysis:** The nerves that control the diaphragm (one of the muscles involved in expanding the chest to enable efficient breathing) run alongside the heart and can sometimes be damaged by the procedure leading to potential breathing difficulties. The risk of this happening to you is between 1 and 2%. If the complication occurs during cryoablation, it generally resolves within about a year – but if it occurs during RF ablation, it may persist.
- **Damage to AV node:** The AV node is a structure which conducts impulses to the ventricles from the top chambers (atria) to the bottom chamber (ventricles). Injury to the AV node will interrupt these impulses and a pacemaker may be needed to correct the problem. This is a very rare complication (less than 0.3%) during AF ablation.
- **Atrial-oesophageal fistulae:** The atria is close to the oesophagus (the tube from the mouth to the stomach), a hole can sometimes be made joining them together. This is a very rare complication (less than 0.1%) but can be life-threatening.
- **Death:** this is extremely rare but with any procedure there is always a small risk. The overall risk of death from an AF ablation is around 0.1%

Additional risks

Occasionally we have difficulties with access through the blood vessels in the groin therefore we can access the blood vessels through the chest wall. We have to make a small incision in the chest wall to pass catheter electrodes through the blood vessels into the heart, this has potential additional risks:

- **Pneumothorax:** Very occasionally, the catheter electrodes can puncture the lung wall. Air leaks out of the lungs and collects in the space between the lung and chest wall, resulting in partial or complete collapse of the lung. If this happens the doctor may need to insert a drain to reinflate your lungs. The risk of this happening to you is less than 1%.
- **Haemothorax:** The catheter electrodes can sometimes damage the chest wall causing blood to collect in the chest cavity. If this happens the doctor may need to insert a chest drain. This is extremely rare and the risk of this happening to you is less than 1%.

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Before admission

Anticoagulation and reducing the risk of a stroke

As explained earlier, one potential complication of AF ablation is the risk of a stroke. A stroke can be devastating and therefore to minimise the risk, you should strictly adhere to the instructions given regarding your anticoagulation (blood thinning) medication.

The goal of pre-procedure anticoagulation is to ensure that no blood clots have formed in the heart before the ablation is undertaken. Any such pre-existing blood clots could get dislodged during the ablation procedure and cause a stroke

Any deviation from the instructions may lead to postponement of the procedure for your safety.

- If you are taking warfarin regular blood tests will be needed for at least four weeks before the procedure, usually at your GP surgery. We ask that you keep your INR between 2.0 and 3.0. A record of this should be kept in your warfarin book.
- You should also check your INR three days before your admission (contact the admissions office on the number given on the last page of this information sheet) to confirm it is in range to enable the procedure to go ahead.
- If you are taking an alternative anticoagulant (for example Rivaroxaban, Dabigatran, Apixaban or Edoxaban) then you will be given an individual management plan to follow. A single missed dose of these tablets in the four weeks before your procedure may lead to your procedure being postponed.
- If you are taking medication to control your heart rhythm you may continue to take your tablets before the procedure.

You will also be asked to stay fasting (not eat) from a specified time before your procedure.

It is essential that you follow the instructions given in your admission letter and call us if you have any queries.

Tests you may have before your procedure

Before the procedure, depending on your individual risk your doctor may run a number of tests to check that you do not have any blood clots in the atria or any other structural heart problems. These tests may include a magnetic resonance imaging scan (MRI), a CT scan and/or a transoesophageal echo (TOE).

Before the procedure

On your arrival to the ward a nurse will talk to you and your family about your hospital admission and answer any questions you may have. Before the procedure, you will have blood tests taken and another ECG recorded. A doctor will also see you to explain the procedure to you and ask you to sign a consent form. If you have any worries or concerns please do not be afraid to ask questions. It is important to tell your nurse or doctor if you have any allergies or have had a previous reaction to drugs or other tests. If you are having the procedure done under a general anaesthetic, you will also talk to an anaesthetist.

A doctor or nurse will need to insert a small needle into a vein in your hand (cannula) in order to give you drugs during the test. You will also be asked to shave your groin and if appropriate, your upper chest. You will then be given a hospital gown to wear. If you are diabetic, your nurse will discuss your tablets/insulin dose with you, because not eating may affect your blood sugar levels.

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How long will the procedure take?

The PVI ablation procedure could take between two and four hours. You may wish to let your family know so they do not worry.

During the procedure

While you are in the catheter lab a nurse will stay with you and be there to reassure you throughout the procedure. There is a lot of equipment in the room, which is used to monitor your heart rhythm. Depending on the technique, you may be given a sedative or put under general anaesthesia (medicine to make you go to sleep).

Local anaesthesia and sedation

The doctor or nurse will give you a sedative medication through the cannula on the vein to keep you relaxed and slightly sleepy. However, you will be aware of your surroundings and hear what's happening around you. You should call the attention of the doctor or nurse if you are in discomfort or if something is not right.

The doctor will inject a local anaesthetic into your groin to numb your leg. This may sting a little and you may feel some mild discomfort. When the local anaesthetic has taken effect, the doctor will insert a small tube (sheath) into your groin. You should not feel any pain, but if you do please let your doctor know. Through the sheath the doctor will gently thread several flexible wires (catheter electrodes) into your heart.

The catheters are about the size of a small drinking straw. The catheters are carefully moved into position. The doctor will make a small hole (transeptal puncture) from the right to the left atrium to gain access to the pulmonary veins. This is performed under x-ray screening. You should not feel pain during this part of the procedure. Once the ablation catheter is in place the doctor will perform the ablation.

Some patients get a headache (brain freeze) or chest discomfort (heartburn) during the procedure - this is short-lasting and wears off quickly, but please let the doctor know if it is very uncomfortable as we are able to give you some more sedation.

This process is repeated around each of the pulmonary veins. The formation of scar tissue as a result of the ablation stops the extra electrical impulses reaching the left atrium.

General anaesthesia

If you are having a general anaesthetic, then you will be first put to sleep. Your anaesthetist will give you medication via the cannula (small tube) in your hand. Once you are asleep, a tube to provide breathing support is inserted to your airway from the mouth (you will not be aware of this). This tube is connected to a machine called a ventilator to maintain breathing during procedure. At the end of the procedure, the tube is taken out and you are woken up. You will also be given a local anaesthetic into your groin to ensure you don't feel any pain in this area on waking up.

Some patients feel drowsy after waking up and occasionally this may make it necessary for you to stay overnight in the hospital.

After the procedure

After the procedure is completed firm pressure will be applied to your groin where the catheter was inserted to stop any bleeding. You will then be moved to the recovery area where you will be monitored for a short time. On returning to the ward you will need to rest for a few hours.

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You may feel a little sleepy until your sedative/anaesthetic has worn off.

The nurse will record an ECG, check your blood pressure, pulse and feel your foot pulses, and check your groin for any bleeding. It is important that you remain in bed and avoid bending your affected leg for about two hours after the catheters have been removed. This is to prevent any bleeding from the puncture site. After this period you will be able to get up if there are no complications. You will be able to eat and drink normally as soon as you return to the ward. The nurse will remove the small needle in your hand. You may require a chest x-ray. If you feel any palpitations or dizziness after the test, please let the nurse know.

Results

Your doctor will usually discuss the results and treatment plan with you and your family after your procedure.

Going home

You will normally be able to go home the same day. It is important to ask a family member or friend to collect you and drive you home. Before you are discharged, your doctor or cardiac rhythm management (CRM) nurse will advise you regarding the medicines you will need to take, or stop, and your follow-up care.

Caring for your wound

You will have a small dressing on your puncture site that can be removed the next day. It is important to keep the area clean and dry until it has healed. If you notice any swelling, redness or oozing please let your GP know or call us on the number below (Monday to Friday, 8am to 6pm).

Resuming normal activities

You can resume your normal daily activities when you leave hospital. You should not strain or lift heavy objects for a few days so that the incision site can heal. Unless your job requires you to lift heavy objects, you can return to work after a day or two.

After a successful catheter ablation the DVLA instructions state that you shouldn't drive for at least two days, we recommend that you do not drive for one week. If you hold a Group 2 PSV licence (lorries/buses) you are not allowed to drive for six weeks and need to inform the DVLA.

Medication

After the procedure your doctor will advise you which medications you need to continue taking. It is essential that you continue to take your anticoagulation medication (blood thinners) as instructed after ablation - as there is an ongoing risk of stroke if it is interrupted or doses missed.

Review in clinic

You will be reviewed in the clinic in approximately three months unless otherwise planned.

When can I expect to notice an improvement?

On average, it takes about three months for the heart to get the full benefit from the procedure. You may experience atrial fibrillation and palpitations (skipped heartbeats) whilst in hospital and in the first two to three months after the procedure. This does not mean the procedure has failed. If this happens your doctor may need to review your medication to stop your arrhythmia whilst continuing your anticoagulation. If you continue to experience atrial

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arrhythmias and feel unwell your doctor may suggest you have a cardioversion to regulate your heart rhythm.

It is important to remember that approximately one third of patients may require a repeat procedure.

Follow-up care

The cardiac rhythm management (CRM) team will give you specific follow-up instructions when you leave hospital. The doctor will write a letter to your GP detailing your hospital stay and treatment.

Cancellations

Unfortunately we do sometimes have to cancel procedures. If this happens to you, we will always try to explain the reason. We fully appreciate that this is a stressful time for you and your family and we will do our best to provide you with a new date that is convenient for you as soon as possible.

Who will perform my procedure?

Your procedure will be performed by a specially trained doctor with appropriate experience (although we aren't able to guarantee that you will be treated by a particular member of staff). If the doctor is undertaking training on this procedure they will be supervised by an appropriately qualified colleague

Contact us

If you have any questions regarding your procedure please call: **023 8120 8436** to speak to a cardiac rhythm management (CRM) clinical nurse specialist.

You can also email: uhs.crmnurses@nhs.net

If you have a query relating your admission date please contact the cardiac rhythm management coordinator on: **023 8120 8772**.

Useful links

The following websites also provide useful information:

www.bhf.org.uk

www.heartrhythmcharity.org.uk

An online version of this factsheet is available on our website www.uhs.nhs.uk.

Navigate to: Our services > Blood, heart and circulation > Cardiac rhythm management > Useful information and resources.

For a translation of this document, or a version in another format such as easy read, large print, Braille or audio, please telephone **023 8120 4688**.

For help preparing for your visit, arranging an interpreter or accessing the hospital, please visit www.uhs.nhs.uk/additionalneeds