Atrioventricular (AV) node ablation

The normal electrical system of the heart

The heart has its own electrical conduction system. The conduction system sends signals throughout the upper chambers (atria) and lower chambers (ventricles) of the heart to make it beat in a regular, coordinated rhythm. The conduction system consists of two nodes that contain conduction cells and special pathways that transmit the impulse.

A normal heartbeat begins when an electrical impulse is fired from the sinus node (also called sino-atrial or SA node), in the right atrium. The sinus node is responsible for setting the rate and rhythm of the heart and is therefore referred to as the heart’s pacemaker.

The electrical impulse fired from the SA node spreads throughout the atria, causing them to contract and squeeze blood into the ventricles. The electrical impulse then reaches the atrioventricular node (AV node), which acts as a gateway, slowing and regulating the impulses travelling between the atria and the ventricles. As the impulse travels down the pathways into the ventricles the heart contracts and pumps blood around the body. The cycle then begins again.

A normal adult heart beats in a regular pattern 60 to 100 times a minute; this is called sinus rhythm.

Diagram of the heart’s electrical system

Arrhythmia

Sometimes, if the conduction pathway is damaged, blocked, or an extra pathway exists the heart’s rhythm changes. The heart may beat too quickly (tachycardia), too slowly (bradycardia) or irregularly. This may affect the heart’s ability to pump blood around the body. These abnormal heartbeats are known as arrhythmias. Arrhythmias can occur in the atria or in the ventricles.
Atrial fibrillation
The type of rhythm disturbance you have is called atrial fibrillation. It is one of the most common types of arrhythmia. Atrial fibrillation occurs in the atria. In atrial fibrillation, it is not just the SA node that produces the electrical impulses. Instead many impulses begin and spread chaotically through the atria. As a result your heartbeat is usually fast and irregular. 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. To prevent you being at an increased risk of stroke your doctor will prescribe you a blood-thinning drug (anticoagulant) called warfarin, or an alternative. You must continue to take your anticoagulant after the procedure.

AV node ablation
An AV node ablation is performed in people who have been diagnosed with atrial fibrillation that has not responded to medication. An AV node ablation and insertion of a permanent pacemaker will regulate your heart rate and provide relief from the symptoms you have been experiencing. This procedure stops the fast, irregular impulses from the atria reaching the ventricles.

The procedure
The AV node slows the electrical signals travelling from the atria to the ventricles. During the procedure, the doctor will use a special ablation catheter to deliver radiofrequency energy (heat energy) to block the AV node. The use of radiofrequency energy creates a scar, which stops the fast irregular impulses reaching the ventricles. Once the AV node is ablated your underlying heart rate will be too slow and you will need a permanent pacemaker, this will be implanted after the ablation. A pacemaker is a small battery-operated device that sends out electrical signals to start a heartbeat when your heart is beating too slowly. It is important to remember that an AV node ablation will not convert atrial fibrillation to sinus rhythm; it will only control the number of impulses reaching the ventricles.

The procedure is performed under a local anaesthetic, with sedation, which will help you to relax. X-ray screening will be used so if you think you may be pregnant you should let us know before the procedure.

Risks of the procedure
AV node ablation is safe. However as with any procedure, there are potential risks. The risks will be fully explained by our doctors before you have your procedure. If you are known to have underlying coronary heart disease the procedural risks are slightly increased.

The risks outlined below can be treated and are rarely life threatening.

At the time of the procedure
• Tamponade: occasionally the catheter electrodes may puncture the heart muscle causing blood to collect around the heart. This is called a cardiac tamponade and can lead to the heart being compressed. If this happens the doctor may need to insert a drain to remove the blood. The risk of this happening to you is less than 1%.

• Blood vessel damage: occasionally the catheter electrodes can damage the blood vessels when being moved into position within the heart. The risk of this happening is between 3 and 5%. Serious injury to the blood vessels requiring a surgical procedure to repair the damage is extremely rare.

• 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 reinfl ate your lungs.
After the procedure

- Bruising and bleeding: this is common in the groin after the procedure. However, this usually disappears within a week and does not cause a problem.

- Success rate: on rare occasions the ablation procedure is not successful. Your doctor will discuss the success rate with you on an individual basis before you sign your consent form. If the procedure is unsuccessful it may be possible to repeat it at a later date.

Please refer to the separate pacemaker booklet for associated risks related to pacemaker implantation.

Before admission

If you are taking warfarin (blood thinner) you will need regular blood tests for at least four weeks before the procedure, usually at your GP’s surgery. We ask that you keep your INR between 2.0 and 3.0. A record of this should be kept in your yellow warfarin book. You should also check your INR three days before your admission (please 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 then you will be given an individual management plan to follow.

Sometimes, before undertaking the procedure your doctor will perform a transoesophageal echo (TOE). This is a test to check that you do not have any blood clots in the atrium.

If you are taking medication to control your heart rhythm you may continue to take your tablets before the procedure.

The above advice should be followed unless your admissions letter advises otherwise.

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. You will have blood tests taken and an electrocardiogram (ECG) recorded. A doctor will also see you and 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 insert a small needle into a vein in your hand (cannula) in order to give you drugs during the procedure. You will also be asked to shave your groin and upper chest and be given a hospital gown to wear.

You will be advised not to eat for six hours before your procedure. If you are diabetic your nurse will discuss your tablets/insulin dose with you, because not eating may affect your blood sugar levels. The procedure could take a couple of hours. You may wish to let your family know so they do not worry.

During the procedure

You will be taken to the catheter lab where a nurse will stay with you to reassure you throughout the procedure. There is a lot of equipment in the room, which is used to monitor your heart rhythm. You will be awake during the procedure, but to help you relax your doctor will give you a short acting sedative.

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 under x-ray screening. You should not feel any pain during this part of the procedure.

Once the ablation catheter is in place the doctor will locate the AV node and deliver a small amount of radiofrequency energy (heat energy) directly onto the node and ablate (destroy) it to create a scar. You may feel a slight burning sensation or heaviness in your chest during this part of the procedure. It is important to remember that in the case of an AV node ablation the creation of scar tissue will block the hearts normal conduction system and this is why you will need to have a pacemaker fitted, this is because scar tissue cannot transmit electrical impulses.

Once the AV node is ablated the doctor will insert the permanent pacemaker and cover it with a sterile dressing.

If you experience any symptoms during the procedure, for example chest pain, dizziness or shortness of breath, please tell your nurse or doctor.

After the procedure is completed the catheter and IV line will be removed. Firm pressure will be applied to your groin where the catheter was inserted to stop you from bleeding.

**After the procedure**

After the procedure you will 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. You may feel a little sleepy until your sedative has worn off. The nurse will record an ECG, check your blood pressure, pulse and feel your foot pulses. The nurse will also check your groin and pacemaker site for any bleeding. It is important that you stay in bed and avoid bending your affected leg for approximately two hours after the catheters have been removed. This is to prevent any bleeding from the puncture site. After this time 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 are back on the ward. The nurse will remove the small needle in your hand. You will also have a chest x-ray to make sure that you do not have a pneumothorax (pocket of air) in your lung and to check the position of the pacemaker. If you have any palpitations or feel dizzy 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 the procedure and x-ray.

**Going home**

You will normally be able to go home after your pacemaker check the following day. It is important to ask a family member or friend to collect you and drive you home. If you are being discharged home the same day as your procedure we would advise you to have someone stay with you for the night. Before you are discharged your doctor or CRM nurse will advise you regarding the medicines you will need to take, or stop and your follow-up care. You will still need to take your anticoagulant since the procedure does not change atrial fibrillation to sinus rhythm, so blood clots may still form.
Caring for your wound
You will have a small dressing covering your pacemaker site. It is important to keep the area clean and dry until it has healed. If you notice any swelling, redness or oozing from the site please inform the cardiac rhythm management (CRM) clinical nurse specialist or cardiac physiologists on the telephone numbers given at the end of this factsheet.

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 weeks so that the pacemaker wires can become embedded and the incision site can heal.

You can return to work in a day or two unless your job requires you to lift heavy objects.

You should not drive a car for one week after the procedure. If you hold a Group 2 PSV licence (lorries/buses), you must not drive for six weeks.

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.

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.

Further information and contacts
We cannot guarantee that a particular person will perform the procedure. The person will, however, have appropriate experience.

If you have any questions regarding your forthcoming procedure please call 023 8120 8436 to speak to a cardiac rhythm management clinical nurse specialist. If you have a query relating your admission date please contact the cardiac rhythm management coordinator on 023 8120 8772.

You can also email crmnurses@uhs.nhs.uk

The following websites also provide useful information:
www.bhf.org.uk
www.heartrhythmcharity.org.uk