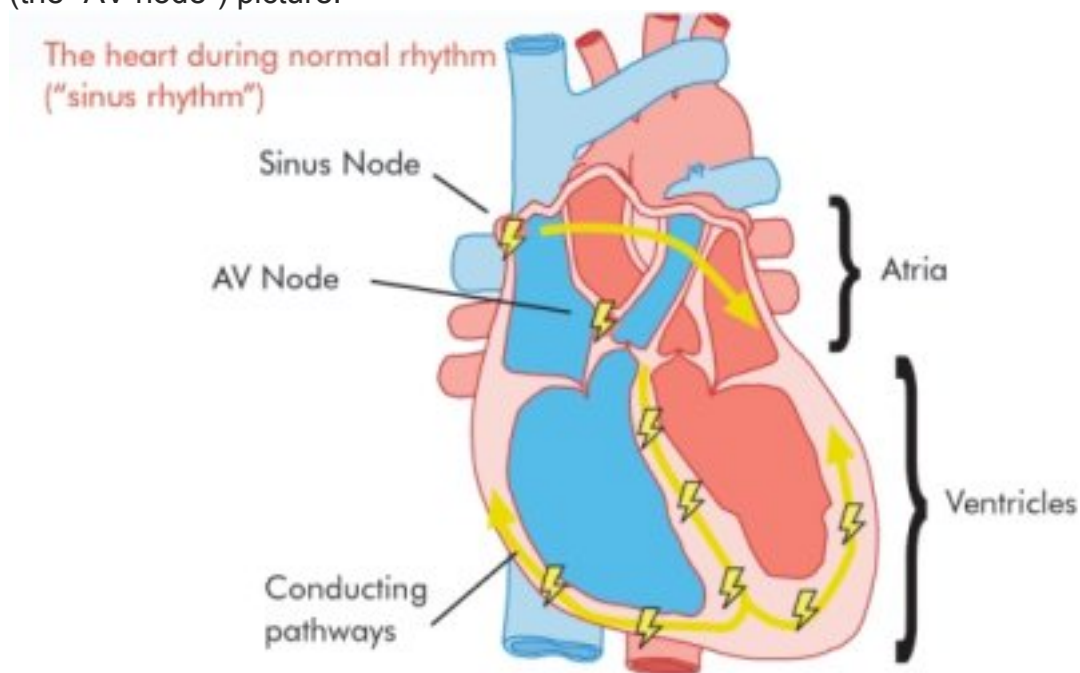


## Catheter Ablation

The heart is a muscular pump, which delivers blood, containing oxygen to the body. It is divided into two upper chambers, or “Atria”, which collect blood returning via the veins, and two lower chambers or “ventricles”, which pump blood out through the aorta (main artery) and to the lungs.

Normally, the heart beats in a regular, organised way, at a rate of 60-100 beats per minute. This is because it is driven by the “sinus node”, an area of specialised cells, which emit electrical impulses and is situated in the atria. These electrical impulses spread through the right and left atria in a smooth and uniform manner and then into the ventricles via a single connecting wire (the “AV node”) picture.



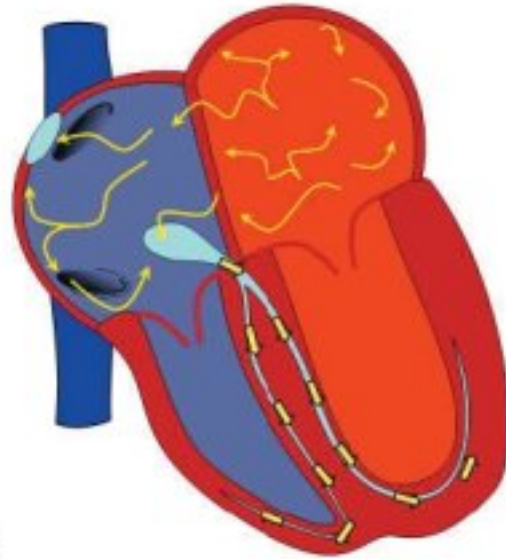
The sinus node is the body’s natural pacemaker, triggering each heart beat according to the needs of the body. An example of this is during exercise, when the heart rate speeds up. When the heart is beating normally like this, we refer to it as “sinus rhythm”, or “normal sinus rhythm”. For the heart to maintain sinus rhythm it needs both a normally working sinus node and for the cells of the atria be able to conduct the electrical impulses smoothly

### Atrial Fibrillation ‘AF’

During a burst of AF the heart beat is often rapid, irregular and of varying intensity. This can cause unpleasant symptoms of palpitations, light headedness, breathlessness, chest pain and may even lead to a collapse. If these episodes are intermittent then it is termed paroxysmal AF. In many

patients however the heart is in the irregular rhythm continuously when it may be termed persistent, permanent or chronic AF. In this situation patients also often complain of tiredness and lack of energy.

AF occurs when the sinus node loses control of the heart rhythm. In paroxysmal AF this is due to other areas of the atrium producing rapid, uncontrolled electrical impulses, often from the four pulmonary veins which bring blood back to the atria from the lungs. In permanent or persistent AF the cells of the atria do not conduct the normal impulses from the sinus node smoothly which causes them to break up and be discharged rapidly across the atrial surface in many different directions (picture).

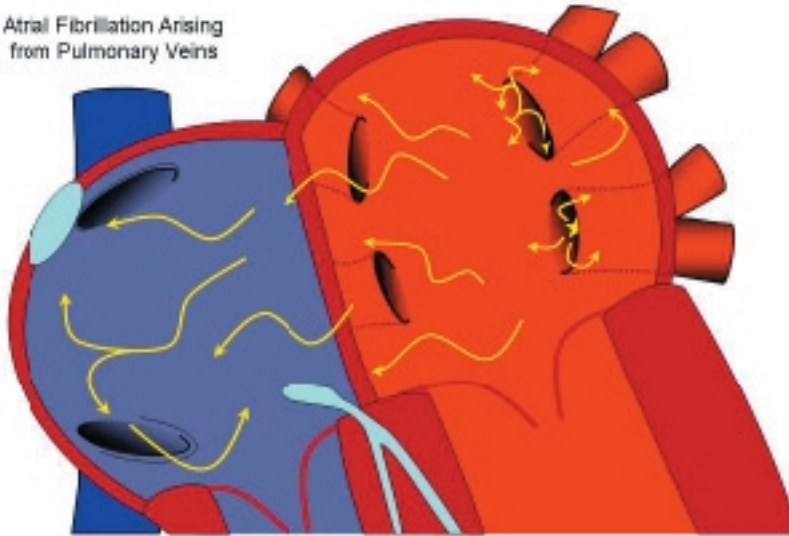


Atrial Fibrillation

© F. M. Knight 2005 The end result in both situations is rapid and chaotic quivering of the atria. The connecting wire (the AV node) protects the pumping chambers from going too fast, however it attempts to keep up with all the extra impulses and as a result the heart beat can sometimes be very fast and erratic. Normal heart rhythm can normally be restored either by using drugs or by restarting the heart with a shock while you are asleep (cardioversion). However AF will almost always return. In some patients the symptoms of AF can be controlled with drugs that control the rate at which the ventricles beat (digoxin, verapamil or beta blockers) combined with a blood thinner (usually warfarin) to prevent a stroke. If these measures have failed your doctor may advise you to undergo an ablation procedure.

## The Ablation Procedure

Atrial Fibrillation Arising from Pulmonary Veins



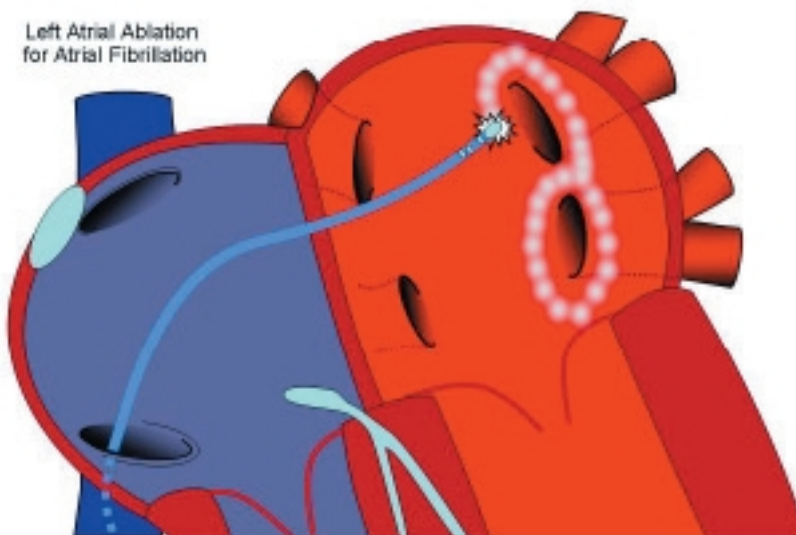
© FHergtroyd 2008 The aim of this

procedure it is to destroy or isolate the abnormal sources of electrical impulses that may be driving AF and to alter the tissue of the atria so that they transmit the impulses from the sinus node smoothly. This is achieved by performing ablation within the atria. Ablation means making small burns in the heart tissue, so that it is unable to conduct electrical impulses. This is done using a long wire threaded into the heart.

Once the tissue is treated in this way it forms a scar which can no longer conduct the abnormal impulses. These “radiofrequency lesions” are introduced in a pattern around the pulmonary veins to prevent the abnormal impulses from escaping and causing AF

This particular pattern of lesions used varies from specialist to specialist.

Left Atrial Ablation for Atrial Fibrillation



© FHergtroyd 2008 In some

specialist centres new forms of ablation energy (such as sound waves or freezing) are used. Also many centres are trying new patterns of lesions to see if they are more effective in preventing the return of AF.

Your specialist will discuss their particular technique with you.

## What happens before the procedure?

Before your admission to hospital you may be invited to a pre-admission clinic with a nurse specialist or other clinical professional who will run through all the aspects of the procedure with you. This is a good time to ask any questions you may have. You can also finalise where and when you need to attend the hospital for your procedure, plus whether you need to fast (avoid anything to eat or drink) prior to admission. You will also be given instructions regarding your current medications such as which to stop and when. You must follow these instructions carefully as it may be necessary to cancel your operation if this is not done correctly, particularly instructions regarding blood thinning drugs such as warfarin.

If you are taking warfarin this may need to be stopped just before the procedure. For the few days while you are not taking warfarin it may be necessary to inject yourself with another blood thinner such as Fragmin or Clexane. You or your partner will be shown how and when to give these injections. In the UK or Europe there is no uniform policy regarding how to manage your blood thinners prior to an AF ablation however most methods are equally safe and your specialist will advise you of the local arrangements. To assist with the procedure it may also be necessary to have a detailed scan of the heart such as a CT or MRI scan. These may provide useful information about the atrial chambers and pulmonary veins, which can make the procedure easier.

You will be admitted to hospital either on the day of or the day before your procedure. A final run through of the procedure will be made by your consultant or a senior specialist trainee under the supervision of your consultant and then you will be asked to sign a consent form that states the benefits and risks of the procedure.

Prior to the ablation it may also be necessary to perform a trans oesophageal echo to ensure there is no blood clot in the atria, which would make it very dangerous to proceed. This is a procedure similar to an endoscopy where you are asked to swallow a thin tube with an ultrasound probe at its end so that the atrium and heart valves can be seen in great detail. Usually local anaesthetic will be sprayed at the back of your throat and you will be sedated to make this procedure as comfortable as possible.

## What happens during the procedure?

Catheter Ablation is carried out in a cardiac catheter laboratory, a room which is similar to an operating theatre. In the UK, the procedure is most often carried out using local anaesthetic and sedation, rather than general anaesthetic. This means that you will be conscious, but you can be given medicines to prevent pain and to make you drowsy. There will be a team of people present, some of whom you may have met before. The doctor, or electrophysiologist, will carry out the procedure with the help of a physiologist (cardiac technician), who gives technical support, nurses, who will look after you and assist the doctor and a radiographer who will assist with the x-ray equipment. Before the procedure starts you will have adhesive patches attached to areas such as your arms, back, chest and legs. These are necessary to monitor you and to allow all the equipment to work normally. There will be a blood pressure cuff on your arm which will inflate during the procedure and a clip on your finger measuring the amount of oxygen in your

blood. It may be necessary for you to wear an oxygen mask. The procedure is performed with long thin wires called catheters which are guided into your heart via tubes inserted in the groin veins which will be inserted into both groins and sometimes into your neck or under your collar bone. Firstly however these areas will be cleaned and covered with sterile drapes (paper or cotton sheets) and then you will have local anaesthetic injected at these sites. Although this will sting for a few seconds, it will cause the skin to become numb so that the insertion of these tubes is painless. In addition, it is usual to be given some sedation or pain killer intravenously via a fine tube in your hand or arm. This should help you feel relaxed and sleepy. You may even go to sleep during the procedure. You may be asked to lie with your arms by your side during the procedure. If so, you need to ask the staff to scratch your nose, if need be, or move things for you so that you do not disturb any of the equipment by lifting your arm from under the sterile drapes! The first part of the procedure is to introduce several wires into the veins of the leg (or neck) move them in to the right atrium and from there to the left atrium. This last movement is done by making a small puncture hole between the right and the left atrium. This is called a “transeptal puncture” and it allows your specialist doctor to perform ablation in the left atrium. The catheters are then placed into the left atrium and ablation is performed. You may feel some chest pain at this point and if this is too unpleasant you should ask for more pain killer. Throughout the procedure a nurse will be monitoring you closely and he/she will always be available if you need anything such as pain killers or sedation. The procedure takes between 2½ and 5 hours. At the end of the procedure your consultant may wish to cardiovert the heart back into its normal (sinus) rhythm by delivering an electrical shock across the heart. If this is necessary you will be given more sedation so that you are asleep

## What happens after the procedure?

Immediately after the procedure you will be returned to the ward where your heart rhythm and your blood pressure will be monitored closely, as will any puncture sites in your groin and neck. The tubes in your groin and neck will be removed there when it is safe to do so. It is usual to be discharged home the next day again with instructions regarding blood thinners and heart rhythm medications – follow these carefully. Fleeting pains in the chest, shoulder, or neck, that catch the breath like a “stitch” are quite common in the first few weeks and are related to inflammation from the scar process.

Most patients recover quickly from the procedure however if you were sedated it may take a day or two to feel completely normal again. It is best to avoid heavy lifting for at least a week to allow your groin to heal properly. It is common to be aware of extra or missed heart beats in the first few weeks however if you experience a prolonged bout of palpitations (longer than 60 minutes) you should get in touch. You should be given a phone number so that you can ring for advice if you run into any difficulties. The DVLA currently state that you may not drive for one week following the ablation (see [DVLA website](#) or check in the hospital for current guidance).

## Are there any risks to the procedure?

Unfortunately all procedures that involve the heart have a small risk of a serious complication. It is important that you understand what these risks are



so you can make the decision of whether you want to have the procedure performed. These will always be discussed with you by your doctor before the procedure.

Minor problems that may occur are chest pain during the ablation (which may feel like severe indigestion) or bruising and soreness in the groin after the procedure. X-ray is used during the operation which could damage an unborn child. You must tell your consultant if there is any chance you could be pregnant. The very serious complications are listed below. They are fortunately unusual. Overall there is a serious complication in approximately 1 in 50 cases (2%).

- **Stroke.** This occurs when either a blood clot blocks one of the arteries in the brain or there is bleeding from one of the arteries. This causes a loss of blood circulation to the brain. It can cause severe impairment or complete paralysis of movement or sensation on one side of your body or face. Vision and speech can be impaired. The damage can recover with time or may leave permanent disablement
- **Perforation of the heart:** It is possible for the ablation catheter to cause a hole in the heart which allows blood to escape out of the heart. The heart is enclosed in a rigid fibrous coat called the pericardium and if enough blood becomes trapped here it can compress the heart and prevent it pumping normally. This is called “cardiac tamponade”. The blood must be drained immediately to allow the heart to beat again and this can usually be done by threading a tube through the chest wall to drain the blood out. Very occasionally this is not possible, and emergency surgery may be needed to drain the blood and repair the hole.
- **Narrowing of the pulmonary veins:** As explained above ablation is performed very close to the pulmonary veins. Very occasionally the veins react to this and become very severely narrowed or even blocked. This does not usually cause any symptoms immediately however if more than one of the four pulmonary veins is severely affected it is possible to cause breathlessness, recurrent chest infections or a blood stained cough. Although symptoms from this complication are rare, they can be very difficult to treat.
- **Death:** this is very rare. A recent worldwide survey of these procedures revealed that death occurred in once every 2000 procedures (0.05%).
- **Other:** there are other very rare complications such as punctured lung, paralysis of the diaphragm and perforation of the gullet.

## Will the procedure work for me?

The success of this procedure depends on several factors including the type

of AF you have (paroxysmal or permanent), the length of time you have had AF, whether or not you have any other heart disease, the experience and the equipment available to the institution where you have your procedure performed. You should discuss this with your heart rhythm specialist and your hospital should be sending records of their procedures to the government central cardiac audit database. Overall AF ablation is successful in 70% of cases. However to achieve this success rate it may be necessary to undergo 2 or 3 procedures. In approximate 30% of patients either the procedure fails or patients are not willing to undergo a repeat procedure.

**Heart rhythm tablets:** If the procedure is successful it should be possible to stop most of your heart rhythm drugs. Your specialist may wish to keep you on some of these medications for a few weeks to allow your heart to recover and get used to being in the normal rhythm again. In some situations these drugs may be also controlling another problem such as blood pressure (eg Beta blockers) in which case you may be advised to continue them.

**Warfarin:** If you were taking a blood thinner before the procedure you will need to continue this for at least six weeks afterwards. Even if your heart stays in sinus rhythm your specialist may still advise you to continue to take warfarin for longer because it may still reduce your chance of having a stroke in the future. The circumstances for each patient are different and you will need to discuss this with your specialist.

## Are there alternative procedures?

There are alternative treatments for atrial fibrillation which have not been discussed in this leaflet. These are:

- Pacemakers
- Ablation of the AV node and a permanent pacemaker
- Specific and strong heart rhythm drugs
- Heart surgery for AF

If you would like to explore these alternative options further you should discuss them with your heart rhythm specialist.