

# AV NODE ABLATION FOR ATRIAL FIBRILLATION

Vancouver Island Arrhythmia Clinic (VIAC)

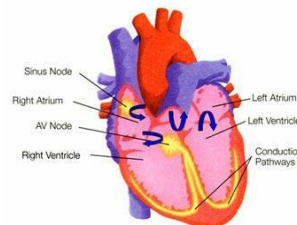
Dr. Richard Leather, Dr Paul Novak, Dr. Larry Sterns,  
Dr. Chris Lane, Dr. Sikkel  
301-740 Hillside Avenue  
Victoria, B.C. V8T 1Z4  
(250) 595-1551

## Normal functioning of the heart

The normal heart has four chambers, two upper and two lower. The two upper chambers (atria) receive blood back from the body and the lungs. By contracting in a coordinated fashion they send the blood through the heart valves to the two lower chambers of the heart (ventricles). The ventricles, having been filled with blood from the upper chambers, contract approximately a quarter of a second after the atria and pump blood back out to the lungs and the body.

The pumping function of the heart is coordinated by an electrical system. Electrical impulses originating in the atria trigger the atria to contract. In a properly functioning heart these electrical impulses then travel in an orderly pattern from the atria to the ventricles causing them to contract. This way the pumping function of the heart is coordinated such that the most efficient delivery of blood to the lungs and body is possible. When the electrical system of the heart malfunctions, efficient pumping of the heart is compromised and unpleasant symptoms may occur.

## Atrial fibrillation



Atrial fibrillation is a very common electrical disturbance of the heart which often leaves people feeling tired, short of breath, with palpitations and sometimes light headedness. The main electrical derangement is a very rapid, chaotic beating of the atria (with atrial rates as fast as 800 beats per minute). Of course the main pumping chambers of the heart, the ventricles, do not beat this rapidly since this would be lethal.

Normally for every heart beat in the atria there will be a corresponding heartbeat from the ventricle. This is because the electrical impulses from the atria are funnelled down to the ventricles via a small heart tissue "wire" between the chambers called the AV (atrioventricular) node. This AV node is actually like a "safety valve" since many of us may develop a bout of atrial fibrillation during our lifetimes. The AV node filters out very high atrial rates thus protecting the ventricles. In fact when the atria are beating at up to 800 beats per minute during atrial fibrillation it is unusual for the ventricles to be beating at any more than 200 beats per minute (i.e. only approximately every fourth beat transmits to the ventricles). This rate (200 beats per minute) is generally not dangerous but because it is inappropriately fast and usually quite irregular, patients feel unwell.

## Treatment of atrial fibrillation

The treatment for atrial fibrillation includes finding and treating the cause (if possible), controlling the ventricular heart rate (this involves medications which "block" the AV node somewhat to decrease the proportion of atrial beats which conduct to the ventricles), restoring normal sinus rhythm, maintaining normal sinus rhythm (requiring anti-arrhythmic medications) and preventing strokes (due to blood clots which form in the atria and travel to the brain).

## Catheter ablation for atrial fibrillation

Most patients with atrial fibrillation require some type of medication to control the unpleasant symptoms associated with the fibrillating heart. In those in whom atrial fibrillation is difficult to treat with medication or in whom medication is poorly tolerated, the adverse symptoms related to the fibrillation (rapid, irregular heart beat) can be managed by "zapping" (or **ablating**) the AV node such that none of the atrial beats transmit to the ventricles.

Ablation of the AV node can be accomplished by placing a special **catheter** (a small, flexible wire with metal tip) adjacent to the AV node and destroying it with a form of heat energy from the tip of the catheter. The form of energy which is delivered from the tip of the catheter and which damages a small area of the heart (about the size of a kernel of corn) is similar to the current used by surgeons with their electronic scalpel (cautery). The form of energy used is radiofrequency energy and therefore the procedure is called **radiofrequency catheter ablation**.

## Need for a permanent cardiac pacemaker

After a successful AV node ablation the ventricles will no longer respond to the electrical signals from the atria. In other words, although the atria may continue to fibrillate at up to 800 beats per minute, the ventricles will be "doing their own thing". In almost all individuals after ablation the ventricular rate will be about 40 beats per minute (and very regular). This 40 beats per minute may seem slow, but it is sufficient to maintain your blood pressure and sense of well-being at **rest**. Unfortunately, even with exertion, the ventricular heart rate will not rise much higher than 40 beats per minute. You would not feel very energetic if we allowed your heart to stay at this slow rate. In order to allow your ventricular rate to rise appropriately with exercise a **rate responsive pacemaker** will be necessary. These pacemakers are very sophisticated (and remarkably small these days). It is possible to easily program them (like tiny computers) to keep your heart rate relatively slow with inactivity (for example 60-70 beats per minute) yet increase the paced heart rate gradually to appropriate higher levels as the sensor in the pacemaker detects increased activity.

The pacemaker is usually implanted prior to the AV node ablation procedure. The implant is done under local anaesthetic, just under the skin below the collarbone, and usually requires either a day procedure or a one-night stay in hospital.

## Ablation procedure

You will be admitted to the hospital the day of the ablation procedure. After an overnight fast, you will be taken to the Electrophysiology laboratory (EP Lab). Usually light sedation is given, the area of the right groin is washed and shaven and a local anaesthetic is applied over the vein. The local anaesthetic is similar to that given for dental procedures. After a slight sting from the local anaesthetic the area becomes numb and you should have no more discomfort. The majority of patients do not require a general anaesthetic.

Catheters are introduced into the femoral vein (which has been anesthetized) and advanced to the heart using x-ray guidance. This procedure is painless. One catheter is used to temporarily pace the heart while the second is used to "map" the region of the AV node looking for the appropriate electrical signals that tell us we are at the correct location. When a satisfactory position is found, radiofrequency energy is applied from the tip of the mapping catheter. This is painless. Occasionally several radiofrequency applications are necessary.

## After the ablation

After the procedure all catheters are removed and you return to your room. You will stay in bed for 3 hours with the right leg straight to prevent bleeding at the site where the catheters had been in the vein. Discharge home is usually the same day, late afternoon or early evening, and you will be seen in the pacemaker clinic in follow up in approximately 4-6 weeks. Your physician will review activity guidelines with you and you will be given a discharge instruction sheet to help remind you.

If the pacemaker had not been implanted before the ablation procedure a temporary pacemaker wire will be left in the heart and the pacemaker procedure will be scheduled as soon as possible in the operating room or the EP Lab. Occasionally an extra day of waiting is necessary for a permanent pacemaker.

## Benefits

The procedure is virtually 100% successful. Very rarely (<3%) a second attempt is required.

Risks are extremely small. To date there have been no serious complications.

Catheter ablation allows us to prevent your heart from racing during atrial fibrillation. The pacemaker maintains your heart beat at a regular rate. However, we have not prevented recurrence of atrial fibrillation. Therefore, you will still require medications to prevent formation of blood clots and strokes. Generally this means life-long aspirin or Coumadin. All other medications, which had been prescribed to control the heart racing, can be discontinued.



Revised December 2018