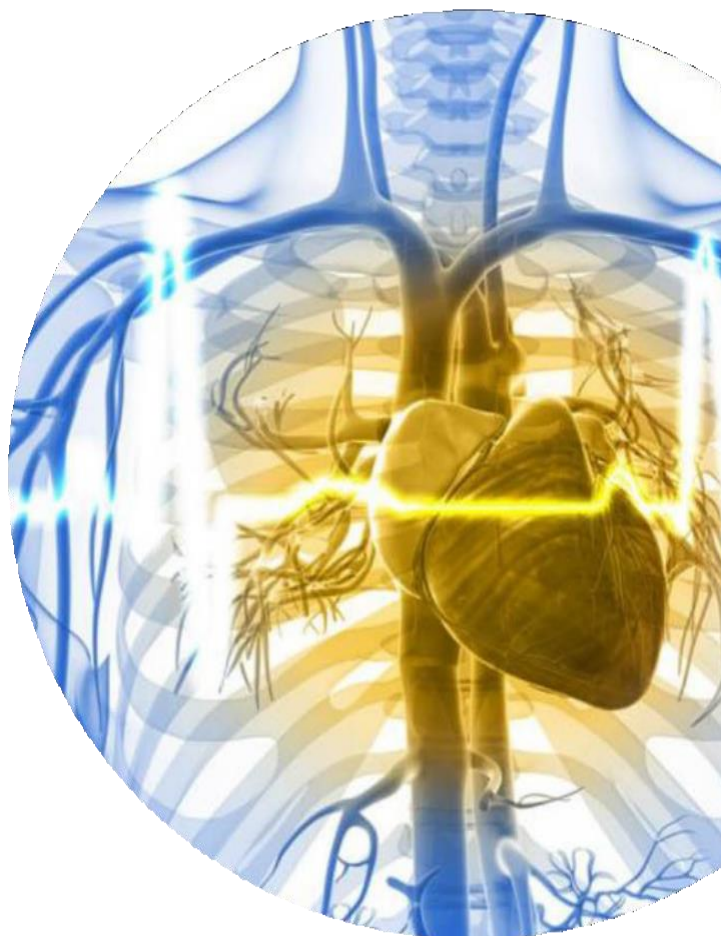


Catheter Ablation for Atrial Fibrillation (Pulmonary Vein Ablation)

A PATIENT HANDBOOK



December 19, 2022 – Version 3 - AODA

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Your Heart's Electrical System

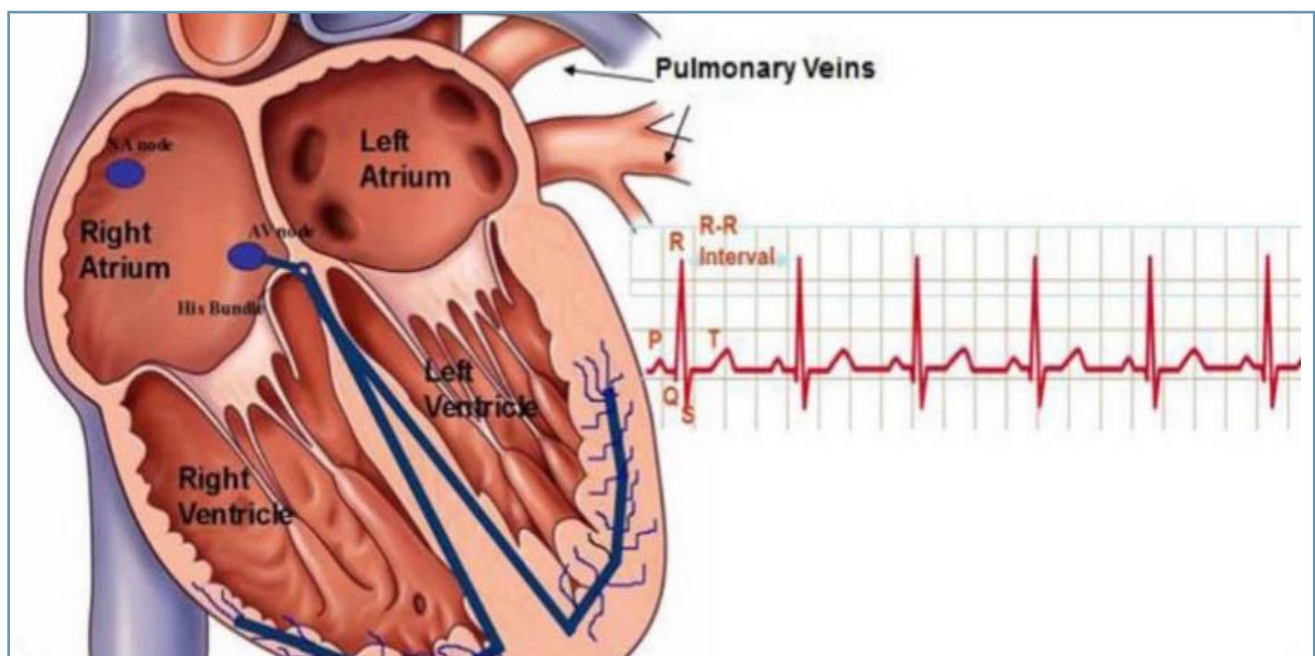
Your heart has an “electrical system”. It causes it to beat and pump blood and nutrients throughout your body.

The sinoatrial (SA) node is the electrical control centre of the heart. It sets the pace or rhythm of the heart. The SA node starts the electrical stimulation of the heart muscle. Then the signal spreads across the heart's upper chambers. This causes them to pump.

The electrical signal then travels to the atrioventricular (AV) node. AV node is found in the middle of the heart. The signal is then sent to the heart's lower chambers. This causes them to pump. This pumping action is felt as your pulse on your wrist or neck. The rate of pumping of the lower chambers determines your pulse rate. Once the lower chambers finish pumping, the SA node begins the cycle again.

The SA node is referred to as the “natural pacemaker”.

The AV node is referred to as the “gate keeper” controlling the heartbeat.



What is an Arrhythmia?

A healthy heart beats 60-100 times per minute during rest. However, some people have an irregular heartbeat. This is called an arrhythmia.

An “arrhythmia” is a disturbance in the rhythm of your heart beat. It may result from “short circuits” in the SA and AV nodes. It may result from anywhere in the electrical pathways of the heart.

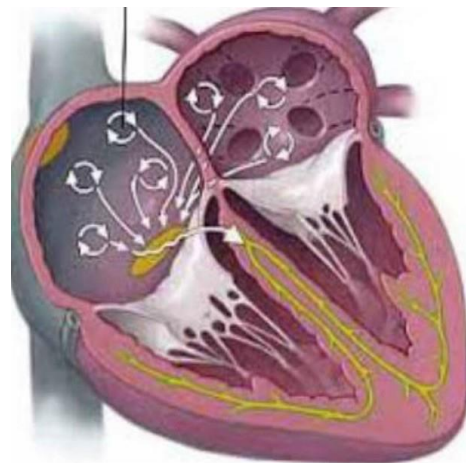
Arrhythmias can cause the heart to beat too fast, too slow, or irregularly. This irregular beating causes the heart to pump poorly. This can lead people to feel irregular heartbeats (palpitations). They can also feel dizzy or fatigue.

The type of arrhythmia you have may put you at a higher risk for medical problems. Those include heart attack, heart failure, stroke, or cardiac arrest.

Arrhythmias can be sorted. It depends on if they cause a heartbeat that is too slow, too fast and where in the heart they start. This book will look at atrial fibrillation (AF).

Atrial fibrillation (AF) is an uncontrolled, irregular heart rhythm. The upper chambers of the heart quiver and do not pump effectively.

Abnormal electrical pathways



Atrial fibrillation

Common Types of Atrial Arrhythmias

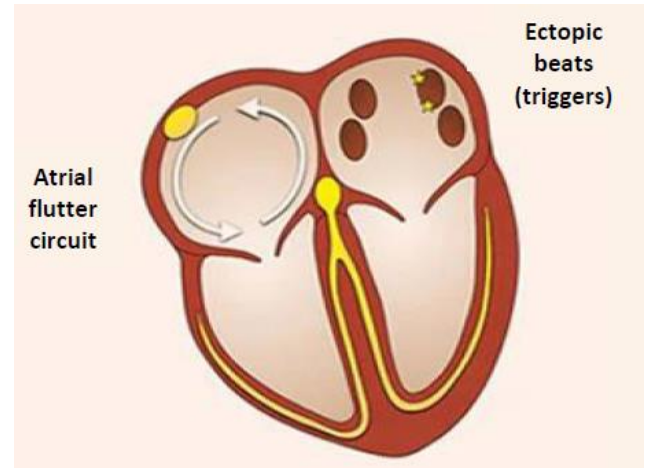
People with atrial fibrillation may also have other types of atrial arrhythmias. Those include:

Atrial Flutter

Atrial flutter is a fast rhythm. It comes from the upper chamber of the heart. It is more organized and regular.

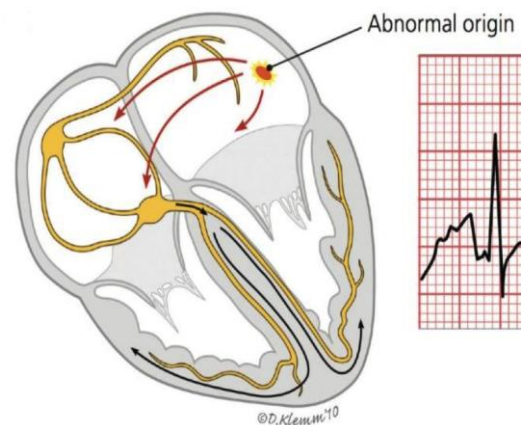
The atria beat between 150-300 times per minute when in atrial flutter. The ventricles usually beat at a regular rate but can also be quite fast.

If you have atrial flutter you may have palpitations or pounding of the heart. Bouts of atrial flutter can last for hours or days. That is why, most people with atrial flutter need treatment. When in atrial flutter, blood does not empty properly from the upper chambers. The blood can pool and sometimes clot. This can lead to a stroke. Your doctor may start you on a blood thinner to lower your stroke risk.



Atrial Tachycardia (AT)

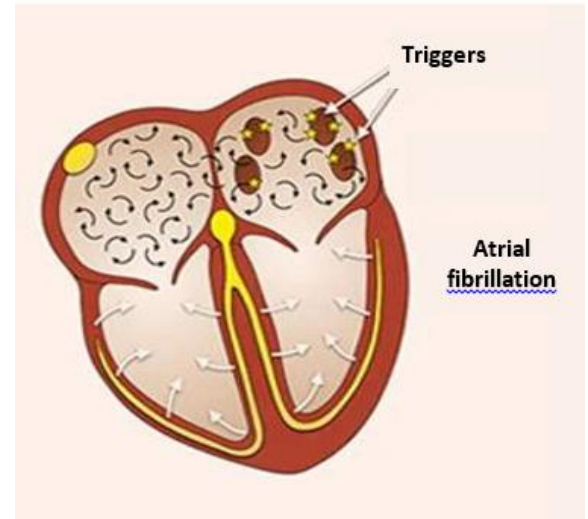
Atrial tachycardia is not as common as atrial fibrillation (AF) or atrial flutter. With AT the electrical impulse starts in the atria, but not in the SA node. This causes a very fast heart rate. Symptoms of AT may include palpitations or pounding of the heart. There is no stroke risk with AT.



What is Atrial Fibrillation?

AF is the most common type of abnormal atrial heart rhythm. It is found in more than 6 million people worldwide. It affects more than 1% of all Canadians.

AF is a disorganized heartbeat. It occurs in the upper chambers of the heart (atria).



A normal heart beats about 60-100 times per minute. During AF, the atria beat between 350-600 times per minute in a random, irregular way. This can cause your ventricles (the lower chambers) to beat irregularly. They can also beat quickly – up to 150-200 times per minute. This is what causes many people to have symptoms. They can feel dizzy, fatigue, chest pain and shortness of breath.

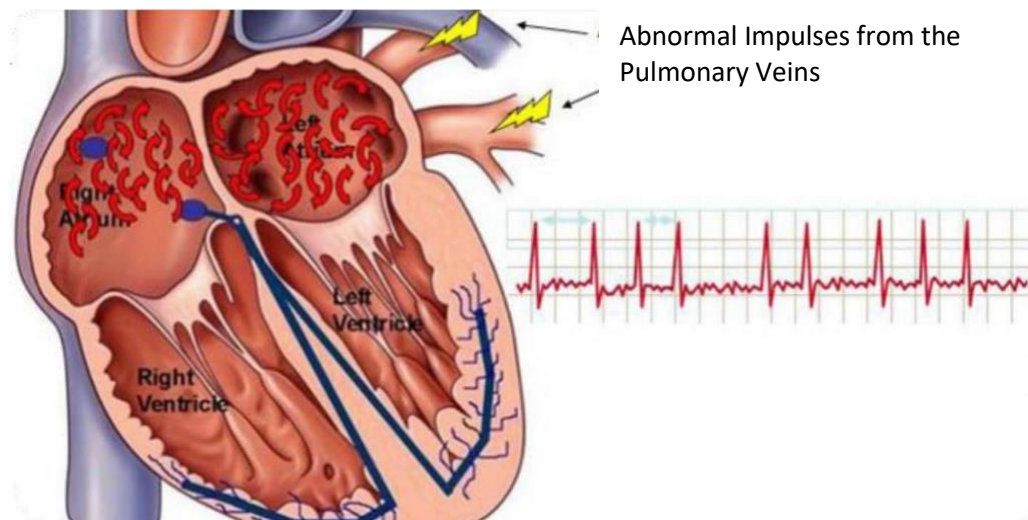
AF can occur in isolated episodes. It can occur for longer periods of time (hours, days, weeks, even months). It may stay all the time. Often, people start by having rare episodes (once a year, once a month). Over time, they become more frequent. Sadly, AF almost never goes away on its own. Once you start having AF episodes, they almost always come back. They also become worse over time.

Types (Patterns) of Atrial Fibrillation

Paroxysmal: refers to AF that comes and goes on its own. The AF may last seconds, minutes, hours, or days before the heart returns to normal rhythm. Often people with this type of AF feel more palpitations. This is because of sudden changes in heart rate from AF to normal rhythm.

Persistent: is when the AF does not stop on its own. People may not feel as many palpitations. They may still feel fatigue and shortness of breath. Medications or an electrical shock are used to reset the heart to normal rhythm. This electric shock is called cardioversion. If no treatment is given, then you will stay in AF.

Permanent: this is when the AF cannot be fixed. Medications and electrical shock do not restore the heart to normal rhythm.



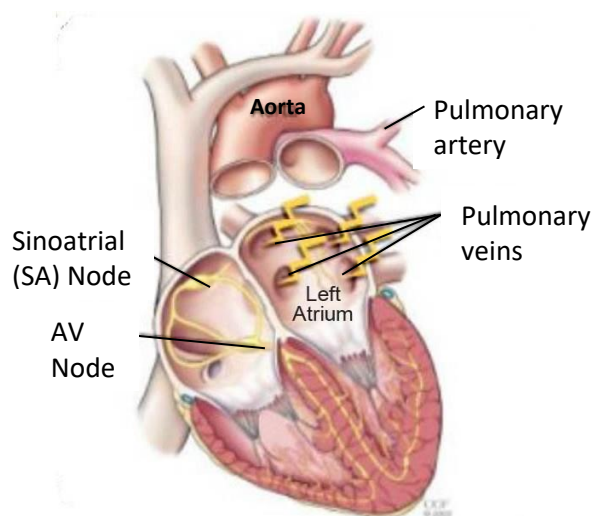
What causes Atrial Fibrillation?

AF most often occurs in adults over age 60. It can occur in younger people. AF may be linked with other heart or lung conditions. Those include high blood pressure, coronary artery disease, heart valve disease, heart failure, chronic lung disease or sleep apnea. Being overweight is an important risk factor as well. In some cases, AF is inherited. Research is ongoing in this field. In many cases, AF occurs in completely normal hearts.

Excessive alcohol, binge drinking, caffeine intake or specific drugs can make AF worse. Electrolyte or hormonal imbalances, stress, and weight gain can lead to more AF symptoms. Sadly, removing these factors may not get rid of the AF. There is no specific diet that seems to make AF worse or better.

Inside the heart, AF is caused by electrical “short circuits”. It fires off electrical impulses in a rapid and irregular way. In AF, there are a lot of these short circuit regions (more than 50-100). Most of these short circuits are located in one of the upper chambers of the heart. This chamber is called the left atrium.

There are four veins called pulmonary veins. They are attached to the left atrium. They bring blood back from the lungs into the heart. Most of the AF short circuits are found around these pulmonary veins.



Is Atrial Fibrillation Dangerous?

In the short term, AF is usually not a life-threatening problem. Some people can be in AF for hours. Some are even in AF all the time. However, in the long term, AF can have some serious effects.

During AF, blood does not empty properly from the upper chambers of your heart. The blood can pool and sometimes clot. If this clot breaks off and goes to the brain, it can cause a stroke. People with AF are five to seven times more likely to have a stroke. Clots can also travel to other areas of the body and damage other organs (kidneys, bowels, heart etc.).



AF is not a life-threatening condition. It requires careful management to ensure you don't suffer complications.

Over time, AF can cause the heart to become abnormally large (dilate). This can decrease the heart's pumping function by 25 percent. It can even lead to heart failure.

For many people, AF interferes with their quality of life. The symptoms caused by AF can be very limiting. They can stop people from living a normal life. Many people can become disabled from the symptoms. Others may feel like they have "aged" by many years because of the tiredness.

How is Atrial Fibrillation Diagnosed?

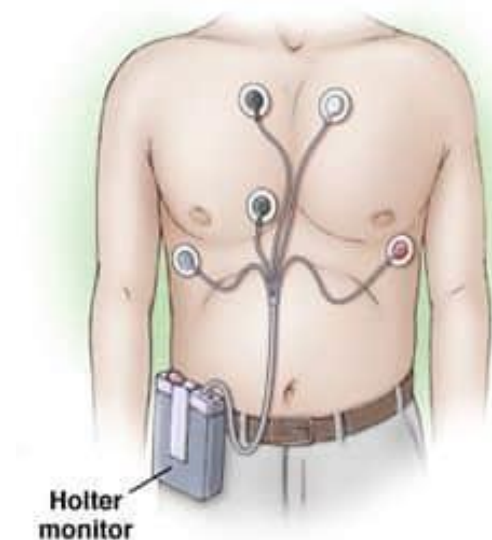
In order to diagnose AF, your doctor needs to record it. There are several tests that can be used to record AF, including:

Electrocardiogram (ECG): a test that draws the electrical signals of the heart on a piece of graph paper.

Recording your heart rhythm during your symptoms or episodes helps in diagnosing AF.



Holter monitor: a portable, external recording device. It is worn for 1-14 days. It records the heart rhythm non-stop. You have to wear small, sticky patches on your skin. The patches attach to wires that feed into the device.



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Loop recorder (event monitor): also a portable, external recording device. Worn for a longer time, usually weeks. It records your heart rhythm only when activated. You have to wear small, sticky patches on your skin. The patches attach to wires that feed into the device. This test is helpful if you have symptoms less often (less than once a day).

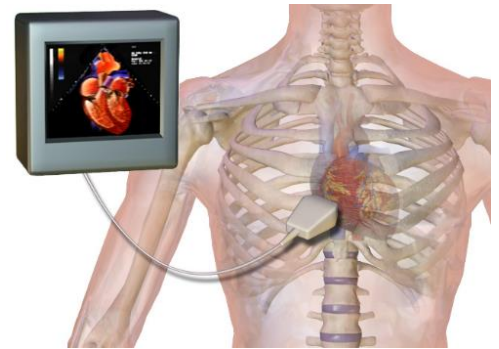
Implantable loop recorder: a special device that can be put under your skin. It records your heart rhythm. You can activate the device with a special remote control. Once activated, it will record your heart rhythm. This device can be left implanted for more than a year. It can be used to record episodes or symptoms that happen very seldom (less than once a month).



How is Atrial Fibrillation Diagnosed? *cont'd*

Other Heart Testing:

Echocardiogram: is an ultrasound of your heart. This test is done by placing gel on your chest. Then a special probe slides along your chest wall. The probe is attached to an ultrasound machine. It uses sound waves to measure the structure of your heart. It also allows the doctor to see how the chambers of your heart are working.

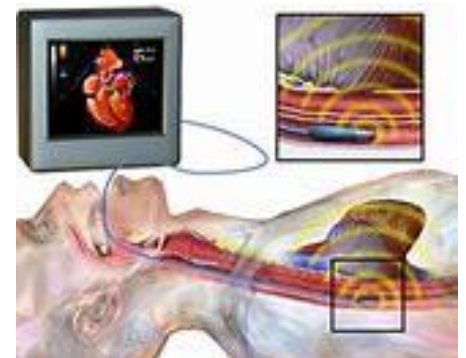


Stress test: a test where you exercise on a treadmill. As you exercise, we record your heart rhythm. We want to see if there are any blockages in the arteries that supply blood to your heart.



Transesophageal Echocardiogram

(TEE): a test where an ultrasound probe is inserted into your mouth and down your food pipe (esophagus). It takes pictures of the heart. We make sure there are no blood clots in the left atrium. Your throat is frozen. You are also given sedation for this test.



How is Atrial Fibrillation Treated?

AF Treatment Goals:

- Reduce the risk of blood clot formation and stroke
- Control your heart rate
- Restore a normal heart rhythm

Your doctor will work with you to develop a treatment plan. It will be specific to you and your condition. The treatment prescribed will depend on the type of your AF, symptoms and lifestyle.

AF Treatment Options:

Your AF treatment plan may include:

Lifestyle changes:

Lifestyle changes can help but will not eliminate AF. There is no specific diet that can fix AF. There are some steps you can take, like:

- **Quit smoking:** Ask your doctor if you feel you will need some help to quit smoking. It is a vital part of reducing your heart risk.
- **Limit alcohol intake:** You do not need to totally stop drinking alcohol. Limit it to small amounts and in moderation (one-two drinks per day).
- **Limit or eliminate caffeine:** One cup per day (coffee, tea, cola, energy drinks and chocolate).

No multivitamin, herbal therapy, or dietary supplement (like fish oils) has been shown to definitely reduce AF.

- **Exercise:** It is important for heart health. If you find AF is stopping you from staying active, speak with your doctor. You could get an exercise prescription for a cardiac rehab program. Try to avoid any activity that triggers your AF. Being overweight can make your AF much worse. Studies show that losing weight will help reduce AF. Discuss with your doctor an option of signing up for a weight loss program.
- **Manage your sleep apnea:** A condition where some people stop breathing for short period of time while they sleep. Signs of sleep apnea include loud snoring and feeling tired after a full night's sleep. A sleep study may be needed to make the diagnosis. If you have sleep apnea you could get night time breathing support. This may be a mouth guard or CPAP. You must use these nightly to improve your AF.
- **Control your blood pressure:** This may be done through lifestyle changes and/or medication. You should keep your blood pressure under 140/90. This may need to be lower in certain people. Check your blood pressure regularly.
- **Hydration:** Keep yourself hydrated. Drink at least 6-8 glasses of water and/or electrolyte rich fluids per day. This may reduce symptoms of dizziness and light-headedness related to AF.

Blood Thinning Medication (anti-coagulants):

Anticoagulants work to thin the blood. This prevents clots from forming, and reduces the risk of stroke. Blood thinners currently available in Canada include: Warfarin(Coumadin®), Dabigatran(Pradaxa®), Rivaroxaban(Xarelto®), Apixaban(Eliquis®), and Edoxaban(Lixiana®).

If you are taking Warfarin, blood tests every 1-4 weeks are needed. Dose of this drug is adjusted to keep the blood thinned to just the right amount.

The other drugs (Dabigatran, Rivaroxaban, Apixaban and Edoxaban) do not require routine blood monitoring. They are given in fixed doses. They may also be linked with less major bleeding risk. Not everyone can take these drugs, such as patients with kidney disease.

In some people, aspirin may be used instead of blood thinner. Your doctor will discuss the best choice of blood thinner for you.

Rate Control Medications

These medications help slow the heart rate during AF. They won't prevent AF from happening. These include: Digoxin(Lanoxin®), beta blockers (like Bisoprolol, Metoprolol, Atenolol), and calcium channel blockers (like Diltiazem, Verapamil).

Rhythm Control Medications (Antiarrhythmic)

These medications try to convert and keep your heart rhythm out of AF. Common examples of these medications include: Flecainide (Tambocor®), Propafenone (Rhythmol®), Sotalol(Sotacor®), and Amiodarone(Cordarone®). These medications work 30-60% of the time. They can become less effective over time. Each medication may also cause side effects. Some may even cause other arrhythmias. The dosage may need to be closely monitored by your heart specialist. Newer antiarrhythmic medications may become available. They could be prescribed by your heart specialist if required. These drugs can be taken as needed if you have infrequent AF. Most often these drugs are taken on a daily basis.

Electrical Cardioversion

AF can be treated electrically. The procedure is called a cardioversion. During the procedure, you are given a short-acting anesthetic. It will put you to sleep. Once asleep, an electrical shock is given. The shock goes through two sticky pads placed on your chest and back. This electrical shock resets the heart's natural pacemaker. This will restore normal heart rhythm. Most people go home the same day after this procedure. You will need a driver to take you home.

Implantable Devices

When the heart is slow, a pacemaker may need to be implanted. It will help keep the heart rate stable. It will not stop atrial fibrillation from occurring.

Every person with AF is unique. Your doctor will work with you to develop a treatment plan. This plan needs to be suited to your condition, symptoms, and situation.

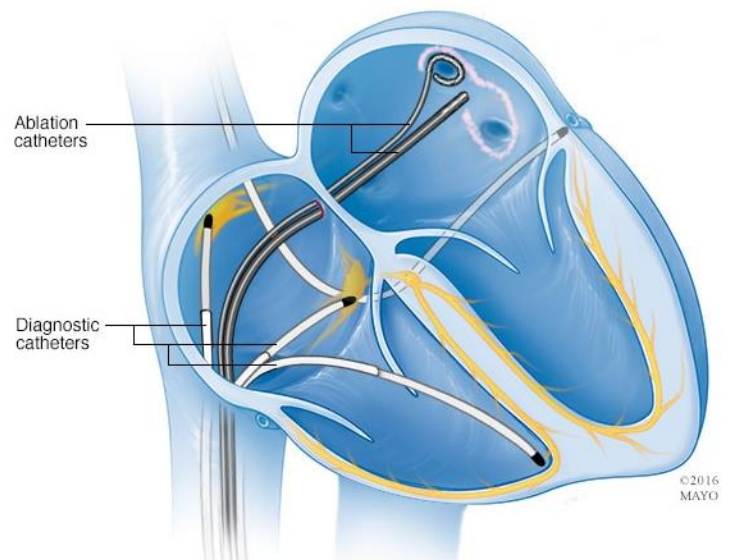
Catheter Ablation

Catheter ablation is a procedure used to remove the short circuits that cause AF. During the procedure, small wires are put into the heart. They are threaded through veins in your legs and neck. These wires map the electrical activity of the heart. This helps locate the problematic areas. These problem areas are burned away (cauterized) or frozen (cryotherapy). This process is called an “ablation”. Ablation is usually offered to people who have a lot of symptoms from their AF.

How is Catheter Ablation Performed?

Catheter ablation procedure is performed in a room with special equipment. This room is called the EP lab. A general anaesthesia is usually required for this procedure. This means you will be asleep during the procedure. You will have a breathing tube in your mouth and throat. This tube will be taken out after the procedure.

While you are sleeping, several long, flexible tubes are placed into your heart. They are called “catheters.” They are inserted through your veins. Once the catheters have been placed, one or two small punctures are made in the wall of the heart. This wall divides the left and the right atria. This is called transeptal puncture. It will help guide the catheters into the left atria.

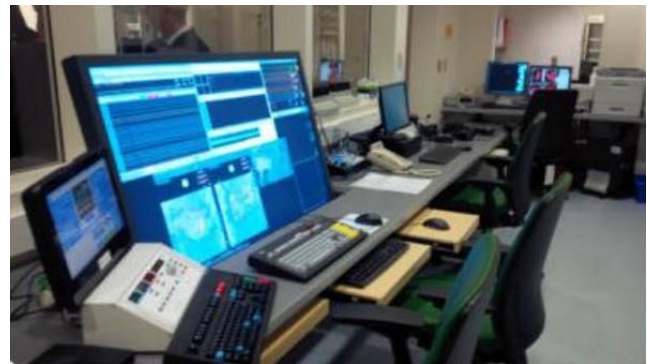


Once the catheters are inside the left atrium, they will be used to map the electrical system of the heart. They will locate the short circuit. You do not need to be in AF to do the mapping. The catheters are guided around the heart. To do this x-ray, ultrasound, and an advanced computer system are used. The computer system can make three-dimensional models of your heart. It will map your heart accurately and safely.

Once the problem areas are found, a special catheter is used to deliver heat energy (radio frequency). The goal is to eliminate (ablate) the problem areas. Sometimes cold energy (cryoablation) may be used instead of heat energy.

An ablation procedure is often used to treat AF. In this procedure, the short circuits that cause and maintaining AF are found and ablated. Most of these short circuits are found around pulmonary veins. Most of the ablation is performed around these veins. Other areas with abnormal electrical signals may also be targeted.

This procedure usually takes 2-4 hours to perform.



*Catheter ablation is performed in a specially equipped lab.
This lab is called an Electrophysiology Suite.*

During the ablation procedure, you will have a general anesthetic and will be sleeping. You will be lying flat on an x-ray table. Because the procedure is long, you may have a urinary catheter inserted into your bladder. You may also have a small probe in your mouth. The probe will check the temperature of your food pipe (esophagus). The esophagus lies behind the left atrium.

Special catheters are used to ablate problem heart tissue causing AF.

Atrial Fibrillation Ablation: Success and Complications

For paroxysmal AF, for first ablation without any antiarrhythmics, we offer an 80% success rate. 20% of people may need a second procedure. The success rate after that is over 90%.

For persistent AF, the success rate is lower. It's around 70% after one procedure. After two procedures it's 80%. However, some people have partial success (10% or more). For those patients, the arrhythmia is not eliminated but may be reduced. Some people may find that antiarrhythmic medications that did not work before, are now effective in eliminating AF. The decision to stay on medication, or to have a second procedure is part of the treatment plan. Your EP doctor will discuss this with you in follow-up appointments.

There are risks you need to know about. The overall risk of something happening is less than 4%.

You can expect a small amount of:

- Bruising or swelling at the insertion site
- Chest discomfort which resolves in 1-2 days
- Less than 3% injury to phrenic nerve (with cryoablation). This can cause shortness of breath. It is rarely permanent.
- Less than 2% chance of bleeding from the catheter site which may need surgery to fix

Rare complications (less than 1%) include:

- Hole in your heart muscle. This could require drainage device or surgery
- Blood clots in vein, lung or heart
- Heart attack or stroke
- Lots of bleeding at insertion site
- Mild pain in groin or shoulder
- Pericarditis – inflammation of the heart sack. Can cause chest pain
- Narrowing of pulmonary veins. Can lead to breathing problems

Very rare complications (less than 0.5%) include:

- Collapsed lung
- Infection
- Damage to your normal conduction system. Can result in permanent pacemaker.

Extremely rare complications include:

- Damage to esophagus (food pipe). Extremely rare, 1 in 1000. Generally seen 2-3 weeks after the ablation.
- Risk to your life is extremely small, 1 in 1000

Preparing for Atrial Fibrillation Ablation:

You and your EP doctor have to agree that a pulmonary vein ablation is right for you. Then, the Heart Rhythm Coordinator will put you on a wait list. You will have an appointment one month before your ablation. You will see an arrhythmia doctor or a nurse practitioner. This may be done by phone or virtually. It can also be in person at the Arrhythmia Clinic. This is our chance to check your health, medications and readiness for AF ablation. This is your chance to ask specific questions about your procedure.



General preparation:

Blood thinners, anti-arrhythmic and rate control medications may be stopped before the procedure. This information will be given to you once your procedure is booked. All other medications can usually be taken as prescribed the morning of your procedure with sips of water.

After Atrial Fibrillation Ablation:

The catheters will be removed once the procedure is done. You will be moved and watched closely in the recovery area. You will be on a strict bed rest for the first 4-5 hours. The nurse will check you often to make sure there is no bleeding. Once you are allowed to walk, the urinary catheter will be removed. Usually, you will be able to go home same day. Please ensure you have responsible adult to stay with you overnight. If a medical reason is requiring you to stay in the hospital overnight, please have a ride arranged for your early morning discharge.

You can resume normal activities after 3 days. Do not do any strenuous activity during the first 48 hours. Avoid straining, excessive stair climbing or squatting. During this time, take extra care to avoid heavy exertion or lifting. This will help the insertion sites in your groin to heal. You may have some bruising in this area. That is normal.

Monitor and watch out for:

- Fever – check your temperature daily for the first week. If you have a fever greater than 38.0°C or greater than 101°F, you need to contact your family doctor right away or go to your local emergency department (ED). Please notify the Arrhythmia Clinic as well.
- Severe chest pain – especially with fever. Promptly go to nearest ED. Bring the letter stating the type of ablation you had.
- Mild-to-moderate central chest pain or aching – normal for it to get worse when you are lying down or when you take a deep breath.

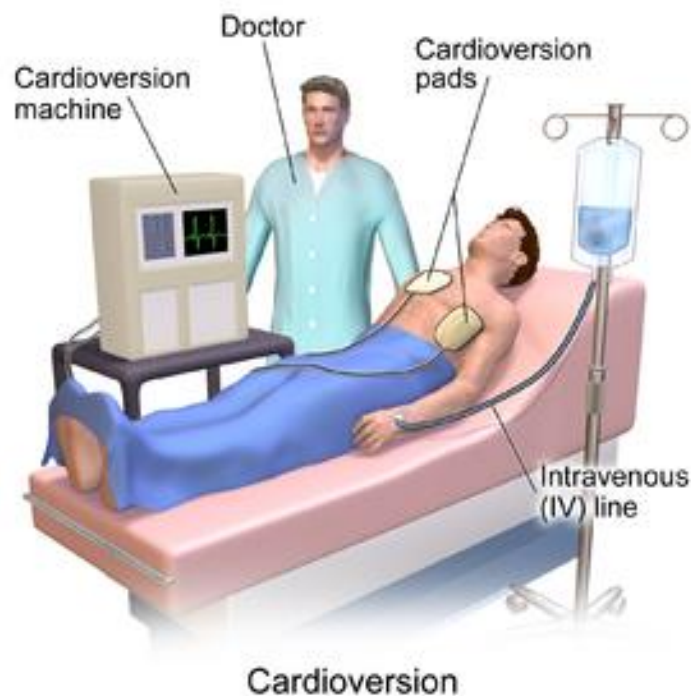


This often means some irritation of the lining of your heart after ablation. It usually resolves after few days. If it is more than mild, contact the clinic. You may be able to take anti-inflammatory medications to help treat the condition.

- Irritation of esophagus – it is important to protect your esophagus (food pipe) for the first 4 weeks after the ablation. You will get a prescription for powerful anti-acid pill, like pantoprazole-Pantoloc®. This will help protect the esophagus against irritation.
- Arrhythmias – the heart gets irritated after ablation. It can go back into AF within the first 3 months. This does not mean that the procedure failed. You may need to go back on some rhythm control (antiarrhythmic) medications. Your EP doctor will discuss when or if you can stop your antiarrhythmic medication.
- Stroke risk reduction - anticoagulation medication (blood thinners) will be restarted after your ablation. It is needed for 3-12 months after the procedure. This is to reduce risk and prevent a stroke. Your EP physician will tell you when you can stop your anticoagulant. Most people need it for at least one year.

If you go back into AF after your ablation for longer than 24-48 hours, we would like you to be electrically cardioverted.

This can be done safely within 48 hours after the start of an episode. This can be done at the nearest emergency department. If you have short episodes of AF that stop on their own you do not need to go to ED. However, if you feel faint or have severe symptoms you should go to ED. Remember to avoid 'triggers' of AF during the first 3 months after your ablation.



Episodes of AF are relatively common in the first months after your procedure.



This does not mean the procedure did not work.

Before you go home your doctor and nurse will go over the procedure. You will receive the “Connect the DOTs” brochure. It will outline the care of your insertion site. It will also have instructions on when to seek help. You will know when to call your family physician. It will also tell you when to call the Arrhythmia Clinic or go to the Emergency Department.

You will get instructions on medication changes. 3 months after your ablation you will have an appointment with your EP doctor or Heart Rhythm NP. We will arrange follow-up testing and an appointment.

You will be referred to a cardiac rehabilitation clinic nearest to you. Exercise programs have shown they can reduce the recurrence of atrial fibrillation. They also improve ablation success rate. You will receive a call from the rehab clinic around 1 month after your ablation procedure.

Remember no strenuous activity for the first week after your ablation



Catheter Ablation
What to Do When You Go Home
The Arrhythmia Clinic phone number is (519) 749-6578 Ext. 1500

Caring for Your Puncture Site:
Check the puncture site daily for the next 7 days

- Wear loose fitting clothing for a few days.
- A small bandage will cover your groin.
- After 48 hours you may shower and remove your bandage.
- Do not soak the groin area for the first 3 days. Gently pat the area dry.
- Avoid lotions and powders on the puncture site.
- You may have bruising at the puncture site. The bruising may extend down the leg over the next few weeks as it heals.
- Mild pain around the puncture site is common. This pain will slowly go away in a few days.
- If a small amount of bleeding occurs, lie down and apply pressure to the puncture site for at least 10 minutes. Place a piece of gauze or cotton ball on the bleeding area. Press directly on it with the tips of 2 or 3 fingers. If bleeding stops remain still and keep the leg straight for two hours. **Call 911 if bleeding continues.**

Activity:

- If you are going home the same day as your procedure consider having someone stay with you overnight.
- You may resume driving 24 hours after your procedure or for the length of time as advised by your doctor.
- Avoid needless walking, squatting or bending for the next 24 hours.
- Do not lift anything over 10 pounds (4 kg) for 7 days.
- If you feel well, you can start getting back to your normal activities 48 hours to 7 days post procedure. Most people can return to work after 48 hours. Ask your doctor when you can return to work.
- Ask your doctor if you have any specific activity questions.

Other types of Ablation:

AV Node Ablation with Pacemaker

This procedure is not done very often. In this procedure, a pacemaker is implanted first. It goes beneath your collarbone. You will have wires that go into your heart. Then, a small catheter is used to burn away (ablated) the AV node. AV node connects the upper and lower chambers of the heart. This stops the lower chambers from beating quickly, when the upper chambers are in AF.

This procedure does not cure AF. It just helps slow and regularize the lower chambers.

Atrial Flutter Ablation:

Some people with AF will also have atrial flutter. The atrial flutter can at times be eliminated. A more limited ablation in the right atrium is needed.



Patient Resources:

SMGH website

- www.smgh.ca

Heart rhythm websites:

- Heart Rhythm Society, patient resources
<http://upbeat.org/>
<https://upbeat.org/common-treatments/catheter-ablation>
- Heart and Stroke Foundation
www.heartandstroke.ca (in the search bar type ablation or arrhythmia)
- Thrombosis Canada
www.thrombosiscanada.ca (information on blood thinners and AF)
- Mayo Clinic
www.mayoclinic.org (in search bar type heart arrhythmia or cardiac ablation)
- Medtronic video of cardiac ablation for AF
<https://www.medtronic.com/us-en/patients/treatments-therapies/catheter-ablation-for-atrial-fibrillation/about-the-therapy/what-is-it.html>
- Medscape-Atrial Fibrillation Patient Education Centre
This site includes frequently asked questions, anatomical drawings and information about treatment options. You must be a registered member of Medscape to access this page. Registration is free
www.medscape.com

