Patient Education | Cardiovascular

Pulsed Field Catheter Ablation and Radiofrequency Catheter Ablation (Cardiac)

Your physician has suggested that you have an ablation. Ablation is a non-surgical procedure. The physician uses pulsed field ablation (PFA) or radiofrequency (RF) ablation to find and destroy abnormal pathways in the heart that cause fast heart rhythms. They will diagnose and treat the issue at the same time. You will have the procedure in the Electrophysiology Laboratory (EP Lab).

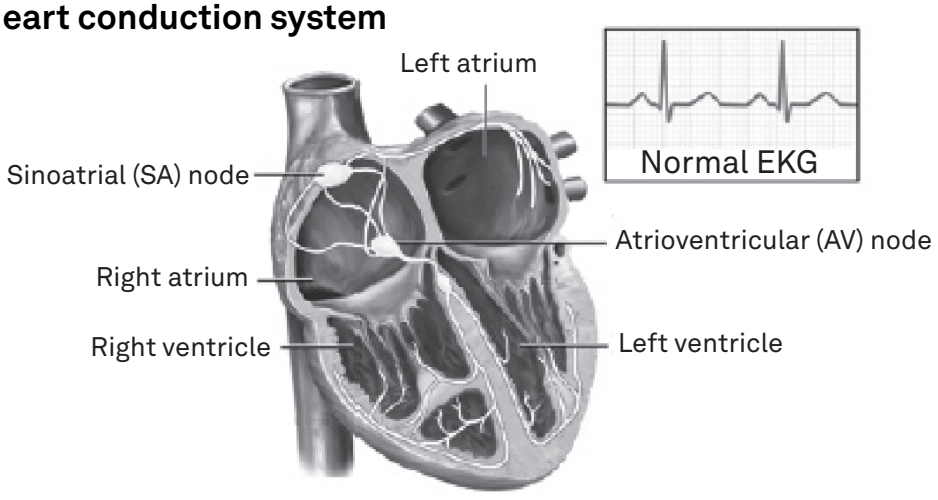
If you have any questions or concerns, talk with your physician or nurse.

This handout will help you understand your heart, abnormal heart rhythms and the ablation procedure.

The conduction system

With each heartbeat, the heart pumps oxygen-rich blood through the body. It needs a "spark plug" or electrical impulse to start a heartbeat. The heart gets this electrical signal from the sinus node in the upper chamber or right atrium (Figure 1). This signal or spark starts the electrical activity along its path or circuit. The signal then moves through the upper chambers (atria) along a path to the lower chambers or ventricles.

Figure 1. Heart conduction system



This electrical circuit makes the heart contract and pump blood throughout the body. “Normal sinus rhythm” is when the circuit follows this normal path.

Tachycardia

Tachycardia is a fast heartbeat. It may cause dizziness, palpitations or fainting. If the heart beats too fast, there is not enough time for the ventricles to fill with blood and the pumping becomes less effective. Tachycardias can start either in the atria, the upper heart chambers, or the ventricles, the lower heart chambers.

Supraventricular tachycardia

Supraventricular tachycardia (SVT) is a fast heart rhythm. It starts in the upper chambers of the heart. SVT happens in about 1 out of 100 people. It may start in infancy, but most often it appears between the ages of 10 and 30 years. It can affect people of all ages.

Usually, SVT is due to a short circuit in the heart’s electrical signals. This causes the heart to beat faster. Symptoms may include palpitations, dizziness, chest pain, clamminess and shortness of breath. Common forms of SVT include:

- **Atrioventricular (AV) node re-entry**
  AV node re-entry is the most common type of SVT treated with RF ablation. The cause of this rhythm is an extra pathway or “fork in the road” for electrical impulses to travel. This fork is located within the AV node tissue. Under certain conditions, the electrical impulse travels down one side of the fork and then back up the other side. The result is electrical impulses quickly going around in a circle. This causes a fast heart rhythm.
- **Wolff-Parkinson-White syndrome**
  An extra pathway that electrical impulses take can cause Wolff-Parkinson-White syndrome. However, its location varies. A bypass tract is a hair-like tissue that conducts electrical impulses. This tract connects the upper chambers with the lower chambers, on the left or right side of the heart. Sometimes an impulse travels down the normal pathway and back up the abnormal bypass tract. This creates a fast circle of electricity. This causes a fast heart rhythm.

- **Atrial fibrillation**
  Atrial fibrillation (AFib) is a common form of SVT. It affects more than 2 million people in the United States. In this condition, the atria of the heart quiver due to chaotic, uncoordinated electrical activity that happens through the atria. This results in fast and irregular impulses in the atrium (up to 300 per minute). As a result, the heartbeat becomes very irregular. It usually is not life-threatening. However, if it lasts, AFib can lead to stroke or heart muscle damage. Generally, people with AFib have palpitations (the feeling that the heart is fluttering or pounding in the chest). They sometimes feel dizzy, faint or short of breath. Some patients say they feel sharp anxiety.
- **Atrial flutter**
  Atrial flutter (AFlutter) usually happens because of changes in the atrial muscle, such as slowing of the conduction of electrical impulses through the atrium. In AFlutter, the abnormal heart rhythm starts in the atria. The typical AFlutter is an abnormal electrical circuit around the heart's tricuspid valve, between the right atrium and right ventricle.

Ventricular tachycardia

Ventricular tachycardia (VT) is the most dangerous of the heart rhythm disorders. It starts in the ventricles. At times, VT can change into ventricular fibrillation. Ventricular fibrillation is life-threatening. This chaotic electrical activity causes the heart to quiver rather than contract. Ventricular tachycardias often happens in patients who have damage from a heart attack, cardiac surgery or inherited disorders. Sometimes they happen in people who do not have a diagnosed heart condition.

Treatment options

Medication

A physician may treat people with these heart conditions with medication. The goal is to prevent the fast heart rhythm or to slow the heart rate. However, many people mention side effects, such as feeling tired and poor tolerance for exercise. Some may still have periods of SVT or VT while taking medication. Some patients want to avoid daily medications altogether.

PFA or RF ablation

The physician may perform a PFA or RF ablation to treat your abnormal heart rhythm. It is a non-surgical procedure that takes place in the EP Lab. The procedure is about 2 to 4 hours long with a possible overnight stay in the Cardiac Recovery Observation Unit.

In this procedure, the physician inserts several small tubes called catheters through a vein or artery and into the heart. The physician uses special equipment to watch the catheters and find the abnormal pathway. Once found, they destroy the pathways with PFA, which is a modern tool to perform ablation. It uses electric pulses (as opposed to traditional radiofrequency or cryo-ablation) to isolate the pulmonary veins. It can treat AFib more efficiently and with a lower risk of damage to surrounding structures like the esophagus and phrenic nerve.

This energy source is considered a non-thermal ablation technique that prevents the pathway from conducting electricity that causes the fast heart rate.

Before the procedure

Before the ablation, you may need several tests. These tests give basic information about your heart function. Your nurse can tell you more about these if you need them. Some of these tests may include:

- Blood tests
- Electrocardiogram (ECG)
- Transesophageal echocardiogram (TEE)
- 24-hour Holter monitor
- Magnetic resonance imaging (MRI)
- Exercise stress test

Your physician will talk with you about the benefit and risks of the procedure in detail. Risks include:

- Bleeding
- Blood clots or stroke
- Damage to the blood vessels or heart

Before the procedure, your physician will decide if you need to stop taking antiarrhythmic (irregular heart beat) medications. They can affect the heart. Keep in mind that stopping medications may give you the following symptoms:

- Palpitations (heart racing or skipping beats)
- Dizziness
- Shortness of breath
- Chest pain

If you have any of these symptoms, tell your nurse or physician right away.

The night before the procedure

Do not eat or drink anything after midnight. You may take medications ordered by your physician with small sips of water.

Day of the procedure

The care team will put a heart monitor on your chest while you are in the hospital.

A physician from the EP Lab will come to see you before your catheter ablation. They will explain the procedure and the possible risks. After the physician answers your questions, they will ask you to sign a consent form.

We will ask you to empty your bladder right before the procedure. You will need to take off your underwear and pajama bottoms. You may wear your glasses, dentures and hearing aids, if you have them, during the procedure.

The EP Lab is on the 8th floor of Galter Pavilion at 201 East Huron Street. During the procedure, your family and friends can wait in the 8th floor visitors' waiting room. We will let them know when you return to your room. Please do not bring any valuables with you to the lab. Either leave valuables at home or with a trusted family member or friend.

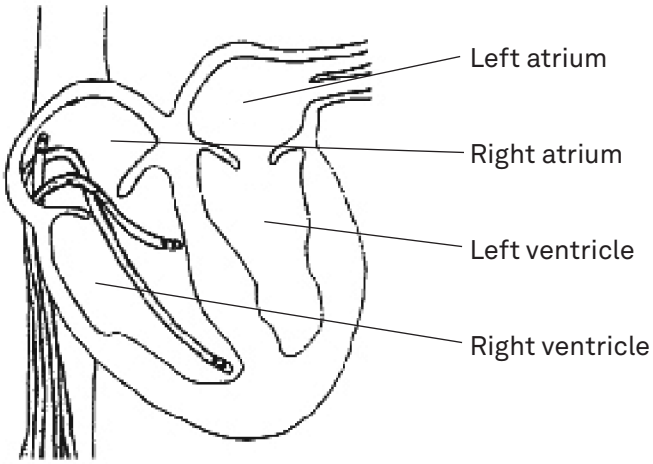
During the procedure

The ablation room has many heart monitors and machines. A specially trained team of physicians and nurses will be with you during the entire procedure. The nurses will connect you to several heart monitors. They will put an IV (into the vein) line in your arm if you do not already have one. The care team will use the IV to give you any medications you need during the procedure. They will also use it to give you medication to keep you relaxed and comfortable during the procedure.

Most often, the care team will put the ablation catheter into a blood vessel in your groin. In some cases, they will insert it in your inner arm or neck. First, they will shave the area and wash it with special soap. Then, they will cover it with sterile sheets. To start the procedure, the physician will inject a numbing medication at the site. You will feel some burning when you receive the medication, but once it takes effect, the site will be numb.

The physician will insert 3 or 4 small catheters (tubes) into the blood vessel in your groin. They will use an X-ray to position these wires into the heart chambers (Figure 2).

Figure 2. Catheters in the heart chambers



These electrodes help the physician find the exact spot of the abnormal electrical pathway. Once the physician finds the right spot, they will place the ablation catheter very close to the abnormal tissue. The PFA or RF energy will go through the catheter to destroy the tissue and the abnormal pathway.

The ablation takes place only after your care team has started and stopped your fast heart rate several times. This process is known as mapping.

During the procedure, the physicians will be discussing your heart rhythm with the EP staff. A clinical specialist from the medical equipment company may also be there. The mapping and ablation portion of the procedure may take up to 2 hours. Sometimes it takes up to 4 hours for more complex ablations, like repeat ablations for AFib or VT ablations.

After the procedure

When the procedure is over, the physician will remove the catheters and tubes. They will hold pressure at the site to prevent bleeding. After the procedure, the care team will take you back to your room. They will check your heart rhythm, blood pressure and pulse often. You will stay in bed for about 4 hours. It is important to keep your leg straight and not move it. This will prevent bleeding. You will be able to eat regular meals and raise the head of the bed 30 degrees.

Tell your nurse right away if you have these symptoms:

- Numbness or tingling in your leg
- Bleeding from the groin site
- Groin pain or pain at the catheter insertion site

As the numbing medication wears off, you may feel minor discomfort at the tube sites. If this happens, tell the nurse. They can give you pain medication. When you can get up, your nurse will help you out of bed. They will help you walk in the hallway.

Possible risks

Your physician will talk with you about the risks of the procedure in detail. The main risks of catheter ablation are:

Bleeding (hematoma)

Bleeding can happen at the puncture site where your care team placed the tubes into the blood vessel. The physician will hold pressure over the sites when they take the tubes out. To decrease the chance of bleeding, you will be on bedrest for several hours after the procedure. The catheters inserted into the heart rarely cause internal bleeding. Your physicians will be prepared to take care of this problem if it happens.

Thrombosis (blood clot)

It is normal for small blood clots to form at the puncture site to prevent bleeding. There is a small risk that other blood clots may form in these blood vessels, causing a blockage. You will get blood-thinning medication during the procedure to prevent blood clots.

Infection

It is rare for an infection to happen inside the heart or at the tube insertion site.

Radiation

The physician uses radiation (X-ray) to place the catheters in the correct areas of your heart. You should not have RF ablation if there is any chance you might be pregnant.

Heart block

If the abnormal pathway is near your normal conduction system, there is a chance that the ablation could damage the normal pathway. If this happens, you may need a pacemaker after the ablation.

At home

After your EP Lab procedure, these instructions will help your recovery.

Diet

You may resume your regular diet at discharge. Do not drink alcoholic beverages for 24 hours.

Activity

It can take 7 to 14 days for the groin to heal completely. During this time, bleeding or swelling can happen if you strain your abdominal or groin muscles.

- On the day of discharge, limit your activities and get plenty of rest.
- Do not drive for 24 hours.
- You may go back to your usual daily activities the day after discharge. This includes normal social activities.
- Do not do physical exercise or heavy lifting (more than 10 pounds) for 1 week. Talk with your physician or the EP Lab physician before you do heavy physical activity or your regular exercise program.
- Limit muscle strain with sexual activity.

Wound healing

The healing puncture site should stay soft and dry. You may see a small bruise or tiny bump. This is normal.

Call your physician or the EP Lab physician if you have any of these symptoms:

- Pain and swelling at the groin site that is getting worse
- Temperature more than 101.4 degrees F for longer than 1 day
- Drainage from the site
- Redness or red streaks on your skin around the wound
- Numbness or tingling in your foot, thigh or leg
- Swelling of your ankle and/or foot
- Color change and/or coolness of your leg or foot
- Calf tenderness or pain

When to call the physician

Please call your physician right away if you have:

- Chest discomfort or pain that spreads to your neck, jaw or arm
- Severe nausea that does not go away, vomiting or heavy sweating
- Shortness of breath
- An irregular heartbeat
- Lightheadedness or dizziness that makes you lie down
- Fainting

If you cannot reach your physician, call 911 or go to the nearest emergency department.

Bleeding

If you see a small amount of bleeding or oozing from the puncture site, do this:

1. Lie flat right away.
2. Put firm pressure just above the puncture site for 15 minutes. You may use a clean cloth or tissue to apply pressure. If possible, have another person apply pressure.
3. After 15 minutes, remove pressure. The wound should be dry and flat without bleeding. Cover the wound with a bandage.
4. Call your physician right away.

If the bleeding does not stop, go to the nearest emergency department or call 911.

Arterial bleeding

Although rare, arterial bleeding is an emergency. It needs medical attention right away. The following signs could mean that the puncture in the artery has reopened and that there is bleeding:

- Quickly increasing swelling of the area around the wound, which may be pulsating
- Continuous blood streaming from the wound
- A jet of blood pumping from the puncture wound

If you notice these symptoms, lie flat right away, apply hard pressure above the puncture site and call 911.

Contact information

If you have questions or concerns, call your care team at the EP Lab:

- During the week, call 312.695.4965 (TTY: 711) during business hours, 8 am to 4 pm, Monday to Friday.
- On nights and weekends, call 312.695.4965 and ask the operator to page the EP Lab fellow on call.
- You may also call Northwestern Memorial Hospital at 312.926.6999, and ask the operator to page the EP Lab fellow on call.

For more information about Northwestern Medicine, please visit our website at **nm.org**.

Developed by: Northwestern Memorial Hospital Electrophysiology Nursing Staff with Interventional Radiology

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