Catheter Ablation of Atrial Fibrillation

Introduction

Atrial fibrillation (AF) is the most common arrhythmia encountered in clinical practice. It has three disadvantages, namely irregular fast heart beat, impairment of contraction of the atrium, and formation of blood clot. These result in palpitation, breathing difficulty, chest discomfort, fatigue, and fainting. In the long run, it may cause heart failure and dislodgement of the blood clots to different organs, e.g. leading to stroke.

Importance of Procedure

Recently, catheter ablation, traditionally used for treatment of supraventricular tachycardia, has been applied for treatment of atrial fibrillation. This technique is mainly used in those patients suffering symptomatic atrial fibrillation despite medical therapy or those intolerate to medical treatment.

During the procedure, physician uses specially designed needle and instrument to make a small hole in the area separating the right and left atrium (Transseptal Left Heart Catheterization). This small hole enable physician to bring catheters from the right atrium to the left atrium. Using computerized tomography image, pulmonary venogram, signals recorded from the catheters, and 3-dimensional navigating system, physician can identify the abnormal electrical firing foci or thoracic vein (e.g. pulmonary veins, superior vena cava) and apply energy (radiofrequency , cryo , or pulse field ablation energy) to destroy them or confining them inside the thoracic vein, making them not able to conduct signal into the atrium. There is possibility that engery will be applied to other sites in the atria according to the discretion of the operating doctors. This procedure not only reduce atrial fibrillation burden, but also provides rhythm control of atrial fibrillation, controls the heart failure symptom and improves quality of life.

Pre-Procedure Preparation

- You may be asked to stop some or all of the anti-arrhythmic drugs and blood thinner (e.g. warfarin) before the procedure.
- If you experience severe symptom during this period (e.g. palpitation or fainting attack), please seek immediate medical attendance at nearby clinic or Accident & Emergency Department.
- You need to sign an informed consent.
- You may need to undergo investigations like blood tests, electrocardiogram, chest X-ray, computerized tomography (CT) or Magnetic resonance imaging (MRI) of the heart and transesophageal echocardiogram to make sure there is no abnormal blood clot and rule out other structural heart disease.

- An intravenous infusion line may be set up and you need to fast for 4-6 hours.
- Shaving and disinfection near the puncture site may be required.
- If you are a female, please provide your last menstrual period (LMP) and avoid pregnancy before the procedure as this procedure involves exposure to radiation.

The Procedure

- This invasive procedure is performed under local anesthesia together with intravenous sedative agent or Monitored Anaesthesia Care, selected patient may upgrade to General Anaesthesia in a cardiac catheterization centre.
- Electrodes are adhered to the chest to monitor the heart rate and rhythm. Blood oxygen monitor through your finger tip will be set up. Measurement of blood pressure from your arm will be taken during the examination.
- Small wounds are made over the groins, under the clavicle or around the neck for access to arteries or veins.
- Catheters are advanced to the heart under X-ray guidance.
- Since the abnormal electrical activities usually arise from the left atrium, physician needs to perform transseptal left heart catheterization with special needle and instrument.
- At specific sites inside the heart, we will record electrical information; we then deliver tiny electric current to alter your heart rate and try to trigger arrhythmias.
- You may experience discomfort when your heart is being excited to certain rate; when an induced arrhythmia is persistent, we may use direct current cardioversion to convert it.
- Energy will be delivered to the target site via special catheter. You may experience slight chest discomfort during delivery of energy.
- After ablation, electrophysiology study will be carried out to confirm the success of the procedure.
- The duration of the procedure could last from 2 hours to 5 hours depending on the nature and complexity of the arrhythmia.
- You will be sent to the ward for observation for another 12-24 hours.

Post-Procedure Care

- After the procedure, catheters will be removed. The wound site will be compressed to stop bleeding.
- Nursing staff will check your blood pressure, pulse and wound regularly.
- Bed rest may be necessary for 4 hours or more. In particular, please do not move or bend the affected limb. Whenever you cough or sneeze, please apply pressure on the wound with your hand.
- You should inform your nurse if you find blood oozing from the wound site.

Post-Procedure Follow Up

- After the procedure, you still need to take blood thinner to prevent formation and dislodgement of blood clot from the heart for certain period of time. Depending on the likelihood of future stroke, physician will determine whether you will need long term blood thinner.
- The wound will be inspected and covered with light dressing. Please keep the wound site clean and change dressing if wet. Showers are allowed 3 days after the procedure.
- Please avoid vigorous activities (household or exercise) in the first week after the procedure. Bruising around the wound site is common and usually subsides 2-3 weeks later. If you notice any signs of infection, increase in swelling or pain over the wound, please come back to the hospital or visit a nearby Accident and Emergency Department immediately.
- You may still experience intermittent palpitation in the first 3 months after the procedure and therefore you still need to continue medication. The final result of the operation will be more obvious after 3 months.
- Usually your doctor has explained to you the results of the procedure before discharge. Should you have further questions, you and your close relatives can discuss with your doctor during subsequent follow-up.
- During subsequent follow-up, our medical staff will explain to you the results of the procedure and discuss on the subsequent plan of management. You are advised to ask your close relatives to join the interview.

Risks and Complications

- The procedure carries certain risks. (Reference 1)
- Minor complications include wound bleeding and wound infection.
- Major complications account for about 3-5%. These include contrast allergy, kidney failure, damage to blood vessels, lung and the heart that may need surgical intervention, cardiac tamponade, narrowing of the pulmonary vein, damage of the nerve supplying the diaphragm leading to permanent diaphragmatic paralysis, breakdown of red blood cell or contrast causing renal function impairment, stroke, formation of abnormal communication between the esophagus and the heart, infection, and death (0.15%) due to uncontrollable complications.
- Depending on the type of atrial fibrillation, the procedure may not be able to improve symptom in 15-30% of cases.
- Some people may require more than one procedure.
- Other potential risks include air embolism resulting in death or neurological damage, retained foreign body such as guide wires.
- Device deployment complications include device dislodgement, device entrapment and wire fracture

Fees and Charges

- This procedure involves the use of consumables which are 'Privately Purchased Medical Items'. Please make financial arrangement before the procedure.
- You need to pay an estimated deposit. The final charge, however, depends on the complexity of the procedure and range of consumables required.
- After the procedure, you may need to pay the balance to or collect refund from the account office.
- The successful rate for paroxysmal, and persistent atrial fibrillation are approximately 80% and 60-70% respectively. Recurrence is possible.. Some patients may need a second procedure. Separate charging is required for each procedure.
- If you have financial difficulty, you can apply for assistance through our medical social worker.

Remarks

- It is hard to mention all the possible consequences if this procedure is refused.
- The list of complications is not exhaustive and other unforeseen complications may occasionally occur. The risk quoted is in general terms. In special patient group, the actual risk may be higher.
- Should a complication occurs, another life-saving procedure or treatment may be required immediately.
- If there is further query concerning this procedure, please feel free to contact your nurse or your doctor.

Reference

1. Cappato R, Calkins H, Chen SA, et al. Updated Worldwide Survey on the Methods, Efficacy, and Safety of Catheter Ablation for Human Atrial Fibrillation. Circulation: Arrhythmia Electrophysiology 2010;3:32-38.
2. Joglar JA, Chung MK, et al. 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2024 Jan 2;149(1):e1-e156.
3. Hindricks G, Potpara T, et al.; ESC Scientific Document Group. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. Eur Heart J. 2021 Feb 1;42(5):373-498. doi: 10.1093/eurheartj/ehaa612.