

What are the surgical options to treat atrial fibrillation?

New concepts for the surgical treatment of atrial fibrillation were introduced in recent years when the surgical device industry introduced different ablation technologies to support various platforms for surgical ablation. As a result, cut and sew maze procedures are no longer performed on a regular basis and device based procedures are widely performed. All procedures include control of the left atrial appendage. The surgical procedures in use are:

1. The full maze procedure

- **Median sternotomy** - Performed through a midline incision and involving splitting the breastbone, a median sternotomy is offered to candidates for a combined procedure, such as coronary artery bypass grafting or valve surgery with indications for surgical ablation of atrial fibrillation. It is also offered to patients for a stand-alone procedure who are not eligible for the minimally invasive approach.
- **Minimally invasive approach** - Performed through a small seven centimeter right anterior thoracotomy, the entire maze procedure is performed with the same high success rate.

2. Pulmonary vein isolation

- This procedure is offered to a subgroup of patients with intermittent atrial fibrillation. The procedure is performed through bi-lateral (left and right) incisions in the chest wall and includes left atrial appendage disarticulation.

What is the surgical Maze procedure?

The Maze procedure is a surgical intervention that cures atrial fibrillation (AF) by interrupting the circular electrical patterns that are responsible for this arrhythmia. By creating surgical ablation lines in both atria the conduction of the erratic electrical impulses is stopped. This facilitates the normal electrical impulse in one direction from the top of the heart to the bottom. Scar tissue generated by the ablation technology device permanently blocks the travel routes of the electrical impulses that cause AF, thus eradicating the arrhythmia. The major advantage the Maze procedure offers over other less-invasive forms of therapy is that it corrects all three problems associated with AF. The Maze procedure: restores sinus rhythm, facilitates the synchrony between the atria and the ventricles and preserves organized atrial contraction.

Does the heart have to be stopped to do a Maze procedure?

In some cases the procedure does require that the heart be stopped and the heart-lung bypass machine used. This is because surgeons need to work on a non-beating heart in order to create the ablation lines. Heart-lung bypass supplies blood flow and oxygen to all of the body's organ systems to protect

them while the heart is stopped. In modern atrial fibrillation surgery, the use of the heart-lung machine have been reduced to minimum in most cases. Unlike the past the most of the procedure can be performed without the support of the heart-lung machine. Pulmonary vein isolation only is performed through bi-lateral incisions in the chest wall and without the use of heart lung machine.

How long does the operation take?

The length of the operation varies depending on the complexity of the surgical procedure and the approach that is used. The actual Maze procedure itself takes about an hour. The remainder of the time is spent safely engaging and disengaging from bypass, opening and closing the chest, and inserting the necessary pressure monitoring lines. The approximate total time in the operating room for a Maze procedure is about 2-3 hours.

How does a doctor determine where to make the atrial incisions?

During the research and development phase of the Maze procedure, a sophisticated, computerized mapping system was devised and patients with AF were studied extensively. Once the characteristics of AF were better understood, it became clear that AF is less chaotic than once believed. In fact, consistent areas in both atria where atrial fibrillation originates were identified in the patient population that was studied. This information lead to the idea of surrounding the electrical circuits with incisions. The Maze procedure is performed in the exact same manner with precise placement of incisions for each patient.

What is the success rate of curing AF with the Maze procedure?

The Maze procedure cures atrial fibrillation about 95 % of the time. Among U.S surgeons reporting their data in the January 2000 issue of Seminars in Thoracic and Cardiovascular Surgery, the overall success of the Maze procedure ranged from 90 - 97%. Of the patients studied, three percent required medication after the procedure in order to maintain normal sinus rhythm.

What are the major complications associated with the Maze procedure?

Fluid retention is sometimes a complication after the surgery. However, patients who take diuretics for the first six weeks after the surgery usually overcome the problem. Other complications include bleeding, wound infection, stroke and pneumonia. These are possible complications with any open-heart surgery procedure.

Can the Maze procedure be done in conjunction with other cardiac surgical procedures?

Yes, the Maze procedure is frequently performed with other cardiac surgical procedures such as coronary artery bypass grafting, mitral valve repair and/or valve replacement.

Can someone who has had heart surgery have a Maze procedure? While it is possible to have a Maze procedure if you have had other cardiac surgery, your physician will need to review your medical records and evaluate your case.

Is there a lot of pain after surgery?

Each patient experiences pain differently. In general, the sternum has relatively few nerve endings making it a dull area of the body. Most patients who have chest surgery complain of aching around the incision and general discomfort between the shoulder blades. Patients are encouraged to take pain medication as needed. Some patients find that a neck pillow is useful in reducing the shoulder aches and pains after surgery.

What is the average length of hospital stay with the Maze Procedure?

Most patients are hospitalized an average of 3-5 days. This is because patients need to stay in the hospital while the atrial tissue swelling decreases after surgery and the sinus node function returns. Usually, patients stay in intensive care for one to two days and then move to a step-down unit for the remainder of their hospital stay. Typically, once patients reach the step-down unit they are able to walk around some with a portable telemetry monitor (about the size of a Walkman).

What is the typical recovery time, and when do people generally return to work?

The typical post-operative recovery time is about 4 weeks after surgery. While the decision about when to return to a full schedule depends on each patient, those with physically demanding jobs may have a recovery as long as three months.

After recuperating from surgery, when will patients resume normal activities?

By the end of 6-8 weeks patients should expect to be back to their normal energy. Patients may feel more tired than usual and may not have the stamina they once had until about six months after the surgery have passed.

Cardiac rehabilitation, a structured and monitored work out program helps many people recover from surgery. To learn more about cardiac rehabilitation at Inova, [click here](#).

What kinds of tests are typically performed prior to surgery?

An echocardiogram is essential for all patients prior to a Maze procedure. The echocardiogram is an ultrasound study of the heart that helps physicians evaluate the structure and the function of the heart and the valves. In addition, diagnostic tests including labwork, an electrocardiogram and a chest x-ray will be required prior to surgery.

Patients over the age of 40 and those with clinical evidence of heart abnormalities or suspected heart conditions will undergo cardiac catheterization to assess cardiac function. A cardiac catheterization can be performed as an outpatient visit by an interventional cardiologist. The catheterization film will be forwarded to your heart surgeon for review prior to surgery.

Can someone with a pacemaker have a Maze procedure?

If you have a pacemaker, you may still be able to have the Maze procedure. Pacemakers do not affect the surgical procedure and may even reduce the time spent in the hospital after the surgery.

Does everyone who has a Maze procedure need a pacemaker after surgery?

Most patients do not need a pacemaker after the Maze procedure.

There may be other pre-existing conditions such as "sick sinus syndrome" or heart block, however, that were masked by atrial fibrillation and become obvious after the surgery. If that happens, a patient might need a pacemaker.

For those who had AV node ablation in the past, but are still symptomatic with AF, is the Maze procedure an option?

Yes. Patients who have had an ablation procedure can still undergo the Maze surgery.

What should patients expect long term (5-10 years) following the Maze procedure?

Since the procedure began in 1987, follow-up information has indicated no adverse or unexpected findings with the long-term patients.

Will having the Maze procedure limit cardiac surgical procedures (bypass, valve replacement) in the future?

The Maze procedure does not prevent further cardiac surgical interventions. However, scar tissue usually forms following any open-heart procedure, making a second procedure is difficult.

Will anticoagulant medication, such as Coumadin, be required after surgery?

Usually, patients are given coumadin during the first twelve weeks after surgery. Coumadin may be necessary for other conditions, such as mechanical valve implantation during the same surgical procedure, but it is not directly related to the maze procedure and will require treatment for life.

Will patients have AF after surgery? How long does it last? When will it stop completely?

Atrial fibrillation occurs in 40-45 % of patients within the first three months after surgery. This is because following the surgery the atrial tissue swells and the rest periods become shorter, making it easier for an irregular beat to trigger AF. However, AF after surgery usually responds well to medication.

Should someone just diagnosed with AF have the Maze procedure?

Because the Maze procedure is open-heart surgery, it is generally reserved for patients for whom medication has not been successful. The average length of time that patients are in AF before undergoing the Maze procedure is eight years. To determine if a patient should have the Maze procedure, a full work-up is completed and then all of the available treatment options are discussed. Each case is unique and must have an individualized approach based on the circumstances.

Should patients with AF who don't know when they are in it and are not bothered by it consider the Maze procedure?

Patients who are unaware if they are in AF or a normal rhythm are probably not appropriate candidates for the Maze procedure. Generally, patients undergo surgery to relieve symptoms associated with AF and improve quality of life.