

Ablation of Supraventricular Tachycardia

What is Supraventricular Tachycardia?

Supraventricular tachycardia (SVT) means that from time to time your heart beats very fast for a reason other than exercise, high fever, or stress. For most people who have SVT, the heart still works normally to pump blood through the body.

During an episode of SVT, the heart's electrical system doesn't work correctly. The heart beats at least 100 beats a minute and may reach 300 beats a minute. After treatment or on its own, the heart usually returns to a normal rate of 60 to 100 beats a minute.

SVT may start and end quickly, and you may not have symptoms. SVT becomes a problem when it happens often, lasts a long time, or causes symptoms.

What are the symptoms of SVT?

Some people with SVT may have no symptoms at all. Others may have:

- Palpitations, a feeling that the heart is racing or pounding.
- Shortness of breath
- Chest pain
- Throat tightness
- A dizzy feeling or may feel lightheaded.
- Near fainting or fainting (syncope).

What causes SVT?

Heartbeats are normally initiated by a group of cells called the sinoatrial node which acts as the heart's natural pacemaker. The sinoatrial node produces electrical signals that pass through the muscles of the upper heart chambers (atria) causing them to contract and pump blood into the lower heart chambers (ventricles).

The signal then passes into another group of cells called the atrioventricular node (AV node). From here the signals travel into the ventricle muscles, causing them to contract and pump blood out to the body.

SVT occurs when a problem in this electrical system develops. This causes faster signals to be sent around the heart, increasing the speed at which the heart beats. These episodes may last for a few seconds, minutes or in some cases hours.

When does SVT occur?

Although SVT episodes can occur in anyone, there are certain factors that may increase an individual's risk. Examples of these risk factors include

- Excessive alcohol use
- Illicit drug use
- Extreme psychological stress and anxiety
- Hyperthyroidism
- Family history of tachycardia
- Structural abnormalities of the heart
- Adverse reactions from certain pharmacologic agents (i.e. antihistamines, theophylline, cough and cold preparations, appetite suppressants)
- Certain medical conditions (e.g. cardiovascular disease, long-term respiratory disease, diabetes, previous cardiac surgery).

Types of SVT

There are three main types of SVT.

- ***Atrioventricular nodal re-entrant tachycardia (AVNRT).***

AVNRT is the most common SVT and accounts for approximately 50-60% of SVT cases. In AVNRT, electrical signals re-enter the heart due to both rapid and slow electrical impulses moving through the AV node.

Some people with known AVNRT may be able to stop their attack by using various tricks to activate the vagus nerve. This includes carotid sinus massage (pressure on the pulse in the neck) or the Valsalva manoeuvre (increasing the pressure in the chest by attempting to exhale against a closed airway).

Medical therapy can be initiated with AV nodal slowing drugs such as adenosine (which is a pharmacologic cardioversion), beta blockers or calcium channel blockers (such as verapamil). Numerous other antiarrhythmic drugs may be effective if the more commonly used medications have not worked; these include flecainide or amiodarone.

- ***Atrioventricular reciprocating tachycardia (AVRT).***

AVRT is the second most common SVT accounting for 30% of SVT cases. People with AVRT are born with an abnormal electrical connection in the heart. In AVRT, the extra connection, which is often called an accessory pathway, joins one of the atria (the upper chambers of the heart) with one of the ventricles (the lower chambers of the heart).

AVRT includes Wolff-Parkinson-White (WPW) syndrome.

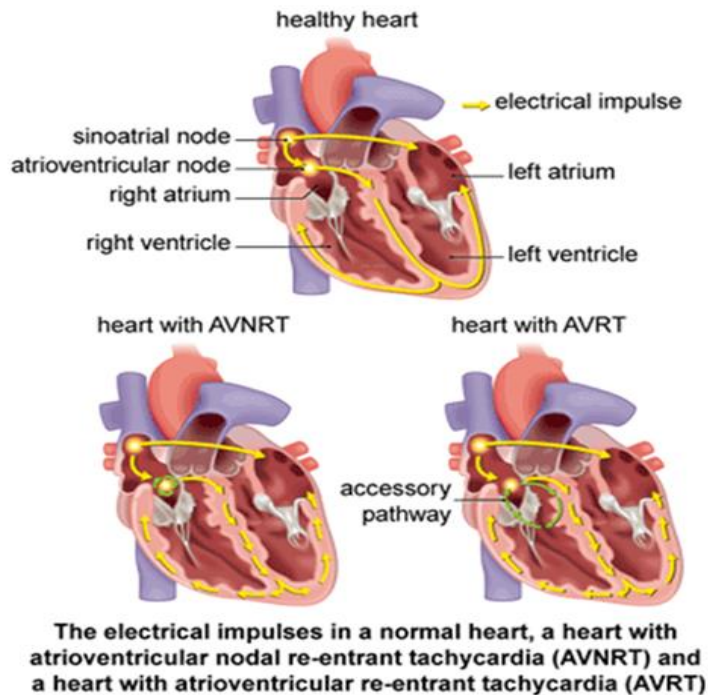
Some people with known AVRT may be able to stop the episode by performing a Valsalva manoeuvre (increasing the pressure in the chest by attempting to exhale against a closed airway). Antiarrhythmic drug therapy is often only partially effective at preventing episodes of AVRT.

- ***Atrial Tachycardia (AT).***

Atrial tachycardia is the least common accounting for approximately 5-15% of cases. AT has been found to occur in healthy patients, alongside those with heart ailments and in some patients who have previously received an AF ablation.

Atrial Tachycardia refers to a faster heartbeat due to signals being sent from the atrium. In this form of SVT, the electrical impulse is received from a different location of atrial tissue instead of the sinoatrial node. Due to the rapid rate of the abnormal impulse there is an increase in heart rate.

The primary treatment during an episode of atrial tachycardia is considered to be rate control using atrioventricular (AV) nodal blocking agents (e.g. beta-blockers or calcium channel blockers) or rhythm control using flecainide or amiodarone. If medical therapy fails it may be necessary to have a Cardioversion (electrical shock) to return the heart back to its normal rhythm.



What are the risks associated with SVT?

In the vast majority of cases, SVT is a benign condition. This means that it will not cause sudden death, damage the heart or cause a heart attack. It will not shorten life expectancy. There are some rare exceptions where there may be damaging effects if the SVT episode lasts a long time or the patient has WPW syndrome. There may be a significant decrease in the ability of the heart to pump blood throughout the body during the episode of SVT. The consequences of decreased blood being pumped through the body varies based on your overall condition, degree of hydration, and specific medical conditions such as heart disease.

What are my treatment options?

Treatment for SVT varies significantly from patient to patient. Treatment depends on a number of factors such as the type of SVT a patient has, the frequency and duration of SVT episodes, and the severity of symptoms.

For patients with recurring episodes of SVT, long-term medical therapy may be required.

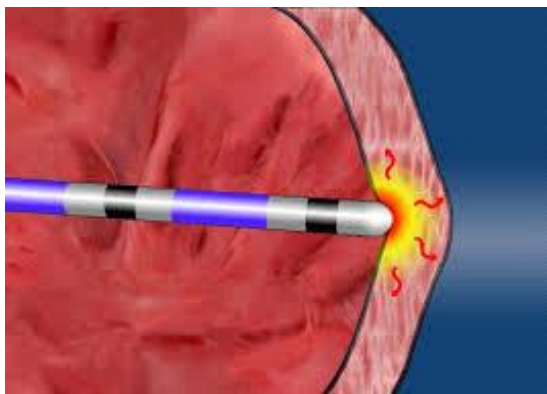
An alternative treatment can be Radiofrequency ablation. Radiofrequency ablation (RFA) is considered a safe, effective, and cost-effective surgical procedure for preventing or suppressing SVT episodes for those patients with frequent SVT episodes and/or those who want to avoid the use of pharmacologic agents. It is also beneficial to those patients who are not responding to or who are unable to tolerate pharmacological agents.

Radiofrequency Ablation



(Radiofrequency Ablation catheter)

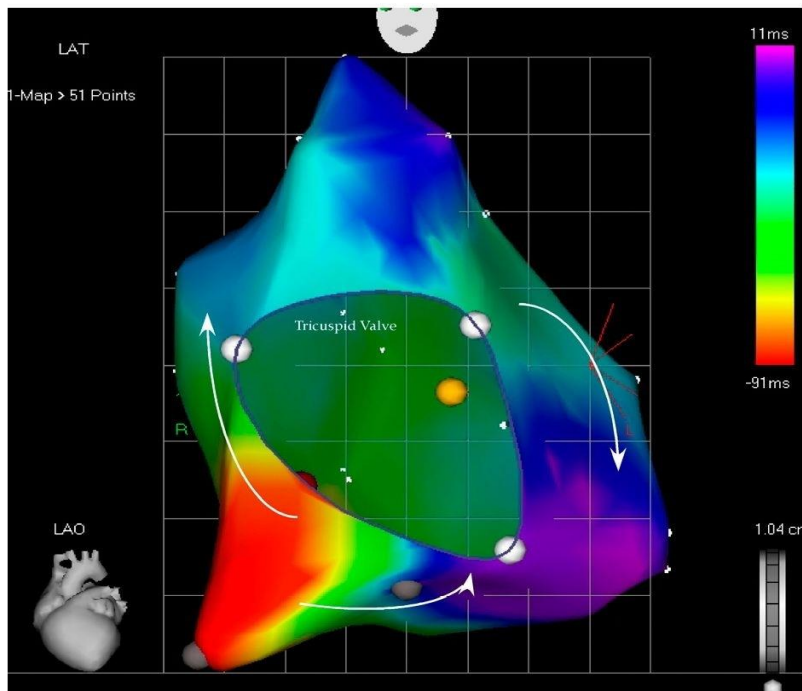
Radiofrequency ablation is used widely around the world to treat different arrhythmia disturbances. It uses low power, high frequency energy that causes a tiny region near the tip of the catheter to increase in temperature and therefore ablating (cauterising) a small area of tissue (picture below).



Prior to ablating various measurements of the electrical system are performed. If a person is in a normal rhythm at the time of the procedure, an attempt is made then to reproduce the SVT by pacing the heart through the catheters. Occasionally an intravenous medicine called Isoprenaline is required to “rev up” the heart in order to reproduce the SVT. Once the SVT is reproduced, the specific type of SVT can be diagnosed using the catheters in the heart.

Once the SVT is diagnosed, an ablation catheter is advanced to the heart to cure the SVT. An ablation catheter is capable of delivering small radiofrequency lesions (electrocautery burns) about 4-5 mm in diameter. These radiofrequency lesions have no long-term adverse consequences. Depending on the type of SVT, these radiofrequency lesions are delivered in various locations of the heart.

Occasionally, more complex diagnostic and ablation techniques are required for catheter ablation of SVT. In such situations, sophisticated 3-dimensional mapping techniques may be used to identify the location necessary to successfully ablate the SVT.



(3D map of the right atrium).

What can I expect to experience during a Radiofrequency ablation?

- **Before the procedure**

Preparing for an ablation procedure is just like preparing for any other type of elective procedure. Typical instructions like no eating or drinking after midnight the evening before your procedure are usual and certain medications may also need to be stopped (your doctor will advise you accordingly). You will need to inform your doctor immediately of any health changes before the scheduled procedure.

You may need to have your chest and groin shaved prior to the procedure (this will be done by nursing staff). An intravenous (IV) line will also be inserted into your arm.

- **During the procedure**

Once you have entered the EP lab, multiple cold patches and ECG electrodes will be placed on your back and chest for monitoring. During the procedure you will receive any necessary medication through your IV line.

A local anaesthetic will be applied to the site where the ablation and other catheters will be inserted. In most cases the vein in your groin is used.

In this procedure the doctor will put sheaths into the vein in your groin so catheters can be inserted. The doctor then threads the catheter to the right atrium of the heart. Once the catheters are in position we will then pace the heart from different areas trying to produce your arrhythmia and diagnose it. As mentioned previously, it may be necessary to use medications to help stimulate your tachycardia. You may feel your heart racing at times during the procedure. Once your tachycardia is

diagnosed we can then ablate it. Sometimes the arrhythmia may be arising from the left side of the heart. If this occurs then the doctor will cross the wall (septum) that separates the left and right sides of the heart. This provides access to the left atrium. You will receive anticoagulants (blood thinners) to help prevent clots if necessary.

The duration of the procedure can be quite variable. Most often SVT cases will take approximately 2 hrs but occasionally some cases may take up to 5 hours.

- **After the procedure**

After the procedure is completed, the catheter and sheaths will be removed and pressure will be applied to the right groin insertion site to reduce any bleeding. You will need to remain lying flat for at least an hour after the procedure. You will need to stay in overnight afterwards for observation and your doctor will visit you to go through the procedure and any other information you will need before discharge. Although activities will need to be limited for a couple of days most patients return to their normal routine within a few days.

You may experience some minor discomfort in your chest or bruising and soreness near the insertion site. Your doctor will prescribe you some pain relief for this if it occurs.

- **Follow-up Visits**

Your doctor will usually organize to see you in 3 months after the procedure to monitor your heart rhythm and to see how you are going since your ablation. Although one catheter ablation is usually enough to treat SVT, in some cases a repeat procedure may be required to achieve full success.

Some patients may still need to continue with their medication. Your doctor will inform you if you will need to continue with this before your discharge from hospital and at your follow-up visit.

What are the benefits and risks of catheter ablation?

- **Benefits**

Catheter ablation may treat SVT. It may improve your quality of life and eliminate or reduce the unpleasant symptoms of SVT like palpitations, shortness of breath and dizziness. In some cases patients may not require further drug treatment after receiving the ablation. Be sure to speak to your doctor about your condition.

- **Risks**

As with any medical procedure there are risks with catheter ablation. Some of these include stroke, damage to the blood vessels in your groin or blood collecting around your heart requiring drainage. There is a 1% risk of damage to your heart's electrical system which might require a pacemaker to correct. The chance of dying from the procedure is less than 1:1000 (0.1%).

Remember to talk to your doctor about all the benefits and risks that are specific to your condition and any concerns or questions you may have. Although many patients benefit from catheter ablation, results may vary.