

Closure of the left atrial appendage to prevent AF-related stroke

This publication provides information about left atrial appendage (LAA) closure, a treatment designed to lower the risk of stroke in some patients with atrial fibrillation (AF).

As outlined in the AF-A patient information sheet, "Blood Thinners", atrial fibrillation is associated with a risk of stroke ranging from less than 1% per year to over 10% per year depending on an individual's CHA₂DS₂-VASc risk score. These strokes commonly result from a clot, which forms within the left upper heart chamber (left atrium), travelling to the brain and blocking a major artery. In the majority of cases these clots form within a small muscular pouch arising from the wall of the atrium, known as the left atrial appendage (LAA). The reason that clots form in the appendage with atrial fibrillation is that this is an area particularly prone to stagnation of blood when the appendage stops contracting upon the loss of normal sinus rhythm.

Preventing clots that cause an AF-related stroke

Anticoagulation ('blood thinning' through medication) including warfarin, dabigatran, rivaroxaban and apixaban, has been proven to greatly reduce the risk of AF-related stroke. Sometimes, especially where there is a high risk of bleeding with these agents, other means of eliminating clot formation within the left atrial appendage are considered. It seems logical that removing or obliterating the LAA would greatly reduce the chance of clots forming within the left atrium and this has indeed been proven in practice.

Taking the LAA out of the picture

When someone is having open-heart surgery (including coronary or valve surgery) the LAA can be tied/stapled off, or removed. Sometimes this is combined with procedures to try to eliminate

atrial fibrillation. Keyhole surgery to tie off the appendage from the outside of the heart has also been employed in a few centres around the world. However, the most common techniques have utilised devices to plug the atrial appendage from the inside.

Percutaneous LAA closure

This means delivering a device to occlude or block off the LAA through a catheter (a small plastic tube) which is passed up from the femoral vein at the top of the leg. The catheter is passed through the right atrium and across the wall (septum) between the right atrium and left atrium. Crossing the septum is done by creating a small hole which usually closes within six months after the procedure. Depending on the type of device and clinical situation, anticoagulant drugs may be required before the procedure to ensure that there is no clot within the appendage at the time of the procedure (and the absence of clot is confirmed with a trans-oesophageal echocardiogram). Anticoagulant medication or antiplatelet (aspirin or similar) treatment will be required for an interval after the procedure.

The procedure is almost always done under general anaesthesia. A tiny cut is made in the skin over the groin and through this opening (percutaneous) a catheter is inserted into a vein. This catheter contains the compressed device which is used to close the opening of the LAA. During the procedure, a trans-oesophageal echocardiogram (cardiac ultrasound) or a TOE examination is undertaken by placing a probe in the oesophagus (gullet). This and x-rays help guide the closure device to the heart, through the septum and into the LAA. Once the device is within the atrial appendage it is opened up, blocking the mouth of the appendage completely (see figure 1). The procedure usually takes between 60 and 90 minutes.





Device in position within the LAA resulting in closure

Figure 1. Position of the LAA closure device

Over a period of six to eight weeks after the procedure, the body forms a new layer of natural tissue over the device, sealing it into place and making it invisible to the bloodstream. Two devices with different designs are approved for use in Australia; the Amplatzer device and the Watchman device (see figure 2). The most suitable device for an individual is decided on the basis of the LAA anatomy and operator experience.



Figure 2. LAA closure device

After the procedure

After a period of bed rest a patient will be able to sit up and walk around. There may be some soreness in the groin and throat because of the TOE. A follow-up echocardiogram will be done. Discharge from hospital is usually within 24 hours and appropriate blood thinning medication and advice on how long to take this will be given.

What are the benefits of percutaneous LAA closure?

The main benefit is the elimination of the need for anticoagulation. For the Watchman device this has been proven in one trial with a reduced risk of both stroke and bleeding in the long term. In the majority of patients after Watchman deployment, warfarin is continued for a minimum period of six to eight weeks after the procedure so as to allow time for the implanted device to bed in. For the

Amplatzer device antiplatelet therapy is continued for at least six months. During the weeks to months after implantation of either type of device the body will form a new layer of natural tissue over the device, sealing it into place.

What are the risks of percutaneous LAA closure?

No medical procedure is entirely without risk. Most of the complications are rare but some are serious. LAA closure would not be recommended if the cardiologist did not believe that the risks were outweighed by the benefits. The most common complications include, but are not limited to:

- The complications of any cardiac catheter procedure including bleeding or bruising in the area of the groin or an air bubble to the brain.
- Stroke (from either clot, dislodgement of the device or air bubble)
- Device malposition or dislodgement
- Perforation of the heart with bleeding around the heart
- Blood clot formation of the device requiring prolonged anticoagulation
- Infection
- Oesophageal damage (damage to the gullet)

Very occasionally complications require emergency open-heart surgery to deal with them, therefore the procedure must be performed at a hospital where this is available.

Who is not suitable for left atrial appendage closure?

The size and shape of the appendage needs to be assessed as the appendage needs to be able to accommodate the device. Each person's appendage is a little bit different. The assessment is usually done with a pre-procedure TOE but on occasion can be done on the day of the procedure.

LAA closure cannot be undertaken while a clot is already present in the left atrium, where there is active infection in the body, or where anticoagulation or antiplatelet medication cannot be taken for a short period.



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