



The Left atrial appendage closure - A watchman device

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ABSTRACT

The Watchman is a latest innovative device which is used for Afib as the best alternative than OAC'S because OAC'S can cause severe adverse effects. In Afib, we do observe irregular heartbeats and formations of the clots leads to stroke. Generally, the heart has a left atrial appendage (LAA) which is a small ear like a sac. In Afib condition, improper impulse arise and spread along the atria, this improper impulse does not give time to contract the atria properly so that blood from atria cannot move properly into the ventricles and in LAA it is believed to the formation of thromboembolism. In order to prevent this, OAC drugs are given as a clot formation prevention therapy, which may not be effective in all the conditions and chance of recurrence is more so as an alternative recently in 2015 FDA has approved watchman device to prevent the recurrence of stroke in predicting patients. This device blocks the LAA sac and prevents the formation of thromboembolism.

Keywords: Afib, Cardiac conduction, Left atrial appendage, Thromboembolism, OAC'S.

INTRODUCTION

The heart has four chambers, 2 atria and 2 ventricles and their functions are well known. Apart from this heart do possess a small sac which is known as left atrial appendage (LAA). The LAA is a small ear shaped sac in the muscle wall of the left atrium (at the top of the left chamber of the heart) its function and use is unclear.

Generally, LAA extends between the anterior and lateral walls of LA and its tip is directed anterosuperiorly, overlapping to the left border of the right ventricular outflow tract or pulmonary trunk and the main stem of the left coronary or circumflex artery. Actually, it is easy to find the tip of LAA directed laterally and backwards.

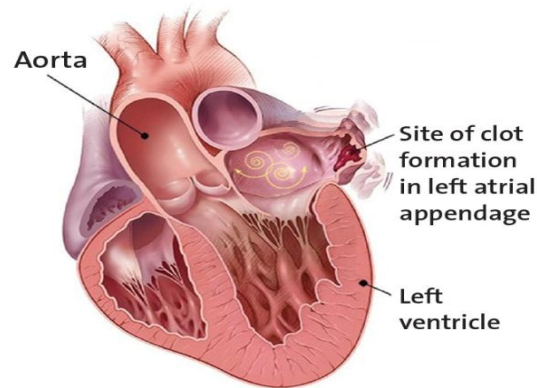


Fig: Shows the site of the LAA region at heart.

In a recent survey done with the use of multidetector computed tomography (MDCT) and along with cardiac magnetic resonance (CMR) the shapes of the LAA in various patients with Afib were classified into 4 morphological types. They are cauliflower, cactus, wind sock and chicken wing shaped sacs.

In 1909 scientist has concluded that cardiovascular stroke associated with Afib is due to formation of thrombi in LAA region, which is the most common site for thrombi formation. A special attention has been taken in order to control the risks of cardioembolic complications. [1]

In Afib condition abnormal heart rhythms characterized by rapid and irregular beating in ECG, there will be no P waves and an irregular ventricular rate. In normal regular electrical impulses generated from the sinoatrial node in the right atrium of a heart where as in Afib condition, improper electrical impulses from the roots of the pulmonary veins and this finally lead to irregular conduction of ventricular impulses that generate the heart beat. Actually, in Afib not only abnormal impulse apart from his strokes also occurred due to emboli formation which is due to the improper contraction in the heart chambers.

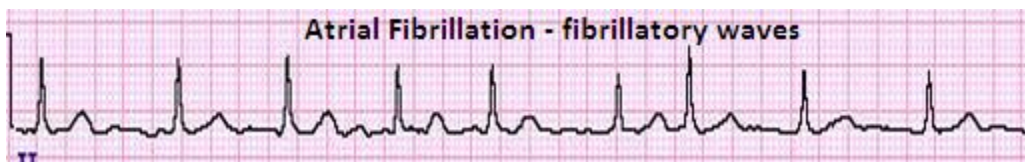


Fig: Shows ECG waves in case of atrial fibrillation.

So in order to reduce the rate of emboli formation, oral anticoagulants like warfarin, aspirin are effective only for some conditions, use of warfarin in all the conditions is not effective because it does have a potentiality to cause a severe bleeding as a side effect and as an alternative aspirin is also given sometimes but it may not be much more effective in preventing recurrence of stroke. Since it is confirmed that about 90% of the strokes are due to the Afib associated LAA emboli and as the best alternative apart from the drug therapy, a device can be implanted in that region so in recent years the FDA has approved an innovative device for this condition that is watchman

device for the closure of left atrial appendage in heart. [2, 4]

ABOUT DEVICE

Watchman device is with a frame made up of nitinol (which is an alloy of nickel /titanium) and composed of 10 fixation anchors which are around the device perimeter that is designed to protect or fix in the LAA. A fabric cap, constructed with a fabric polyethylene terephthalate (PET) serves as a filter and prevents harmful clots from exiting during the healing process and the device is available in various sizes. [3, 4, 5]

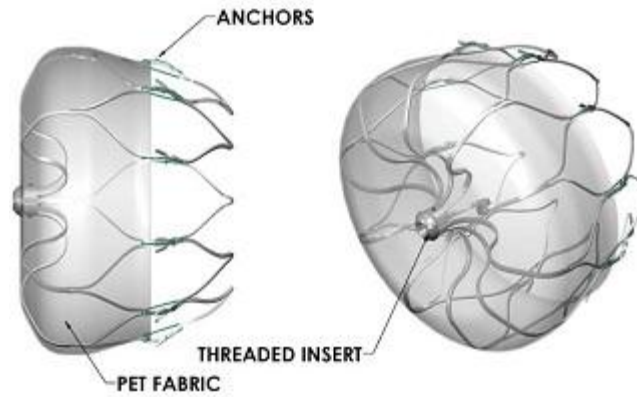


Fig: Explains about parts in watchman device

DEVICE IMPLANTATION

Implantation of this device is critical in some conditions. At first transesophageal echocardiogram (TEE) is performed to assure absence or the presence of thrombi within LAA and also used to determine the approximate size of device to be implanted, so in order to know the size of LAA ostium minimum 4 TEE views are required.

Following materials should be available for the implantation of the device. They are a loop, Biopptome, Pericardiocentesis tray, Thrombectomy device, Coronary guidewire and reading devices like BP monitor, EKG, Supplementary airway devices like laryngeal mask airway, Biplane fluoroscopy should be used.

Before starting the procedure give 20 ml of lidocaine in groin region of the subject, femoral vein is the place of the transseptal access system medial into the femoral vein and then insert guidewire and vessel dial into a vein for the access into the heart. The catheter and the guide wire move into position. In order to check the right position, a special dye called

contrast medium is injected. Using TEE readings, mid to lower part of the septum is identified which is an optimal place for transseptal crossing. After the interatrial septum is crossed using a standard transseptal access system, the watchman access sheath and dilator are moved over a guidewire into the left atrium. Then the access sheath is carefully moved into the distal portion of the LAA. Select the appropriate sized watchman device based on the measurements taken from TEE.

The watchman delivery system is ready to insert into the access sheath, and slowly under fluoroscopic guidance. The watchman device is then sent into the LAA. The device released characteristics can be confirmed by fluoroscopy. If any gap is found around the device that is larger than 5 mm, the device should be repositioned or fully recaptured and replaced. After successful deployment of the device, perform angiography along with contrast dye to assure that the device is in right place. Then, seal and remove the sheath assembly from the left atrium.[6]

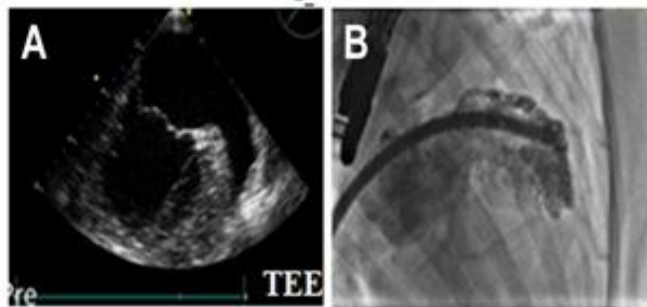


Fig: A) Pre implantation of watchman device in heart transesophageal echocardiography (TEE) reports. B) The Angiogram image of LAA, pre-implantation of device. [7]

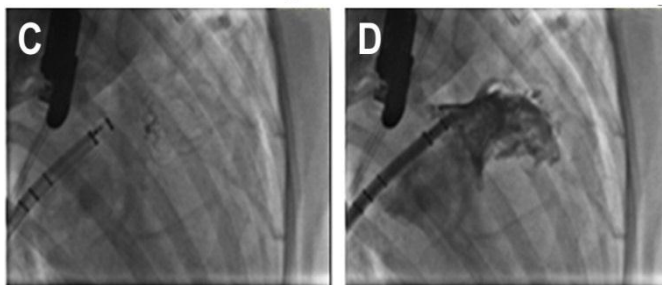


Fig: C) post releasing of the watchman device angiogram image. D) Post-implantation of a watchman device into the site -angiogram image. [7]

Implantation of a device into the heart using the TEE plays a key role by confirming that the device has met the following points such as position, anchor, size and seal.

After the confirmation about the implantation of a device, remove the sheath which is used in the implantation of device. Continuous heart rate, blood pressure, O₂ saturation should be measured and monitored until the patient is awake. The patient should be on warfarin along with aspirin for a minimum of 40-45 days. The patient should be administered with antibiotic as prophylaxis. Patients, who stopped warfarin, should start taking of

clopidogrel 75mg and aspirin daily about six months. [6,8]

When we compare the watchman device with another device like Amplatzer Cardiac Plug (ACP). In case of ACP, it does have a potentiality to damage the LAA or surrounded structures and also can cause a delay in healing, whereas the watchman device does not affect or obstruct the LAA adjacent structures, results in a favorable surface recovery. While developing a medical device, one should keep some considerations, not only the anatomy of the organ but also about surrounding structures. [6, 7]

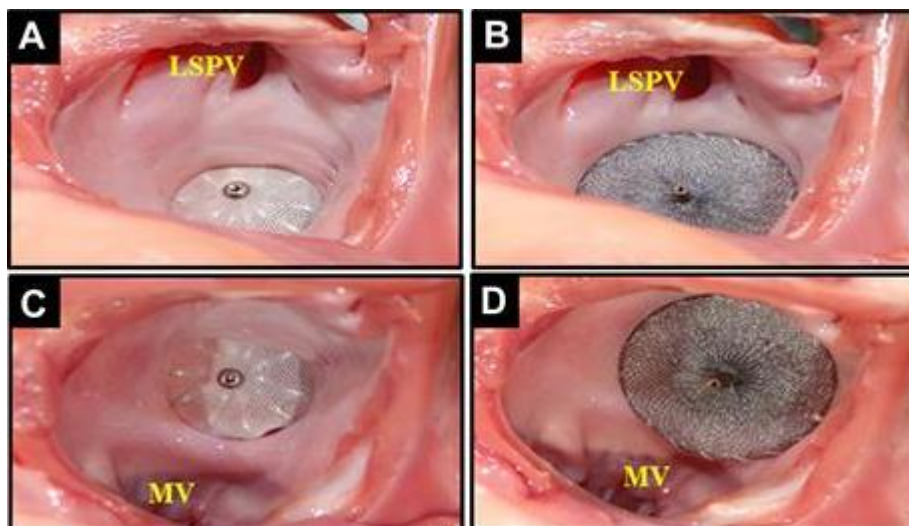


Fig: A and B images are the observations of the watchman device after the implantation, C and D images are the observations of the amplatzer cardiac plug. LSPV = left superior pulmonary vein, MV = mitral valve [7]

CONCLUSION

LAA closure with watchman device appears to be safe for best results along with lower risk of recurrence of stroke risk despite discontinuation of anticoagulation. Because the chance of occurrence of

Afib in the elderly and others, in whom anticoagulation carries a high risk of adverse effects, these devices will offer a wide range of attractive solution to the AF-related emboli problem

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