



Surgical implant of Medtronic Pediture left atrial appendage exclusion clip during off-pump bilateral internal thoracic artery coronary artery bypass grafting

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Clinical vignette

A 52-year-old man presented to the emergency department with severe chest pain (10/10) that occurred during sleep. He had a significant family history of coronary artery disease, along with hypertension, hyperlipidemia, pre-diabetes (HbA1c 6.4%), and frequent palpitations. The diagnosis of non-ST elevated myocardial infarction (NSTEMI) was established with a high-sensitivity troponin I (hsTnI) level of 7,037 ng/mL. Additionally, he experienced a brief episode of atrial fibrillation (AF) lasting less than 20 minutes, which converted to normal sinus rhythm after an intravenous amiodarone bolus. Left heart catheterization via the left radial artery revealed a critical 90% stenosis in the proximal left anterior descending (LAD) artery, 90% stenosis in obtuse marginal 1 (OM1), and chronic total occlusion (CTO) of the mid right coronary artery. Subsequently, the patient underwent an off-pump coronary artery bypass graft (CABG) procedure involving left internal thoracic artery (ITA) to LAD anastomosis, right ITA (RITA) *in situ* via the transverse sinus to OM1, saphenous vein graft from the aorta to posterior descending artery (PDA), and left atrial appendage (LAA) exclusion with a Pediture clip (Medtronic, Inc., Minneapolis, MN, USA).

Surgical techniques

Preparation

Transesophageal echocardiography (TEE) confirmed the absence of thrombi in the LAA. The Pediture LAA exclusion system clip, designed for permanent implantation, is intended to be placed at the base of the LAA. Before clip positioning, measurement of the LAA base should be performed using the included sizer. The clip is available in four sizes: 35, 40, 45, and 50 mm.

Operation

For clip placement, the LAA was gently mobilized with an atraumatic forceps. The fabric-free design and low clip profile provided an advantage in the presence of an *in situ* RITA passing via the transverse sinus to reach OM1. The wide opening at the base of the Pediture clip offered good visibility during deployment, and the tip-first closure ensured complete and secure exclusion of the LAA. The clip, being recapturable and redeployable after the first deployment, provided flexibility during placement. In this patient's case, the RITA to OM1 anastomosis was performed after clip placement to avoid possible graft capture and obstruction.

Completion

After the clip was released, TEE was utilized to verify complete exclusion, enabling the assessment of any residual stump that may necessitate a more proximal repositioning of the device. The Medtronic Penditure clip presents two small pins at the tip of the handle to recapture, reposition and redeploy the device itself if needed.

Comments

Clinical results

Intraoperative graft flow was assessed with transient time-flow measurement, demonstrating excellent revascularization outcomes. Postoperatively, no stroke or myocardial infarction occurred.

Indications

The recently released 2023 American College of Cardiology/American Heart Association (ACC/AHA) guidelines (1) have upgraded surgical LAA exclusion to class I for patients with AF undergoing cardiac surgery and having a CHA₂DS₂-VASc score of ≥ 2 or an equivalent stroke risk. This, along with the continuation of anticoagulation therapy, is indicated to lower the risk of stroke and systemic embolism.

Advantages

The LAA clip device presents several key features to enhance its functionality and adaptability. Equipped with a rotation knob allowing a $\pm 90^\circ$ rotation, the device incorporates an 11 cm bendable and rotatable aluminum shaft for precise maneuverability (2). The implantable atraumatic clip, designed with a slight curve to align with atrial anatomy, provides the deployment tool a total of 16.8 cm working length. The clip's fabric-free design reduces the chances of inflammation and adhesions with adjacent tissue. Notably, the recapturable and redeployable clip feature, offers flexibility during the placement process. The Penditure clip includes an actuation lever for efficient opening and a release trigger for single-button deployment without the need for string cutting. The clip utilizes a closure mechanism initiated from the tip, ensuring thorough capture and preventing any risk of tissue moving forward. Other clipping devices have evolved from the original closed-ended tip to the newer open-ended V-clips (3). Both types demonstrate similar

performance, and the selection between them depends solely on the surgeon's preference.

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Footnote

Conflicts of Interest: G.T.: Consulting fee for Peters Surgical. The other authors have no conflicts of interest to declare.

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