Automated proximal anastomosis for redo coronary artery bypass grafting through a lateral thoracotomy

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Redo coronary artery bypass is well recognized for the higher perioperative risk involved.[1] This is related to the risks of injuring a functioning graft, the heart, or the great vessels during sternotomy, dissection, and cannulation for cardiopulmonary bypass (CPB), as well as the general risk of increased microvascular bleeding caused by the formation of adhesions from the previous sternotomy. Achieving revascularization without the need for CPB,[2] as well as without the need for a resternotomy,[3] presents a safer but possibly technically more challenging option. To this end, constructing the proximal anastomosis with an automatic device is appealing if reliability and accuracy can be ensured. We present a how-to-do article on a case of a redo coronary artery bypass grafting (CABG) performed without CPB through a lateral thoracotomy with the aortic anastomosis caused by an automatic coupling device.

A 50-year-old man with a long history of ischemic heart disease and quadruple CABG 12 years ago was reinvestigated because of recurrent angina. The angiogram showed a patent graft from the left internal thoracic artery to the left anterior descending coronary artery, but all other grafts were blocked. The patent left internal thoracic artery graft was crossing the midline beneath the sternotomy. A myocardial perfusion scan showed viable muscle in the circumflex territory but no viable myocardium supplied by the right coronary territory. The circumflex system was therefore the targeted site for revascularization. His medical history included previous transient ischemic attack with left internal carotid artery stenosis of 70% to 80%. He had hypercholesterolemic insulin-dependent diabetes, had a positive family history, and was still smoking 5 to 10 cigarettes a day. A Doppler ultrasonogram showed a small radial artery with poor flow.

He electively underwent single CABG through a left lateral thoracotomy. Under general anesthesia, a double-lumen tube for isolated lung ventilation was placed. Long saphenous vein was harvested from the leg and measured for its diameter. The symmetry aortic connector was used to construct the proximal anastomosis (St Jude Medical, Inc, St Paul, Minn). The vein was mounted onto the appropriate size connector and loaded to its tip (Figure 1), with the minimum diameter available being 4.5 mm. The adventitia was cleared from a section of the descending aorta opposite the left inferior pulmonary vein, and the stapler was deployed after making a punch hole onto the wall of the descending aorta with the supplied cylindrical cutter. The mounting of the vein onto the stapler was performed in parallel with the thoracotomy by an assistant. Mounting the vein involves placing the edges of the vein onto fine hooks located radially at the edge of the connector (Figure 1). The device has 2 sets of Nitinol struts (St Jude Medical), and once inserted into the aortic wall, they expand radially deep and superficial to the aortic wall, sealing the anastomosis (Figure 2). There was no need for additional sutures on the site of the aortic anastomosis. The deployment of the connector is instantaneous. The pericardium was then opened posterior to the phrenic nerve. The obtuse marginal branch distal to an occluded vein graft was isolated between Silastic stay sutures, and the distal anastomosis was constructed off bypass with the aid of the CTS Vortex stabilizer (Cardiothoracic Systems Inc, Cupertino, Calif).

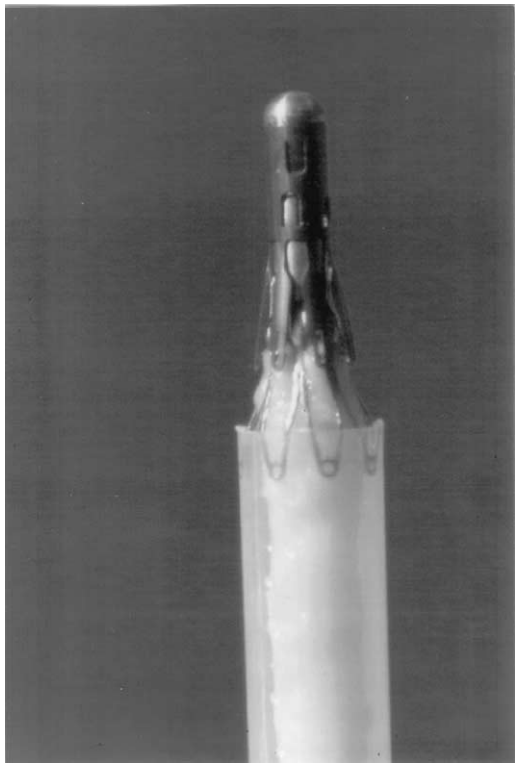

Figure 1. The vein is mounted to the appropriate size stapler.

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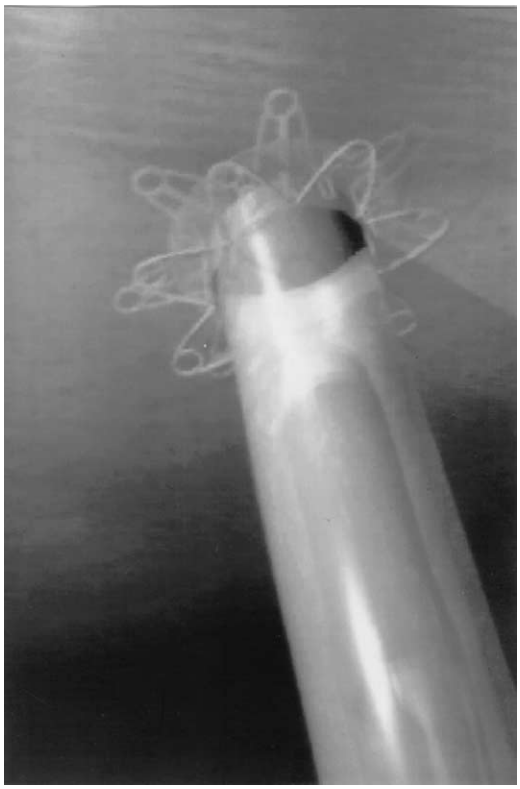

Figure 2. The anastomosis constructed with 2 sets of nitinol struts.

Comment

Lateral thoracotomy, as described before, for access to the circumflex territory offers excellent exposure with no need to rotate the heart.[3] In a redo case like this, this approach also avoids the risk related to dissection and manipulation of tissues around the heart.[2] Use of an off-pump strategy offers potential advantages over use of CPB.[2] The use of an automatic device for the anastomosis of the vein graft to the aorta has been presented before with other devices.[5] This device significantly reduces operating time, allows for the anastomosis to be performed before CBP onset (if it is to be used), and does not require manipulation or side clamping of the aorta.[6] The vein handling is minimal. In this particular approach, it further simplifies the procedure allowing for an instant anastomosis on the descending aorta, which can be technically demanding if it was to be performed with classical surgical techniques. It should be noted that the aortic anastomosis has to precede the distal anastomosis, and particular attention has to be made to ensure adequate length for each anastomosis. In our experience of using this device in 33 cases, it has consistently produced a rapid, reproducible, and safe anastomosis.

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