

## Beating-heart endoscopic coronary artery surgery

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**We have developed a novel technique allowing closed-chest beating-heart coronary artery bypass grafting, and have used it successfully in two patients.**

Minimally invasive coronary artery bypass grafting, which includes grafting the left internal thoracic artery (LITA) to the left anterior descending coronary artery (LAD) via a small thoracotomy approach without cardiopulmonary bypass, has emerged as a promising technique for the surgical revascularisation of selected patients with coronary artery disease.<sup>1</sup> It would be useful if surgery could be done through an even smaller incision via an endoscope. However, due to technical difficulties, closed-chest bypass grafting has only been done under cardioplegic arrest and cardiopulmonary bypass.<sup>2</sup>

We developed a suction endoscopic stabiliser that enables immobilisation of the anterior wall of the left ventricle through a thoracoport, to allow closed-chest beating-heart coronary artery bypass grafting. We did this procedure on two men (aged 68 and 76 years) with LAD single-vessel disease. Both patients were thoroughly informed and signed a consent form.

The endoscopic stabilisation device is reusable and is introduced through a thoracoport (figure 1). The device has a flexible suction channel that comprises a hollow rod with a flexible portion at the distal tip. There is a mechanism that causes the flexible portion of the rod to coil into a ring. Attached to the flexible tip of the rod is a suction channel which receives a negative pressure of  $-400$  mm Hg.

Operations were done through two 12 mm and two 15 mm diameter thoracoports. After the left lung was deflated, the LITA was harvested as a pedicle with an ultrasonic scalpel.

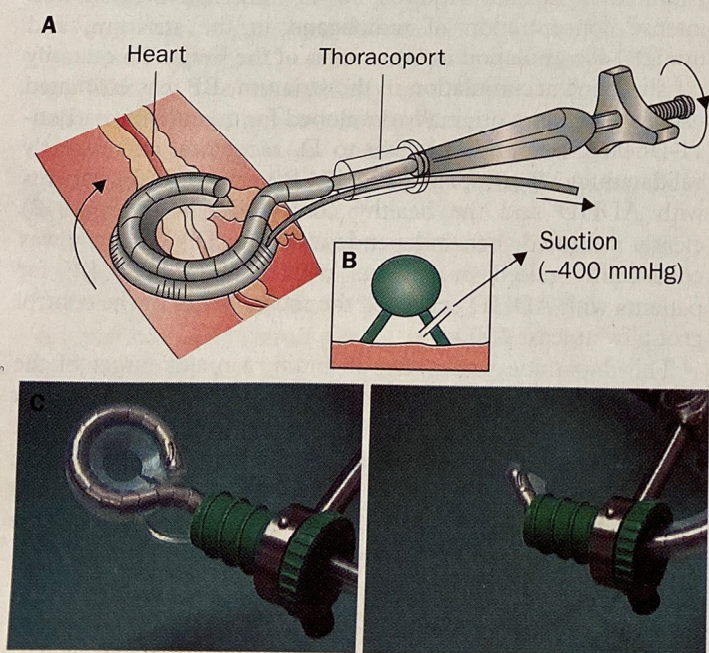


Figure 1: The coiled device (A) and cross-section of the flexible portion (B). C the device introduced through a 12 mm thoracoport

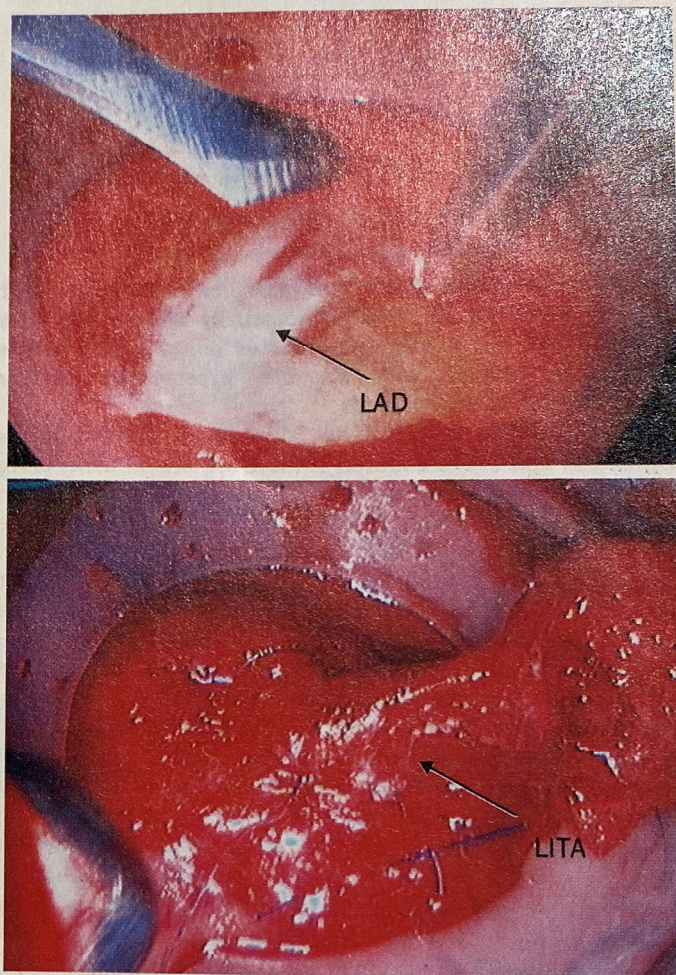


Figure 2: Site of the operative field. LAD; left anterior descending artery, LITA; left internal thoracic artery

The distal end was clipped after intravenous administration of 10 000 IU of heparin and prepared for the anastomosis. The pericardium was then opened and the LAD was identified. The device was inserted through a fourth ICS thoracoport. Suction immobilised the LAD (figure 2). The proximal snare was placed with a 5-0 prolene suture to obtain a bloodless field. After blunt dissection of the coronary artery, an arteriotomy was performed with a sharp blade and enlarged with endoscopic Potts scissors. With an endoscopic needle holder and forceps via two thoracoports at the fourth intercostal space, a conventional end-to-side anastomosis was done with 8-0 prolene suture. The time taken for the anastomosis was 25-40 min.

There were no intraoperative arrhythmias and no postoperative haemorrhage. The patients required no intensive care management postoperatively. Both patients were ready for discharge on the fourth postoperative day. Postoperative angiograms showed that both anastomoses were patent.