

Less Invasive Direct Coronary Artery Bypass Grafting Using H Graft for a Patient with Advanced Prostatic Cancer

Satoru Nishida, MD,¹ Tamotsu Yasuda, MD,¹ Go Watanabe, MD,^{1,2}
Taro Kanamori, MD,¹ Yujiro Kikuchi, MD,¹ and Shigeki Ito, MD¹

Minimally invasive direct coronary artery bypass grafting (MIDCAB) using an H graft was performed on a 74-year-old man with advanced prostatic cancer who needed coronary revascularization. Through a left anterior small thoracotomy, the left internal thoracic artery (LITA) and the left anterior descending artery (LAD) were cleared, and a short radial artery (RA) was placed in an end-to-side fashion between the LITA and LAD. The distal LITA was ligated to avoid potential steal phenomenon. A flow pattern through the RA graft evaluated by transit time flow measurements demonstrated good diastolic flow with a mean value of 37 mL/min. The total surgical duration was 80 min, and no blood products were required. A post-operative angiogram showed a widely patent H graft. The patient was relieved of chest pain and was discharged. The H graft procedure is a useful alternative technique to minimize the surgical trauma in limited situations such as a high-risk case. (Ann Thorac Cardiovasc Surg 2007; 13: 278–281)

Key words: H graft, minimally invasive direct coronary artery bypass grafting

Introduction

Minimally invasive direct coronary artery bypass grafting (MIDCAB) of the left internal thoracic artery (LITA) to the left anterior descending coronary artery (LAD) through a left anterior small thoracotomy has been shown to produce excellent results with a very low mortality rate.^{1,2} MIDCAB advantages include the avoidance of a large skin incision and cardiopulmonary bypass morbidity. However, in high-risk cases such as patients with advanced cancer, less invasive coronary artery bypass grafting (CABG) is recommended. Here we report a less invasive technique, MIDCAB using an H graft, for a pa-

tient with advanced prostatic cancer.

Case

A 74-year-old man with advanced prostatic cancer and coronary insufficiency was referred to our department for the consideration of CABG. A coronary angiogram demonstrated a tight LAD lesion treated unsuccessfully with percutaneous coronary intervention. The left ventricular ejection fraction was 0.49. The exercise ^{99m}Tc-MIBI test showed a reversible perfusion defect correlating with LAD stenosis. Because of the patient's age and advanced prostatic cancer, less invasive coronary revascularization by MIDCAB was recommended.

After the satisfactory establishment of a general endotracheal anesthesia with a double-lumen tube, the patient was turned 30° on his left side, abducting the left arm for sufficient exposure of the axilla. We elected to use the H graft procedure, considering it less traumatic than LITA harvest under direct vision. The left anterior small thoracotomy, 8 cm in length, was made at the fifth intercostal space. A section of the cartilaginous portion

From ¹Division of Cardiac Surgery, Tokyo Medical University, Tokyo, and ²Department of General and Cardiothoracic Surgery, Kanazawa University Graduate School of Medical Science, Ishikawa, Japan

Received November 9, 2006; accepted for publication December 15, 2006

Address reprint requests to Satoru Nishida, MD: Division of Cardiac Surgery, Tokyo Medical University, 6-7-1 Nishishinjuku, Shinjuku-ku, Tokyo 160-0023, Japan.

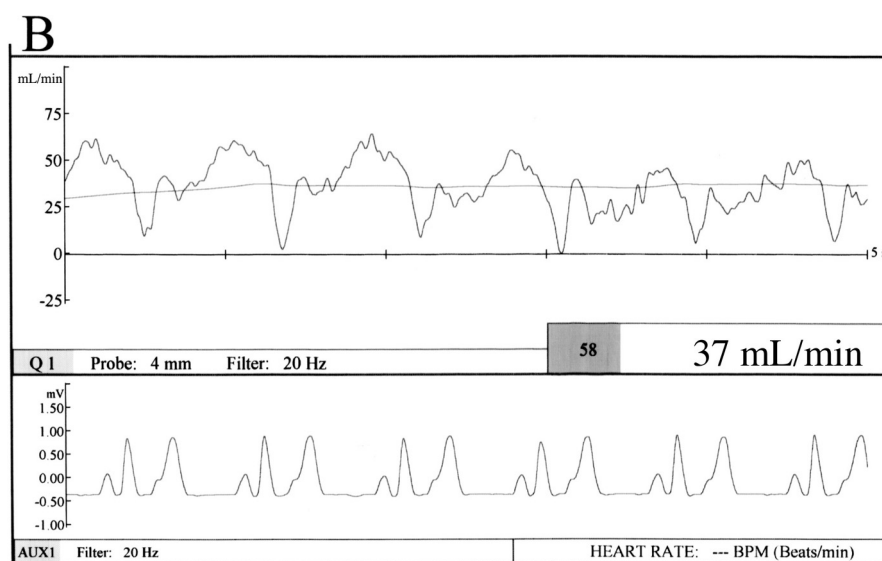
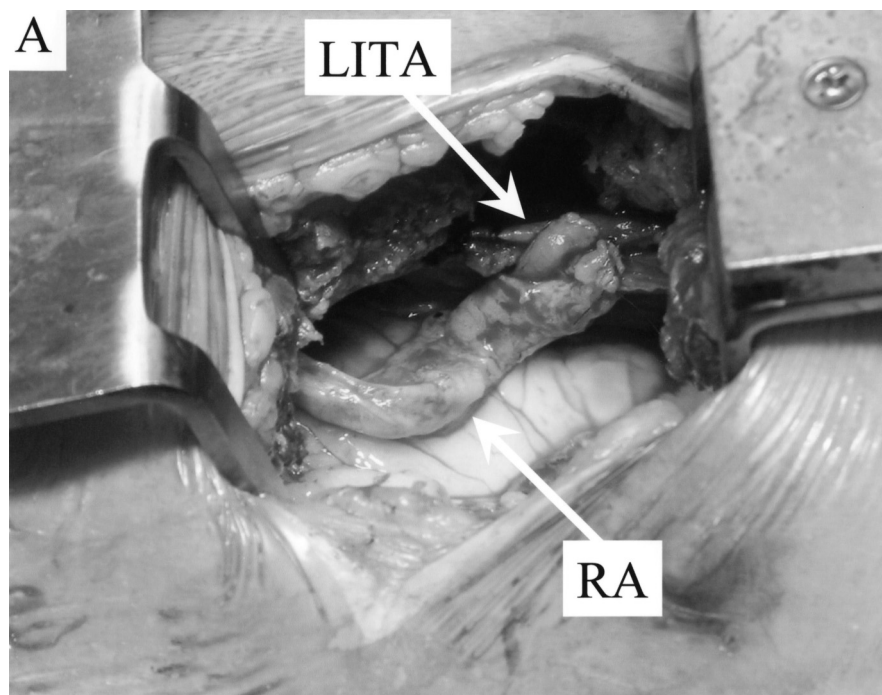


Fig. 1.
A: The short radial artery (RA) was placed in an end-to-side fashion between the left internal thoracic artery (LITA) and the left anterior descending artery (LAD).
B: The flow pattern through the H graft evaluated by transit time flow measurements demonstrated good diastolic flow with a mean value of 37 mL/min.

of the rib was removed, and the LITA and LAD were exposed. The LITA was cleared for a distance of 5 cm. The LITA had excellent pulse. The left radial artery (RA), 7 cm in length, was harvested, and Heparin was given intravenously. The RA was anastomosed to the LITA in an end-to-side fashion. After the heart tissue stabilizer was placed, the LAD was looped proximally with 5-0 polypropylene. The proximal suture was tightened for 3 min as an ischemic test. There were no manifestations of ischemia. A longitudinal arteriotomy was performed on

the LAD, and the proximal suture was tightened. The RA was anastomosed to the LAD in an end-to-side fashion (Fig. 1A). The distal LITA was ligated to avoid potential steal phenomenon. Blood flow through the RA was evaluated by transit time flow measurements (TTFM; Medi-Stim AS, Oslo, Norway). The flow pattern demonstrated good diastolic flow with a mean value of 37 mL/min (Fig. 1B). The total surgical duration was 80 min, and no blood products were required.

A postoperative angiogram showed a widely patent RA

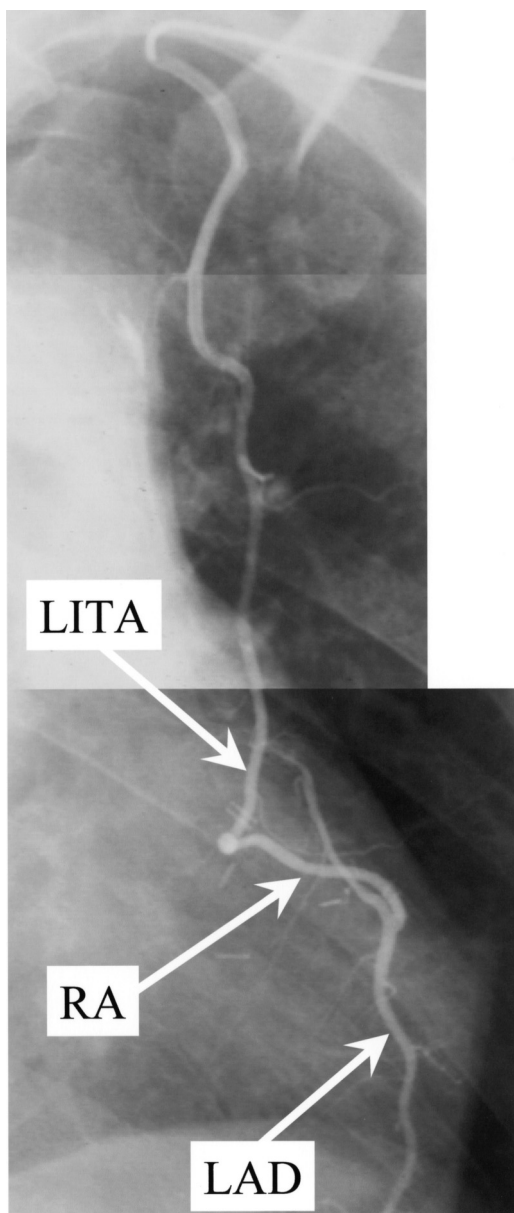


Fig. 2. A postoperative angiogram showed a widely patent H graft from the left internal thoracic artery (LITA) to the left anterior descending artery (LAD).

graft from LITA to LAD (Fig. 2). The postoperative course was uneventful. The patient was relieved of chest pain and discharged. Although there were no cardiac events, after 6 months the patient died of cancer progression.

Discussion

Our experience demonstrated that the MIDCAB procedure using an H graft is a much simpler and quicker way

of doing MIDCAB. The H graft procedure, in contrast to the standard MIDCAB, is able to avoid chest wall retraction and requires less dissection of LITA, and it provides excellent visualization. It is a useful alternative technique to minimize surgical trauma in limited situations, such as high-risk cases. However, there are disadvantages to this procedure, including the need for a second incision to harvest the graft and the need for two anastomoses. Perhaps the most important issue is the potential for a diversion of LITA flow to noncoronary vascular beds, the so-called steal phenomenon.³⁾

Because the LITA is left undissected in its bed in the H graft procedure, it remains to be shown whether this will detract from blood flow to the coronary artery. Some authors claim that the persistence of intact proximal intercostal branches does not influence blood flow of the distal LAD.^{4,5)} The key point is that the biggest potential source of steal is the distal LITA, and it should be clipped to prevent steal. Karamanoukian et al. measured flows before and after clipping the distal LITA.⁶⁾ In their cases, flow in the RA graft was increased after clipping. In the H graft technique without ligation of the distal LITA, the motivation is to preserve the whole length of the LITA for future revascularization.⁴⁾ However, high-risk patients are unlikely to be able to undergo reoperation because of their serious conditions. We think the H graft procedure with ligation of the distal LITA is a better procedure than without it.

H graft is basically a palliative procedure and is not as good as the standard MIDCAB with direct LITA-to-LAD anastomosis. We should compare the standard MIDCAB and H graft procedures to determine which is better for the sick patient. Although the H graft procedure is technically easier than the standard MIDCAB, we should not choose this procedure only because of the convenience.

Conclusion

The H graft procedure is a useful alternative technique to minimize the surgical trauma in limited situations, such as high-risk cases. We think the H graft procedure with ligation of the distal LITA is a better operation than one without it.

References

1. Calafiore AM, Giammarco GD, Teodori G, et al. Left anterior descending coronary artery grafting via left anterior small thoracotomy without cardiopulmonary

- bypass. *Ann Thorac Surg* 1996; **61**: 1658–65.
2. Watanabe G, Misaki T, Kotoh K, et al. Bilateral minimally invasive direct coronary artery bypass grafting with the use of two arterial grafts. *J Thorac Cardiovasc Surg* 1997; **113**: 949–51.
 3. Schmid C, Heublein B, Reichelt S, et al. Steal phenomenon caused by a parallel branch of the internal mammary artery. *Ann Thorac Surg* 1990; **50**: 463–4.
 4. Cohn WE, Suen HC, Weintraub RM, et al. The “H” graft: an alternative approach for performing minimally invasive direct coronary artery bypass. *J Thorac Cardiovasc Surg* 1998; **115**: 148–51.
 5. Luise R, Teodori G, Di Giammarco G, et al. Persistence of mammary artery branches and blood supply to the left anterior descending artery. *Ann Thorac Surg* 1997; **63**: 1759–64.
 6. Karamanoukian HL, D’Ancona G, Salerno TA, et al. Steal syndrome documented by transit time flow measurement technique in an “H” graft. *Heart Surg Forum* 1999; **2**: 239–41.