How-to-do-it

Retrocaval in situ RIMA for distal marginal arteries grafting

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Abstract

The length of the in situ right internal mammary artery (RIMA) often restricts its use as a graft to distal marginal arteries. We describe herein a retrocaval supra-azygous extra-pleural passage of the RIMA that allows a significant gain in length. We report our experience in 30 patients with distal marginal lesions or with large hearts.

Keywords: Internal mammary artery; Retrocaval; Coronary artery bypass grafting

1. Introduction

In situ (pediculated) mammary arteries in coronary artery bypass grafting (CABG) are widely considered as conduits of choice [1]. This is particularly true for left internal mammary to left anterior descending artery (LIMA to LAD) grafting [2]. While in situ right internal mammary artery (RIMA) achieves superior results to venous grafting [3,4], its use has been hindered by insufficient length to reach the desired position on the targeted artery, especially distal marginal arteries, by passing it through the transverse sinus. Attempts to resolve the problem by free grafting or graft extension have been proposed [5]; however, this was accompanied by a reduced patency rate and higher graft failure [6]. Thus, its use as an in situ graft whenever possible is largely advocated.

2. Technique

The RIMA is harvested in a skeletonized manner up to its origin from the right subclavian artery behind the right subclavian vein. When the RIMA does not reach the target artery when placed through the transverse sinus as we perform conventionally, we proceed to this technique. Thus, the superior vena cava (SVC) is dissected and freed around its upper circumference almost at the confluent of the brachiocephalic veins well above the azygous vein entry, taking care not to damage the right phrenic nerve which should be kept lateral to the margin of dissection and without opening the pleura (Fig. 1). The azygous vein, which drains into the posterior aspect of the SVC, should be kept at a level below the dissection to avoid its injury. The RIMA is then passed behind the upper portion of

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Fig. 1. Anatomic drawing illustrating the retrocaval supra-azygous passage of the RIMA.
the SVC by a right-angled forceps to take a direct passage into the traverse sinus to be anastomosed to the target (usually marginal) artery. The potential risk of twisting by retrocaval passage is limited by direct visual control, while only minimal compression is exerted by the low pressure system of the SVC as verified by checking the flow of the RIMA before anastomosis. The first five patients had coronary angiography showing patent anastomoses and all subsequent patients were controlled by an exercise ECG test within 1 month from surgery. No exercise-induced ischemia was detected.

3. Comments

Bilateral pediculated mammary artery grafting is superior to saphenous venous grafting [2]. While LIMA takes a direct path to LAD and is usually of sufficient length, the length of the graft may limit the RIMA to marginal artery bypass even after adequate harvesting. Our technique of passing the RIMA behind the SVC allows more direct access into the sinus, thus reducing the distance otherwise necessary to pass in front of the SVC and providing an important gain in the RIMA length (2–3 cm). This makes it substantially sufficient to be applied to distant target vessels and/or in patients with enlarged hearts. The techniques of skeletonizing and harvesting the mammary arteries are not changed. Dissection of the SVC before establishing cardiopulmonary bypass is the only additional procedure and adds only a few minutes to the total operating time. In our early experience of 30 patients, retrocaval passage of the RIMA enabled us to perform the anastomosis of the RIMA to the distal marginal artery when traditional passage through the transverse sinus of the heart failed to reach the target artery. Retrocaval passage can provide a gain of length permitting the anastomosis and is thus indicated when the length of the graft may limit the RIMA to marginal artery bypass even after adequate harvesting (Table 1). No complications occurred from this dissection. We emphasize avoiding injury to the phrenic nerve and azygous vein, which represent the only hazards of this technique. The passage taken by the RIMA is a smooth one and does not expose it to kinking or compression as shown in the angiographic control (Fig. 2). Furthermore, the RIMA is well ‘hidden’ behind the vena cava which can be considered as an advantage in redo surgery by further avoiding RIMA damage.

References