Brief communication - Coronary

Fluoroscopic angiography-guided mini-entry localization before minimally invasive redo coronary artery bypass

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Received 3 February 2004; received in revised form 18 May 2004; accepted 1 June 2004

Abstract

We have been using a mini-thoracotomy localization technique before re-operative minimally invasive direct coronary artery bypass (MIDCAB) to the left anterior descending artery (LAD). This technique was performed during the diagnostic laboratory catheter study, in which the skin portion was marked just above the target LAD site, observing the enhanced LAD by fluoroscopy. In nine patients, a 3–4-cm mini-entry was made by referring to the marked position, the LAD was identified in the minimally dissected epicardium, and anastomoses were performed using the vein in six cases, the left internal thoracic artery in two, and the right gastroepiploic artery in one.

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Keywords: Redo MIDCAB; Small thoracotomy; Coronary angiography; Preoperative marking

1. Introduction

Minimally invasive direct coronary artery bypass (MIDCAB) has been customarily defined as off-pump bypass grafting to the left anterior descending artery (LAD) using a small anterior thoracotomy approach [1,2]. In a redo situation, the limited thoracotomy must be made just above the target portion of the LAD so that the target site can be identified precisely in the minimally dissected epicardium.

Hence, before redo MIDCAB, we have been using a simple, cost-effective fluoroscopic angiography-guided technique for localization of the mini-thoracotomy, which clearly demonstrates the skin portion just above the target site of the LAD. This communication describes the methods employed and the clinical outcomes obtained.

2. Patients and methods

The present technique was used in nine patients (seven men, two women, 78 ± 9.0 years old), who underwent MIDCAB to the LAD in a re-operative status. The mean interval was 6.5 ± 2.2 years since previous operation. Six patients suffered from multi-coronary-artery disease; three were octogenarians and three cases had advanced malignant disease. In these cases, catheter intervention following MIDCAB was applied to non-LAD lesions.

In each patient, the present technique was performed during the routine diagnostic laboratory catheter study. The patient was placed supine, and the fluoroscopy view was set exactly antero-posterior. While the LAD was being enhanced, a small radiopaque marker was placed on the skin just above the target anastomosis site in the LAD (Fig. 1). The marker was removed and the location was recorded on the chart; the number of the intercostal space and the distances from the sternal margin and the nipple were noted.

In the present patient series, redo MIDCAB was performed consistently by a single surgeon. In each case, a 3–4-cm skin incision was made parallel to the rib for limited thoracotomy; the mid-portion of the incision corresponded exactly with the fluoroscopically marked site. The epicardium was minimally dissected and the LAD was exposed. The thoracoscopically mobilized LITA was used in two patients [3]. In seven patients, the LITA had been already used at previous surgery; a left axillary artery-to-LAD bypass was performed using a saphenous vein graft in the six cases, and a right gastroepiploic artery in situ graft was used in the patient who had had two...
previous operations. The vein graft was advanced as far as the mini-thoracotomy through the chest cavity using video-thoracoscopic assistance [4].

3. Results

In each patient, the present fluoroscopic marking maneuver was performed in a few seconds during a single injection of contrast medium into the diseased LAD.

There was no mortality or major morbidity associated with the redo MIDCAB, no conversion to cardio-pulmonary bypass and no requirement for homologous blood transfusion. In each patient, the epicardium was minimally dissected and the LAD was identified at the center of the wound (Fig. 2). In two patients, although the LAD was intramyocardial or embedded under the dense epicardial scar, it was identified successfully by dissecting the point that lay in the exact center of the wound.

In each patient, postoperative angiography was done within a week after surgery; each graft was confirmed to be correctly anastomosed to the target portion of the LAD (Fig. 1), and catheter intervention was additionally conducted in the six patients with non-LAD lesions.

4. Comments

MIDCAB to the LAD via a limited thoracotomy has been applied to redo cases and satisfactory clinical outcomes have been reported [5,6]. The MIDCAB approach results in minimal dissection of the heart, and the remaining adhesions limit the extent of epicardial motion, making it easier to conduct coronary anastomosis on the beating heart. Nevertheless, it is difficult before surgery to identify the optimal mini-thoracotomy site, which lies just above the target portion of the LAD.

The first author and associates have previously reported the application of enhanced three-dimensional computed tomography (3D-CT) to preoperative anatomic investigation of the LAD as well as the patent graft in redo MIDCAB cases [7]. Despite its effectiveness in redo cases, this expensive modality cannot be applied to most patients.

The present technique was cost-effective, and the maneuver was performed quickly and easily in the present nine redo-MIDCAB cases. In each patient, a 3–4-cm mini-entry was created successfully just above the target portion of the LAD. Although our experience is limited, this technique seemed less effective in the primary MIDCAB cases; the LAD was observed lateral to the suggested point via mini-thoracotomy. The heart with little adhesion to the rib cage might change its position in the hemi-laterally opened thorax.

In the present patient series, the marking maneuver was performed by a cardiologist during the routine laboratory diagnostic catheter study, and no special examination was required. It is therefore important that cardiologists are reminded that the present method is effective and should be considered in cases where redo MIDCAB to the LAD may be indicated.

In conclusion, although MIDCAB to the LAD were applicable in the limited redo-status, we have shown that
an optimal mini-entry site just above the target LAD site can be localized precisely before redo MIDCAB using the present fluoroscopic angiography-guided skin-marking technique.

References


