Brief communication - Coronary

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

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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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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 adherence 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


