

Direct Stenting of a Transradial Left Internal Mammary Artery Graft

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Taking the transfemoral approach when performing a left internal mammary artery (LIMA) graft intervention is generally recognized as posing significant technical challenges. However, little has been reported on alternative transradial approaches to LIMA. In this report, we present our experience in a patient who had anastomosis-site LIMA graft stenosis and was successfully treated with direct stenting. We used a 6-French Kimny guiding catheter inserted through the left radial artery, even though the procedure was complicated by an acute occlusion of a LIMA body, requiring bail-out stenting following intra-aortic balloon pump support and temporary cardiac pacing. The patient was discharged 6 days after the procedure and remains asymptomatic during follow-up visits. Our results suggest that a transradial approach is feasible for LIMA intervention procedures. (*Chang Gung Med J* 2003;26:925-9)

Key words: left internal mammary artery graft, transradial approach, direct stenting.

The left internal mammary artery (LIMA) is the first choice of grafts for coronary artery bypass graft (CABG) surgery because it is better than saphenous vein grafts (SVGs) in terms of the long-term patency rate. Even with a 10-year patency rate reaching 90%-95%,^(1,2) stenosis does occasionally occur. LIMA graft stenosis is typically treated through percutaneous coronary intervention (PCI) using a transfemoral approach.⁽³⁻⁵⁾ However, procedural success was 73% to 88% which was lower than for regular coronary artery interventions.^(3,5) The transradial approach to LIMA intervention has rarely been reported,⁽⁶⁾ but could be a useful alternative as it offers a shorter and more-direct approach to the LIMA graft. In this report, we relate our experience in a patient with stenosis of an anastomosis-site LIMA graft which was successfully treated with direct stenting using a transradial approach.

CASE REPORT

A 65-year-old man who underwent CABG surgery for 3-vessel coronary artery disease 9 years previous was admitted to our hospital because of recurrent angina refractory to medical treatment. Cardiac catheterization was performed via the left radial artery approach using a 6-French (Fr) Kimny mini radioforce guiding catheter (Schenider Corp); cardiac catheterization revealed total occlusions in the ostium of the left anterior descending artery (LAD), the proximal left circumflex artery (LCX), and the right coronary artery (RCA). The proximal saphenous venous grafts to the LCX and RCA were also totally occluded. Initial attempts to engage the ostium of the LIMA using the same 6-Fr Kimny guiding catheter met with difficulty. With the aid of a 5-Fr JB2 carotid diagnostic catheter (Benlson,

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mani, J curve), we passed the ostium with a 0.365-mm Terumo 260-cm wire (Terumo Corp., Tokyo, Japan). The 5-Fr JB2 diagnostic catheter was subsequently replaced by a 6-Fr Kimny guiding catheter, which was then deeply engaged in the LIMA ostium (Fig. 1A). Selective angiography revealed an extremely tortuous LIMA graft to the LAD, which exhibited no significant stenosis over its body. However, 73% stenosis located at the anastomosis site was noted (identified using qualitative coronary analysis). The LIMA graft provided retrograde flow to the diagonal branch and the distal RCA by collateral circulation (Fig. 1B).

Because of the importance of the LIMA graft to this patient, he underwent direct stenting without balloon pre-dilatation to the anastomosis lesion. A 0.36-mm high-torque floppy wire (Advanced Cardiovascular System, Santa Clara, CA, USA) was used to cross the lesion followed by deployment of a

BX velocity 3.0×13-mm stent (Johnson & Johnson Corp Miami, USA) at 1621.2 kPa (16 atm) [give in CGS units first; 1 atm = 101.325 kPa]. Post-stenting dilatation up to a pressure of 1621.2 kPa (16 atm) was performed using a 3.5×9-mm Maxxum balloon catheter. Residual stenosis at the anastomosis site was 12%. Repeated angiography, however, showed that the mid-LIMA body was totally occluded (Fig. 1C), and the patient developed hypotension, bradycardia, and chest pain. The patient was immediately supported by an intra-aortic balloon pump (IABP) and temporary cardiac pacing. Two additional stents (ACS multi-link 4.0×28 mm and Medtronic S670 4.0×24 mm) were deployed to the mid-LIMA body. The final angiographic result revealed a patent LIMA graft. All 3 sequential stents placed in the mid-LIMA body and the anastomosis site expanded satisfactorily (Fig. 1D).

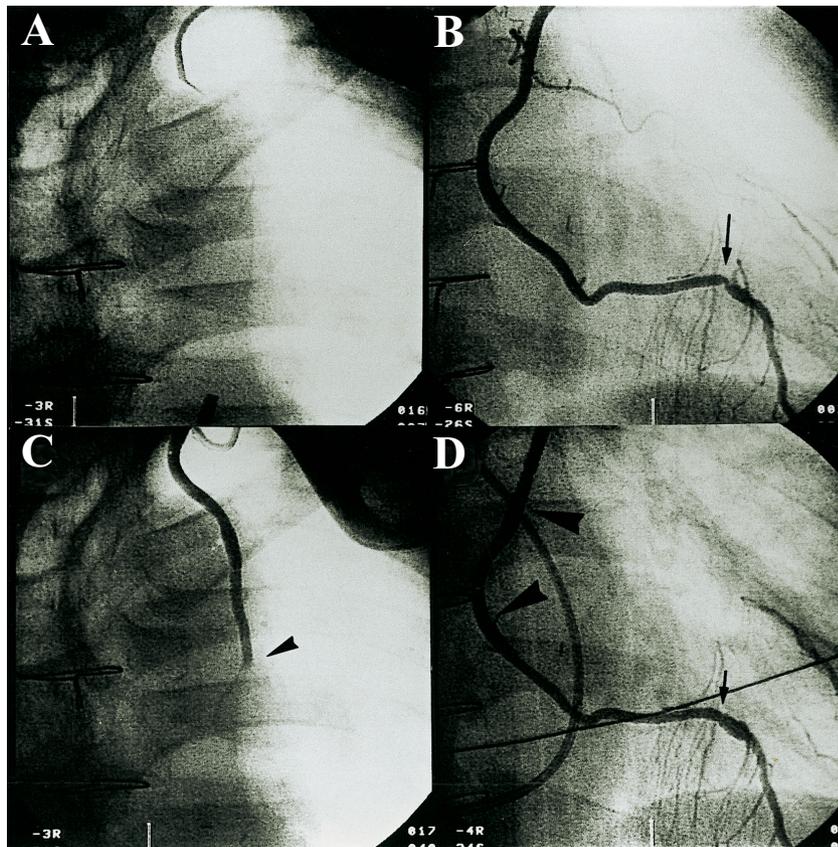


Fig. 1 The Kimny guiding catheter deeply engaging the LIMA. (B) A 73% stenosis at the anastomosis site of the LIMA graft (white arrow). (C) Acute occlusion of the LIMA body (arrowhead). (D) Final angiogram showing a patent vessel after being bailed out with stenting.

As the patient's condition had improved by the following day, IABP support and temporary cardiac pacing were discontinued. The patient was discharged 6 days after the angioplastic procedure, and remained free of symptom during 2 years of follow-up.

DISCUSSION

LIMA grafts have frequently been used in the treatment of coronary artery disease because of better patency and event-free rates than those achieved using saphenous venous grafts.^(1,2) A recent study performed on patients with proximal, isolated de novo LAD disease even indicated that the LIMA graft was superior to the LAD stent in terms of additional revascularization.⁽⁷⁾ The number of patients receiving LIMA grafts is large, and interventional cardiologists face a new problem in coronary artery disease treatment when stenosis of the LIMA graft occurs either in its body or at the anastomotic site as a result of fibrointimal proliferation. In addition, progressive arteriosclerosis in the native vessel distal to the internal mammary artery anastomotic site is also common.

Angioplasty for LIMA grafts is a challenge for interventional cardiologists, even though success rates are typically between 73% and 88%, if it is performed through the femoral artery.⁽³⁻⁵⁾ As pointed out by Mann et al.,⁽⁶⁾ several reasons underlie this difficulty with angioplasty. First, there is a sharp angle between the proximal subclavian and internal mammary arteries, which typically cannot be adequately supported with a guiding catheter. Second, employing a large guiding catheter in a transfemoral approach to engage a small IMA may interfere with blood flow, causing ischemia or dissection at the origin of the IMA. Third, the relatively long length and meandering nature of the IMA graft frequently rule out smooth guidewire manipulation and balloon delivery.

The ipsilateral brachial approach, which offers a shorter, more-direct approach and better engagement to the IMA, in contrast to the transfemoral approach, has been tried previously.⁽⁸⁾ However, this approach has not become popular, probably due to the relative complexity of postoperative recuperative requirements. Like the transbrachial approach, the ipsilateral radial approach also offers a short, direct route to

the LIMA graft. However, the latter offers advantages over the former as it involves only a simple arterial puncture technique and therefore allows for relatively easy postoperative care of the puncture site.⁽⁹⁾ The feasibility of the transradial approach for LIMA graft intervention, however, has not been widely tested.

Using a specially designed IMA guiding catheter, Mann and associates were able to successfully perform LIMA angiographies in 40 patients through the left radial artery.⁽⁶⁾ Among those patients, 10 received coronary interventions, and 5 of the 10 patients even underwent coronary stenting within either the LIMA or native LAD. No procedural complications were reported. Mann et al.'s findings indicate that the transradial approach to the transluminal LIMA intervention may be feasible. One special note with regard to Mann et al.'s study is that the special IMA catheters they used are not readily available.

The successful result in our patient supports the feasibility of using the transradial approach for LIMA graft intervention. The result also indicates the usefulness of a 6-Fr Kimny mini radioforce guiding catheter in LIMA graft intervention, even though the catheter might encounter certain difficulties in engaging the LIMA ostium. This difficulty can be overcome by engaging the ostium first with a 5-Fr JB2 carotid diagnostic catheter and switching back to the Kimny guiding catheter following advancement of a 0.01-mm (0.025-in) Terumo wire into the LIMA.

With this strategy, the 6-Fr Kimny guiding catheter can deeply engage the LIMA. We found that the 6-Fr Kimny guiding catheter, as a result of its small size and soft tip, did not interfere with blood flow or cause trauma to the LIMA ostium.

The cause of the acute occlusion noted in our patient was not apparent. It may have been due to traumatic dissection when the Terumo or floppy wire was advanced through the winding LIMA body. A wire coated with a softer, hydrophilic material (e.g., Choice PT, Scimed, Co.) capable of passing through the extremely tortuous course of the LIMA could avoid this complication.

As in our patient, the coronary circulation totally depends on the LIMA graft, and intervention to this graft carries a risk similar to that in patients undergoing left main coronary angioplasty. Therefore, prophylactic IABP support may be neces-

sary before the angioplastic procedure.

In conclusion, LIMA intervention can be successfully performed via a transradial approach. In addition, the commercially available 6-Fr Kimny guiding catheter is feasible for use in transradial LIMA graft stenting.

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經撓動脈執行左內乳動脈繞道移植血管直接支架置放術

洪尉欽 郭必芳 吳炯仁 陳建仁 方志元

經股動脈執行左內乳動脈移植血管介入性治療一直被認為是技術性的一大挑戰，而且少有經撓動脈執行左內乳動脈的介入性治療報告。在此我們報告一位男性在左內乳動脈繞道移植血管吻合處發生狹窄，我們成功地經由撓動脈使用 6 Fr Kimny 導引導管，執行介入性治療。雖然在過程中發生左內乳動脈急性阻塞需要主動脈氣球幫浦、暫時性心律調節器輔助及額外支架置放治療，最後依然成功執行直接支架置放術。病人 6 天後出院，門診追蹤一直都沒有任何症狀。我們的結果顯示經由撓動脈執行左內乳動脈移植血管介入性治療是可行的。(長庚醫誌 2003;26:925-9)

關鍵字：左內乳動脈移植血管，經撓動脈著手，直接支架置放術。

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