

How to Perform Selective Angiography and Percutaneous Coronary Intervention Through a Left Mammary Artery from the Right Radial Artery?

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Due to extended patency rate, mammary arteries have become standard grafts on left anterior descending (LAD) artery for coronary artery bypass graft (CABG) surgery. Still, for other coronary arteries, saphenous vein graft remains commonly used and accelerated atherosclerosis is a landmark process in those grafts. Therefore, a significant number of post-CABG patients are referred for control angiography in the ensuing years following operation.

Right radial angiography is the most common technique for diagnostic and interventions on coronary arteries. Conversely, left radial approach is frequently used in post-CABG patients for easier injection of the left internal mammary artery (LIMA), which is usually grafted on the distal LAD artery (Figure 1). Since a significant number of patients now receive bilateral mammary arteries, we have developed a large experience performing left mammary injection through the right radial artery. In some instances, we have also performed LAD percutaneous coronary intervention (PCI) through the LIMA from the right radial artery. In this manuscript, we describe the technique used to selectively cannulate the LIMA from the right radial artery and perform PCI on LAD.

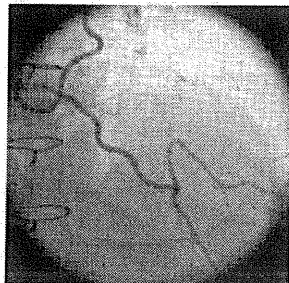


Figure 1: Left mammary artery grafted on distal left anterior descending artery

Step 1

After angiography of the left and right coronary arteries and saphenous grafts, the catheter (JR 4.0 or mammary catheter) is advanced in the descending aorta and then, slowly retrieved until the ostium of the left subclavian artery is located. The ostium is usually very close to the origin of the left vertebral artery. To

better identify the anatomy of the left subclavian artery and exclude a significant stenosis, a non-selective injection of contrast is performed and the best image is shown on a reference screen (Figure 2).



Figure 2: Non-selective angiography of left subclavian artery

Step 2

Using a Hydrophilic 0.035" wire (Terumo, Japan), access to the left subclavian artery is obtained. It is crucial that the wire is placed deeply into the brachial artery, beyond the shoulder in order to provide enough support for advancing the catheter (Figure 3). In our experience, if the operator does not succeed to advance the wire in the brachial artery, it is useless to try to advance the catheter since it will always flip back into the aorta. Since there are many small branches, it is easier to use a torque to manipulate the hydrophilic wire. In some cases, the operator may elect to use a standard coronary wire (0.014 inch BHW, Abbott Vascular) instead of the hydrophilic wire.



Figure 3: Advancement of hydrophilic wire into distal brachial artery

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Step 3

Once the wire is in place, the most difficult part is over. Gently advance the catheter over the wire distal to the ostium of the LIMA. Sometimes asking the patient to take a deep breath will facilitate advancing the catheter in the ascending portion of the left subclavian artery. Although, we never used it, a group has proposed to compress externally the left brachial or radial artery in order to maintain the wire and hence increase the support to advance the catheter¹.

Step 4

Once the catheter is placed distally to the LIMA ostium, remove the wire and slowly pull back the catheter until it 'jumps' into the ostium. Again, asking the patient to take a deep breath may facilitate selective cannulation. Although different catheter curves have been proposed, we have found that a standard or slightly modified mammary artery catheter (Figure 4) is adequate in most cases. In rare cases, operators have used a radial-brachial catheter (Figure 5). The different curves are illustrated in Figure 6. Other authors have used Judkins Left 1 or 3.5, modified Simmons or Yukimo catheters²⁻⁴. We do not have experience with those specific curves.

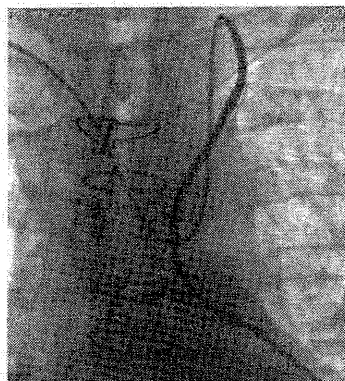


Figure 4: Selective angiography of LIMA with internal modified mammary catheter



Figure 5: LIMA angiography with Radial-Brachial catheter

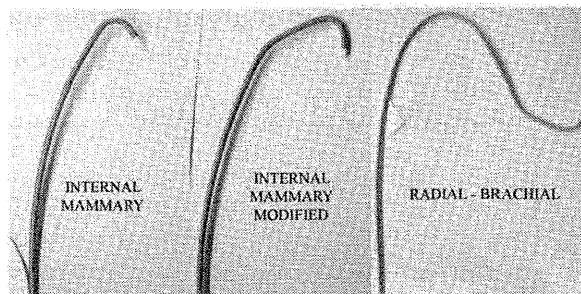


Figure 6: Different curves of catheters, used to cannulate LIMA from right radial approach (Cordis Corporation, USA).

Step 5

PCI might be performed in 5Fr or 6Fr, according to operator preference. The technique is similar. However, with 5 Fr guiding catheter, it is even possible to deeply intubate the LIMA in order to increase support for balloon or stent delivery (Figure 7). In order to position the guiding catheter deep into the mammary artery, a balloon anchoring technique might be required.

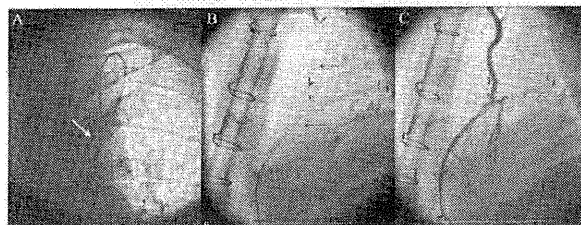


Figure 7: Right transradial approach PCI of distal LAD via LIMA. Panel A : Deep intubation of LIMA with XB 5 Fr catheter, AP view. White arrow : distal tip of the XB catheter. Panel B : Guidewire in distal LAD, lateral view. White arrow : distal tip of XB catheter. Black thin arrows : guidewire in LIMA and distal LAD. Panel C : Final result, lateral view.

In summary, when a post-CABG patient with a LIMA on LAD and other vein grafts is referred for control angiography, we use a left radial approach and the LIMA is easily cannulated with a modified LIMA catheter. However, in case of bilateral mammary arteries or technical limitations to use the left radial approach, the proposed technique with the right radial approach allows good quality injection and adequate support to perform PCI on mid or distal LAD.

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