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EDITORIAL COMMENTARY

Cautions on use of distal internal thoracic artery and its bifurcations

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See related article on pages 1042-50.

The reactivity, particularly the pharmacologic reactivity, of the internal thoracic artery (ITA) at the distal end, including its bifurcations, is an important clinical issue. This is due to the fact that ITA grafting often requires enough length to graft onto the distal left anterior descending artery (LAD). On the other hand, the distal section of the ITA (approximately 3 cm proximal to the bifurcation) is more pharmacologically

FIGURE 1. The contractility of the internal thoracic artery (IMA) is higher at the distal section and bifurcation. At the distal section, the contractility is inversely correlated to the diameter. Reproduced with permission.¹

responsive to vasoconstrictor agents than is its midsection. With the knowledge that ITA spasm happens sometimes at this section, I designed a study¹ that demonstrated that the contractility of the distal section of the ITA is inversely correlated to the diameter; that is, the smaller the diameter, the greater the tendency for spasm to develop (Figure 1).

Further, under certain circumstances, such as when both the LAD and the diagonal branch require grafts, the distal bifurcation of the ITA is used for Y grafting.^{2,3} Despite the convenient use of this part of the ITA, an early report

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FIGURE 2. The distal end of the internal thoracic artery is the muscular regulator because the somatic conduit arteries are physiologically contracted under the critical situation when the body perfuses vital organs such as heart, brain, and kidney. Reproduced from with permission.⁶

has revealed that the patency rate for bifurcation of the ITA is poor.⁴ In view of this, we did another study that tested the hypothesis that the contractility (tendency for spasm) is greater at the bifurcation than that in the main ITA, even at the distal end.⁵ The results showed higher sensitivity to various vasoconstrictors in the bifurcation than at the distal end of the main ITA.

It is obvious that the distal end is the muscular regulator of the ITA⁶ (Figure 2) because the somatic conduit arteries are physiologically contracted under critical situations; for example, hemorrhagic shock, when the body perfuses vital organs such as heart, brain, and kidney. This physiologic role is a protective mechanism for the body.

When the conduit artery is used for coronary artery bypass grafting as a graft, the surgeon must be aware of this higher contractility. I proposed¹ that trimming off the distal end of the ITA as much as possible may be the best way to prevent graft spasm, this of course including trimming off the bifurcation. The exception to this is probably when there is a need to have more length of the ITA to graft to the more distal part of the LAD or when the bifurcation is used as a Y graft for the LAD and a diagonal artery. Under such circumstances, the surgeon should be aware of the risk of spasm of the distal end and the bifurcation.

In this issue, Shavit and colleagues⁷ report on a study on the physiologic and histologic properties of the distal ITA and its subdivisions (bifurcation) and they confirmed our previous studies on the higher contractility in ITA bifurcation, suggesting caution in the use of the bifurcation

for revascularization. In addition, they proposed that the extra length, sufficient flow, and favorable histologic properties suggest that the bifurcation may be appropriate for coronary revascularization in selected cases.

On the basis of the above-mentioned previous clinical observation⁴ and previous experimental studies^{1,5} in addition to this new study,⁷ I emphasize that the best way to avoid spasm of the ITA is not to use the bifurcation and the distal end if possible; if the distal end or the bifurcation is necessary to be used for extra length or Y graft, particular caution must be paid to the possibility of spasm of these parts of ITA. Further, if these sections are used, antispastic therapy such as a vasodilator solution (a calcium antagonist plus a nitric oxide donor such as glyceryl trinitrate) could be used for topical treatment of the graft⁸⁻¹⁰ and systematic use of these vasodilators may be also necessary to avoid spasm and related lower patency of the graft.

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