Improvement of Myocardial Perfusion After Transmyocardial Laser Revascularization and Coronary Artery Bypass Graft Surgery

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A 69-year-old man with severe angina had severe 3-vessel disease by coronary angiography. At the time of coronary revascularization, he had left internal mammary artery implantation to the left anterior descending artery, a vein graft to the diagonal branch, and a vein graft to the marginal branch of the left circumflex artery. Transmyocardial laser revascularization was performed in the territory of the right coronary artery (because of poor distal runoff) with a xenon chloride excimer laser (under an investigational device exemption sponsored by United States Surgical Corp). The postoperative course was uneventful. The patient experienced improvement of symptoms.

The patient had an exercise treadmill test by the Bruce protocol before and ~3 months after surgery. Before surgery, he developed angina during exercise with ST-segment depression at 75% of maximum predicted heart rate. After surgery, he exercised to 87% of maximum predicted heart rate with no angina or ST-segment depression.

Before surgery, exercise single photon emission CT (SPECT) 99mTc-sestamibi myocardial images revealed extensive reversible perfusion defects consistent with 3-vessel ischemia. After surgery, the exercise SPECT perfusion images were almost normal (Figure). The improvement in the perfusion pattern during exercise was equally remarkable in the vascular area treated with laser and the vascular territories treated with bypass surgery.

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Circulation encourages readers to submit cardiovascular images to Dr Hugh A. McAllister, Jr, St Luke’s Episcopal Hospital and Texas Heart Institute, 6720 Bertner Ave, MC1–267, Houston, TX 77030.

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Exercise 99mTc-sestamibi images obtained before (upper row) and after (lower row) surgery. Top left panel, Short-axis slices; middle left panel, vertical long-axis slices; top right panel, horizontal long-axis slices. Polar maps are shown in right middle panel (before surgery, left; after surgery, right). Gated three-dimensional perfusion images at end diastole (left) and end systole (right) before surgery are shown in the left lower panel and after surgery in the lower right panel. Preoperative images reveal extensive perfusion defects involving the 3 vascular territories. Rest images (not shown) reveal almost complete redistribution. Postoperative images reveal almost complete normalization of perfusion pattern. Of note, improvement in perfusion pattern in territory of right coronary artery (area of transmyocardial laser revascularization) is comparable to improvement in territories of left anterior descending and left circumflex coronary arteries (areas revascularized with bypass grafting).
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