

The Heart Surgery Forum®

A Perspective on MIDCAB

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The development of direct myocardial revascularization by direct coronary anastomosis, like many technical advances, has followed a sometimes meandering and circuitous route. Certainly as one reviews the history of our specialty it becomes clear that very little is new in the way of concepts, but that often progress is achieved as parallel technology becomes enabling. Direct anastomosis on coronary branches on the beating heart, as well as thromboendarterectomy and patching of stenotic areas by pioneers such as Longmire, Lillehei, Demikhov, DeBakey, Murray, and many others, represented the first attempts toward establishing aortocoronary bypass. Even they had built upon the concepts proposed forty years before by Carrel when he stated, "In certain cases of angina pectoris, when the mouth of the coronary is calcified, it would be useful to establish a complementary circulation for the lower part of the arteries. I attempted to perform an indirect anastomosis between the descending aorta and the left coronary. It was, for many reasons, a difficult operation. On account of the continuous motion of the heart, it was not easy to dissect and to suture the artery".

The movement of the beating heart was problematic then, as now, in creating an accurate anastomosis. The requirement of a still and clear field for construction was solved with the progress made in mechanical support and myocardial protection. These advances made the widespread application of this procedure and its favorable outcomes possible for many years.

Reports of beating heart surgery with favorable outcomes, however, were still to be found in the literature. These usually dealt with special situations that at one time or another all cardiac surgeons face, such as calcified aortas, redo operations, poor ventricular function, single anterior grafts, or economic constraints for equipment purchase. More recently, extensive reports of using beating heart surgery with some frequency began emerging, partic-



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ularly from South America. Dovetailed with this was growing experience in thoracoscopic operations and less invasive approaches. It was not surprising that a number of institutions then set about to fuse these concepts into an operative approach that would support the axiom of all minimally invasive surgery...to achieve the desired therapeutic goal with the least change in the patient's homeostasis.

MIDCAB, as it has come to be known, was not even on the radar screen of cardiac surgery when the first meeting dedicated to the idea was held in Utrecht, Holland. The attendance was inversely proportional to the importance of this seminal event. From there came a general feeling that many coronary bypass operations could be performed in some manner like this, though the instrumentation was certainly lacking. As instruments directed toward helping with the operation began proliferating, however, so did the debate over this approach. Not only did it impact what had become a well-accepted technique, but it threatened the quality of the left internal mammary to the left anterior descending artery anastomosis, which has been demonstrated, largely by the Cleveland Clinic, to be of utmost importance to the patient's welfare.

Many studies have been undertaken (and others still ongoing) to determine the quality of the MIDCAB procedure, although it's been years since its inception. If coronary artery bypass is the most studied operation in history, then MIDCAB may presently be the most studied subset. A recent review of the literature shows that over 16 studies with angiographic follow-up have been done rivaling earlier studies on the IMA, especially in a prospective manner. Despite variations in patient numbers and intervals of follow-up, the cumulative data is compelling. Over 1,300 patients and 850 follow-up angiograms demonstrating patency rates of 92% to 100% are reported. When one looks at the additional benefit of stabilization and increasing experience, they are over 97% to 99%. This, of course, has been only a few years, and certainly time will indicate if there is greater attrition. But with the addition of stabilization to maintain a still, yet clear field, the conclusion will not be unlike that of the first studies on IMA grafting. That is, given the initial anastomotic problems due to technical factors, the long-term patency rate demonstrates a very slow attrition.

Off-pump bypass via median sternotomy is presently receiving more attention, particularly due to the common and more comfortable exposure and for multivessel revas-

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cularization. In many patients, however, revascularizing the LAD and/or a diagonal represent total revascularization. Some of these patients never reach a surgical opinion for single vessel disease unless a minimally invasive approach is available, as it should since the LIMA to the LAD remains the gold standard for durability.

MIDCAB is a different type of operation and as such should be approached with the same criteria that are required while learning any new procedure. These requirements are proper training and instrumentation. There is a learning curve, but it is not unlike many other beneficial procedures such as the Ross or mitral valve repair. As such, it should be included in the armamentarium of each surgical student of revascularization. Those surgeons becoming comfortable with beating heart surgery should continue on, if their skill and case volume allow, and become more

proficient in grafting via small incisions as minimal access will represent much of the future in cardiac surgery.

The MIDCAB operation is still undergoing study and refinement. The great benefit to the patient, however, can already be attested to by avoiding the homeostatic chaos inherent in the alternative means of surgical revascularization. While patient selection is important, the developing and evolving technology is enabling us to offer these approaches to a growing number of patients. MIDCAB represents thus far the best studied off-pump operation, demonstrating its applicability in a growing number of centers. It should not be set aside in favor of what is more comfortable to the surgeon, but surgeons should increase their skill to do what is best for the patient.

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