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Beating heart pump-assisted direct coronary artery bypass grafting (PAD-CAB): The best of both worlds

Coronary Artery Bypass Grafting (CABG) is the most common cardiac surgery operation in adults. The clinical history of this procedure can be dated back to the 1960s when various surgeons began to consider coronary revascularization with a graft. At that time, the heart-lung machine was still a device with considerable challenges separate from the technical aspects of the operation itself. As such, the first bypass procedures were done Off-Pump on the beating heart, typically to the RCA only. With improvements in technology, coronary bypass grafting expanded to multi-vessel procedures utilizing cardio-pulmonary bypass, aortic cross-clamping, and cardioplegic arrest. This traditional technique afforded a near-perfect environment in which hemodynamic stability could be maintained while grafting the coronaries in a motionless field. The traditional CABG was, and remains, the standard by which all other techniques of coronary revascularization is measured. And the results, by the way, are excellent. In the past two decades, alternatives to the traditional CABG have been proposed and tested by numerous surgeons—an attempt to minimize or eliminate the sequellae associated with the body's exposure to the heart-lung machine. One area of investigation was considered and implemented: OFF-PUMP CABG (OP-CAB). The idea behind the OP-CAB was to determine if the CABG operation can be conducted on the beating heart without the support of the heart-lung machine. Special industry-sponsored devices (i.e. stabilizers) were developed to help accomplish this goal. Many manuscripts were published describing the techniques and outcomes of the OP-CAB procedure—some supporting its use and others showing no advantage over the traditional CABG. Often absent from these manuscripts are the "intangibles"—the stress on the surgeon and anesthesiologist while trying to perform the procedure; the difficulty in training residents and fellows to do the procedure; the "near misses" when events during the procedure (e.g. arrhythmia, hypotension, ST segment changes) force an emergency conversion to a traditional CABG; and the suggestion that some territories were left ungrafted for "technical reasons". In an effort to determine if a "hybrid" approach could afford the benefits of a beating heart technique utilizing the heat-lung machine, but without aortic cross-clamping and cardioplegic arrest, the pump-assisted CABG (PAD-CAB) was examined. The purpose of this talk is to describe my experience with the PAD-CAB procedure from 2005 through 2016. During this time frame, more than 300 PAD-CAB cases were performed, representing 37% of the overall number of CABG cases (No. 834). Since 2013, the PAD-CAB approach represented 84% of the CABG cases; and since 2015, the PAD-CAB technique was utilized in 96% of the cases. Overall, the hospital and 30-d mortality for all PAD-CAB procedures was 0.65%, with only 1 death (0.35%) in the last 288 procedures. The majority of cases were men (76%), the average age was 67 years (range: 38 – 91 years), and the average number of grafts was 3.2 (range 1 – 5). Thirty-nine cases (12.7%) were emergent. In summary, the PAD-CAB procedure is safe and effective and should be considered as an alternative to the traditional CABG.

Biography

Louis Samuels graduated Medical School from Hahnemann University (Philadelphia, PA) in 1987 and completed his Cardiothoracic Surgical training in 1995. He joined the faculty of Drexel University as the Surgical Director of Cardiac Transplantation. In 2001, Samuels and his team implanted the world's 5th totally implantable electric artificial heart (AbioCor™). In 2003, he joined the Main Line Health System as the Surgical Director of Heart Failure. In addition to cardiac transplantation and LVAD implantation, Samuels performs CABG and Aortic Valve surgery. In 2012, Samuels became Professor of Surgery at Thomas Jefferson University School of Medicine.

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