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A Brief History Of Advances In Coronary Artery Bypass Grafting

A BRIEF HISTORY OF ADVANCES IN CORONARY ARTERY BYPASS GRAFTING

1876: Adam Hammer establishes that angina pain could be attributed to interruption of coronary blood supply and that heart attacks occurred when at least one coronary artery is blocked.1

1910: As the culmination of animal and human development efforts, Alexis Carrell presents paper to American Surgical Association describing coronary artery bypass.2

1950: Arthur Vineburg accomplishes myocardial revascularization by rerouting internal mammary artery into heart muscle, allowing side branches to bleed into, and nourish, heart muscle.3

1953: Dr. John Gibbon performed first successful open heart operation using cardiopulmonary bypass machine.4

1953: Canadian surgeon D. W. Gordon Murray reports placement of arterial grafts in the coronary circulation. Sutured sections of mammary, axillary or carotid arteries to replace diseased left anterior descending artery sections in five patients.5

1955: Sidney Smith harvests saphenous vein from leg and uses it as a graft from aorta to direct blood flow into the myocardium.6

1960: Robert Goetz performed single mammary artery bypass to anterior descending coronary artery and implanted tantalum stent.7

1962: Drs. Sones and Shirey, Cleveland Clinic, demonstrate first practical angiography to visualize blockages in coronary arteries. Using the brachial arterial approach under X-ray visualization, they manipulated a catheter into the coronary ostia and injected contrast solution while watching the image intensifier and recording image on movie film.8

1968: René G. Favolaro, Cleveland Clinic, achieves restoration of coronary blood flow in 171 patients with saphenous vein grafts bypassing occlusions in several positions,

sometimes with multiple grafts in the same patient.9

1973: Benetti, Calafiore, Subramian achieve direct anastamoses between left internal mammary artery and left anterior descending artery on beating hearts, operating through 10 cm. incisions between ribs.10

1995: The medical products industry, with significant venture capital support, launches innovative products to enable coronary revascularization on a beating heart via a median sternotomy without an external perfusion circuit or through intercostal ports while using the perfusion circuit. This stimulated development of techniques and products designed to minimize the risk associated with cardiac surgical procedures.

1997: In partnership with a team led by Professor Cornelius Borst at the University of Utrecht in the Netherlands, Medtronic, Inc., introduces one of the industry's first tissue stabilizers, the Octopus®, which utilizes suction technology to stabilize the coronary target for off-pump revascularization. Significant adoption of this technology, which avoids use of the external perfusion circuit, stimulates interest among surgeons and cardiologists in the benefits of off-pump revascularization of the beating heart.

1998: Duhaylongsod, Mayfield and Wolf report successes at various centers in harvesting internal thoracic artery thoracoscopically.11

2000: The American Heart Association reports that 350,000 U.S. patients undergo coronary artery bypass grafting each year. Such procedures make up about 80 percent of current cardiac surgeries.12

2000: Falk, Diegeler, Walther, Auschbach and Mohr report a succession of developments in minimally invasive robotic surgery.13

2001: Anastomotic devices introduce automated sewing of bypass grafts to the aorta in what is believed to be a less traumatic manner because the aorta is likely to undergo less manipulation.

2001: A team at Duke University published an article in The New England Journal of Medicine reporting its findings that elderly persons who experienced a decline in neurocognitive function after on-pump (stopped heart) coronary artery grafting procedures tended to improve somewhat within a year but showed a marked decline again five years later.14

2001: The American Heart Association's journal, Circulation, publishes results from the first randomized, head-to-head comparison between on-pump (stopped heart) and off-pump (beating heart) bypass surgery. The results demonstrate equivalency in cardiac outcomes following the two types of coronary artery bypass grafting surgery, as well as marked advantages for the off-pump group, including less use of blood products and less injury to the heart's tissue (as exhibited by the release of the CK-MB isoenzyme).

2002: Medtronic introduces Octopus System II, including the Octopus®4 tissue stabilizer and the Starfish™2 heart positioner and reported that its family of Octopus stabilizers has been used in more than 175,000 Beating Heart bypass surgeries worldwide.

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6 Westaby S, Landmarks in Cardiac Surgery. Isis Medical Media, Oxford, 1997. 191-192.
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10 Ibid, 202.
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