Coronary Artery Bypass Surgery: Conventional vs. Beating Heart

Coronary artery bypass surgery gives beneficial results to patients with coronary artery disease by restoring adequate blood flow and normal delivery of oxygen and nutrients to the heart. Bypass surgery reroutes the blood around a blockage in the coronary artery, creating an alternate pathway for blood to deliver important nutrients and oxygen to the heart muscle. The two main types of bypass surgery, conventional (arrested heart) and Beating Heart, are different in their approaches, as outlined below.

Conventional Bypass Surgery

- Conventional bypass surgery is performed on an arrested (stopped) heart through an incision down the middle of the chest. Patients are placed on a heart-lung machine during the procedure.

- Patients are typically discharged from the hospital several days after the surgery. Year 2000 Medicare claims data shows an average LOS for a CABG to be 8 days.

- When a patient is placed on the heart-lung machine, the blood is removed from the body and routed through the heart-lung machine. The patient may need to receive transfusions (in a recent study by Puskas, more than half of the patients receiving a conventional CABG required some blood products) to replenish blood volume, red blood cells, or platelets.

Beating Heart Bypass Surgery

- Beating Heart bypass surgery is performed on a beating heart through an incision down the middle of the chest. The heart-lung machine is not used during the procedure*.

- Patients may be discharged from the hospital more quickly after beating heart surgery. A recent report from the medical literature notes a 32% shorter length of hospital stay for off-pump patients, a statistically significant difference.1

- Avoiding the heart-lung machine has been shown to reduce the use of blood products.1,2,3 Fewer patients require transfusions when undergoing beating heart surgery.
Conventional (Arrested Heart) Bypass Surgery

- A recent study in the *New England Journal of Medicine* found measurable and persistent neurocognitive decline in patients who had conventional heart bypass surgery. A number of researchers are currently studying surgery with Cardiopulmonary Bypass and its possible negative impact on neurocognitive function (memory loss, decline in thinking skills).

- Conventional surgery requires considerable resources in terms of staff, time, products and equipment, medications, and other items that impact total cost of the procedure.

- In the medical literature, surgeons refer to “high risk patients”—patients whom they consider poor candidates for conventional bypass surgery because they are too ill, or have preexisting medical conditions that make exposure to the heart-lung machine too risky. These “high risk” patients include the elderly, and those with renal problems, diabetes, previous history of strokes or heart attacks, etc.

Beating Heart Bypass Surgery

- Beating Heart surgery may reduce neurocognitive decline because the surgery typically does not use Cardiopulmonary Bypass. In two separate studies, postoperative neurocognitive function test scores were significantly better in beating heart groups than in conventional groups.

- Beating Heart surgery typically costs less than conventional surgery because Cardiopulmonary Bypass is not used and fewer blood products are needed. A retrospective study by Boyd, et al found a reduction of $1082 (Canadian) per patient in the group that underwent off pump CABG. This cost savings resulted from shorter ICU stay and hospital length of stay. The study also showed a significant reduction in the need for blood products and the reduction of postoperative complications. Ascione, et al reported significantly lower transfusion requirements and costs, significantly lower operative costs, lower material and bed occupancy costs, and lower costs related to managing postoperative complications. A study by Puskas, et al, reported similar results.

- Beating Heart surgery, which avoids, may make it possible for high-risk patients to have bypass surgery. Arom, et al, found that off-pump CAB carries a significantly lower mortality rate in the high risk population than conventional CAB.
Medtronic, Inc., headquartered in Minneapolis, is the world’s leading medical technology company, providing lifelong solutions for people with chronic disease. Its Internet address is www.medtronic.com.

*On occasion a surgeon may convert to use of the heart-lung machine during the procedure if for some reason the patient’s condition becomes unstable unexpectedly.


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