Beating Heart Bypass Surgery

Beating Heart bypass surgery is an approach that allows surgeons to avoid placing the patient on the heart-lung machine.* This alternative to the conventional bypass procedure is instead performed on a beating heart, rather than on a stopped or “arrested” heart.

Medtronic’s recent introduction of the Octopus® System further advances the practice and potential of Beating Heart bypass surgery to offer significant benefits for patients.

How Beating Heart Bypass is Performed

An incision is made in the chest as the heart continues to beat. The use of suction or compression stabilizes a portion of the heart, and the graft is sewn into place as the heart continues to beat. In some instances, the heart may need to be positioned to provide access to coronary arteries. Positioning devices may also be used in this process.

How Surgeons Use Stabilizers to Perform Surgery on a Beating Heart

One of the greatest challenges in Beating Heart bypass surgery is the difficulty of suturing or “sewing” on a beating heart. If the surgeon chooses to operate on a beating heart, a stabilization system is used to steady only the portion of the heart where the surgeon is sewing the bypass graft into place. A stabilization system makes it possible to avoid use of the heart-lung machine by enabling for the surgeon to carefully work on the patient’s heart while it continues to beat.

Potential Patient Benefits of Beating Heart Bypass Surgery

Beating Heart bypass surgery is believed to have the same beneficial results as conventional bypass surgery with the heart-lung machine – restoring adequate blood flow and normal delivery of oxygen and nutrients to the heart. Recent clinical studies suggest that Beating Heart bypass surgery also may also have the following potential benefits:

- **Shorter length of hospital stay:** Patients are often 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

- **Fewer blood transfusion requirements/less blood product usage:** Avoiding the heart lung machine has been shown to reduce the use of blood products.¹²⁻³ Fewer patients require transfusions when undergoing beating heart surgery.

- **Potential avoidance of neurocognitive decline:** A recent study in the New England Journal of Medicine found measurable and persistent neurocognitive decline in patients who had conventional heart bypass surgery.⁴ A number of researchers are studying surgery with the heart-lung machine and its possible negative impact on neurocognitive function (memory loss, decline in thinking skills). Beating Heart surgery may reduce neurocognitive decline because the surgery
does not use the heart-lung machine. In two separate studies, postoperative neurocognitive function test scores were significantly better in beating heart groups than in conventional groups.5,6

• Less cost: Beating Heart surgery typically costs less than conventional surgery because the heart-lung machine is not used and fewer blood products are needed. A retrospective study by Boyd, et al found a reduction of $1,082 (Canadian) per patient in the group that underwent off pump CABG.2 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.7 A study by Puskas, et al, reported similar results.5

• Available to more patients: Some patients are poor candidates for traditional bypass surgery techniques due to preexisting medical conditions, or the fact that they are very ill. The medical literature refers to these patients as “high risk.” Beating Heart surgery, which avoids the heart-lung machine, 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.8

*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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