

**Beating Heart Surgery**  
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Beating Heart Coronary Artery Bypass Surgery is a relatively new procedure in which the open heart surgery is performed while the heart is still beating. This procedure may be an effective alternative for some patients with Coronary Artery Disease.

Coronary Artery Disease describes the condition in which the coronary arteries become blocked due to a buildup of cholesterol fats referred to as atherosclerotic plaque. Plaque deposits can make arteries stiff and irregular resulting in hardening and in some cases complete blockages.

Coronary artery disease can appear as a single blockage or multiple blockages and can vary in location. Blockages prevent certain areas of heart tissue from receiving oxygen and other nutrients which may cause tissue damage, and heart attacks.

Coronary Artery Bypass Grafting is a surgical procedure that restores blood flow to the portion of the heart beyond the blockage, it reroutes the blood around the blockage to restore blood flow to the portion of the heart receiving insufficient blood flow.

Grafts are created using portions of another artery or vein from the patient's body, usually from a vein or artery in the leg or arm. The grafts are connected to the diseased artery beyond the blockage to reestablish blood flow.

In traditional Coronary Bypass Surgery, the patient's heart is stopped and the body is placed on a heart-lung machine. This machine oxygenates the blood and removes carbon dioxide, and provided blood circulation during surgery.

The traditional surgery has been used since the 1950's, but the use of the heart lung machine can include additional post surgery complications such as: stroke, pneumonia, heart arrhythmia, and cognitive dysfunction.

Two companies have developed devices that allow coronary bypass surgery to be performed while the heart is still beating, eliminating the need for the heart-lung machine. Basically, these devices stabilize the specific area where the bypass surgery is being performed. In conjunction with the stabilization system they have also developed devices which allow the surgeon to position the heart to gain access to all areas of the heart.

Although the surgical procedure for beating heart bypass surgery is more complicated than the traditional method, there are many benefits. These benefits include shorter hospital stays, fewer pulmonary complications, less blood loss (and the need for transfusions), and overall reduced mortality from surgery.

**Sources:**

www.  
[medtronic.com/cardsurgery/therapy/beatingheart.html](http://medtronic.com/cardsurgery/therapy/beatingheart.html)  
[www.guidant.com/products/axis\\_offpump.html](http://www.guidant.com/products/axis_offpump.html)  
[www.medtronic.com/cardsurgery/octo\\_cases.html](http://www.medtronic.com/cardsurgery/octo_cases.html)  
[heart.vchospitals.edu/services/coronary-artery-disease/](http://heart.vchospitals.edu/services/coronary-artery-disease/)  
[www.ctsnet.org/innovation/beatingheart/](http://www.ctsnet.org/innovation/beatingheart/)  
[www.guidant.com/education/inthad/surgery.html](http://www.guidant.com/education/inthad/surgery.html)