



Robotic Hybrid Coronary Revascularization



Stanford
HEALTH CARE

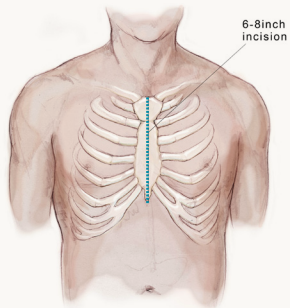
Important benefits before, during, and after surgery



If you have coronary artery disease (CAD), your doctor may discuss several treatment options with you. These options may include surgery. One advanced surgical option is called “robotic hybrid coronary revascularization.”

What are the benefits of robotic hybrid coronary revascularization?

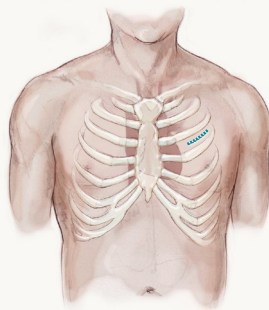
- **Less pain**
 - Smaller incisions than surgeries that access the heart through the breastbone
- **Lower risk of complications**
 - Less risk of bleeding
 - Less risk of infection
 - Potentially less risk of atrial fibrillation, an irregular, often rapid, heart rate that can be triggered by heart surgery
 - Reduced need for blood transfusions
 - Lower risk of stroke because the heart-lung machine isn't generally needed
- **Faster return to daily activities**
 - Less time in the intensive care unit
 - Less time in the hospital
 - Fewer restrictions on driving and lifting
- **Better appearance**
 - Smaller incisions leave less visible scarring



Traditional approach

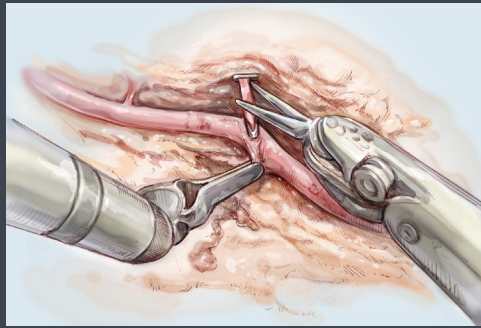


Actual patient post-op incision



Minimally invasive approach

Hybrid coronary revascularization combines two well-known and effective minimally invasive methods to restore blood flow to the heart.



Robotic arms harvesting the LIMA

Coronary artery bypass grafting (or CABG, pronounced “cabbage”) is the most commonly performed heart surgery. In this procedure, a cardiac surgeon creates a detour around a narrowed coronary artery using another artery or vein. The most effective bypass technique uses the left interior mammary artery (LIMA) to bypass a blockage in the left anterior descending (LAD) artery. Patients receiving this graft are known to live longer.

To reduce risk and recovery times, surgeons have developed minimally invasive methods of performing CABG surgeries. The most beneficial portion of traditional bypass surgery, the LIMA-to-LAD graft, can be performed using a minimally invasive technique. In this procedure, the cardiac surgeon makes small incisions on the patient’s left side instead of a large opening on the front of the chest. Minimally invasive CABG surgery reduces patients’ recovery times and leaves less noticeable scars.

The minimally invasive surgery is best suited to the LIMA-to-LAD graft. Many patients have disease in other vessels that also requires treatment.



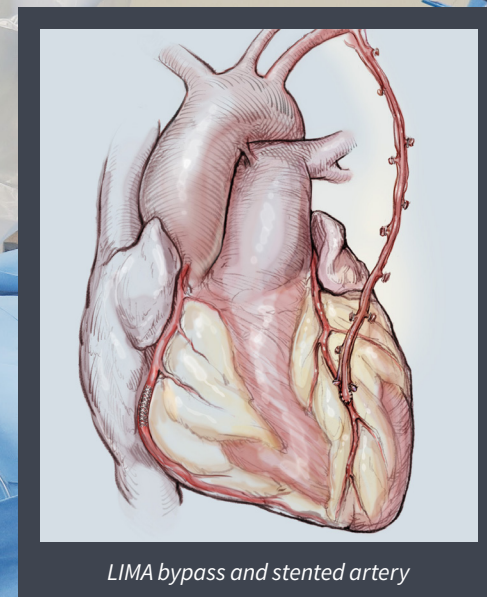
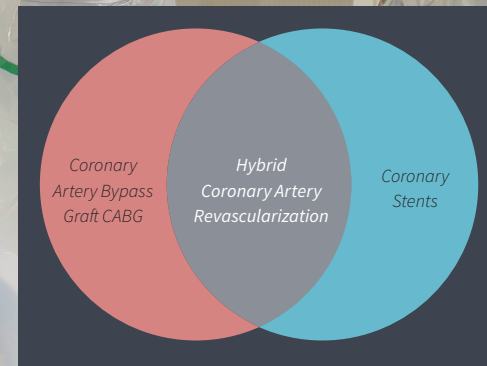
To treat narrowed coronary arteries other than the LAD, doctors can insert a drug-eluting stent in the affected artery to open it up. An interventional cardiologist inserts the stent through blood vessels in the patient's wrist or groin. The procedure is called a percutaneous coronary intervention, or PCI.

PCI is a safe, effective procedure used to treat mild or moderate coronary artery disease. Stents allow blood to flow through the affected artery, and they release medication over time to help prevent the blockage from reforming.

CABG surgery, however, can be more beneficial for patients with certain categories of coronary artery disease. The primary benefit to these patients comes from the LIMA-to-LAD bypass.

At Stanford, we offer hybrid coronary revascularization to provide the benefits of the minimally invasive CABG surgery and treat multiple narrowed arteries while still avoiding a large incision.

A + B = Hybrid Coronary Revascularization



Hybrid coronary revascularization combines these two proven minimally invasive treatments for coronary artery disease. It can eliminate the need for sternotomy while still providing the LIMA-to-LAD bypass in eligible patients.

To perform the CABG (Part A), a surgeon uses a surgical robot to prepare the LIMA and a minimally-invasive incision to complete the bypass by hand. For the PCI (part B), an interventional cardiologist inserts drug eluting stents to treat any other narrowed arteries.

This provides patients with the benefits of the LIMA-to-LAD bypass and allows doctors to treat multiple narrowed arteries while avoiding the sternotomy.

A Minimally Invasive, Robotic-Assisted Surgery Technique

If your doctor says that you're right for this surgery, here's how it works.

The surgeon makes three small incisions on your chest (each less than one-third of an inch across). This eliminates the need to cut the breastbone to gain access to the heart. The surgeon uses an advanced imaging robot to bring down the left interior mammary artery (LIMA) from the chest wall. Harvesting the LIMA using a robot allows for extreme precision. The surgeon then uses direct visualization of the heart to sew the LIMA graft to the front side of the heart along the left anterior descending (LAD) artery. The bypass is performed while the heart is still beating, which is associated with a lower risk of complications.

The stenting portion of the hybrid coronary revascularization is performed by an interventional cardiologist before, during or after the CABG surgery, depending on what's best for the patient. The interventional cardiologist inserts the stent(s) into the coronary arteries through small tubes called catheters that enter through an artery in the patient's wrist or groin.

Whether hybrid revascularization or another treatment is right for your coronary artery disease, Stanford Health Care provides important advantages:

- Advanced beating-heart surgery can improve outcomes. Our specialists perform hybrid coronary revascularization without stopping the heart, a technique that helps preserve heart function, shorten hospital stays, and reduce the risk of stroke.



Robotic arms operator console

- Minimally invasive procedures are our specialty. Whenever appropriate, we perform heart surgery that is minimally invasive—that is, using the smallest cut and the fastest procedure possible.
- Leading-edge technology maximizes precision. We perform surgery using surgical robots. These imaging systems help us precisely guide tiny surgical instruments to the heart through small keyhole-sized incisions between the ribs.

Stanford has earned a global reputation for leadership in coronary artery disease. Our surgeons are world leaders, renowned for excellence in surgical technique, care before and after surgery, and research.

“Patients deserve the highest quality treatment, with the smallest physical impact. I believe patients get the best of both minimally invasive worlds with robotic hybrid surgery. We work closely with our cardiologists so our patients can receive the benefit of a LIMA-to-LAD bypass without a sternotomy, and we can revascularize the other blockages using stents.”

—Jack Boyd, MD

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