**Minimally Invasive, Robot-Assisted Heart Bypass Surgery**

The University of Arizona Department of Surgery at University Medical Center is the only institution in Arizona – and one of only a handful in the nation – to offer minimally invasive, robot-assisted heart bypass surgery with hybrid techniques used to treat the broadest range of patients. The surgeons and cardiac team at the UA Department of Surgery are pioneers in the use of robotics and hybrid technology to perform minimally invasive procedures.
What is coronary artery disease?
Coronary artery disease is a condition in which plaque builds up inside the coronary (heart) arteries and reduces blood flow to the heart muscle. Plaque can also increase the likelihood of blood clots, which can further narrow or block blood flow to the heart. Angina (chest pain) occurs when an artery is narrowed and an area of the heart doesn’t receive enough oxygen-rich blood. The complete blockage of an artery can cause a heart attack.

What is coronary artery bypass graft surgery?
Coronary artery bypass graft (CABG) surgery is a procedure that allows a surgeon to restore blood flow to the heart muscle using a section of artery or vein from another part of the patient’s body. The surgeon “re-routes” blood flow around (bypasses) the narrow or blocked artery. Conventional CABG surgery is considered major heart surgery and performed almost exclusively by cardiothoracic surgeons. It is one of the most effective treatment options for coronary artery disease, the most common form of heart disease.

What is minimally invasive, robot-assisted CABG?
Minimally invasive, robot-assisted CABG is a revolutionary procedure that allows a surgeon to perform a CABG operation through a series of very small incisions (1-2 centimeters in length) between the ribs, and then inserts small robotic arms and a small camera through the incisions. The camera provides the surgeon with a 3-dimensional view of the heart that is magnified 10 times greater than normal vision. Sitting at a computer console, the surgeon’s hands control the robotic arms to perform the surgery. The robotic arms mimic the surgeon’s hand movements, but allow for a greater range of motion and more precision. The surgeon stabilizes the portion of the heart that requires surgery, allowing the heart to continue beating throughout the procedure. The operation begins when the surgeon finds a healthy artery, usually a mammary artery, in the patient’s chest. Using the robotic arms, the surgeon moves one end of the healthy artery to the blocked artery, bypassing the blockage and restoring blood flow to the heart muscle. The surgeon can repeat this process to “bypass” multiple arteries in one procedure.

What is a hybrid procedure?
Many patients present with multivessel disease. A hybrid approach combines robot-assisted CABG and stenting. Essentially, this approach combines the best of these two different procedures and enables less invasive surgery to be used on patients that otherwise would not have been candidates.

How is robot-assisted CABG different from conventional CABG surgery?
Conventional CABG surgery requires the surgeon to operate from a long incision down the front of the chest through the breastbone or sternum. This incision, called a median sternotomy, allows the surgeon to see the heart and aorta. During conventional CABG surgery, the patient must be connected to a heart-lung machine while the bypasses are performed and the heart is stopped. When the bypass is complete, the patient is taken off the machine and his or her own heart takes over once again.
What are the benefits of robot-assisted CABG?

Although safe and effective, conventional CABG is an invasive surgical procedure that requires a longer recovery period and carries the risk of additional side effects and complications, such as blood loss, infection, kidney failure and stroke. Robot-assisted CABG offers many benefits compared to traditional CABG, including:

- Shorter hospital stay (3.5 days vs. 6 days)
- Faster recovery time (3 weeks vs. 2 months)
- Quicker return to normal activities
- Smaller incisions and scars
- Fewer side-effects and complications
- Less blood loss
- Fewer transfusions
- Less pain
- Less risk of infection

What can patients expect before surgery?

Before surgery, you will be scheduled to undergo testing, including a medical history evaluation and physical examination by a nurse practitioner or physician’s assistant, followed by an electrocardiogram, blood work, urinalysis and chest x-ray. At this appointment, you will receive information regarding medications, what to eat or drink prior to surgery, and where and when to report the morning of surgery. You and your family also will be given a brief tour of the hospital areas where you will recover after surgery. If you have recently been hospitalized at University Medical Center, much of this evaluation may have already been completed. If you are traveling from out-of-state, some of these tests may be done locally prior to your departure. The results can be sent to University Medical Center, or brought with you on the day of your testing.

What can patients expect after surgery?

Recovery in the hospital

After surgery, you will be transferred to the surgical intensive care unit (ICU) where you will be awakening from anesthesia. Your post-operative recovery will be monitored through blood tests, chest x-rays and electrocardiograms. You will get out of bed early as part of your recovery. The nurses will give you pain medications as needed and, in some cases, you will have a pain pump that you can use if necessary for pain control. If you undergo a minimally invasive surgery, you may anticipate discharge 2 to 3 days after surgery. Discharge planning is on a case-by-case basis, and there may be circumstances that prolong your hospitalization.

Recovery at home

The doctors, nurses and staff at University Medical Center make every effort to ensure a smooth transition home. Intensive education and support prepare you for discharge, and resources are available for you when you are at home, including 24-hour telephone assistance. Topics to be covered at discharge include:

- Care of your surgical incisions
- Daily taking of your temperature and weight
- Reporting of shortness of breath or swelling in your legs

At discharge, you will be scheduled for a post-operative follow-up appointment with your surgeon within 2 to 4 weeks. Further instructions regarding returning to work, activities and driving will be reviewed at that post-operative visit. You should also schedule a follow-up appointment with your primary care physician and cardiologist, who will resume your care after your visit with your surgeon.

Ongoing Care

Post-surgical care may include periodic checkups with doctors, during which tests may be done to see how the heart is working. These may include EKG, stress testing and echocardiogram.
Our Team

Robert S. Poston, MD, is professor of surgery and chief of the Division of Cardiovascular and Thoracic Surgery at the University of Arizona Department of Surgery. Dr. Poston has pioneered the use of robotics in minimally invasive surgery to treat the most complex forms of coronary artery disease. Under Dr. Poston’s leadership, University Medical Center is the only hospital in Arizona – and one of only a handful in the nation – to offer this cutting edge procedure using the da Vinci® robotic surgical equipment.

Molly A. Szerlip, MD, is assistant professor of medicine in the Division of Cardiology at the UA College of Medicine. Dr. Szerlip is an interventional cardiologist specializing in complex coronary intervention, structural heart disease intervention and peripheral intervention. She is partnering with Dr. Poston to lead the way in combining innovative interventional techniques with state-of-the-art surgical techniques to form a patient-friendly, combined hybrid approach to some forms of cardiac disease.

Karl B. Kern, MD, is professor of medicine and chief of the Division of Cardiology at the UA College of Medicine. Dr. Kern is also the director of the cardiac catheterization laboratories at UMC and the interventional cardiology fellowship at the UA College of Medicine. He has been with UMC and the UA for more than 25 years and continues to play an integral role in overseeing the collaborative efforts between the Divisions of Cardiology and Cardiovascular and Thoracic Surgery.

To learn more about state-of-the-art robot-assisted bypass surgery at the University of Arizona Department of Surgery, including our team of expert clinicians, please call our Division of Cardiothoracic Surgery at (520) 626-6339 or visit our website at www.surgery.arizona.edu.