



Myocardial Bridge Unroofing



Stanford
HEALTH CARE

A myocardial bridge is a heart condition involving a segment of coronary artery trapped by a band of muscle (myocardium). Your coronary arteries carry blood to your heart muscle. These arteries typically lie on the surface of the heart muscle.

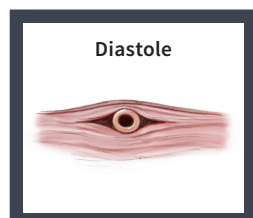
In this condition, when the heart beats and contracts, a muscle overlying the coronary artery also contracts. The contracting myocardial bridge can limit the flow of blood to the artery, causing chest pain.



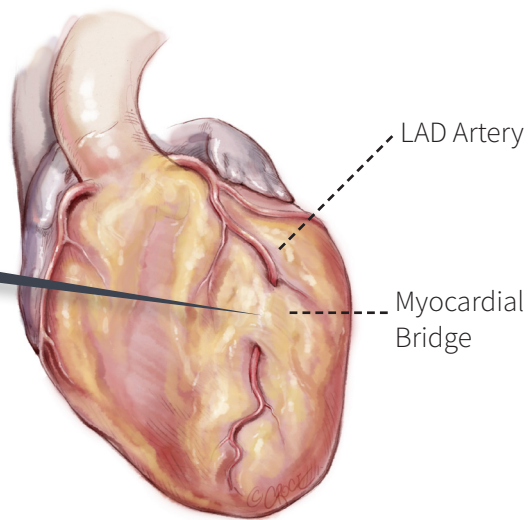
What causes chest pain

Approximately 1 in 5 people have a myocardial bridge. Many people do not have any symptoms when they have a myocardial bridge. A small subset, however, can have a wide range of symptoms including debilitating chest pain. The chest pain can be mild, and last only seconds, or severe and last several minutes.

Myocardial bridge during diastole/relaxation

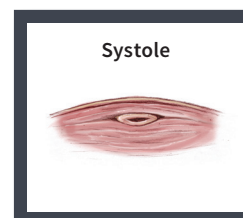


Cross section view of the LAD in diastole

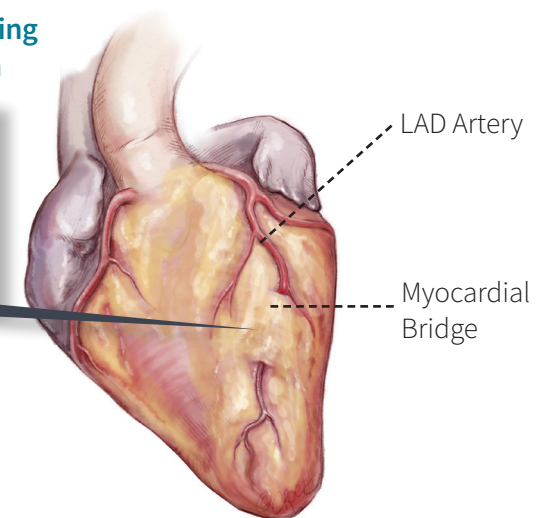


Myocardial bridge on the left anterior descending (LAD) artery. When the heart is in diastole/relaxation, it allows blood to flow freely through the LAD.

Myocardial bridge during systole/contraction

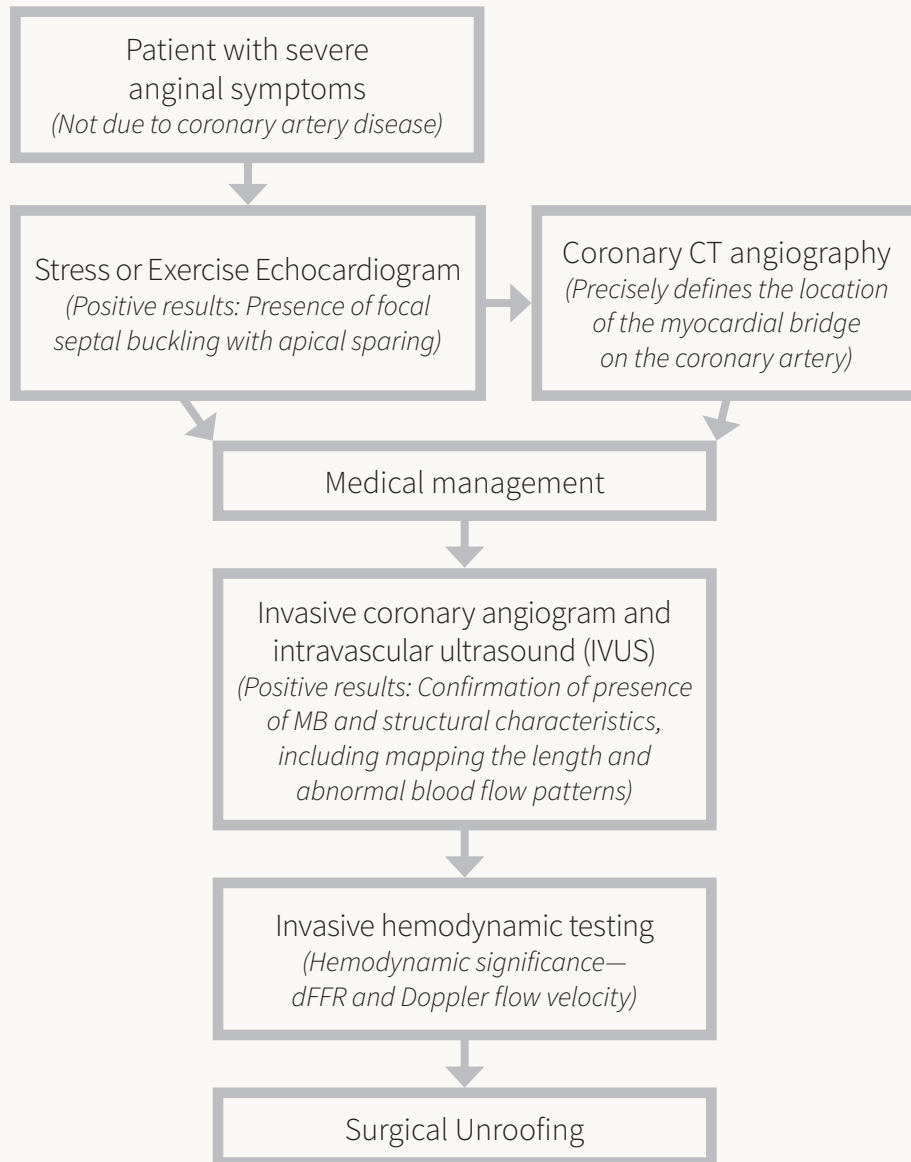


Cross section view of the LAD in systole



When the heart is in systole/contraction, the myocardial bridge overlying the LAD also contracts, trapping the artery by limiting blood flow and causing chest pain.

Evaluation for diagnosing and treating a myocardial bridge



Schematic representation of the detailed evaluation performed for diagnosing a hemodynamically significant myocardial bridge suitable for surgical unroofing. (CT = computed tomography; dFFR = diastolic fractional flow reserve; IVUS = intravascular ultrasonography.)

Evaluation of who needs myocardial unroofing?

Some people aren't helped by standard medicine for angina—including medications like beta blockers, calcium channel blockers, statins, and aspirin. The first step in treatment options include long term medical management and use, under the care of your cardiologist.

One advanced option is “surgical myocardial bridge unroofing.” Doctors perform tests to identify if the myocardial bridge is affecting blood flow. The tests include stress echocardiograms, ultrasounds and angiograms.

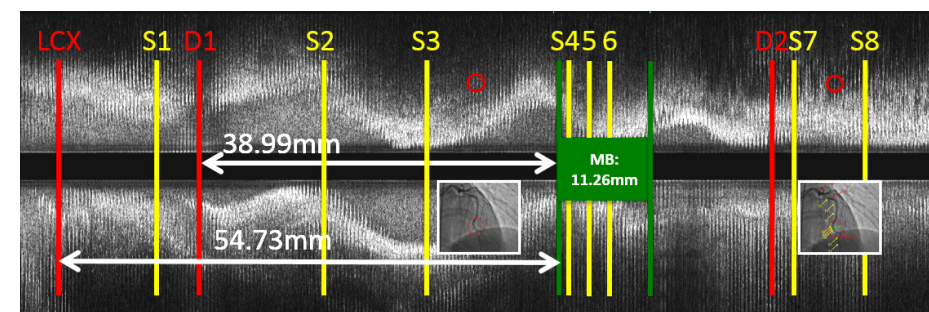
Treating the problem directly

Previously, patients whose angina didn't respond to medicine had few options. Many people with a myocardial bridge have lived with chest pain for many years by the time Stanford doctors see them.

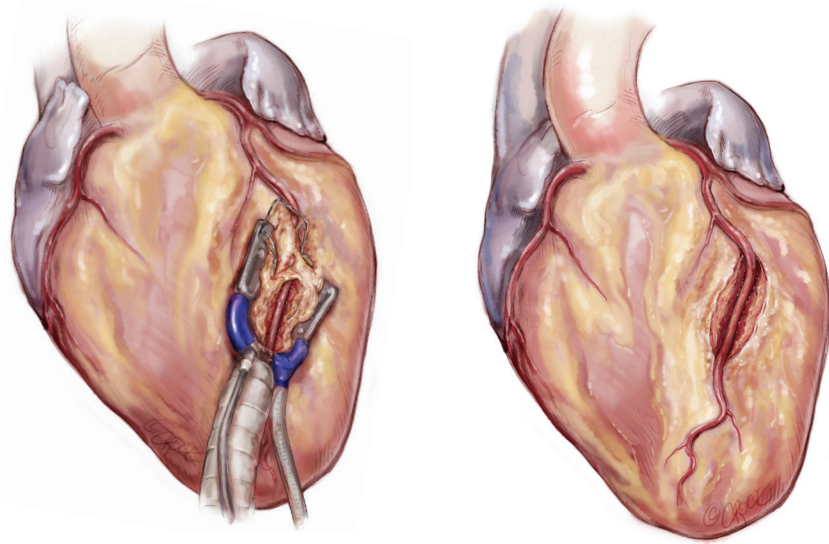
Some other treatments that have been unsuccessfully tried for treatment of bridges include percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) surgery. These procedures are not designed to treat structural abnormalities in the heart like myocardial bridges.

Studies have shown that these other procedures fail to provide lasting relief for people with myocardial bridges. The squeezing of the muscle in the bridge damages the stents used in PCI over time, and bypass grafts tend to close, due to competitive flow.

Surgical myocardial bridge unroofing is safe and effective. Stanford doctors use new imaging techniques to map the muscle bridge very precisely before surgery is considered.



Circle is location of the myocardial bridge. These are intravascular angiogram and ultrasound images used to map the length and blood flow patterns of the bridge before surgery.



Left: Surgery to release the coronary artery from the myocardial bridge.
Right: Free-flowing coronary artery after myocardial bridge procedure.

Surgical Treatment Options:

At Stanford, doctors can offer multiple options if you have chest pain from a myocardial bridge. When medical therapy is ineffective, a surgical procedure called a myocardial bridge unroofing can be considered.

During this procedure, the surgeon divides the band of the muscle that covers the artery.

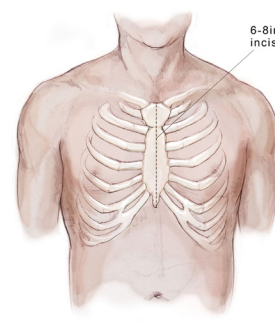
Pre-Operative:

- The imaging studies previously completed for diagnosis are used as a detailed road map for your surgical plan and approach.
- Nerve blocks can be placed to reduce pain after surgery.

Intra-Operative:

- Surgical approach options will be discussed with you and your surgeon. The type of incision for this surgery depends on the length and location of the myocardial bridge. It also depends on the patient's body type and preferences.
 - A “minimally invasive” approach, also called a “mini-thoracotomy,” uses a smaller incision in your chest. This incision is roughly 3–4 inches, on the left front side of the chest, between the ribs.
 - A “median sternotomy” approach, uses an incision through the breastbone to reach the heart.
- Stanford doctors perform the surgery “off-pump,” or without the heart-lung machine. The surgery is done on a beating heart. A stabilizer allows the surgeons to work on the bridge safely.
- Bridge muscle is divided in 1–2 millimeter increments.
- Surgery takes approximately 2 hours.

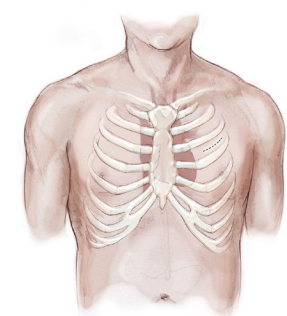
“Numerous myocardial bridge patients, before they found care at Stanford, feel tired and hopeless from their search. Many of these patients have sought care all over the country, in an effort to find relief from their pain. It is deeply rewarding to have the opportunity to finally offer these patients the care and relief from pain that they have been seeking.”—Jack Boyd, MD



Traditional approach



An actual post-op patient from a minimally invasive approach



Minimally invasive approach



Stanford Hospital named one of the top hospitals in the nation

Stanford Hospital Named to *U.S. News & World Report's* 2017-18 Honor Roll—one of only 20 hospitals in the nation to earn top honors for exceptional performance in specialized, complex patient care.

Glossary

Angina: Chest pain that occurs when the heart doesn't get enough blood

Coronary arteries: Arteries that carry blood to the heart

CT angiography or angiogram: An imaging test that looks at the arteries supplying blood to your heart, often done to diagnose chest pain

Diastole and systole: Two parts of a heartbeat

Diastole is the relaxation period when your heart muscle is relaxed.

Systole is the contraction period when heart muscle tightens.

Echocardiogram: A test that uses sound waves to produce images of your heart beating and pumping blood

Invasive hemodynamic test:

A test that measures the movement of blood and its pressure in the veins, arteries, and chambers of the heart

Intravascular ultrasound: A test that uses sound waves to see inside blood vessels, often used to evaluate coronary arteries that supply blood to the heart

LAD artery: left anterior descending artery, a major artery bringing blood to the heart

Median sternotomy: Surgery that makes an incision in the breastbone to reach your heart

Minimally invasive surgery: Surgery that makes a small incision

Mini-thoracotomy: Surgery that makes a small incision in your chest

Myocardium: Heart muscle

Myocardial bridge: A band of heart muscle that lies on top of a coronary artery, instead of underneath it

Off-pump surgery: Done without a heart-lung machine, while the heart is beating

Unroofing: Surgery that splits the myocardial bridge so it no longer presses on (and squeezes) a coronary artery



Stanford | MEDICINE

Stanford Health Care

300 Pasteur Drive
Stanford, CA 94305
tel: 650.724.7500

MD Helpline

866.742.4811

stanfordhealthcare.org/heartsurgery

Risks and Complications

All procedures carry risks. Your doctor will carefully review the potential risks and complications with you as you consider the procedure.