

# Study shows that a type of surgery improves the quality of life for patients with myocardial bridging

October 17 2016, by Tracie White

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Credit: AI-generated image ([disclaimer](#))

In 2010, Ingela Schnittger, MD, a cardiologist at the Stanford University School of Medicine, sat in her lab examining the echocardiogram of a young man who came to the heart clinic at Stanford Health Care complaining of chest pain. She spotted a curious motion of the heart on

the computer screen, one that she'd seen before while examining these kinds of diagnostic heart tests.

"All of the sudden I had this flashback," she said. She remembered a young physics professor at another institution who had suddenly dropped dead of a heart attack while running on a treadmill. During an autopsy, a little-known heart anomaly called a myocardial bridge was found. The term describes a condition in which a major artery runs through the muscle of the heart rather than resting on top of the organ.

"I was thinking, 'Wow, I wonder if this patient could have a myocardial bridge?'" she said. Six years later, Schnittger, professor of [cardiovascular medicine](#), has been a co-author of four research studies on myocardial bridges. A fifth, published online Oct. 13 in the *Annals of Thoracic Surgery*, finds that a procedure called surgical unroofing is safe and provides significant relief for patients with myocardial bridges who have incapacitating symptoms, such as [chest pain](#), arrhythmias and fatigue, that are not helped by medication alone.

Schnittger is senior author of the study, and the lead author is Jack Boyd, MD, clinical assistant professor of cardiothoracic surgery.

## Long considered benign

Myocardial bridging remains a mystery to much of the medical community. It's a congenital anomaly that was discovered during autopsies almost 300 years ago, but it has long been considered benign, the study said.

Bridging continues to be little understood and is often misdiagnosed, Boyd said.

"It's not taught in medical school, and there is no agreed-upon

treatment," he said.

That lack of understanding about the condition is what sent Schnittger along her path of investigation. She wanted to know more: Could bridging be dangerous? Did it cause symptoms? How should it be treated?

In 2011, Schnittger designed a study at Stanford to enroll patients with undiagnosed chest pain and examine them in the catheterization laboratory using diagnostic-imaging techniques, such as angiograms, to visualize the arteries of the heart and its chambers.

"Sometimes we saw myocardial bridging on the angiogram," she said. "Then we'd use an intravascular ultrasound to see them more clearly."

Since then, 150 participants in this ongoing study have been diagnosed with myocardial bridges. Research has involved measuring blood flow and blood pressure in the bridging vessel. Schnittger and her colleagues were able to show that compression of the heart muscle can reduce or cut off blood flow in the artery, resulting in serious problems, including angina, myocardial ischemia, acute coronary syndrome, left ventricular dysfunction and malignant ventricular arrhythmias.

## **For some, symptoms are severe**

"It hadn't before been proven with blood-flow studies that circulation got impaired enough to cause ischemia, inadequate [blood flow](#) and oxygen to the heart muscle," Schnittger said.

Most patients with the condition remain asymptomatic. Some have minor symptoms that can be controlled with medication, such as beta blockers and calcium-channel blockers. But a small portion have severe symptoms that greatly affect their daily lives. Some are left homebound.

Many make repeated trips to emergency rooms complaining of heart-attacklike symptoms, only to get sent home with no answers.

"Many of these patients have these heartbreaking stories to tell," Schnittger said. "They can't hold a job, they can't travel, they can't take care of their families. Most cardiologists are completely at a loss. They know myocardial bridges exist, but they have been taught they are benign and never cause problems.

"When these patients go to the ER, and they go there a lot, all the cardiology tests come back normal. They're told, 'Here's a little Valium. I think you're anxious.' They get belittled, not taken seriously, and they get really depressed."

## Unroofing

Unroofing the myocardial bridge entails cutting through the heart muscle to uncover the tunneled artery, thus relieving compression on the artery caused by the bridging.

The surgery is known to be effective, Boyd said. However, concerns that healthy heart muscle could be damaged during the operation have slowed its adoption. "At Stanford, we use new imaging techniques to map the bridge muscle very precisely, and we perform the unroofing with conservative surgical techniques to safeguard the healthy [heart muscle](#)," he said.

In the past, the surgery was done only as a treatment of last resort, Schnittger said. "You took a patient very, very occasionally to surgery when everybody had tossed their hands up," she said. "Stanford probably did no more than one surgery a decade in the past."

But with Schnittger and her team, including study co-author Jennifer

Tremmel, MD, assistant professor of cardiovascular medicine, and Ian Rogers, MD, clinical assistant professor of cardiovascular medicine and of pediatric cardiology, helping to guide the surgeries, the number performed at Stanford Medicine has increased substantially. More than 80 have been performed at SHC and Lucile Packard Children's Hospital Stanford in the past five years.

For the new study, the researchers examined 50 adult patients who between 2011-15 underwent the unroofing procedure because of severe symptoms that medication had failed to manage. The first 35 were performed using a heart-lung machine for life support. The last 15 were performed off-pump on a beating heart.

## **Studying the condition in the lab**

"We studied the patients' hearts comprehensively in the lab, proving there was ischemia when we simulated a stress test by infusing drugs that increased the heart rate," Schnittger said. "Anxiety, sleep deprivation—anything that drives up the heart rate would also cause ischemia."

Prior to surgery, study participants filled out the Seattle angina questionnaire, a three-page survey describing their symptoms and ranking their quality of life. Then six months after the surgery, they filled out the survey again.

This is a comprehensive survey often used in cardiac research to ask how much pain the patient has, how frequently they have it, how much it limits their life.

Results showed that the average ranking of quality of life prior to surgery by the patients was 25 percent. After surgery, that figure jumped to 78 percent.

"Our patients come back after surgery so grateful," Schnittger said. "They have suffered for so long—finally they've found doctors who understand them.

"One patient, a mother of five, was so symptomatic before surgery she had arranged her whole life around her symptoms. She didn't play with her children outside; she couldn't even pick them up at the playground. She was basically housebound. She couldn't do laundry or go grocery shopping. After surgery, she could do all those things—laundry, play outside with her children, go for a walk. It's a life-changer.

"Our team wants to spread the word, to educate the medical community that this is a real thing," she added, noting that a myocardial bridge clinic has been established at Stanford Medicine.

**More information:** Jack H. Boyd et al. Surgical Unroofing of Hemodynamically Significant Left Anterior Descending Myocardial Bridges, *The Annals of Thoracic Surgery* (2016). [DOI: 10.1016/j.athoracsur.2016.08.035](https://doi.org/10.1016/j.athoracsur.2016.08.035)

Provided by Stanford University Medical Center

Citation: Study shows that a type of surgery improves the quality of life for patients with myocardial bridging (2016, October 17) retrieved 20 March 2024 from <https://medicalxpress.com/news/2016-10-surgery-quality-life-patients-myocardial.html>

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