

# Transcatheter Mitral Valve Repair — MitraClip

By Kamran I. Muhammad, MD FACC FSCAI

**M**itral regurgitation occurs due to the failure of one of the main valves of the heart to fully close. This results in the backwards flow of blood and can cause disabling symptoms of congestive heart failure, heart muscle dysfunction and an increased risk of death (Figure 1). Patients with significant mitral regurgi-

tation can suffer from severe symptoms including shortness of breath, fatigue, lightheadedness, cough, swollen legs and ankles and palpitations. Untreated mitral regurgitation can result in cardiac dysfunction, including enlargement and weakness of the heart muscle, causing decreased function and efficiency of this vital organ. Mitral

regurgitation is one of the most common valvular disorders in the United States, with 6% of people over 65 years of age, and almost 10% of people over 75 years of age being affected by significant mitral regurgitation.

The traditional therapy for severe, symptomatic mitral regurgitation has been open heart

Oklahoma Heart Institute physicians (right to left) Dr. Kamran Muhammad, Dr. Wayne Leimbach Jr. (interventional cardiology), and Dr. Paul Kempe (cardiovascular thoracic surgery) performing the first MitraClip procedure in Tulsa on November 18, 2014.



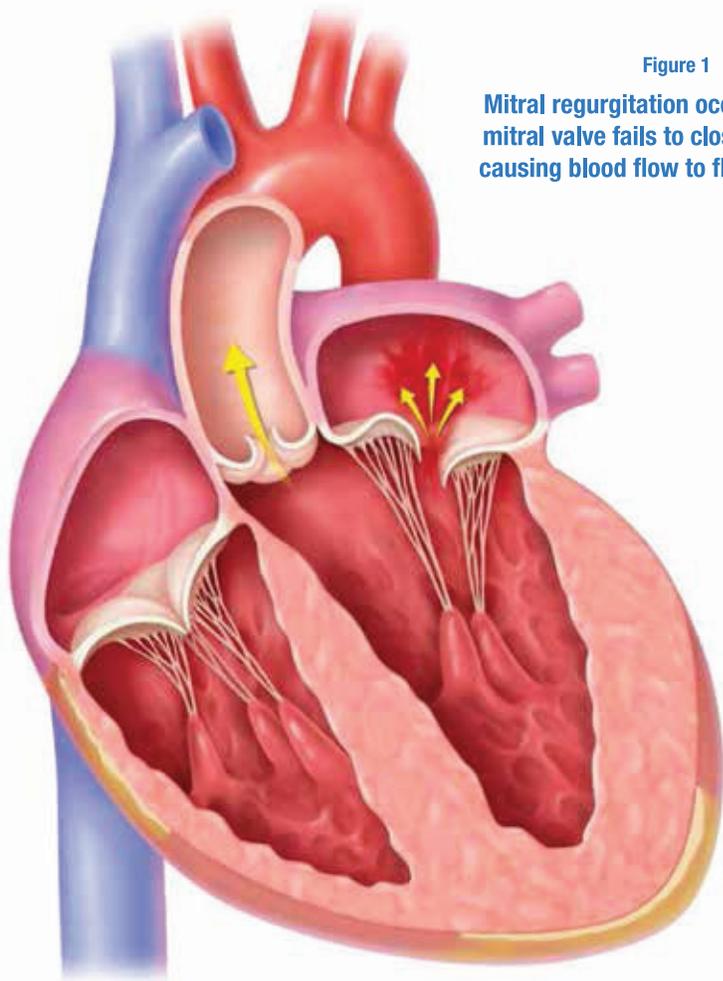


Figure 1

**Mitral regurgitation occurs when the mitral valve fails to close completely, causing blood flow to flow backward.**

surgery for mitral valve repair or replacement. Although this type of surgery is generally very effective for reducing mitral regurgitation severity, alleviating symptoms, and improving the function of the heart muscle, it is a highly invasive therapy requiring median sternotomy (cutting through the breast-bone) and cardiopulmonary bypass (use of the heart-lung machine) while the heart is stopped. Because of the highly invasive nature of this surgery, many patients with severe symptomatic mitral regurgitation are often considered too high-risk for mitral valve surgery and therefore go untreated. Indeed, studies have shown that as few as 2% of patients with severe, symptomatic mitral regurgitation undergo surgery for this condition. As a result of this significant under-treatment, many patients are left to suffer significant negative effects.

Up until recently, the only alternative to mitral valve surgery for high-risk patients with severe symptomatic mitral regurgitation was medical therapy. While medical therapy can be effective in relieving some of the symptoms of this condition, it is generally not a definitive therapy, and symptoms can recur and progress as the function and efficiency of the heart muscle deteriorates. Ironically, as these patients become sicker with progressive heart muscle dysfunction, they become even poorer candidates for mitral valve surgery.

As is apparent, there was a great need for a non-surgical and minimally-invasive alternative to open-heart surgery for high-risk patients with significant mitral regurgitation. This type of therapy would provide the benefits associated with mitral valve surgery without the stress and risks of surgery. To meet this need, transcatheter mitral valve repair with the MitraClip system was developed.

Transcatheter mitral valve repair with the MitraClip device allows for repair of the leaky mitral valve using one or more small clip-like devices placed on the valve percutaneously via femoral venous access (through the vein in the leg without surgery), similar in concept to a cardiac catheterization procedure (Figure 2). The MitraClip mitral valve repair procedure is performed on a beating heart, and there is no need for cardiopulmonary bypass (heart-lung machine). This revolutionary procedure simulates an edge-to-edge surgical repair of the leaky mitral valve without the need for any surgery (Figure 2).

Studies of transcatheter mitral valve repair with the MitraClip system over the past decade have demonstrated that it is effective in reducing the

*Continued on p. 22*

**Figure 2**  
**The MitraClip transcatheter mitral valve repair system allows for edge-to-edge mitral valve repair through a percutaneous non-surgical approach from the femoral vein.**



Continued from p. 21

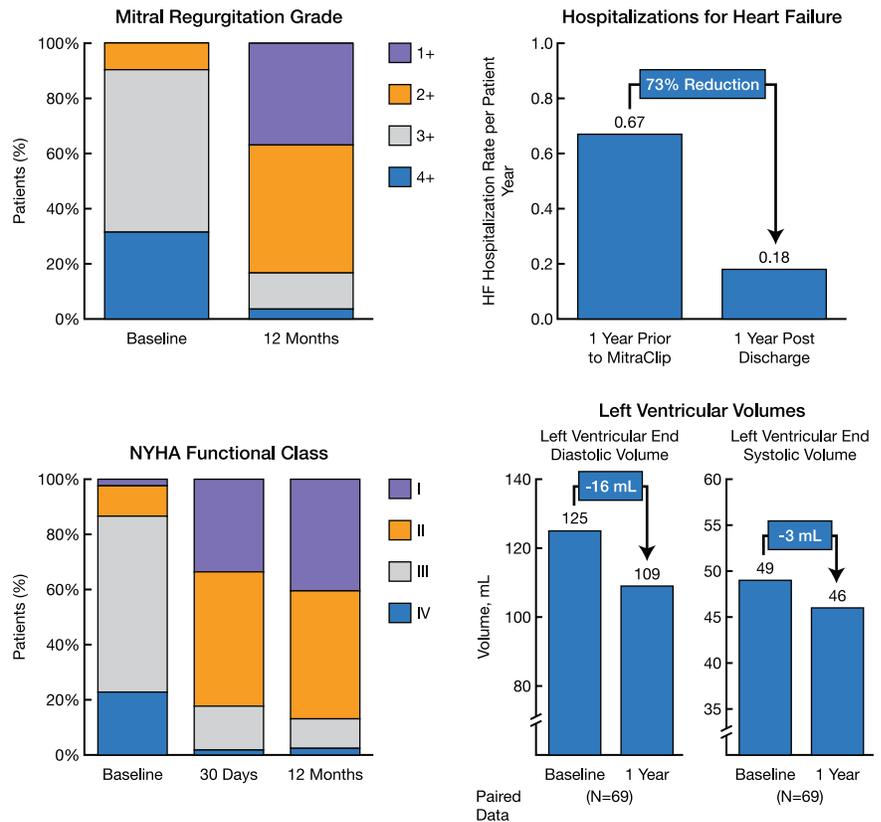
degree of mitral regurgitation (Figure 3). Additionally, patients treated with MitraClip have improvement in congestive heart failure symptoms, improvement in quality of life, reduced rates of hospitalization for heart failure and improvement in heart muscle function (Figure 3). The safety of the MitraClip procedure was also demonstrated in these studies. Because of the minimally-invasive nature of the MitraClip procedure, patients generally have a very quick recovery and typically have a hospital stay of less than 3 days. Compared with surgery, there is less pain, a shorter hospital stay and a quicker overall return to normal life and activities.

The first successful MitraClip transcatheter mitral valve repair procedure was performed in 2003 in Caracas, Venezuela. Since then, more than 20,000 patients have successfully been treated worldwide. The MitraClip device was approved by the United States Food and Drug Administration for commercial use to treat high-risk, severe, symptomatic, degenerative mitral regurgitation in October of 2013. Currently, only 100 centers in the U.S. offer this first-in-class technology, and Oklahoma Heart Institute is proud to be part of this select group of elite medical centers.

In keeping with its role as the premier cardiovascular institution in the region, Oklahoma Heart Institute is currently the only facility offering the commercial MitraClip procedure in Oklahoma. Oklahoma Heart Institute was also the first facility to perform the MitraClip procedure in Tulsa, in November of 2014 (Figure 4). The first patient's procedure was highly successful, and he was subsequently featured in a TV news story (<http://www.fox23.com/news/news/local/new-life-saving-procedure-being-offered-tulsa/njT7rt/>). Our facility offers a comprehensive and multi-disciplinary program for therapy of all valvular heart diseases, including mitral regurgitation. By offering the MitraClip procedure, we add an important technology to our comprehensive valve and structural heart disease program, so that we may continue to provide cutting-edge, world-class care to our patients. ❤️

*Dr. Muhammad is a subspecialist in interventional cardiology. In addition to expertise in traditional areas of interventional cardiology, such as coronary intervention (angioplasty, stent placement, atherectomy, intravascular imaging) and peripheral vascular and carotid artery intervention, Dr. Muhammad has a special interest and expertise in interventional therapies for structural and valvular heart disease including the percutaneous non-surgical replacement and repair of heart valves — TAVR and MitraClip. As such, he currently serves as the Director of the Structural Heart Disease Program at OHI.*

**Figure 3**  
Decrease in mitral regurgitation grade, reduced hospitalizations for heart failure, improved symptoms and improved heart muscle function after MitraClip.



**Figure 4**

Oklahoma Heart Institute Team that performed the first MitraClip procedure in Tulsa on November 18, 2014.

