MEDICAL POLICY – 2.02.30
Transcatheter Mitral Valve Repair

BCBSA Ref. Policy: 2.02.30
Effective Date: Aug. 1, 2022
Last Revised: July 11, 2022
Replaces: N/A

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Introduction

The heart has four chambers, two upper and two lower. The mitral valve is between the upper and lower left chambers. After blood has been pumped from the upper left chamber to the lower left chamber, the mitral valve closes. The mitral valve is made up of small pieces of tissue called leaflets. If the leaflets don’t close properly when the left lower chamber pumps blood out to the body some of the blood can leak back into the upper left chamber. This is known as mitral valve regurgitation. Medication can be used to help manage the symptoms of mitral valve regurgitation. Open heart surgery is a treatment option. If a person is too sick for surgery, a nonsurgical procedure may be used to place a clip to close the leaky mitral valve. In this procedure, a long, hollow tube (a catheter) is threaded through a specific vein into the heart. The catheter then becomes the pathway for getting the clip to the mitral valve. Imaging is used to make sure the device is correctly placed. This policy describes when transcatheter mitral valve repair is considered medically necessary.

Note: The Introduction section is for your general knowledge and is not to be taken as policy coverage criteria. The rest of the policy uses specific words and concepts familiar to medical professionals. It is intended for providers. A provider can be a person, such as a doctor, nurse, psychologist, or dentist. A provider also can be a place where medical care is given, like a hospital, clinic, or lab. This policy informs them about when a service may be covered.
### Policy Coverage Criteria

<table>
<thead>
<tr>
<th>Service</th>
<th>Medical Necessity</th>
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</thead>
</table>
| **Transcatheter mitral valve repair (i.e., MitraClip® Clip Delivery System)** | **Transcatheter mitral valve repair using a device approved by the U.S. Food and Drug Administration for use in mitral valve repair may be considered medically necessary for patients with symptomatic, primary mitral regurgitation who are considered at prohibitive risk for open surgery.**  

**Prohibitive risk for open mitral valve repair surgery may be determined based on:**  
- The documented presence of a Society for Thoracic Surgeons predicted mortality risk of 12% or greater  
  **AND/OR**  
- The documented presence of a logistic EuroSCORE of 20% or greater  

**Transcatheter mitral valve repair with a device approved by the U.S. Food and Drug Administration may be considered medically necessary for patients with heart failure and moderate-to-severe or severe* symptomatic secondary mitral regurgitation despite the use of maximally tolerated guideline-directed medical therapy**.**  

**Note:**  
* Moderate to severe or severe MR may be determined by:  
  - Grade 3+ (moderate) or 4+ (severe) MR confirmed by echocardiography  
  - New York Heart Association (NYHA) functional class II, III, or IVa (ambulatory) despite the use of stable maximal doses of guideline-directed medical therapy and cardiac resynchronization therapy (if appropriate) administered in accordance with guidelines of professional societies.  

**Note:** **Optimal guideline directed medical therapy (see Appendix)**

**Transcatheter mitral valve repair is considered investigational in all other situations.**
Documentation Requirements

The patient’s medical records submitted for review for all conditions should document that medical necessity criteria are met. The record should include the following:

- Name of the Food and Drug Administration (FDA) approved device to be used
- Documentation that patient has symptomatic primary mitral regurgitation

AND

- Patient is at greater risk for open mitral valve repair surgery based on:
  - The documented presence of a Society for Thoracic Surgeons predicted mortality risk of 12% or greater
  - The documented presence of a logistic EuroSCORE of 20% or greater

**Coding**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>CPT</td>
<td>Description</td>
</tr>
<tr>
<td>0345T</td>
<td>Transcatheter mitral valve repair percutaneous approach via the coronary sinus</td>
</tr>
<tr>
<td>0544T</td>
<td>Transcatheter mitral valve annulus reconstruction, with implantation of adjustable annulus reconstruction device, percutaneous approach including transseptal puncture</td>
</tr>
<tr>
<td>33418</td>
<td>Transcatheter mitral valve repair, percutaneous approach including transseptal puncture when performed; initial prosthesis</td>
</tr>
<tr>
<td>33419</td>
<td>Transcatheter mitral valve repair, percutaneous approach, including transseptal puncture when performed; additional prosthesis(es) during same session (List separately in addition to code for primary procedure)</td>
</tr>
</tbody>
</table>

**Note:** CPT codes, descriptions and materials are copyrighted by the American Medical Association (AMA). HCPCS codes, descriptions and materials are copyrighted by Centers for Medicare Services (CMS).

**Related Information**

**Definition of Terms**

**New York Heart Association (NYHA) Classification:**
**Class I** No symptoms and no limitation in ordinary physical activity, e.g., shortness of breath when walking, climbing stairs etc.

**Class II** Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.

**Class III** Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g., walking short distances (20–100 m). Comfortable only at rest.

**Class IV** Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients

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**Evidence Review**

**Description**

Transcatheter mitral valve repair (TMVR) is an alternative to surgical therapy for mitral regurgitation (MR). MR is a common valvular heart disease that can result from a primary structural abnormality of the mitral valve (MV) complex or a secondary dilatation of an anatomically normal MV due to a dilated left ventricle caused by ischemic or dilated cardiomyopathy. Surgical therapy may be underutilized, particularly in patients with multiple comorbidities, suggesting that there is an unmet need for less invasive procedures for MV repair. One device, MitraClip, has approval from the FDA for the treatment of severe symptomatic MR due to a primary abnormality of the MV (primary MR) in patients considered at prohibitive risk for surgery and for patients with heart failure and moderate-to-severe or severe symptomatic secondary MR despite the use of maximally tolerated guideline-directed medical therapy.

**Background**

**Mitral Regurgitation**

**Epidemiology and Classification**

MR is the second most common valvular heart disease, occurring in 7% of people older than age 75 years and accounting for 24% of all patients with valvular heart disease.\(^1\)\(^-\)\(^2\) MR with accompanying valvular incompetence leads to left ventricular (LV) volume overload with secondary ventricular remodeling, myocardial dysfunction, and left heart failure. Clinical signs
and symptoms of dyspnea and orthopnea may also be present in patients with valvular dysfunction.\textsuperscript{3} MR severity is classified as mild, moderate, or severe disease on the basis of echocardiographic and/or angiographic findings (1+, 2+, and 3-4+ angiographic grade, respectively).

Patients with MR generally fall into two categories — primary (also called degenerative) and secondary (also called functional) MR. Primary MR results from a primary structural abnormality in the valve, which causes it to leak. This leak may result from a floppy leaflet (called prolapse) or a ruptured cord that caused the leaflet to detach partially (called flail).\textsuperscript{4} Because the primary cause is a structural abnormality, most cases of primary MR are surgically corrected. Secondary MR results from left ventricular (LV) dilatation due to ischemic or dilated cardiomyopathy. This causes the mitral valve (MV) leaflets not to coapt or meet in the center.\textsuperscript{3} Because the valves are structurally normal in secondary MR, correcting the dilated LV using medical therapy is the primary treatment strategy used in the United States.

**Standard Management**

**Surgical Management**

In symptomatic patients with primary MR, surgery is the main therapy. In most cases, MV repair is preferred over replacement, as long as the valve is suitable for repair and personnel with appropriate surgical expertise are available. The American College of Cardiology and the American Heart Association have issued joint guidelines for the surgical management of MV, which are outlined in Table 2.\textsuperscript{5}

The use of standard open MV repair is limited by the requirement for thoracotomy and cardiopulmonary bypass, which may not be tolerated by elderly or debilitated patients due to their underlying cardiac disease or other conditions. In a single-center evaluation of 5737 patients with severe MR in the United States, Goel et al (2014) found that 53\% of patients did not have MV surgery performed, suggesting an unmet need for such patients.\textsuperscript{6}

Isolated MV surgery (repair or replacement) for severe chronic secondary MR is not generally recommended because there is no proven mortality reduction and an uncertain durable effect on symptoms. Recommendations from major societies\textsuperscript{7,8} regarding MV surgery in conjunction with coronary artery bypass graft surgery or surgical aortic valve replacement are weak because the current evidence is inconsistent on whether MV surgery produces a clinical benefit.\textsuperscript{9,10,11,12}
**Transcatheter Mitral Valve Repair**

Transcatheter approaches have been investigated to address the unmet need for less invasive MV repair, particularly among inoperable patients who face prohibitively high surgical risks due to age or comorbidities. MV repair devices under development address various components of the MV complex and generally are performed on the beating heart without the need for cardiopulmonary bypass. Approaches to MV repair include direct leaflet repair, repair of the mitral annulus via direct annuloplasty, or indirect repair based on the annulus’ proximity to the coronary sinus. There are also devices in development to counteract ventricular remodeling and systems designed for complete MV replacement via catheter.

**Direct Leaflet Approximation**

One device that undertakes direct leaflet repair, the MitraClip Clip Delivery System (Abbott Vascular), has been approved through premarket approval process by the FDA for use in certain patients with symptomatic primary MR (see **Regulatory Status** section). Of the transcatheter MV repair devices under investigation, the MitraClip, has the largest body of evidence evaluating its use; it has been in use in Europe since 2008. The MitraClip system is deployed percutaneously and approximates the open Alfieri edge-to-edge repair approach to treating MR. The delivery system consists of a catheter, a steerable sleeve, and the MitraClip device, which is a 4-mm wide clip fabricated from a cobalt-chromium alloy and polypropylene fabric. MitraClip is deployed via a transfemoral approach, with trans-septal puncture used to access the left side of the heart and the MV. Placement of the MitraClip leads to coapting of the mitral leaflets, thus creating a double-orifice valve.

The PASCAL (PAddles Spacer Clasps ALfieri) Mitral Repair System (Edwards Lifesciences) is also a direct coaptation device and works in a similar manner to the MitraClip system. The delivery system consists of a 10-mm central spacer that attaches to the MV leaflets by 2 paddles and clasps (CE marked, which is a status of approval awarded by a quality organization in the European Union). Pivotal trials are ongoing in the U.S.

**Other Mitral Valve Repair Devices**

Devices for transcatheter MV repair that use various approaches are in development. Techniques to repair the mitral annulus include those that target the annulus itself (direct annuloplasty) and those that tighten the mitral annulus via manipulation of the adjacent coronary sinus (indirect annuloplasty). Indirect annuloplasty devices include the Carillon® Mitral Contour System.
(Cardiac Dimension) and the Monarc™ device (Edwards Lifesciences). The CE-marked Carillon Mitral Contour System is comprised of self-expanding proximal and distal anchors connected with a nitinol bridge, with the proximal end coronary sinus ostium and the distal anchor in the great cardiac vein. The size of the connection is controlled by manual pullback on the catheter. The Carillon system was evaluated in the Carillon Mitral Annuloplasty Device European Union Study (AMADEUS) and the follow-up Tighten the Annulus Now study, with further studies planned. The Monarc system also involves two self-expanding stents connected by a nitinol bridge, with one end implanted in the coronary sinus via internal jugular vein and the other in the great cardiac vein. Several weeks after implantation, the biologically degradable coating over the nitinol bridge degrades, allowing the bridge to shrink and the system to shorten. It has been evaluated in the Clinical Evaluation of the Edwards Lifesciences Percutaneous Mitral Annuloplasty System for the Treatment of Mitral Regurgitation (EVOLUTION I) trial.

Direct annuloplasty devices include the Mitralign Percutaneous Annuloplasty System (Mitralign) and the AccuCinch® System (Guided Delivery Systems), both of which involve transcatheter placement of anchors in the MV; they are cinched or connected to narrow the mitral annulus. Other transcutaneous direct annuloplasty devices under investigation include the enCorTC™ device (Micardia), which involves a percutaneously insertable annuloplasty ring that is adjustable using radiofrequency energy, a variation on its CE-marked enCorSQ™ Mitral Valve Repair System, and the Cardioband™ Annuloplasty System (Valtech Cardio), an implantable annuloplasty band with a transfemoral venous delivery system.

Transcatheter Mitral Valve Replacement

Permavalve™ (MicroInterventional Devices), under investigation in the United States, is a transcatheter MV replacement device that is delivered via the transapical approach. On June 5, 2017, the SAPIEN 3 Transcatheter Heart Valve (Edwards Lifesciences) was approved by FDA as MV replacement device. These replacement valves are outside the scope of this policy.

Medical Management

The standard treatment for patients with chronic secondary MR is medical management. Patients with chronic secondary MR should receive standard therapy for heart failure with reduced ejection fraction; standard management includes angiotensin converting enzyme inhibitor (or angiotensin II receptor blocker or angiotensin receptor-neprilysin inhibitor), β-blocker and mineralocorticoid receptor antagonist, and diuretic therapy as needed to treat
volume overload. Resynchronization therapy may provide symptomatic relief, improve LV function, and in some patients, lessen the severity of MR.

**Summary of Evidence**

For individuals who have symptomatic primary MR and are at prohibitive risk for open surgery who receive TMVR using MitraClip, the evidence includes a single-arm prospective cohort with historical cohort and registry studies. The relevant outcomes are overall survival, morbid events, functional outcomes, and treatment-related morbidity. The primary evidence includes the pivotal EVEREST II HRR and EVEREST II REALISM studies and Transcatheter Valve Therapy Registry studies. These studies have demonstrated that MitraClip implantation is feasible with a procedural success rate greater than 90%, 30-day mortality ranging from 2.3% to 6.4% (less than predicted Society of Thoracic Surgeons (STS) mortality risk score for MR repair or replacement; range, 9.5%-13.2%), postimplantation MR severity grade of 2+ or less in 82% to 93% of patients, and a clinically meaningful gain in quality of life (5-point to 6-point gains in ySF-36 scores). At one year, freedom from death and MR more than 2+ was achieved in 61% of patients but the one-year mortality or heart failure hospitalization rates remain considerably high (38%).

Conclusions related to the treatment effect on mortality based on historical controls cannot be made because the control groups did not provide unbiased or precise estimates of the natural history of patients eligible to receive MitraClip. Given that primary MR is a mechanical problem and there is no effective medical therapy, a randomized controlled trial (RCT) comparing MitraClip with medical management is not feasible or ethical. The postmarketing data from the United States is supportive that MitraClip surgery is being performed with short-term effectiveness and safety in select patient population. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have heart failure and symptomatic secondary MR despite the use of maximally tolerated guideline-directed medical therapy who receive TMVR using MitraClip, the evidence includes a systematic review, two RCTS as well as multiple observational studies. The relevant outcomes are overall survival, morbid events, functional outcomes, and treatment-related morbidity. The trials had discrepant results potentially related to differences in primary outcomes. The larger trial, with patients selected for nonresponse to maximally tolerated therapy, found a significant benefit for MitraClip after two years compared to medical therapy alone. Improvements in MR severity, quality of life measures, and functional capacity persisted to 36 months in patients who received TMVR. The systematic review confirmed the benefit of MitraClip found in the larger RCT but had important methodological limitations. The evidence is
sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have symptomatic primary or secondary MR and are surgical candidates who receive TMVR using MitraClip, the evidence includes a systematic review, one RCT and a retrospective comparative observational study in individuals aged ≥75 years. The relevant outcomes are overall survival, morbid events, functional outcomes, and treatment-related morbidity. The RCT found that MitraClip did not reduce MR as often or as completely as the surgical control, although it could be safely implanted and was associated with fewer adverse events at one year. Long-term follow-up from the RCT showed that significantly more MitraClip patients required surgery for MV dysfunction than conventional surgery patients. For these reasons, this single trial is not definitive in demonstrating improved clinical outcomes with MitraClip compared with surgery. Additional RCTs are needed to corroborate these results. The observational study in individuals aged ≥75 years found that although MitraClip was associated with improved one-year survival and a lower rate of all acute complications compared with surgical repair, it had lower five-year survival and greater MR recurrence. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have symptomatic primary or secondary MR who receive TMVR using devices other than MitraClip, the evidence includes an RCT, nonrandomized prospective studies, and noncomparative feasibility studies. The relevant outcomes are overall survival, morbid events, functional outcomes, and treatment-related morbidity. A head-to-head RCT comparing the direct leaflet repair devices, PASCAL and MitraClip, is ongoing. Prospective nonrandomized trials demonstrate promising efficacy and safety results for the PASCAL direct leaflet repair device. A small open-label head-to-head comparison trial between PASCAL and MitraClip (Gercek et al 2021) demonstrated similar safety and efficacy between the two systems. Data from the ongoing RCT is needed to draw conclusions about the net health benefit. The randomized, sham-controlled trial for the indirect annuloplasty device Carillon also offers promising safety data, however further studies are needed to determine efficacy and long-term outcomes. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review are listed in Table 1.
<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ongoing</strong></td>
<td></td>
<td></td>
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<tr>
<td>NCT02444338</td>
<td>A RandomizEd Study of tHe MitraClIp DEvice in Heart Failure Patients With Clinically Significant Functional Mitral Regurgitation (RESHAPE-HF)</td>
<td>650</td>
<td>June 2024</td>
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<tr>
<td>NCT04009434</td>
<td>Treatment of Concomitant Mitral Regurgitation by Mitral Valve Clipping in Patients With Successful Transcatheter Aortic Valve Implantation</td>
<td>1162</td>
<td>Aug 2023</td>
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<tr>
<td>NCT01626079a</td>
<td>Cardiovascular Outcomes Assessment of the MitraClip Percutaneous Therapy for Heart Failure Patients With Functional Mitral Regurgitation (The COAPT Trial)</td>
<td>614</td>
<td>July 2024 (5-year follow-up per protocol)b</td>
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<tr>
<td>NCT04198870a</td>
<td>Percutaneous MitraClip Device or Surgical Mitral Valve REpair in PAtients With PrimaRy Mitral Regurgitation Who Are Candidates for Surgery (REPAIR MR)</td>
<td>500</td>
<td>Feb 2027</td>
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<tr>
<td>NCT05090540</td>
<td>Transcatheter Edge to Edge Mitral Valve Repair Versus Standard Surgical Mitral Valve Operation for Secondary Mitral Regurgitation</td>
<td>600</td>
<td>Dec 2023</td>
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<tr>
<td>NCT05051033</td>
<td>Percutaneous or Surgical Repair In Mitral Prolapse And Regurgitation for &gt;65 Year-Olds (PRIMARY)</td>
<td>450</td>
<td>Jan 2032</td>
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<tr>
<td>NCT05021614a</td>
<td>Evaluation of the Efficacy and Safety of the Transcatheter Mitral Valve Repair System in Patients With Moderate and Above Degenerative Mitral Regurgitation at High Surgical Risk</td>
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<td>Sep 2027</td>
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<tr>
<td>NCT04734756a</td>
<td>A Prospective, Multicenter, Objective Performance Criteria Study to Evaluate the Safety and Effectiveness of Dragonfly Transcatheter Mitral Valve Repair System for the Treatment of Degenerative Mitral Regurgitation (DMR) Subjects</td>
<td>120</td>
<td>May 2027</td>
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<tr>
<td>NCT04733404a</td>
<td>A Prospective, Multicenter, Objective Performance Criteria Study to Evaluate the Safety and Effectiveness of Dragonfly Transcatheter Mitral Valve Repair System for the Treatment of Functional Mitral Regurgitation (FMR) Subjects</td>
<td>120</td>
<td>Sep 2027</td>
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<tr>
<td>NCT04430075a</td>
<td>Transcatheter Repair of Mitral Regurgitation With Edwards PASCAL Transcatheter Valve Repair System: A European</td>
<td>500</td>
<td>Dec 2026</td>
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<td>NCT No.</td>
<td>Trial Name</td>
<td>Planned Enrollment</td>
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<tr>
<td>NCT03706833 a</td>
<td>Edwards PASCAL TrAnScatheter Valve RePair System Pivotal Clinical Trial (CLASP IID/IIF): A Prospective, Multicenter, Randomized, Controlled Pivotal Trial to Evaluate the Safety and Effectiveness of Transcatheter Mitral Valve Repair With the Edwards PASCAL Transcatheter Valve Repair System Compared to Abbott MitraClip in Patients With Mitral Regurgitation</td>
<td>1275</td>
<td>Jan 2028</td>
</tr>
<tr>
<td>Unpublished</td>
<td>GIsse Registry Of Transcatheter Treatment of Mitral Valve regurgitaTiOn (GIOTTO)</td>
<td>1500</td>
<td>Feb 2021</td>
</tr>
</tbody>
</table>

NCT: national clinical trial

* Denotes industry-sponsored or cosponsored trial.

### Clinical Input Received from Physician Specialty Societies and Academic Medical Centers

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

#### 2015 Input

In response to requests, input was received from four academic medical centers, one of which provided four responses, for a total of seven responses, while this policy was under review in 2015. Input supported the use of TMVR in patients with primary (degenerative) MR at prohibitive risk of open surgery. The greatest consensus for selection criteria to determine “prohibitive risk” was for the use of the Society of Thoracic Surgeons predictive operative risk of 12% or higher, or a logistic EuroSCORE of 20% or higher.
Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion if they were issued by, or jointly by, a U.S. professional society, an international society with U.S. representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American College of Cardiology and American Heart Association

In 2020, the American College of Cardiology and American Heart Association presented updated expert consensus on the management of mitral regurgitation (MR). The recommendations are as follows: "At present, transcatheter mitral repair using an edge-to-edge clip device can be considered for the treatment of patients with primary MR and severe symptoms who are felt to be poor surgical candidates. Surgical or transcatheter treatment for secondary MR is undertaken only after appropriate medical and device therapies have been instituted and optimized, as judged by the multidisciplinary team with input from a cardiologist with experience managing heart failure and MR."

Also in 2020, the American College of Cardiology and American Heart Association released updated guidelines on the management of valvular heart disease. The guidelines state that TMVR is of benefit to patients with severely symptomatic primary MR who are at high or prohibitive risk for surgery, and to a subset of patients with secondary MR who remain severely symptomatic despite guideline-directed management and therapy for heart failure. Relevant recommendations on interventions for primary and secondary MR are shown in Table 2.

Table 2. Recommendations on Interventions for Primary and Secondary MR

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>COR</th>
<th>LOE</th>
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<tbody>
<tr>
<td><strong>Primary MR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In symptomatic patients with severe primary MR (Stage D), mitral valve intervention is recommended irrespective of LV systolic function</td>
<td>1 (Strong)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In asymptomatic patients with severe primary MR and LV systolic dysfunction (LVEF &lt;60%, LVESD &gt;40 mm) (Stage C2), mitral valve surgery is recommended</td>
<td>1 (Strong)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>Recommendation</td>
<td>COR</td>
<td>LOE</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>In patients with severe primary MR for whom surgery is indicated, mitral valve repair is recommended in preference to mitral valve replacement when the anatomic cause of MR is a degenerative disease, if a successful and durable repair is possible</td>
<td>1 (Strong)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In asymptomatic patients with severe primary MR and normal LV systolic function (LVEF &gt;60% and LVESD &gt;40 mm) (Stage C1), mitral valve repair is reasonable when the likelihood of a successful and durable repair without residual MR is &gt;95% with an expected mortality rate of &lt;1% when it can be performed at a Primary or Comprehensive Valve Center</td>
<td>2a (Moderate)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In asymptomatic patients with severe primary MR and normal LV systolic function (LVEF &gt;60% and LVESD &lt;40 mm) (Stage C1) but with a progressive increase in LV size or decrease in EF on ≥3 serial imaging studies, mitral valve surgery may be considered irrespective of the probability of a successful and durable repair</td>
<td>2b (Weak)</td>
<td>C-LD²</td>
</tr>
<tr>
<td>In severely symptomatic patients (NYHA class III or IV) with primary severe MR and high or prohibitive surgical risk, TEER is reasonable if mitral valve anatomy is favorable for the repair procedure and patient life expectancy is at least 1 year</td>
<td>2a (Moderate)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In symptomatic patients with severe primary MR attributable to rheumatic valve disease, mitral valve repair may be considered at a Comprehensive Valve Center by an experienced team when surgical treatment is indicated, if a durable and successful repair is likely</td>
<td>2b (Weak)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In patients with severe primary MR where leaflet pathology is limited to less than one half the posterior leaflet, mitral valve replacement should not be performed unless mitral valve repair has been attempted at a Primary or Comprehensive Valve Center and was unsuccessful</td>
<td>3: Harm (Strong)</td>
<td>B-NR¹</td>
</tr>
</tbody>
</table>

**Secondary MR**

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>COR</th>
<th>LOE</th>
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<tbody>
<tr>
<td>In patients with chronic severe secondary MR related to LV systolic dysfunction (LVEF &lt;50%) who have persistent symptoms (NYHA class II, III, or IV) while on optimal GDMT for HF (Stage D), TEER is reasonable in patients with appropriate anatomy as defined on TEE and with LVEF between 20% and 50%, LVESD &lt;70 mm, and pulmonary artery systolic pressure &lt;70 mmHg</td>
<td>2a (Moderate)</td>
<td>B-R³</td>
</tr>
<tr>
<td>In patients with severe secondary MR (Stages C and D), mitral valve surgery is reasonable when CABG is undertaken for the treatment of myocardial ischemia</td>
<td>2a (Moderate)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In patients with chronic severe secondary MR from atrial annular dilation with preserved LV systolic function (LVEF &gt;50%) who have severe persistent symptoms (NYHA class III or IV) despite therapy for HF and therapy for associated AF or other comorbidities (Stage D), mitral valve surgery may be considered</td>
<td>2b (Weak)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In patients with chronic severe secondary MR related to LV systolic dysfunction (LVEF &lt;50%) who have persistent severe symptoms (NYHA class III or IV) while on optimal GDMT for HF (Stage D), mitral valve surgery may be considered</td>
<td>2b (Weak)</td>
<td>B-NR¹</td>
</tr>
<tr>
<td>In patients with CAD and chronic severe secondary MR related to LV systolic dysfunction (LVEF &lt;50%) (Stage D) who are undergoing mitral valve surgery because of severe</td>
<td>2b (Weak)</td>
<td>B-R³</td>
</tr>
</tbody>
</table>
Recommendation

| Symptoms (NYHA class III or IV) that persist despite GDMT for HF, chordal-sparing mitral valve replacement may be reasonable to choose over downsized annuloplasty repair |
|---|---|---|

Source: Adapted from Otto et al (2020)\(^5\)

1Moderate, nonrandomized; 2Limited data; 3Moderate, randomized.

AF: atrial fibrillation; CABG: coronary artery bypass graft; CAD: coronary artery disease; COR: class of recommendation; EF: ejection fraction; GDMT: guideline-directed medical therapy; HF: heart failure; LOE: level of evidence; LV: left ventricular; LVEF: left ventricular ejection fraction; LVESD: left ventricular end-systolic diameters; MR: mitral regurgitation; MV: mitral valve; NYHA: New York Heart Association; TEE: transesophageal echocardiogram; TEER: transcatheter edge-to-edge repair

American College of Cardiology, American Association for Thoracic Surgery, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons

The American College of Cardiology, American Association for Thoracic Surgery, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons (2014) issued a position statement on transcatheter therapies for mitral regurgitation (MR).\(^64\) This statement outlined critical components for successful transcatheter MR therapies and recommended ongoing research and inclusion of all patients treated with transcatheter MR therapies in a disease registry.

National Institute for Health and Care Excellence

The NICE guideline on heart valve disease management (2021) makes the following recommendations related to TMVR:\(^65\)

- "1.5.10 - Consider transcatheter edge-to-edge repair, if suitable, for adults with severe primary mitral regurgitation and symptoms, if surgery is unsuitable.

- "1.5.14 - Consider transcatheter mitral edge-to-edge repair for adults with heart failure and severe secondary mitral regurgitation, if surgery is unsuitable and they remain symptomatic on medical management."
Medicare National Coverage

The Centers for Medicare & Medicaid Services (2015) issued a national coverage decision for the use of TMVR.66

The Centers for Medicare & Medicaid Services determined that it would cover TMVR under Coverage with Evidence Development for the treatment of significant symptomatic MR when all of the following conditions are met:

1. “The procedure is performed with a complete TMVR system that has received FDA [Food and Drug Administration] premarket approval (PMA) for that system’s FDA approved indication.

2. Both a cardiothoracic surgeon experienced in mitral valve surgery and a cardiologist experienced in mitral valve disease have independently examined the patient face-to-face and evaluated the patient’s suitability for mitral valve surgery and determination of prohibitive risk; and both surgeons have documented the rationale for their clinical judgment and the rationale is available to the heart team.

3. The patient (pre-operatively and post-operatively) is under the care of a heart team...
   TMVR must be furnished in a hospital and with the appropriate infrastructure that includes but is not limited to:
   a. On-site active valvular heart disease surgical program with >2 hospital-based cardiothoracic surgeons experienced in valvular surgery;
   b. Cardiac catheterization lab or hybrid operating room/catheterization lab equipped with a fixed radiographic imaging system with flat-panel fluoroscopy, offering catheterization laboratory-quality imaging,
   c. Non-invasive imaging expertise including transthoracic/transesophageal/3D echocardiography, vascular studies, and cardiac CT studies;
   d. Post-procedure intensive care facility with personnel experienced in managing patients who have undergone open-heart valve procedures;
   e. Adequate outpatient clinical care facilities
   f. Appropriate volume requirements per the applicable qualifications below.

There are institutional and operator requirements for performing TMVR. The hospital must have the following:
a. A surgical program that performs >25 total mitral valve surgical procedures for severe MR per year of which at least 10 must be mitral valve repairs;

b. An interventional cardiology program that performs >1000 catheterizations per year, including >400 percutaneous coronary interventions (PCIs) per year, with acceptable outcomes for conventional procedures compared to National Cardiovascular Data Registry (NCDR) benchmarks;

c. The heart team must include:
   
   o An interventional cardiologist(s) who:
     
     ▪ Performs >50 structural procedures per year including atrial septal defects (ASD), patent foramen ovale (PFO) and trans-septal punctures; AND
     
     ▪ Must receive prior suitable training on the devices to be used; AND
     
     ▪ Must be board-certified in interventional cardiology or board-certified/eligible in pediatric cardiology or similar boards from outside the United States
   
   o Additional members of the heart team, including: cardiac echocardiographers, other cardiac imaging specialists, heart valve and heart failure specialists, electrophysiologists, cardiac anesthesiologists, intensivists, nurses, nurse practitioners, physician assistants, data/research coordinators, and a dedicated administrator;

d. All cases must be submitted to a single national database;

e. Ongoing continuing medical education (or the nursing/technologist equivalent) of 10 hours per year of relevant material;

f. The cardiothoracic surgeon(s) must be board-certified in thoracic surgery or similar foreign equivalent.

4. The heart teams [sic] interventional cardiologist or a cardiothoracic surgeon must perform the TMVR. Interventional cardiologist(s) and cardiothoracic surgeon(s) may jointly participate in the intra-operative technical aspects of TMVR as appropriate.

5. The heart team and hospital are participating in a prospective, national, audited registry that: 1) consecutively enrolls TMVR patients; 2) accepts all manufactured devices; 3) follows the patient for at least one year; and, 4) complies with relevant regulations relating to protecting human research subjects...
The registry should collect all data necessary and have a written executable plan.

1. TMVR for MR uses that are not expressly listed as an FDA-approved indication when performed within an FDA-approved randomized clinical trial that fulfills all of the following:
   
a. TMVR must be performed by an interventional cardiologist or a cardiac surgeon. Interventional cardiologist(s) and cardiothoracic surgeon(s) may jointly participate in the intra-operative technical aspects of TMVR as appropriate.

b. As a fully described, written part of its protocol, the clinical research study must critically evaluate the following questions at 12 months of longer follow-up:
   
   - What is the patient's post-TMVR quality of life (compared to pre-TMVR) at one year?
   - What is the patient's post-TMVR functional capacity (compared to pre-TMVR) at one year?"

In addition, the clinical research study must address a series of questions at one-year postprocedure as outlined in the proposed decision memo.

**Regulatory Status**

In October 2013, the MitraClip Clip Delivery System (Abbott Vascular) was approved by the FDA through the premarket approval process for treatment of “significant symptomatic mitral regurgitation (MR ≥3+) due to primary abnormality of the mitral apparatus (degenerative MR) in patients who have been determined to be at a prohibitive risk for mitral valve surgery by a heart team.”

FDA product code: NKM.

In March 2019, the FDA approved a new indication for MitraClip for “treatment of patients with normal mitral valves who develop heart failure symptoms and moderate-to-severe or severe mitral regurgitation because of diminished left heart function (commonly known as secondary or functional mitral regurgitation) despite being treated with optimal medical therapy. Optimal medical therapy includes combinations of different heart failure medications along with, in certain patients, cardiac resynchronization therapy and implantation of cardioverter defibrillators.”


Appendix
Figure 1

Stages, Phenotypes and Treatment of HF

**At Risk for Heart Failure**
- **STAGE A**
  - At high risk for HF but without structural heart disease or symptoms of HF
  - Patients with:
    - HTN
    - Arteriosclerotic disease
    - DM
    - Obesity
    - Metabolic syndrome
    - Patients with:
      - Using cigarettes
      - With family history of cardiomyopathy

**STAGE B**
- Structural heart disease but without signs or symptoms of HF
  - Patients with:
    - Previous MI
    - LV remodeling including LVH and low EF
    - Asymptomatic valvular disease

**STAGE C**
- Structural heart disease with prior or current symptoms of HF
  - Patients with:
    - Known structural heart disease and HF signs and symptoms

**Heart Failure**
- **STAGE D**
  - Refractory HF
  - Patients with:
    - Marked HF symptoms at rest
    - Recurrent hospitalizations despite GDMT

**THERAPY**
- Goals:
  - Heart healthy lifestyle
  - Prevent vascular, coronary disease
  - Prevent LV structural abnormalities

- Drugs:
  - ACEI or ARB as appropriate
  - Beta blockers as appropriate
  - In selected patients:
    - ICD
    - Beta blockers or valve surgery as appropriate

**THERAPY**
- Goals:
  - Prevent HF symptoms
  - Prevent further cardiac remodeling

- Drugs:
  - ACEI or ARB as appropriate
  - Beta blockers as appropriate
  - In selected patients:
    - ICD
    - Beta blockers or valve surgery as appropriate

**THERAPY**
- Goals:
  - Control symptoms
  - Improve HRQoL
  - Prevent hospitalization
  - Prevent mortality

- Drugs for refractory use:
  - Diuretics for fluid retention
  - ACEI or ARB
  - Beta blockers
  - Aldosterone antagonists
  - Digoxin for use in selected patients
  - ICD for those with implantable defibrillator
  - In selected patients:
    - ICD
    - Catheterization or valvular surgery as appropriate

**THERAPY**
- Goals:
  - Control symptoms
  - Patient education
  - Prevent hospitalization
  - Prevent mortality

- Drugs for refractory use:
  - ICD for those with implantable defibrillator
  - ACEI and ARB
  - Digoxin

- In selected patients:
  - ICD
  - Catheterization or valvular surgery as appropriate

Helping Cardiovascular Professionals Learn. Advance. Heal.
History

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>09/08/14</td>
<td>New Policy. Policy created with literature review through June 4, 2014. Transcatheter mitral valve repair considered investigational for all indications.</td>
</tr>
<tr>
<td>01/12/15</td>
<td>Coding update. New CPT codes 33418-33419, effective 1/1/15, added to policy; codes 0343T and 0344T deleted 12/31/14 noted on policy.</td>
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<tr>
<td>12/08/15</td>
<td>Annual Review. Added policy statement that Transcatheter mitral valve repair with the MitraClip is now medically necessary to treat degenerative mitral regurgitation when criteria are met. (Previously considered Investigational). Updated Policy Guidelines, with clarification about documented presence of risk score from one of the stated tools in the prohibitive risk definition. Added FDA indications for use. Policy updated with literature review through June 1, 2015; references added. Policy statement changed as noted. Codes 0343T and 0344T removed as deleted from codebook effective 12/31/14.</td>
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<tr>
<td>02/01/16</td>
<td>Coding update. Added 93799.</td>
</tr>
<tr>
<td>10/21/16</td>
<td>Minor formatting edit. Restored reference hyperlinks.</td>
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<tr>
<td>01/23/18</td>
<td>Coding update, added CPT codes 0483T and 0484T (new codes effective 1/1/18).</td>
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<td>08/01/18</td>
<td>Annual Review, approved July 13, 2018. Policy updated with literature review through March 2018; references 29, 34-35, and 53 added. In the policy degenerative mitral regurgitation was replaced with primary mitral regurgitation and functional mitral regurgitation was replaced with secondary mitral regurgitation including the policy statement to be in consistent with language used in the guidelines. Data from FDA documents were added. Removed CPT code 93799.</td>
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<tr>
<td>07/01/19</td>
<td>Coding update, added CPT code 0544T (new code effective 7/1/19).</td>
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<td>04/01/20</td>
<td>Delete policy, approved March 10, 2020. This policy will be deleted effective July 2, 2020, and replaced with InterQual criteria for dates of service on or after July 2, 2020.</td>
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<td>06/26/20</td>
<td>Policy will remain active and will no longer be deleted effective July 2, 2020.</td>
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<tr>
<td>07/02/20</td>
<td>Minor update. Related policy 7.01.132 removed; this policy is deleted and replaced with InterQual® criteria.</td>
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<tr>
<td>08/01/22</td>
<td>Annual Review, approved July 11, 2022. Policy updated with literature review through March 16, 2022; references added to review of evidence for 'Other Transcatheter Mitral Valve Repair Devices'; guidelines section updated. Minor editorial refinements to policy statements; intent unchanged.</td>
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