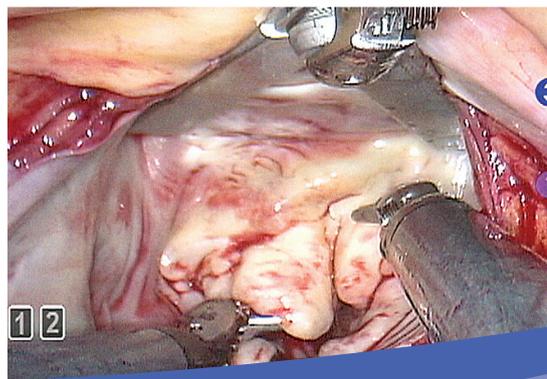
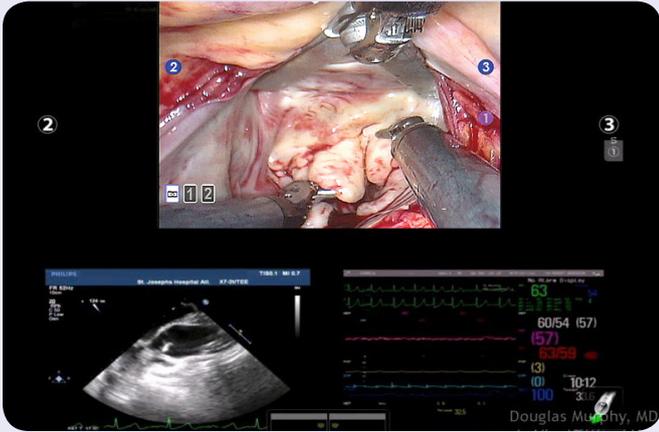


*da Vinci.*  
MITRAL VALVE REPAIR



Solutions for minimally invasive cardiac surgery

# The *da Vinci* Surgical System



## TilePro™ Multi-Input Display

Allows the surgeon and the OR team to view 3D video of the operative field along with up to two additional video sources, such as ultrasound and EKG.

## Available exclusively on the *da Vinci*® *Si*™

Dual console capability allows an additional surgeon to provide an assist or can facilitate teaching and proctoring by connecting a second surgeon console.

- High-definition 3D vision
- *EndoWrist*® instrumentation
- *Intuitive*® motion

## Surgeon Benefits

### Enables surgeons to offer a minimally invasive surgical approach for mitral valve prolapse<sup>1,2</sup>

The visualization, precision, dexterity and control provided by the *da Vinci* Surgical System offers the following potential surgeon benefits:

- ❖ Similar immediate repair success rates as conventional surgery with significantly shorter recovery times<sup>3</sup>
- ❖ Extend the benefits of minimally invasive surgery to more patients with similar outcomes and patient satisfaction<sup>2,4,5</sup>
- ❖ Surgical autonomy and efficiency with control of the camera and three operative arms from the surgeon console

*da Vinci* Mitral Valve Repair is a technically complex procedure, which may result in longer operative times.

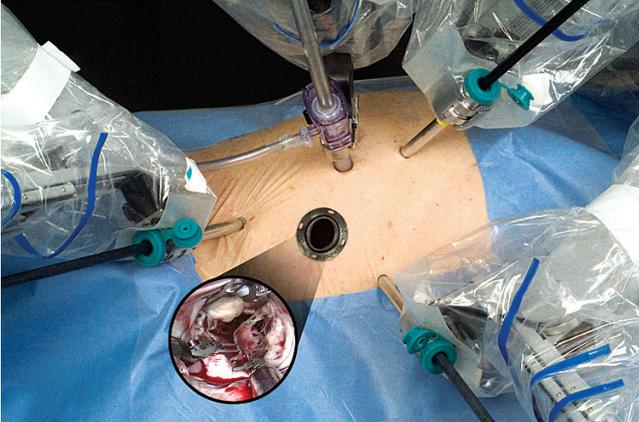


8mm *EndoWrist*®  
Atrial Retractor

# Application Highlights

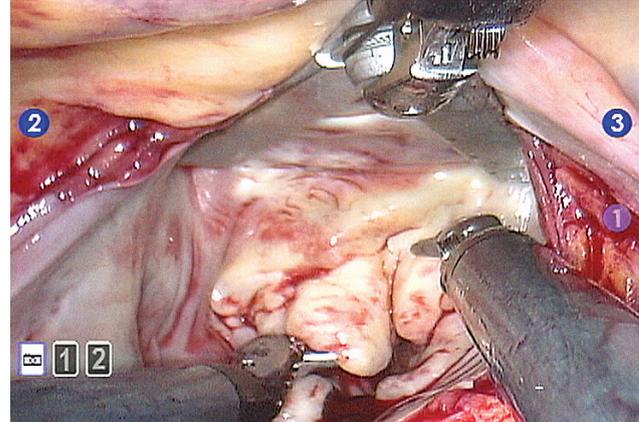
Four ways *da Vinci* technology facilitates a precise mitral valve repair:

## 1. Lateral Approach



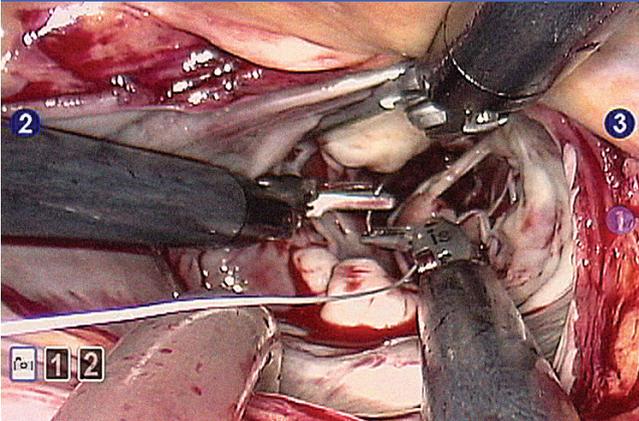
Obtain a 3DHD® view of the mitral valve anatomy and minimize valve distortion or rib spreading with a minimally invasive lateral approach.

## 2. Dynamic Atrial Retraction™



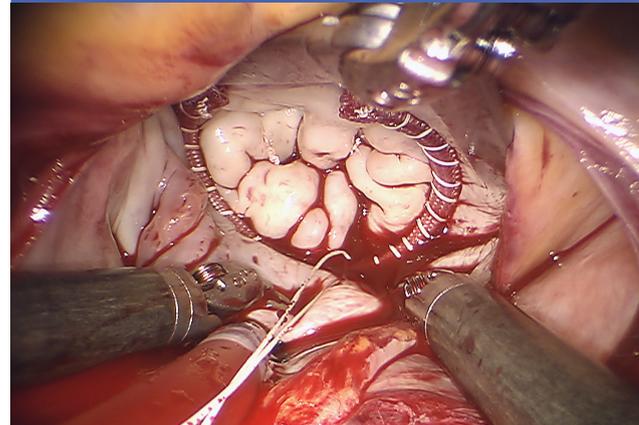
*da Vinci*-controlled *Dynamic Atrial Retraction*™ provided by the 3<sup>rd</sup> instrument arm allows the surgeon to adapt and optimize exposure of the entire mitral valve from the console.

## 3. Complex Repair



The precision and dexterity offered by *EndoWrist* instrumentation facilitates a surgeon's ability to use innovative techniques, including subvalvular chord transposition or *Gore-Tex*® chord insertion, on complex abnormalities.

## 4. Sutured Annuloplasty



*EndoWrist* instrumentation enables sutured annuloplasty with conventional rigid, semi-rigid, and/or flexible annuloplasty band and ring technologies along with a running horizontal mattress or interrupted technique depending on surgeon preference.

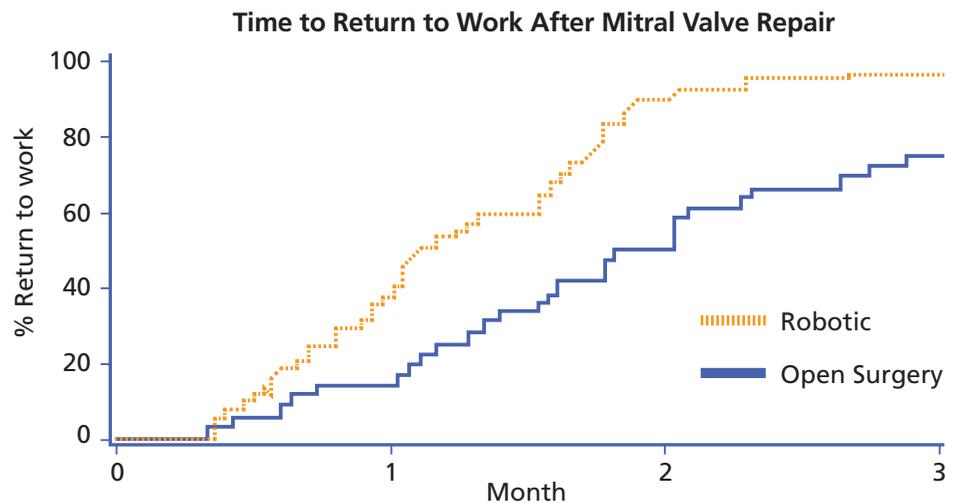
For technology videos visit  
[www.daVinciSurgeryCommunity.com](http://www.daVinciSurgeryCommunity.com)

## Quality of life after early mitral valve repair using conventional and robotic approaches.

Suri RM, Antiel RM, Burkhart HM, Huebner M, Li Z, Eton DT, Topilsky T, Sarano ME, Schaff HV. *Ann Thorac Surg.* 2012 Mar;93(3):761-9.

The time between the operation and return to full-time or parttime employment was shorter for patients who had robotic repair ( $p < 0.001$ ).

Study limitations include but are not limited to: retrospective pilot study; single assessment of quality of life with no baseline or follow-up; unmeasured factors could account for observed treatment differences.

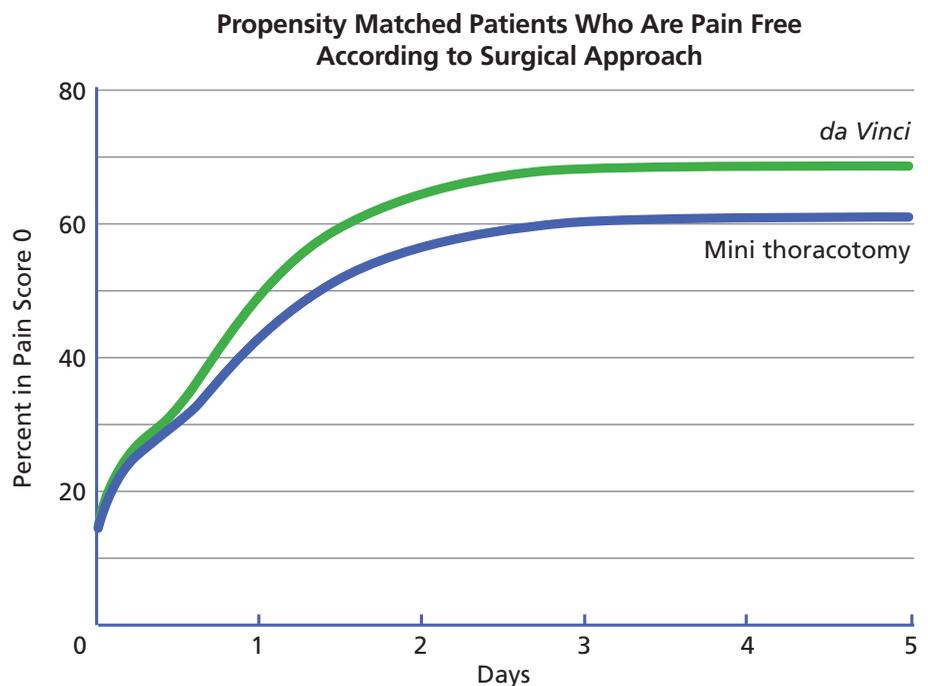


## Robotic repair of posterior mitral valve prolapse versus conventional approaches: potential realized.

Mihaljevic T, Jarrett CM, Gillinov AM, Williams SJ, DeVilliers PA, Stewart WJ, Svensson LG, Sabik JF 3rd, Blackstone EH. *J Thorac Cardiovasc Surg.* 2011 Jan;141(1):72-80. Epub 2010 Nov 19.

Among propensity matched patients in the robotic ( $n=261$ ) and mini thoracotomy ( $n=114$ ) groups, those in the robotic group had the shortest postoperative stay (median, 4.2 days) and 0.9 less days than the mini thoracotomy group ( $p < 0.001$ ).

Study limitations include but are not limited to: retrospective nature; single institution; outcomes analysis limited to post-operative stay



The clinical evaluation of the *da Vinci* Surgical Systems (Models IS1200, IS2000, IS3000) supporting its use for mitral valve repair was not performed totally endoscopically. Introduction and manipulation of the endoscopic instruments were controlled by the *da Vinci* Surgical System through port incisions ( $< 1$  cm) while accessory technologies, e.g., atrial retractor and cardioplegia line, etc, were introduced through a mini-thoracotomy. Performance characteristics of totally endoscopic mitral valve repair using the *da Vinci* System have not been established.

For additional data pertaining to these studies visit  
[www.daVinciSurgeryCommunity.com](http://www.daVinciSurgeryCommunity.com)

# Potential Patient Benefits & Risks

## POSSIBLE BENEFITS COMPARED TO OPEN SURGERY:

- ❖ Less blood loss and need for transfusions<sup>6</sup>
- ❖ Less time in intensive care<sup>3</sup>
- ❖ Shorter hospital stay<sup>3,4,6,7,8</sup>
- ❖ Lower rate of atrial fibrillation after surgery (rapid/irregular heartbeat)<sup>4</sup>
- ❖ Lower rate of pleural effusions after surgery (excess fluid around the lung)<sup>4</sup>
- ❖ Faster recovery and return to normal daily activities,<sup>3</sup> including work<sup>5</sup>
- ❖ Faster improvement of physical & mental health following surgery<sup>5</sup>
- ❖ Small incisions for minimal scarring

## POSSIBLE RISKS INCLUDE:

- ❖ Heart attack or stroke
- ❖ Heart rhythm problems
- ❖ Infection in the kidneys, chest, valves or bladder
- ❖ Fever and chest pain (together called post-pericardiotomy syndrome)
- ❖ Memory loss and/or loss of mental clarity

In addition to the above risks, there are risks related to minimally invasive surgery, including *da Vinci* Mitral Valve Repair Surgery, such as damage to nearby organs or nerves and conversion to open surgery.<sup>9,10</sup>



## EndoWrist<sup>®</sup> Instruments Offered for *da Vinci*<sup>®</sup> Mitral Valve Repair

STANDARD/S, Si PNs	FEATURES	STANDARD/S, Si PNs	FEATURES
 <b>Curved Scissors</b> 400178/420178	<ul style="list-style-type: none"> <li>❖ Curved jaws</li> <li>❖ Narrow cutting profile</li> <li>❖ Tapered atraumatic tip</li> </ul>	 <b>DeBakey Forceps</b> 400036/420036	<ul style="list-style-type: none"> <li>❖ Classic DeBakey design</li> </ul>
 <b>Resano Forceps</b> 400181/420181	<ul style="list-style-type: none"> <li>❖ Resano-style jaw design</li> <li>❖ Tip-closing jaw</li> </ul>	 <b>Large Needle Driver</b> 400006/420006	<ul style="list-style-type: none"> <li>❖ Crosshatch pattern</li> <li>❖ Strong jaw design</li> </ul>
 <b>Atrial Retractor</b> 400204/420204	<ul style="list-style-type: none"> <li>❖ <i>EndoWrist</i> technology</li> <li>❖ Robotic control</li> <li>❖ Low profile, narrow 45mm blades</li> </ul>	 <b>Large <i>SutureCut</i> Needle Driver</b> 420296	<ul style="list-style-type: none"> <li>❖ Carbide-insert style jaws</li> <li>❖ Diamond pattern jaw profile</li> </ul>
 <b>Valve Hook</b> 400192/420192	<ul style="list-style-type: none"> <li>❖ Smooth, rounded 90° nerve hook design</li> </ul>		



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All surgeries carry risks of adverse outcomes. While clinical studies support the use of the *da Vinci*® Surgical System as an effective tool for minimally invasive surgery for specific procedures, individual results may vary. Training provided by Intuitive Surgical is limited to the use of the *da Vinci* System. Intuitive is not responsible for procedure descriptions. Unless otherwise noted, products featured are cleared for commercial distribution in the U.S. and bear the CE mark. For availability and clearances outside the US, please check with your local representative or distributor. For complete technical and labeling information, including indications, contraindications, warnings, precautions and safety information, please refer to [www.intuitivesurgical.com/safety](http://www.intuitivesurgical.com/safety).

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<sup>1</sup> Oliveira JM, Antunes MJ. Mitral valve repair: better than replacement. *Heart*. 2006 Feb;92(2):275-81. <sup>2</sup> Kam JK, Cooray SD, Kam JK, Smith JA, Almeida AA. A cost-analysis study of robotic versus conventional mitral valve repair. *Heart Lung Circ*. 2010 Jul;19(7):413-8. Epub 2010 Mar 30. <sup>3</sup> Meyer MA, von Segesser LK, Hurni M, Stumpe F, Eisa K, Ruchat P. Long-term outcome after mitral valve repair: a risk factor analysis. *Eur J Cardiothorac Surg*. 2007 Aug;32(2):301-7. Epub 2007 Jun 11. <sup>4</sup> Mihajlevic T, Jarrett CM, Gillinov AM, Williams SJ, DeVilliers PA, Stewart WJ, Svensson LG, Sabik JF 3rd, Blackstone EH. Robotic repair of posterior mitral valve prolapse versus conventional approaches: potential realized. *J Thorac Cardiovasc Surg*. 2011 Jan;141(1):72-80.e1-4. Epub 2010 Nov 19. <sup>5</sup> Suri RM, Antiel RM, Burkhardt HM, Huebner M, Li Z, Eton DT, Topilsky T, Sarano ME, Schaff HV. Quality of life after early mitral valve repair using conventional and robotic approaches. *Ann Thorac Surg*. 2012 Mar;93(3):761-9. <sup>6</sup> Woo YJ, Nacke EA. Robotic minimally invasive mitral valve reconstruction yields less blood product transfusion and shorter length of stay. *Surgery* 2006; 140 (2):263-67. <sup>7</sup> Folliguet T, Vanhuysse F, Constantino X, Realli M, Laborde F. Mitral valve repair robotic versus sternotomy. *Eur J Cardiothorac Surg*. 2006 Mar;29(3):362-6. Epub 2006 Jan 19. <sup>8</sup> Felger JE, Chitwood WR Jr, Nifong LW, Holbert D. Evolution of mitral valve surgery: toward a totally endoscopic approach. *Ann Thorac Surg*. 2001 Oct;72(4):1203-8; discussion 1208-9. <sup>9</sup> National Institutes of Health. Mitral Valve Surgery. Available from: <http://www.nlm.nih.gov/medlineplus/ency/article/007411.htm> <sup>10</sup> National Institutes of Health. Mitral Valve Surgery, Open Surgery. Available from: <http://www.nlm.nih.gov/medlineplus/ency/article/007412.htm>