Superior septal approach for mitral valve surgery

Ovidio A. Garcia-Villarreal*

Department of Cardiac Surgery, Hospital of Cardiology, Monterrey, Nuevo León, Mexico

* Corresponding author. Sierra Nayarita 143, Col. Virginia Tafich, 66374, Santa Catarina, Nuevo Leon, Mexico. Tel: +52-82-8388917; e-mail: ovidiogv@hotmail.com

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Abstract

Superior septal approach is a very useful technique to address the mitral valve surgery. Since this approach virtually divides the left atrium in two parts between the ascending aorta and the superior vena cava, mitral valve exposure becomes quite easy. We present a case of mitral valve repair by means of this approach.

Keywords: Cardiac surgical procedures • Heart atria • Mitral valve

INTRODUCTION

Optimal visualization of the mitral valve (MV) is required for any MV surgery. Several factors such as the location of the left atrium (LA) at the back of the heart, median sternotomy as the preferred approach, a small LA and a very deep thoracic cavity may adversely affect MV exposure. All these factors may make the conventional approaches unsatisfactory to address the MV. Superior septal approach (SSA) provides optimal exposure of the MV.

CASE DESCRIPTION

This is a case of a 47-year old male patient. He was diagnosed to have severe MV regurgitation. Echocardiography showed a mechanism Type II according to Carpentier’s surgical classification with P2 prolapse. He was in NYHA functional class II. MV repair was performed by P2 quadrangular resection plus annuloplasty band insertion. SSA was used to address the MV (Video 1).

SURGICAL TECHNIQUE

Operation is performed through median sternotomy on cardiopulmonary bypass. Ascending aorta and bicaval cannulation are used. Several critical steps must be taken into account. We always insert a right-angled cannula in the superior vena cava, so free access is obtained between this one and right atrial appendage (Fig. 1A). Once the aorta is cross-clamped, anterograde cold cardioplegia is administered. At this point, caval tapes are snuggled. Right atrium is opened parallel to the right atrioventricular groove at least 2 cm outside (Fig. 1B). This incision is largely extended superiorly across the right atrial appendage until reaching the junction of the bi-atrial roof (Fig. 1C), and inferiorly just in front of the inferior vena cava cannulation site (Fig. 1B). Four 4/0 polypropylene stay sutures are placed to fully expose the interatrial septum. Fossa ovalis is now located and opened in a longitudinal way. Fossa ovalis incision is extended until reaching the LA roof (Fig. 1D). We recommend to extend the incision 2 or 3 cm superiorly into the LA roof. This incision must be placed exactly at a midpoint between the aortic root and the superior vena cava, so enough tissue is left in both sides to assure a safe further closure. Two small retractors are required to expose the MV (Video 1).

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the right atrium origin. We place the first stitch over the LA suture line, and the second stitch just where the right atrium arises. Teflon pledgets are used to knot the suture properly. This suture line is prolonged downwards beyond right atrial appendage. A 4/0 polypropylene double running suture is used to close the inferior end of the right atrial incision. This is continued until reaching the other one and knotting both ends. Aortic clamp is removed, and the rest of the operation is performed as usual.

**DISCUSSION**

Perfect exposure of the MV is crucial to perform any type of MV surgery. Sometimes, the conventional LA incision through Sondergaard’s groove does not give ideal exposure. In fact, the lack of the surgeon’s vision towards the MV by bulging the atrial septum can become a major disadvantage. Since SSA virtually divides the LA between the ascending aorta and the superior vena caval system, it allows for better visualization of the MV. This technique can be particularly beneficial for mitral valve procedures where access to the MV is limited, providing a better working environment for the surgeon.
cava, it provides an undistorted MV exposure with no forceful retraction. From the standpoint of simplicity, closure of the atriotomy in SSA takes certainly a little more time. However, this technique has been enhanced by controlling the critical areas with a potential risk of bleeding by using routinely pledgeted sutures. Cardiac rhythm disturbances related to the unavoidable sinus node artery transection in SSA have been argued [1]. We have previously published our results regarding this issue. Most patients with prior normal sinus rhythm in this series recovered this normal rhythm at hospital discharge [2]. Preoperative, intraoperative and postoperative data of 324 patients operated on with this technique are illustrated in Table 1.

In conclusion, SSA gives excellent exposure of the MV with minimal need for atrial retraction. It is advisable for almost any kind of MV surgery, especially for small LA. In our experience, cardiac rhythm disturbances with this technique are temporary and solved at hospital discharge in most cases.

Conflict of interest: none declared.

REFERENCES


Table 1: Preoperative and postoperative data of all cases underwent superior septal approach to mitral valve surgery

<table>
<thead>
<tr>
<th>Cases</th>
<th>324</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, female</td>
<td>220 (67.9%)</td>
</tr>
<tr>
<td>NYHA functional class</td>
<td>2.9 ± 0.7</td>
</tr>
<tr>
<td>LVEF</td>
<td>0.51 ± 0.09</td>
</tr>
<tr>
<td>PSAP (mmHg)</td>
<td>53 ± 12</td>
</tr>
<tr>
<td>Left atrium (cm)*</td>
<td>6.2–6.5–5.9</td>
</tr>
<tr>
<td>Previous cardiac surgery</td>
<td>43 (13.2%)</td>
</tr>
<tr>
<td>Mitral valve procedures</td>
<td></td>
</tr>
<tr>
<td>Isolated</td>
<td>189</td>
</tr>
<tr>
<td>Mitral valve repair</td>
<td>111</td>
</tr>
<tr>
<td>Mitral valve replacement</td>
<td>78</td>
</tr>
<tr>
<td>Biological</td>
<td>52</td>
</tr>
<tr>
<td>Mechanical</td>
<td>26</td>
</tr>
<tr>
<td>Associated procedures</td>
<td>135</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>15</td>
</tr>
<tr>
<td>Tricuspid valve repair</td>
<td>19</td>
</tr>
<tr>
<td>Tricuspid valve replacement</td>
<td>03</td>
</tr>
<tr>
<td>CABG</td>
<td>98</td>
</tr>
<tr>
<td>Perfusion time (min)</td>
<td>122 ± 14</td>
</tr>
<tr>
<td>Cross-clamp time (min)</td>
<td>86 ± 9</td>
</tr>
<tr>
<td>Bleeding in 24 h (ml)</td>
<td>452 ± 26</td>
</tr>
<tr>
<td>Reoperation for chest bleeding</td>
<td>20 (6.1%)</td>
</tr>
<tr>
<td>Exhusted in OR</td>
<td>224 (84.5%)</td>
</tr>
<tr>
<td>Reintubated</td>
<td>19 (5.8%)</td>
</tr>
<tr>
<td>Prolonged intubation</td>
<td>71 (21.9%)</td>
</tr>
<tr>
<td>Renal failure</td>
<td>19 (5.8%)</td>
</tr>
<tr>
<td>LOS in ICU (days)</td>
<td>2.5 ± 1.3</td>
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<tr>
<td>LOS in-hospital after surgery (days)</td>
<td>10 ± 2.3</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>12 (3.7%)</td>
</tr>
<tr>
<td>Operative mortality</td>
<td>17 (5.2%)</td>
</tr>
<tr>
<td>Postoperative heart rhythm</td>
<td></td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>129 (39.8%)</td>
</tr>
<tr>
<td>Normal sinus rhythm</td>
<td>178 (54.9%)</td>
</tr>
<tr>
<td>AV block</td>
<td>10 (3%)</td>
</tr>
<tr>
<td>Other disturbances</td>
<td>10 (3%)</td>
</tr>
<tr>
<td>Permanent pacemaker</td>
<td>09 (2.7%)</td>
</tr>
</tbody>
</table>

AV: atrioventricular; CABG: coronary artery bypass grafting; ICU: intensive care unit; LVEF: left ventricular ejection fraction; LOS: length of stay; NYHA: New York Heart Association; OR: operating room; PSAP: pulmonary systolic artery pressure.

*Left atrial diameters (anterior–posterior)-(superior–inferior)-(transversal) by transthoracic echocardiography.