Atrioventricular Septal Defect
Modified Single Patch Technique

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I have no financial disclosures or conflicts of interest to disclose

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History

THE DIRECT-VISION INTRACARDIAC CORRECTION OF CONGENITAL ANOMALIES BY CONTROLLED CROSS CIRCULATION

RESULTS IN THIRTY-TWO PATIENTS WITH VENTRICULAR SEPTAL DEFECTS, TETRALOGY OF FALOT, AND ATRIOVENTRICULARIS COMMUNIS DEFECTS

C. WALTON LILLEHEI, M.D., MORLEY COHEN, M.D. HERBERT E. WARDEN, M.D., AND RICHARD L. VARCO, M.D., MINNEAPOLIS, MINN.

(From the Department of Surgery, University of Minnesota Medical School)

Surgery 1955;38–11–29
Lillehei Operative Technique
(drawing dated June 1954)
Background. There are few congenital anomalies of the heart that have benefited more from thorough anatomic analysis than the complex anomaly known as atrioventricular septal defect in the setting of common atrioventricular junction. Recent advances in understanding the anatomy of this lesion have led to alternative methods of repairing these defects.

Methods. The medical records of 21 consecutive patients undergoing repair of complete atrioventricular septal defect have been reviewed. Nine of these patients had a standard one- or two-patch direct closure of the ventricular element. The medical records of 12 patients who underwent an alternative method of repair were also reviewed.

Results. Direct closure resulted in significantly shorter pump and cross-clamp times. Follow-up for an average of 34 months suggests that when direct closure can be performed, the results are comparable with those of the more standard technique.

Conclusions. Our initial success with this approach is encouraging; however, longer follow-up is required to establish whether it will be broadly applicable.

Objective: Because of the complexity of traditional 1- and 2-patch techniques for the repair of complete atrioventricular septal defect, we modified our repair technique to avoid the use of any ventricular septal patch material. We report our prospective experience with this simplified 1-patch technique. Method: Forty-seven consecutive patients between May 1995 and August 1998 underwent repair with the use of this technique without modification. Repair was done in all patients by direct suturing of the common atrioventricular valve leaflets to the crest of the ventricular septum. No division of valve leaflets was necessary. A single pericardial patch was used to close the defect in the atrial septal component. Follow-up included electrocardiography and echocardiographic assessment of ventricular function, atrioventricular valve function, and adequacy of the left ventricular outflow tract. Results: There were 2 deaths (4%), only 1 cardiac related, in the series. There were 17 male patients and 30 female patients. Mean age at repair was 5.6 months (median, 3.4 months). Associated lesions were repaired in 19 patients (40%). Mean follow-up was 1.85 years (median, 1.9 years). There was no heart block. There were no significant residual ventricular septal defects detected and no left ventricular outflow tract obstruction seen on echocardiography in any patient to date. Mitral valve status after operation was assessed as no incompetence in 13 patients (28%), minimal in 19 patients (40%), mild in 12 patients (26%), and moderate in 3 patients (6%). Conclusion: The repair of complete atrioventricular septal defect by direct suturing of the atrioventricular valve leaflets to the crest of the ventricular septum with a single-patch technique greatly simplified the repair and does not lead to left ventricular outflow tract obstruction nor interfere with valve function.

(J Thorac Cardiovasc Surg 1999;118:642-7)
Complete AVSD
Modified Single - Patch
Modified Single Patch
Modified Single Patch
Complete Atrioventricular Canal: Comparison of Modified Single-Patch Technique With Two-Patch Technique

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Background. The purpose of this study was to compare the modified single-patch technique to the two-patch technique for infants with complete atrioventricular canal (CAVC) defects.

Methods. Between January 2000 and June 2006, 55 infants underwent CAVC repair. Twenty-six patients had a modified single-patch technique; 29 patients had a two-patch technique. Trisomy 21 was present in 23 of 26 and 26 of 29 patients (p = not significant [ns]). Mean age was 4.4 ± 1.3 months (single-patch) versus 5.5 ± 1.9 months (two-patch, p < 0.02). Mean weight was 4.74 ± 0.92 versus 5.28 ± 1.67 kilograms (p = ns).

Results. There was one death in the modified single-patch group (postoperative day 130, liver failure) and no deaths in the two-patch group. Cross-clamp times and cardiopulmonary bypass times were shorter in the modified single-patch group (97.3 ± 19.9 vs 123.3 ± 28.2 minutes, p < 0.0003; 128 ± 25 vs 157 ± 37, p < 0.03). Rastelli classification was type A (18 vs 14), B (1 vs 0), and C (7 vs 15). Mean size of the ventricular septal defect as assessed by transesophageal echocardiogram was 9 ± 2 mm, (single-patch) versus 10 ± 3 mm (two-patch) (p = ns). Median postoperative length of stay did not differ (10 vs 8 days). There was no difference in the degree of postoperative left or right AV valve insufficiency as assessed by serial echocardiography. One patient (4%) required reoperation for mitral insufficiency in the modified single-patch versus three patients in the two-patch group (10%, p = ns). There were no patients with third degree atrioventricular block or that required reoperation for residual VSD in the modified single-patch group. There was one patient with third-degree AV block that required a pacemaker and one patient who had reoperation for a residual ventricular septal defect in the two-patch group (p = ns). No patient in either group required reoperation for left ventricular outflow tract obstruction.

Conclusions. The modified single-patch technique produced results comparable with the two-patch technique in younger patients with similarly sized ventricular septal defects. Furthermore, the modified single-patch technique was performed with significantly shorter cross-clamp and cardiopulmonary bypass times.

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Results: Modified Single Patch
2000-2011 (n = 56)

- Mean age 4 mos, mean weight 5.3 kg
- 30-day Mortality = 0
- Late Mortality = 2
- Median Postop LOS = 10 days
- Reoperation
  - Left AV valve 3 (5%) 1 early, 2 late (3.5%)
  - Pacemaker 0
  - LVOTO 1 (1.7%, prior COA repair)
  - VSD 1 (1.7%)
A single surgeon experience using a modified single patch technique for the repair of 128 patients with complete atrioventricular canal is presented. Thirty-day mortality was 1.6%. Follow-up of these patients has shown no incidence of significant residual ventricular septal defect, a 2.3% incidence of reoperation on the mitral valve, and no instances of left ventricular outlet obstruction requiring resection in the follow-up period. Comparisons are drawn between these results and the author’s own experience with repair of complete atrioventricular canal using a two-patch technique (46 cases) and repair of partial atrio-ventricular canal (126 cases) to shed light on late valve function and left ventricular outlet obstruction in all groups.

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Pledgeted sutures placed well away from the septal crest posteriorly.
## Modified Single-Patch Technique

<table>
<thead>
<tr>
<th>Author</th>
<th># Patients</th>
<th>Operative Mortality</th>
<th>Mitral Valve Reoperation</th>
<th>Heart Block</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilcox</td>
<td>12</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nunn</td>
<td>128</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Jonas</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Backer</td>
<td>56</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>230</strong></td>
<td><strong>4 (1.7%)</strong></td>
<td><strong>6 (2.6%)</strong></td>
<td><strong>1 (0.4%)</strong></td>
</tr>
</tbody>
</table>
Conclusions

• The modified single-patch technique (Australian technique, Lillehei technique) is our current procedure of choice for Atrioventricular Septal Defect repair

• Ideal age = 4 months

• Operative mortality < 2%

• Pacemaker < 1%

• Left AV valve reoperation < 3%

• LVOT reoperation < 2%