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严重脊柱侧弯患者经右侧肋间行微创二尖瓣、主动脉瓣置换术1例并文献复习

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摘　要

微创心血管手术的进步与发展拓宽了由于脊柱侧弯导致的肺功能不全患者的手术路径，提高了患者对同种心血管手术的耐受能力，同时也降低了患者术后因肺功能降低而引发的多种并发症。我们在此篇报告描述一例脊柱侧弯引起胸廓畸形、肺功能较差的患者，由于术式的改进从而能够耐受在体外循环下同期主动脉瓣、二尖瓣瓣膜置换术。

关键词

脊柱侧弯，微创，二尖瓣置换术，主动脉瓣置换术

Minimally Invasive Mitral and Aortic Valve Replacement via the Right Intercostal Space in a Patient with Severe Scoliosis and Review of the Literature

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Abstract

The progress and development of minimally invasive cardiovascular surgery broadens the surgical path of patients with pulmonary insufficiency caused by scoliosis and improves the patient's tolerance to the same kind of cardiovascular surgery. At the same time, it also reduces a variety of postoperative complications caused by decreased pulmonary function. In this report, we describe a patient with thoracic deformity and poor pulmonary function caused by scoliosis who was able to tolerate simultaneous aortic and mitral valve replacement under cardiopulmonary bypass.

Keywords

Scoliosis, Minimally Invasive, Mitral Valve Replacement, Aortic Valve Replacement

1. 引文

大量数据证实先天性、特发性、创伤性等类型的脊柱侧弯均会引起患者心肺解剖和功能异常的患病率、发病率的升高[1]。严重的脊柱侧弯不仅会使心脏瓣膜受到结构性的损害，引发慢性心力衰竭，继发肺功能低下，也会因为脊柱结构改变促使胸廓结构改变引发限制性肺部缺陷导致患者肺功能进一步降低[2]。当脊柱侧弯患者因心脏瓣膜疾病拟行手术治疗时，传统的平卧位，经胸骨正中切口为手术入路就会收到解剖结构的影响而难以实现，不仅手术难度加大，术后心肺功能较差也将直接影响患者预后及恢复[3]。

我们在此报告一例严重脊柱侧弯患者经右侧第三肋间小切口微创行同期主动脉瓣、二尖瓣生物瓣膜置换术，术后患者心肺功能恢复快、预后好。数据使用已告知患者并经患者知情同意。

2. 病历资料

一位 67 岁老年男性，因幼时右肩脱位未予治疗导致脊柱侧弯、胸廓畸形(图 1、图 2 所示)，体检时发现二尖瓣脱垂(A3 区为主)、二尖瓣腱索断裂、二尖瓣关闭不全(重度)、主动脉瓣关闭不全(重度)拟行二尖瓣和主动脉瓣置换术。入院时，患者脊柱呈 S 形侧弯，胸廓畸形明显，两肩呈左低右高状，存在限制性通气呼吸功能障碍，在未予任何辅助呼吸措施下 PaO_2 和 $PaCO_2$ 分别为 59.10 mmHg、51.60 mmHg，为 II 型呼吸衰竭，经皮氧饱和度为 90.9%。治疗上给予持续低流量(2 L/min)吸氧后，患者肺功能明显得到改善，PaO_2 和 $PaCO_2$ 分别提升至 111.00 mmHg、41.00 mmHg，氧饱和度提高至 98.30%。

冠状动脉造影显示冠状动脉正常，左心室收缩力良好。经胸心脏彩超显示二尖瓣脱垂(A3 区为主)伴中到重度反流，主动脉瓣对合不良伴中度反流。胸部平扫显示心脏向右扩大，伴有相应器官移位和严重的脊柱侧弯。

手术时，在全麻下，双腔气管插管单肺通气，患者取平卧位，右侧垫高与床面呈 30 度。全身肝素化后，采用 20F 动脉插管和 24F 静脉插管经右侧股动静脉建立体外循环(CPB)。在右前外侧第三肋间行 8 cm 小切口，胸腔内充满二氧化碳，胸膜与心包膜黏连但相对容易剥脱，心脏明显左旋移位，经冠状动脉开

Figure 1. Shows a plain chest scan before operation
图 1. 术前胸部平扫

Figure 2. Shows a plain chest scan after operation
图 2. 术后第 4 天复查时胸部平扫

口左右冠直接灌注停跳液后探查主动脉瓣，主动脉瓣三叶钙化及变性严重，无冠瓣和右冠瓣对合错位，切除病变瓣膜。斜切房间沟探查二尖瓣，二尖瓣双叶呈严重的波浪状改变伴中度钙化、二尖瓣腱索断裂，切除瓣膜，瓣膜线间断缝合置换 27 mm 进口牛心包二尖瓣生物瓣，试瓣启闭正常，用 4-0 prolene 线连续缝合左房切口。瓣膜线间断缝合置换 2 mm 进口牛心包主动脉瓣生物瓣，试瓣启闭正常，5-0 prolene 线连续缝合主动脉切口。充分排空左心系统气体后，开放主动脉，心脏自动复跳，并行循环复温，CPB 脱机顺利。手术后返回重症监护病房时 ABG 良好：pH 7.45，$PaCO_2$ 41.00 mmHg，PaO_2 111 mmHg。术后第 7 天拔除气管插管。为避免患者术后因心肺功能较差出现呼吸衰竭，在监护室病房成功拔管后，应用 BiPAP 无创呼吸机辅助呼吸[1]，患者术后心、肺功能并没有恶化且恢复良好。患者出院 1 月后门诊复查情况：患者心脏超声及胸部 CT 检查正常。

3. 讨论

目前许多研究表明脊柱侧弯促使心脏相关疾病发病率增高，主动脉瓣、二尖瓣瓣膜疾病发生率明显高于其他心脏疾病的发生率，因此定期行超声心动图是最简单、有效能够使患者意识其心脏异常的最佳方法之一[4] [5] [6]。以微创经右侧肋间为手术入路行主动脉瓣及二尖瓣置换术无论从创伤性、安全性还是从手术愈后等方面患者获益都高于常规胸骨正中入路方式[7] [8]。尤其适合患有脊柱侧弯和胸廓畸形患者同期行主动脉瓣、二尖瓣置换术[9]。常规胸骨正中入路不仅由于患者脊柱弯曲、胸廓畸形难以平卧，更会因解剖结构异常的原因，影响手术视野，手术精细操作难以实现，延长了手术时间，增加了术后并发症的发生率[10] [11]。正如此篇报道病例，经过术前评估及探讨，选择将患者右侧垫高至与手术台呈

30˚，以右胸第三肋间为手术入路部位，即可充分暴露主动脉根部，切开主动脉根部探查及置换主动脉瓣，斜切房间沟探查及置换二尖瓣，手术视野清晰、精细操作简便，切除病变瓣膜及缝合生物瓣膜快捷，整个置换过程及缝合过程因没有胸骨的损伤，出血量较少，手术整体时长同常规正中行双瓣置换手术治疗无明显延长，停体外循环后患者自主心跳恢复迅速，停机过程顺畅，生命体征平稳，手术整体过程达到了术前预期[12] [13]。术后返回心脏外科监护室继续治疗，因患者术前肺功能较差，可见术后行床旁胸部平片提示患者右侧肺部因脊柱侧弯影响较大，术后拔管时间较其他患者稍有延长，加强呼吸道护理后未发生感染等情况[14] [15] [16]。出院前(术后第 12 天)再行超声心动图和胸部 CT 平扫可见心肺功能恢复至预期水平，患者出院后分别于出院后 1、3、6 月于我院门诊复诊，复查结果较术前明显好转。微创经右胸小切口成为了脊柱侧弯未矫治患者行心脏瓣膜置换手术入路的新选择，具有的优点有：① 切口长度较胸骨正中切口短(长度大约为 5~10 cm)，切口位置因乳房遮挡等相对隐蔽，美观性及愈合性较好；② 手术整体出血量少、创伤性小；③ 操作方便、开关胸便捷，无胸骨对合不良等并发症，切口更安全；④ 一侧肺叶单肺通气，无论是术中还是术后均可对减少肺部并发症的发生；⑤ 无胸骨固定钢丝或骨蜡等异物滞留于体内，引发患者切口出现排异反应，降低了切口愈合不良发生率，因此可优先选为该类患者手术入路[17] [18]。但这类切口也有一些缺点需要我们去重视和改进：① 手术视野受限制，心脏暴露不完全，无法同胸骨正中切口一样对心脏整体行更为全面的探查；② 容易对术侧肺部造成长时间的挤压与损伤；③ 术中无法安放临时起搏电极或心包胸骨后引流，应对心脏反复室颤、复跳不佳、大量出血等意外情况相对困难[18]。目前临床已采取多种应对方法减少以上缺点，如研发出多种特制器材(如图 3~5)配合微创右侧肋间小口(特制长针持、线剪、打结器、撑开器等)；采用双腔气管插管，减少对整体肺功能的影响及损伤；术前贴合除颤电极贴等，但我们仍然需要更为完善的方案和配合来扩大优势，减少缺点的发生及影响[19]。微创瓣膜置换时代的到来让心脏外科医生不得不去寻求思想与技术新突破[20] [21] [22]。

Figure 3. Shows endoscopic instruments
图 3. 为内窥镜器械

Figure 4. Shows endoscopic instruments
图 4. 链式阻断钳

Figure 5. Shows left atrial shunt
图 5. 左心房分流器

4. 结论

脊柱侧弯患者会引发多器官移位及变形，增加了心脏疾病如瓣膜移位及病变的风险率和发生率，最终需要进行心脏瓣膜手术去修复和改善。对于本篇报告中的患者由于脊柱侧弯、胸廓畸形、肺功能差的原因，不适宜采用平卧位的胸骨正中切口进行同期双瓣置换术，更适合采用经右胸小切口的入路方式。

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