

· 论著 ·

胸骨下端小切口微创手术治疗先天性心脏病的效果

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【摘要】 目的 探讨胸骨下端小切口微创手术治疗先天性心脏病的效果。方法 回顾性选取2016年8月至2021年3月于贵州省人民医院行手术治疗的先天性心脏病患者332例为研究对象。根据手术方法将患者分为胸骨下端小切口微创手术组和传统开胸手术组, 各166例。比较两组基线资料、手术相关指标(手术时间、体外循环时间、主动脉阻断时间、术后引流量)、呼吸机使用时间、ICU停留时间、安全性指标(术后并发症发生情况)、预后指标(非计划再次手术情况、围术期死亡情况)。结果 胸骨下端小切口微创手术组年龄小于传统开胸手术组, 体质量、肺静脉异位引流(APVC)发生率高于传统开胸手术组($P < 0.05$)。胸骨下端小切口微创手术组手术时间、体外循环时间、主动脉阻断时间、呼吸机使用时间、ICU停留时间短于传统开胸手术组, 术后引流量小于传统开胸手术组($P < 0.05$)。胸骨下端小切口微创手术组术后并发症发生率低于传统开胸手术组($P < 0.05$)。两组无一例患者进行非计划再次手术及发生围术期死亡。结论 胸骨下端小切口微创手术可有效缩短先天性心脏病患者的手术时间及ICU停留时间, 促进患者康复, 虽然其操作难度稍大, 但术者完全能够克服, 且其安全性好, 值得广泛推广。

【关键词】 心脏病; 先天性心脏病; 微创外科手术; 胸骨下端小切口微创手术; 传统开胸手术; 治疗结果

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Effect of Minimally Invasive Surgery with Small Incision at the Lower End of the Sternum in the Treatment of Congenital Heart Disease

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【Abstract】 Objective To investigate the effect of minimally invasive surgery with small incision at the lower end of the sternum in the treatment of congenital heart disease. **Methods** A total of 332 patients with congenital heart disease who underwent surgical treatment in Guizhou Provincial People's Hospital from August 2016 to March 2021 were retrospectively selected as the research subjects. According to the surgical method, the patients were divided into minimally invasive surgery with small incision at the lower end of the sternum group and traditional thoracotomy group, with 166 cases in each group. The baseline data, surgery-related indicators (operation time, cardiopulmonary bypass time, aortic occlusion time, postoperative drainage volume), ventilator use time, ICU stay time, safety indicators (postoperative complications), and prognostic indexes (non-planned surgery, perioperative death). **Results** The age of the minimally invasive surgery with small incision at the lower end of the sternum group was younger than that of the traditional thoracotomy group, and the body weight and the incidence of anomalous pulmonary venous connection (APVC) were higher than those in the traditional thoracotomy group ($P < 0.05$). The operation time, cardiopulmonary bypass time, aortic occlusion time, ventilator use time, and ICU stay time in the minimally invasive surgery with small incision at the lower end of the sternum group were shorter than those in the traditional thoracotomy group, and the postoperative drainage volume was smaller than that in the traditional thoracotomy group ($P < 0.05$). The incidence of postoperative complications in the minimally invasive surgery with small incision at the lower end of the sternum group was lower than that in the traditional thoracotomy group ($P < 0.05$). No non-planned surgery or perioperative death occurred in any patient in the two groups. **Conclusion** Minimally invasive surgery with small incision at the lower end of the sternum can effectively shorten the operation time and ICU stay time of patients with congenital heart disease, and promote the recovery of

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patients. Although the operation is slightly difficult, the operator can completely overcome it, and its safety is good, so it is worth popularizing widely.

【Key words】 Heart diseases; Congenital heart disease; Minimal surgical procedures; Minimally invasive surgery with small incision at the lower end of the sternum; Traditional thoracotomy; Treatment outcome

先天性心脏病是心外科常见疾病,大部分患者需要外科手术矫治,其中传统正中开胸完全纵行劈开胸骨的手术方法仍然是目前临床上运用较多的术式,此手术方法创伤大、术后胸廓畸形等相关并发症多。随着医学发展,微创手术已成为当前的趋势,贵州省人民医院自2013年开展胸腔镜辅助下心内直视手术以来,同时采取了胸骨下端小切口微创手术对部分先天性心脏病患者进行手术矫治,获得了较好的效果。本研究旨在分析胸骨下端小切口微创手术治疗先天性心脏病的效果,以期为先心病的临床治疗提供参考。

1 对象与方法

1.1 研究对象 回顾性选取2016年8月至2021年3月于贵州省人民医院行手术治疗的先天性心脏病患者332例为研究对象。纳入标准:(1)符合先天性心脏病的诊断标准及手术指征^[1];(2)常见先天性心脏病(心内畸形):室间隔缺损(ventricular septal defect, VSD)、房间隔缺损(atrial septal defect, ASD)、肺静脉异位引流(anomalous pulmonary venous connection, APVC)、三尖瓣反流(tricuspid valve regurgitation, TVR)、二尖瓣反流(mitral valve regurgitation, MVR)、肺动脉瓣狭窄(pulmonary stenosis, PS)。排除标准:(1)胸廓畸形及纵隔心包粘连;(2)心脏旋转、术中难以暴露。根据手术方法,将患者分为胸骨下端小切口微创手术组和传统开胸手术组,各166例。本研究符合《赫尔辛基宣言》中有关伦理学的要求,患者术前均签署了知情同意书。

1.2 手术方法 患者均取仰卧位,常规消毒铺单,进行全身麻醉下气管插管,于桡动脉置管测压,右颈内静脉置双腔管以建立补液通道。传统开胸手术组完全切开胸骨,悬吊心包以暴露心脏,进行上下腔静脉套带,在升主动脉相应部位缝荷包并分别插入主动脉管及灌注管,于上下腔静脉插入直头管,转机,浅低温下阻断升主动脉,于右心房、房间隔切口入路行心内畸形矫治,术毕关胸,用钢丝固定胸骨。胸骨下端小切口微创手术组于胸骨体中下端相应位置行皮肤切口(3~5 cm),分离剑突,自下向上部分锯开中下段胸骨(保留胸骨柄及部分胸骨体),撑开下端胸骨以显露并悬吊心包,用血管钳夹升主动脉近端并稍下拉以显露升主动脉,选取合适位置缝荷包并行升主动脉插管及灌注插管,其余步骤同传统开胸手术操作,术毕用关胸线(双股聚丙烯线)连续缝合胸骨以关胸,其余处理同传统正中开胸手

术操作。

1.3 观察指标 比较两组基线资料〔包括年龄、性别、体质量、心内畸形类型(VSD、ASD、APVC、TVR、MVR、PS)〕、手术相关指标(包括手术时间、体外循环时间、主动脉阻断时间、术后引流量)、呼吸机使用时间、ICU停留时间、安全性指标〔术后并发症(纵隔感染、切口感染、胸口畸形)发生情况〕、预后指标(非计划再次手术情况、围术期死亡情况)。

1.4 统计学方法 运用GraphPad Prism 7软件进行数据分析。符合正态分布的计量资料以($\bar{x} \pm s$)表示,组间比较采用两独立样本 t 检验;计数资料以相对数表示,组间比较采用 χ^2 检验。以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 基线资料 胸骨下端小切口微创手术组年龄小于传统开胸手术组,体质量、APVC发生率高于传统开胸手术组,差异有统计学意义($P < 0.05$);两组性别及VSD、ASD、TVR、MVR、PS发生率比较,差异无统计学意义($P > 0.05$),见表1。

2.2 手术相关指标、呼吸机使用时间、ICU停留时间 胸骨下端小切口微创手术组手术时间、体外循环时间、主动脉阻断时间、呼吸机使用时间、ICU停留时间短于传统开胸手术组,术后引流量小于传统开胸手术组,差异有统计学意义($P < 0.05$),见表2。

2.3 安全性指标 传统开胸手术组术后发生纵隔感染3例、切口感染7例、胸口畸形5例,术后并发症发生率为9.0%(15/166);胸骨下端小切口微创手术组无一例患者发生术后并发症。胸骨下端小切口微创手术组术后并发症发生率低于传统开胸手术组,差异有统计学意义($\chi^2 = 15.710, P < 0.001$)。

2.4 预后指标 两组无一例患者进行非计划再次手术及发生围术期死亡。

3 讨论

微创手术是当前外科手术的趋势,体外循环下心内直视手术也越来越注重微创方式^[1-4]。心外科常见的微创手术方式各异,包括机器人手术、全胸腔镜下及胸腔镜辅助下心内直视手术、非胸骨完全劈开的方式及其他入路手术方式等,这些手术方式虽具有明显优势,但也各自有相应的不足。胸骨下端小切口微创手术对心内疾病的常见畸形矫治具有可操作性,尤其对先天性心脏病的畸形矫治有很强的可行性。但此方式在术野暴露方面

表1 两组基线资料比较
Table 1 Comparison of baseline data between the two groups

组别	例数	年龄 ($\bar{x} \pm s$, 岁)	性别 (男/女)	体质量 ($\bar{x} \pm s$, kg)	心内畸形类型 [n (%)]					
					VSD	ASD	APVC	TVR	MVR	PS
传统开胸手术组	166	8.8 ± 0.3	87/79	24.2 ± 0.7	83 (50.0)	92 (55.4)	6 (3.6)	36 (21.7)	9 (5.4)	7 (4.2)
胸骨下端小切口微创手术组	166	8.7 ± 0.4	78/88	24.9 ± 0.7	79 (47.6)	100 (60.2)	19 (11.4)	42 (25.3)	7 (4.2)	6 (3.6)
$\chi^2 (t)$ 值		2.577 ^a	0.976	-9.110 ^a	0.193	0.790	7.310	0.603	0.263	0.080
P值		0.010	0.323	<0.001	0.661	0.374	0.007	0.437	0.608	0.777

注: VSD=室间隔缺损, ASD=房间隔缺损, APVC=肺静脉异位引流, TVR=三尖瓣反流, MVR=二尖瓣反流, PS=肺动脉瓣狭窄; ^a表示t值

表2 两组手术相关指标、呼吸机使用时间、ICU停留时间比较 ($\bar{x} \pm s$)
Table 2 Comparison of surgery-related indicators, ventilator use time, and ICU stay time between the two groups

组别	例数	手术时间 (min)	体外循环时间 (min)	主动脉阻断时间 (min)	术后引流量 (ml)	呼吸机使用时间 (h)	ICU停留时间 (h)
传统开胸手术组	166	107.9 ± 0.9	50.7 ± 0.6	20.8 ± 0.5	146.4 ± 4.4	8.7 ± 0.2	18.1 ± 0.4
胸骨下端小切口微创手术组	166	100.3 ± 1.1	49.1 ± 0.5	19.8 ± 0.4	106.8 ± 3.6	7.7 ± 0.2	16.4 ± 0.2
t值		68.896	26.394	20.122	89.746	45.552	48.976
P值		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

有一定的局限性,有些心外科医师认为,对先天性心脏病患者进行手术治疗时,与传统开胸手术相比,胸骨下端小切口微创手术视野暴露更困难、术中操作难度相对偏大、手术时间偏长,因此不太愿意采用此方法^[4-5]。本研究旨在分析胸骨下端小切口微创手术治疗先天性心脏病的效果。

随着当前体外循环插管、心肌保护措施及手术器械方面的改良,采用胸骨下端小切口微创手术治疗先天性心脏病越来越具有可操作性。研究显示,相对于传统开胸手术,胸骨下端小切口微创手术可缩短手术时间,因为在开胸、关胸环节,胸骨下端小切口微创手术操作时间更短^[5]。本研究结果显示,胸骨下端小切口微创手术组手术时间、体外循环时间、主动脉阻断时间短于传统开胸手术组,提示与传统开胸手术相比,胸骨下端小切口微创手术在治疗先天性心脏病患者中有明显的优势。胸骨下端小切口微创手术组呼吸机使用时间短于传统开胸手术组,这可能主要与胸骨下端小切口微创手术组患者术中创伤小、胸骨稳定性好,该手术对呼吸原动力的影响小,患者术后呼吸功能的恢复快有关。胸骨下端小切口微创手术组ICU停留时间短于传统开胸手术组,提示接受胸骨下端小切口微创手术的先天性心脏病患者较接受传统开胸手术的患者术后恢复更快。胸骨下端小切口微创手术组术后引流量小于传统开胸手术组,分析原因主要与胸骨下端小切口微创手术创面小、出血概率小有关。

心脏手术后切口感染与切口大小及缝合后的张力等有直接关系^[6-7],纵隔感染与胸骨稳定性差及纵隔附近局部感染有直接关系^[8-10]。研究显示,胸廓畸形的发生与胸骨损伤的程度、胸骨的稳定性及年龄等均有直

接关系^[11-12]。先天性心脏病是新生儿出生时就有的—类疾病,其诊断及治疗年龄偏小,术后更易出现胸廓畸形。本研究结果显示,胸骨下端小切口微创手术组术后并发症发生率低于传统开胸手术组,分析原因,虽然胸骨下端小切口微创手术采用聚丙烯关胸线连续缝合下端胸骨以关胸,理论上其受力要差于传统开胸手术采用的钢丝关胸的受力,但胸骨下端小切口微创手术保留了胸骨柄及部分胸骨体并维持其完整性,从而使胸骨的稳定性更好。本研究结果还显示,两组无一例患者进行非计划再次手术及发生围术期死亡,提示接受胸骨下端小切口微创手术与传统开胸手术的患者预后均较好。

此外,本研究结果显示,胸骨下端小切口微创手术组年龄小于传统开胸手术组,体质量、APVC发生率高于传统开胸手术组,但低年龄、体质量和心内畸形只会增加手术的难度,不会影响手术效果。

综上所述,胸骨下端小切口微创手术可有效缩短先天性心脏病患者的手术时间及ICU停留时间,促进患者康复,虽然其操作难度稍大,但术者完全能够克服,且其安全性好,值得广泛推广。但本研究为单中心、小样本量研究,且缺乏长期随访结果,尚需要多中心、大样本量研究进一步证实本研究结论。

作者贡献:罗洪波进行文章的构思与设计、结果的分析与解释、论文撰写与修订,负责文章的质量控制及审校,对文章整体负责、监督管理;罗洪波、蒋振威、张文斌进行研究的实施与可行性分析;罗洪波、蒋振威进行数据收集、整理,统计学处理。

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