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胸腔镜辅助小切口对多发肋骨骨折患者手术及康复的影响 *

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摘要 目的:探讨胸腔镜辅助小切口术式在严重多发肋骨骨折患者手术及术后康复中的应用前景。**方法:**选取我科收治的严重多发肋骨骨折患者作为研究对象,随机分为对照组和实验组,分别采取传统开胸手术方式和胸腔镜辅助小切口术式。术中记录手术时间、失血量等信息,术后记录引流管引流时间、术后住院时间以及发热、肺不张、肺炎、伤口感染、下肢静脉血栓、房颤等并发症发生率;分别于术前、术后 1 天、术后 3 天、术后 5 天、术后 7 天进行疼痛评分;在术后 1、3、6 个月评估患者的生活质量。通过统计学分析,对比两组间有无统计学差异。**结果:**(1)实验组在手术时间、术中出血量、术后胸腔引流时间、术后住院天数等方面均显著优于对照组;(2)在术后并发症方面,实验组肺炎发生率显著低于对照组,其他并发症组间无明显差异;(3)实验组术后第三天,疼痛评分已降至轻度疼痛,不影响正常生活,对照组在术后第五天降为轻度疼痛,显著低于实验组;(4)实验组在术后 3 个月生活质量基本恢复正常,对照组至术后 6 个月才基本正常,显著低于实验组。**结论:**胸腔镜辅助小切口术式在严重胸部外伤患者手术的应用中显著优于传统开胸术式,值得临床推广借鉴。

关键词:胸腔镜辅助小切口;肋骨骨折;并发症;生活质量

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Effect of Thoracoscopic Assisted Small Incision on Operation and Rehabilitation of Patients with Multiple Rib Fractures*

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ABSTRACT Objective: To explore the application prospect of thoracoscopic assisted small incision surgery in the operation and postoperative rehabilitation of patients with severe multiple rib fractures. **Methods:** The patients with severe multiple rib fractures in our department were randomly divided into control group and experimental group. The patients were treated with traditional thoracotomy and thoracoscopic assisted small incision respectively. The operation time, blood loss and other information were recorded during the operation. After the operation, the drainage time of the drainage tube, the postoperative hospital stay and the incidence of complications such as fever, atelectasis, pneumonia, wound infection, lower limb venous thrombosis and atrial fibrillation were recorded; Pain scores were made before operation, 1 day after operation, 3 days after operation, 5 days after operation and 7 days after operation; The quality of life was assessed at 1, 3 and 6 months after operation. Through statistical analysis, compare whether there is statistical difference between the two groups. **Results:** (1) the experimental group was significantly better than the control group in operation time, intraoperative blood loss, postoperative thoracic drainage time and postoperative hospital stay; (2) In terms of postoperative complications, the incidence of pneumonia in the experimental group was significantly lower than that in the control group, and there was no significant difference among other complication groups; (3) On the third day after operation, the pain score in the experimental group decreased to mild pain, which did not affect normal life. On the fifth day after operation, the pain score in the control group decreased to mild pain, which was significantly lower than that in the experimental group; (4) The quality of life in the experimental group basically returned to normal 3 months after operation, and that in the control group was basically normal 6 months after operation, which was significantly lower than that in the experimental group. **Conclusion:** Thoracoscopic assisted small incision surgery is significantly better than traditional thoracotomy in the operation of patients with severe chest trauma, which is worthy of clinical promotion and reference.

Key words: Thoracoscopic assisted small incision; Rib fracture; Complication; Quality of life

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前言

胸廓是人体最不易受伤的部位,一旦发生胸部损伤,则说明伤情相对较严重。导致胸外伤的因素较多,临床工作中以交通事故及工伤为主^[1],常常导致肋骨骨折、胸骨骨折、血气胸等,且致死率较高,其中肋骨骨折最为常见^[2,3]。肋骨骨折根据骨折数不同则治疗方式也不同,有研究表明^[4],大于三处肋骨骨折即应接受手术治疗,若出现多根多处肋骨骨折,甚至出现连枷胸,则必须接受手术治疗。近年来,我院收治胸外伤患者逐渐增多,多发肋骨骨折患者居多,且多数合并血胸、气胸、肺挫裂伤等,传统切开复位内固定手术已不能满足医患对于医疗质量的需求。随着诊疗技术的发展,胸部外伤治疗方式也朝着微创方向发展,对于需要开胸探查的胸外伤患者,胸腔镜辅助小切口术式逐渐在临床开展应用,并取得了较好的疗效。本文将对胸腔镜辅助小切口术式在多发肋骨骨折患者中的应用研究作全面报告:

1 材料与方法

1.1 患者信息

选取 2018 年 1 月至 2021 年 10 月在空军军医大学第二附属医院胸外科接受手术治疗的肋骨骨折患者作为研究对象,共 127 人,随机分为 A、B 两组,其中 A 组 63 人,为对照组,采取传统开胸手术方式;B 组 64 人,为实验组,采取胸腔镜辅助小切口术式。纳入标准为:① 肋骨骨折明显错位大于 3 处;② 术前检查无明显手术禁忌;③ 头颅、腹部或四肢无严重合并损伤;④ 伴有气胸、血胸或血气胸,需开胸手术处理;⑤ 签署手术知情同意书。排除标准为:① 术前检查有明显手术禁忌;② 合并其他脏器严重损伤;③ 单纯肋骨骨折,无血胸、气胸等需要开胸探查指征;④ 患者及家属拒绝手术治疗。两组患者在性别、年龄、肋骨骨折数、术前往院时间等方面无明显统计学差异(表 1, $P>0.05$)。所有手术均由我科外伤组独立完成,主刀医师具有高级职称,助手均具有主治医师及以上职称。该研究获得我院伦理委员会批准。

表 1 两组患者基本信息

Table 1 The Basic information of two groups of patients

Project		Group A (n=63)	Group B (n=64)	χ^2/t	P
Age (year)		43.57± 5.13	42.92± 4.88	0.73	>0.05
Gender	Male	46	49	0.06	>0.05
	Female	17	15		
Number of rib fractures(n)		6.11± 1.22	5.96± 1.83	0.54	>0.05
Preoperative hospital stay(d)		1.89± 0.22	1.83± 0.25	1.43	>0.05

1.2 手术方法

对照组:于患侧第 5 肋间行开胸手术,切口长约 15-20 cm,清除胸腔内积血,修补损伤肺组织。采用传统切开复位内固定手术,根据病史、体格检查及术前影像学检查,结合开胸切口,于骨折处合理设计手术切口,充分暴露骨折线,同时尽量保护周围肌肉、血管、神经,确切止血后关胸,用肋骨爪或肋骨板固定肋骨断端。术后留置胸腔闭式引流。

实验组:于患侧第 5 肋间行胸腔镜辅助小切口术式,切口长约 3 cm,在腔镜下处理积血、肺组织修补及止血等操作。肋骨骨折切开复位内固定术、关胸、留置胸腔闭式引流等操作同对照组。

1.3 观察指标

术中记录手术时间、失血量等信息,术后记录引流管引流时间、术后住院时间以及发热、肺不张、肺炎、伤口感染、下肢静脉血栓、房颤等并发症发生率。分析组间有无统计学差异。

1.4 疼痛评分

采用问卷调查的方式,分别于术前、术后 1 天、术后 3 天、术后 5 天、术后 7 天进行 VAS 疼痛评分,统计分析两组间有无统计学差异。分别为无痛;轻度疼痛:能忍受;中度疼痛:影响睡眠但能忍受;重度疼痛:有渐强烈的疼痛,疼痛难忍,影响食欲,影响睡眠。具体评分标准如下:

表 2 VAS 疼痛评分标准

Table 2 VAS pain scoring criteria

Pain rating	Score
Painless	0
Mild pain	1-3
Moderate pain	4-6
Severe pain	7-10

1.5 生活质量评估

参照欧洲 EORTC 生活质量量表 QLQ-C 中文版^[5]在手术前进行调查问卷分析并评估患者的生活质量,制定各项指标的基准值。在术后 1、3、6 个月等四个时间节点进行问卷调查,评估患者的生活质量。本次量表评估主要关注两个方面,第一,功能方面包括体力、角色等,第二,症状方面包括疲劳、疼痛等。通过统计学分析,比较患者术后在功能和症状方面较术前有无统计学差异以及组间在各个时间节点有无统计学差异,以此来评估两组患者生活质量。

1.6 统计学分析

采用 t 检验分析分析计量资料的差异,采用卡方检验分析计数资料的差异,设定 $P<0.05$ 有统计学差异,所有统计操作均应用 SPSS 20.0 版本进行。

2 结果

2.1 两组患者手术情况比较

对照组手术时间为:77.52± 6.25 分钟,术中出血量为:105.66± 9.82 mL,术后胸腔引流时间为:3.21± 0.29 天,术后住院天数为:5.74± 0.66 天;实验组手术时间为:68.52± 7.31 分

钟,术中出血量为:56.92± 4.26 mL,术后胸腔引流时间为:2.16± 0.34 天,术后住院天数为:4.26± 0.59 天。根据统计数据
分析,实验组(B组)在术中手术时间、术中出血量、术后胸腔引
流时间和术后住院天数等方面均显著优于对照组(A组),组间
有统计学差异, $P<0.05$ (见表3)。

表3 两组患者手术情况对比

Table 3 Comparison of operation between the two groups

Project	Group A (n=63)	Group B (n=64)	t	P
Operation time(min)	77.52± 6.25	68.52± 7.31	7.45	<0.05
Intraoperative bleeding volume(ml)	105.66± 9.82	56.92± 4.26	36.38	<0.05
Thoracic drainage time(d)	3.21± 0.29	2.16± 0.34	18.71	<0.05
Postoperative hospital stay(d)	5.74± 0.66	4.26± 0.59	13.33	<0.05

Note: there is a statistical difference between the groups with $P<0.05$.

2.2 两组患者术后并发症发生率比较

术后并发症主要为发热、肺不张、肺炎、伤口感染、下肢静脉血栓、房颤等方面,两组患者发热和肺炎的发生率较高,其他并发症的发生率较低,无术后死亡病例。其中,实验组肺炎发生

率显著低于对照组,组间有统计学差异, $P<0.05$ (见表4)。其他
并发症发生率实验组均低于对照组,但组间无统计学差异, $P>$
0.05(见表4)。

表4 两组患者并发症发生率对比

Table 4 Comparison of the incidence of complications between the two groups

Project	Group A (n=63)	Group B (n=64)	χ^2	P
Postoperative fever	33	29	0.38	>0.05
Atelectasis	3	1	0.27	>0.05
Pneumonia	17	6	5.50	<0.05
Wound infection	2	1	0.01	>0.05
Venous thrombosis of lower extremity	2	1	0.01	>0.05
Atrial fibrillation	1	1	0.49	>0.05

Note: $P<0.05$ is taken as the statistical difference between the groups, χ^2 Critical value: 3.84.

2.3 两组患者疼痛评分比较

根据疼痛评分结果可以看出,实验组和对照组术前疼痛评分无统计学差异, $P>0.05$ (表5),术后第一天,实验组疼痛评分就显著低于对照组,两组都是中度疼痛,组间有统计学差异, $P<0.05$ (表5),术后第三天,实验组已降至轻度疼痛,对照组仍

是中度疼痛,组间有统计学差异, $P<0.05$ (表5),术后第五天,
实验组基本没有明显疼痛,对照组为轻度疼痛,组间有统计学
差异, $P<0.05$ (表5),至术后第7天,两组患者均无明显疼痛,
组间无统计学差异, $P>0.05$ (表5)。

表5 两组患者疼痛评分对比

Table 5 Comparison of pain scores between the two groups

Project	Group A (n=63)	Group B (n=64)	t	P
Before operation	7.52± 1.21	7.48± 1.17	0.19	>0.05
1 day after operation	6.13± 1.16	5.37± 1.21	3.61	<0.05
3 day after operation	5.02± 0.86	3.27± 0.67	12.81	<0.05
5 day after operation	3.05± 0.21	1.41± 0.12	54.14	<0.05
7 day after operation	1.35± 0.17	1.32± 0.15	1.05	>0.05

Note: $P<0.05$ is taken as the statistical difference between the groups, χ^2 Critical value: 3.84.

2.4 两组患者生活质量比较

根据问卷调查结果统计分析可以看出,在功能和症状方面,两组患者术前各项指标均无统计学差异, $P>0.05$ (表6),术后1个月时,两组患者在功能和症状方面较基准值均有显著下降,实验组在功能和症状方面评分均显著优于对照组,功能方面主要体现在肢体力量、角色、情绪、认知等方面,组间有统计学差异, $P<0.05$ (表6),社交方面两组间无统计学差异, $P>0.05$ (表6);症状方面主要体现在疲劳、恶心呕吐、疼痛、呼吸困

难、失眠、食欲不振等方面,实验组评分显著优于对照组,组间有统计学差异, $P<0.05$ (表6),在便秘和腹泻两方面,两组间无统计学差异, $P>0.05$ (表6);术后3个月时,实验组各项指标已基本接近正常,与基准值无统计学差异, $P>0.05$ (表6),对照组多数指标仍显著低于基准值,有统计学差异, $P<0.05$ (表6);术后6个月,两组患者在功能和症状方面较基准值无统计学差异,两组间也无统计学差异, $P>0.05$ (表6)。

表6 两组患者生活质量的比较
Table 6 Comparison of quality of life between the two groups

Living quality	Groups	Before operation	At 1 month after operation	At 3 month after operation	At 6 month after operation
Function					
Physical strength	A(n=63)	71.3± 6.9	59.1± 6.1 [#]	65.1± 7.1	69.1± 8.1
	B(n=64)	71.4± 7.2	64.9± 6.7 ^{**}	68.9± 7.2 [*]	71.1± 7.7
Role	A(n=63)	64.8± 7.2	51.9± 6.2 [#]	57.9± 6.3 [#]	62.2± 6.5
	B(n=64)	65.6± 6.6	61.1± 6.8 ^{**}	64.2± 7.4 [*]	63.9± 7.6
Emotion	A(n=63)	63.9± 6.7	48.8± 5.3 [#]	53.9± 4.9 [#]	58.9± 6.3
	B(n=64)	64.6± 7.3	56.1± 6.2 ^{**}	61.1± 6.2 [*]	61.8± 5.9
Cognition	A(n=63)	88.8± 9.1	68.3± 8.1 [#]	76.2± 8.4 [#]	85.6± 9.7
	B(n=64)	90.9± 10.1	77.2± 8.6 ^{**}	85.1± 9.3 [*]	89.1± 10.3
Social contact	A(n=63)	71.2± 8.2	66.7± 5.8	69.5± 6.9	70.2± 7.8
	B(n=64)	72.8± 8.6	67.2± 7.3	71.2± 8.6	71.9± 8.8
Symptom					
Fatigue	A(n=63)	51.1± 4.8	70.2± 8.3 [#]	62.4± 7.1 [#]	53.8± 6.4
	B(n=64)	50.5± 5.2	62.3± 7.3 ^{**}	54.2± 6.6 [*]	51.5± 5.1
Nausea and vomiting	A(n=63)	45.3± 5.1	63.1± 6.3 [#]	56.2± 7.1 [#]	48.8± 5.6
	B(n=64)	46.1± 4.8	56.1± 6.1 ^{**}	51.1± 5.5 [*]	47.7± 6.9
Pain	A(n=63)	43.3± 4.8	60.1± 7.3 [#]	53.2± 5.2 [#]	45.9± 4.7
	B(n=64)	42.6± 4.6	56.6± 6.5 ^{**}	47.1± 6.1 [*]	44.8± 4.1
Dyspnea	A(n=63)	43.1± 4.4	79.2± 9.3 [#]	63.2± 7.7 [#]	46.2± 5.5
	B(n=64)	42.3± 4.6	68.2± 8.7 ^{**}	48.2± 5.3 [*]	44.9± 5.1
Insomnia	A(n=63)	45.9± 5.3	61.2± 7.9 [#]	54.6± 5.3 [#]	47.2± 4.8
	B(n=64)	44.8± 6.1	54.2± 6.6 ^{**}	48.3± 6.2 [*]	46.5± 4.3
Loss of appetite	A(n=63)	41.2± 4.3	57.3± 6.3 [#]	51.7± 6.7 [#]	44.3± 5.7
	B(n=64)	42.3± 5.2	48.8± 5.3 ^{**}	44.8± 5.8 [*]	43.9± 5.4
Constipation	A(n=63)	48.8± 5.9	52.1± 4.9	48.6± 4.9	47.2± 6.2
	B(n=64)	47.9± 5.5	49.2± 5.7	48.4± 5.1	46.9± 5.6
Diarrhea	A(n=63)	37.6± 4.7	38.1± 3.8	39.5± 4.7	41.1± 5.5
	B(n=64)	38.3± 4.4	38.9± 4.0	39.1± 4.5	40.6± 4.9

Note: *: B VS A, $P<0.05$; #: Comparison with that before operation, $P<0.05$.

3 讨论

相较于四肢外伤及颅脑外伤等常见外伤,胸部外伤发生率

相对较低^[6],原因是胸廓位于人体中心部位,受伤的概率较低,如果发生胸部外伤,多数原因是外伤比较严重,常常附带身体其他部位的损伤^[7]。胸部外伤的范围较广,肋骨作为构成胸廓骨

性结构的重要部分,位于胸廓的外围,最容易受到损伤^[8]。根据肋骨骨折的位置和数量的不同以及并发症的不同,治疗方式也不尽相同^[9],第1和第2肋骨位置较深,手术不易操作,即便发生骨折,如果错位不是特别严重,一般不予手术处理。第11和第12肋骨是浮肋,对胸廓支撑作用不大,骨折后如无明显移位一般不予手术处理。对于单根单处肋骨骨折,即使出现骨折,对胸廓形态影响也不大,一般也不予手术处理。对于多根多处肋骨骨折,尤其是伴有骨折断端明显移位的患者,则需要手术治疗,如合并其他胸内损伤,还需要开胸手术,完成血胸清理、止血、肺破裂修补术等^[10]。但开胸手术创伤大,术后恢复慢,随着微创技术的提高,胸腔镜技术在严重胸外伤手术中的应用愈发广泛,且取得了一定的进展^[11]。

通过文献回顾可以发现,胸外伤发生率相对较低,但致死率较高,是外伤致死的重要原因之一^[12],约占所有外伤致死总数的30%,胸外伤患者中约有75%的患者需要接受手术治疗,如伴有血气胸,则需要开胸探查术^[13]。研究表明,多发肋骨骨折患者,手术治疗可显著提高患者住院时间,降低并发症发生率^[14],尤其对于老年患者,效果尤为显著^[15]。传统的开胸手术切口长,且需广泛切开肌肉层,创伤较大,术后患者的疼痛感较强,会对其术后康复产生直接影响^[11]。相较传统手术或胸腔镜辅助手术,全腔镜下胸内固定手术切口更小,无需切断胸壁肌肉,不损伤肋间神经、血管,将手术创伤降到更小^[16,17]。但全腔镜下手术也有缺点:手术于胸腔内操作,术野局限,手术难度大,手术及麻醉时间延长^[11];手术适应证范围小,对于肩胛骨遮挡、靠近肋软骨及脊柱骨折,由于位置过高操作困难均无法固定^[18];目前缺乏手术需要的专用腔镜及手术器械,各种内固定材料应用缺乏大样本、大数据循证依据^[19,20],故临床开展困难。近年来也有学者将3D打印技术应用于复杂肋骨骨折手术中,对于精确定位及精准治疗有较好效果,然而导致医疗费用显著升高^[21,22]。

本课题组在前人研究的基础上,主要聚焦中重度胸外伤且伴有血气胸的患者,这部分患者由于伴有不同程度血气胸,需要进行开胸探查,在开胸手术方式的选择上,传统的开胸术式已经不能满足医患对手术疗效日益增长的需求。本研究通过问卷调查、手术实践、数据统计分析等方式科学评估胸腔镜术式与传统开胸术式在严重胸外伤手术中应用的优劣性,结果显示:(1)实验组在手术时间、术中出血量、术后胸腔引流时间、术后住院天数等方面均显著优于对照组;(2)在术后并发症方面,实验组肺炎发生率显著低于对照组,其他并发症组间无明显差异;(3)实验组术后第三天,疼痛评分已降至轻度疼痛,不影响正常生活,对照组在术后第五天降为轻度疼痛,显著低于实验组;(4)实验组在术后3个月生活质量基本恢复正常,对照组至术后6个月才基本正常,显著低于实验组。综合实验结果可以看出,胸腔镜辅助小切口术式在严重胸部外伤患者手术的应用中优于传统开胸术式,微创术式几乎在所有方面都优于传统术式,这可能与胸腔镜的优势相关:(1)电视胸腔镜视野好,可以辅助判断肋骨骨折的严重程度和具体位置以及手术切口的定位;(2)微创技术在临床中应用广泛,多数医师都能够熟练掌握,安全性高;(3)微创术式损伤相对较小,对于神经肌肉的保护较好,有效避免了开胸手术肋骨容易断裂的问题,术后疼痛较轻,便于促进患者咳嗽排痰,加快恢复。

综上所述,胸腔镜辅助小切口术式对严重胸外伤患者具有良好的治疗效果,值得临床推广应用。然而,本研究也有不完善之处,今后在临床研究中应继续探讨如何掌握手术适应证,选择合理手术时机及手术方式,进一步完善临床评估办法,为患者围术期治疗提供更加精确的参考依据。

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