

doi: 10.13241/j.cnki.pmb.2023.01.017

单操作孔胸腔镜单向式肺叶切除术临床分析*

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摘要 目的:对比研究单操作孔胸腔镜单向式肺叶切除术与单操作孔胸腔镜常规肺叶切除术的临床效果。**方法:**选取我院 2018 年 4 月至 2022 年 1 月早期非小细胞肺癌患者 60 例,根据手术方式不同分为观察组(30 例)和对照组(30 例),观察组行单操作孔胸腔镜单向式肺叶切除术,对照组行单操作孔胸腔镜常规肺叶切除术。比较两组手术相关指标、术后疼痛情况、肺功能、炎症因子以及并发症。**结果:**两组患者淋巴结清扫个数、胸腔引流量比较,差异无统计学意义($P>0.05$),观察组手术时间、术中出血量、住院时间均少于对照组, $P<0.05$ 。两组患者手术前视觉模拟评分(VAS)无统计学意义($P<0.05$),两组患者术后 1 d、3 d VAS 上升,术后 7 d VAS 下降($P<0.05$),观察组术后 1 d、3 d VAS 低于对照组($P<0.05$)。两组患者术前一秒用力呼气容积(FEV_1)、用力肺活量(FVC)、 FEV_1/FVC 无差异,两组患者术后 1 m、3 m FEV_1 、FVC、 FEV_1/FVC 先下降后上升,差异有统计学意义($P<0.05$)。两组患者术前 C 反应蛋白(CPR)、肿瘤坏死因子- α (TNF- α)、白细胞介素-6(IL-6)无统计学意义($P>0.05$),术后 1 d、3 d CPR、TNF- α 、IL-6 先下降后上升($P<0.05$),且观察组患者 1 d、3 d CPR、TNF- α 、IL-6 均低于对照组($P<0.05$)。两组患者并发症比较无统计学差异($P>0.05$)。**结论:**单操作孔胸腔镜单向式肺叶切除术能缩短手术时间、减少术中出血、降低术后疼痛、降低炎症因子,利于康复。

关键词:单向式;单操作孔;胸腔镜;肺叶切除术;肺癌;临床效果

中图分类号:R734.2 文献标识码:A 文章编号:1673-6273(2023)01-87-06

Clinical Analysis of Single-direction Uniportal Thoracoscopic Pulmonary Lobectomy*

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ABSTRACT Objective: To explore the clinical effect of single-direction uniportal thoracoscopic pulmonary lobectomy. **Methods:** To select 60 patients with early non-small cell lung cancer who were treated in our hospital from April 2018 to January 2022, and divide them into observation group and control group according to different surgical methods, with 30 cases in each group. single-direction uniportal thoracoscopic pulmonary lobectomy was performed in the observation group and uniportal thoracoscopic pulmonary lobectomy was performed in the control group. Compare the two groups of surgery related indicators, postoperative pain, lung function, inflammatory factors and complications. **Results:** There was no significant difference in the number of lymph node dissections and thoracic drainage between the two groups of patients ($P>0.05$). The operation time, intraoperative blood loss, and hospital stay in the observation group were less than those in the control group ($P<0.05$). The visual analogue scale (VAS) of the two groups of patients before operation was not statistically significant ($P<0.05$). The VAS of the two groups increased at 1 d and 3 d after surgery. VAS decreased on the 7th day, and the difference was significant($P<0.05$). The VAS of the observation group was lower than that of the control group at 1 and 3 days after operation, and the difference was statistically significant ($P<0.05$). There was no difference in forced expiratory volume (FEV_1), forced vital capacity (FVC), FEV_1/FVC in the two groups before surgery. The two groups of patients were 1m and 3m FEV_1 after surgery, FVC, FEV_1/FVC first decreased and then increased, the difference was significant ($P<0.05$). The preoperative C-reactive protein (CPR), tumor necrosis factor- α (TNF- α), and interleukin-6 (IL-6) were not significant in the two groups ($P>0.05$). Postoperative 1 d, 3 d CPR, TNF- α , IL-6 were first decreased and then increased ($P<0.05$), and patients 1 d, 3 d CPR, TNF- α , IL-6 were lower than the control group ($P<0.05$), and the 1 d and 3 d CPR, TNF- α and IL-6 of the observation group were lower than those of the control group, the difference was significant ($P<0.05$). There was no difference in complications between the two groups ($P>0.05$). **Conclusion:** Single-direction uni-

* 基金项目:安徽省重点研究和开发计划项目(1804h08020284)

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(收稿日期:2022-04-25 接受日期:2022-05-21)

portal thoracoscopic pilmonary lobectomy can shorten the operation time, reduce intraoperative bleeding, reduce postoperative pain, reduce inflammatory factors, and accelerate recovery.

Key words: Single-direction; Uniportal; Thoracoscopic; Pilmonary lobectomy; Llung cancer; Clinical effect

Chinese Library Classification(CLC): R734.2 **Document code:** A

Article ID: 1673-6273(2023)01-87-06

前言

肺癌的发病率、死亡率位于全球恶性肿瘤的榜首,严重威胁人民生命健康^[1]。对于早期肺癌可通过手术达到较好的治疗效果,传统开胸手术需要在胸前作一个 20~25 cm 的切口,术后恢复慢且并发症发生率高。随着腔镜技术的发展,已有大量文献证明,胸腔镜技术在肺癌治疗的近远期效果均不逊于、甚至优于传统开胸手术,而其创伤小、并发症低的优势较传统手术尤为明显^[2-4]。单操作孔胸腔镜肺叶切除术仅在一个操作孔下完成肺叶切除,可减少术中出血、缩短患者住院时间,但在有些较复杂情况下手术相对会较为困难^[5]。有学者通过总结经验、优化流程提出单操作孔胸腔镜单向式肺叶切除术,已广泛应用于临床^[6]。笔者在学习和掌握单操作孔胸腔镜单向式肺叶切除术的基础上,对比单操作孔胸腔镜单向式肺叶切除术与单操作孔胸腔镜常规肺叶切术的临床效果,现报道如下。

1 材料与方法

1.1 临床资料

选取 2018 年 4 月至 2022 年 1 月我院早期非小细胞肺癌

患者 60 例。

纳入标准:(1)研究对象均经过 CT 及术中或术后病理学检查确诊为非小细胞肺癌^[7]。(2)临床分期为 I~II 期,无转移。(3)预期生存时间>6 个月,KPS 评分>60 分。(4)术前患者未接受过放疗、化疗。(5)患者对本研究知晓,签署知情同意书。

排除标准:(1)存在凝血功能障碍。(2)存在精神或认知功能障碍者。(3)合并严重的心、肝、肾等系统疾病者。

根据手术方式不同分为对照组(单操作孔胸腔镜常规肺叶切术)和观察组(单操作孔胸腔镜单向式肺叶切除术)。观察组 30 例,男 19 例、女 11 例,年龄 48~77 岁,平均年龄(64.83±4.92)岁,病理类型:鳞癌 19 例,腺癌 11 例,临床分期:I 期 13 例,II 期 17 例,病灶位置:左上叶 9 例,左下叶 6 例,右上叶 8 例,右中叶 6 例,右下叶 1 例。对照组 30 例,男 21 例、女 9 例,年龄 46~75 岁,平均年龄(64.03±5.42)岁,病理类型:鳞癌 22 例,腺癌 8 例,临床分期:I 期 12 例,II 期 18 例,病灶位置:左上叶 10 例,左下叶 5 例,右上叶 8 例,右中叶 5 例,右下叶 2 例。两组患者一般临床资料具有可比性,差异无统计学意义($P>0.05$)。

表 1 两组临床资料比较/[n,($\bar{x}\pm s$)]

Table 1 Comparison of the two groups of clinical data/[n,($\bar{x}\pm s$)]

Groups	n	Age (year)	Sex	Pathology type	Clinical stages	Focal location
			Male / female	Squamous cancer / adenocarcinoma	I/II	Left upper / left lower / right upper / right middle / right lower lobe
Observation group	30	64.83± 4.92	19/11	19/11	13/17	9/6/8/6/1
Matched group	30	64.03± 5.42	21/9	22/8	12/18	10/5/8/5/2
t/χ^2		0.598	0.300	0.693	0.068	0.567
P		0.551	0.583	0.405	0.793	0.966

1.2 手术方法

围手术期常规管理采用加速康复外科技术,手术前:(1)给予患者劝解戒烟戒酒、了解心理情况及时心理疏导、介绍 ERAS 流程等内容的讲解。(2)适当心肺功能训练。术中:(1)保温毯:术中使用保温毯保温。(2)术中输液进行加温至 37℃,并控制术中输血量尽量限制在 1500 mL 以内。术后:(1)进食时间:术后无不良反应,一般术后 6 h 即可进食。(2)早期活动:提倡患者进行早期活动和锻炼,术后当天即可坐起 2~3 次。(3)导尿管:术后 6 h 拔出导尿管。两组患者均由同一主刀医生进行手术。

对照组采用单操作孔胸腔镜常规肺叶切除术,患者取侧卧位,双腔气管内插管全身麻醉,健侧单肺通气,术侧腋中线第

7-8 肋间做 1.5 cm 切口作为观察孔,取腋前线第 4 或第 5 肋间做 3 cm 的切口作为操作孔,利用切口保护圈牵拉患者的筋膜肌肉,胸腔镜下松解肺韧带,使用直线切割闭合器依次切断肺静脉、肺动脉各分支后处理支气管,同时对淋巴结进行清扫,放置引流管。

观察组使用单操作孔胸腔镜单向式肺叶切除术。(1)右肺下叶、左肺下叶:由下而上分别处理:肺静脉→叶支气管和肺动脉→离断肺裂。(2)右肺中叶:中叶静脉→叶支气管→外侧段动脉→内侧段动脉→斜裂水平裂。(3)右肺上叶:上叶肺静脉→尖前支动脉→上叶支气管→后升支动脉→肺裂。(4)左肺上叶:左上静脉→左上叶支气管→上叶各肺动脉分支→肺裂。

1.3 观察指标

(1)手术相关指标:观察2组患者手术时间、术中出血量、淋巴清扫数目、术后胸腔引流量等指标。

(2)疼痛情况:采用视觉模拟评分法(Visual analogue scale, VAS)^[9]评价观察患者术前、术后1 d、术后3 d、术后7 d疼痛情况。

(3)肺功能情况:记录患者术前以及术后1个月、3个月肺功能情况,肺功能包括一秒用力呼气容积(Forced expiratory volume in one second, FEV₁)、用力肺活量(Forced vital capacity, FVC)以及FEV₁/FVC的比值。

(4)炎症因子:于患者术前、术后1 d、7 d抽取患者肘静脉血5 mL,采用酶联免疫吸附法测量C反应蛋白(C-reactive protein, CPR)、肿瘤坏死因子- α (TNF- α)以及白细胞介素-6(Interleukin-6, IL-6),试剂盒购自生工生物工程股份有限公司,严格按照操作说明执行。

(5)并发症:比较2组患者术后肺部感染、肺不张、乳糜胸等并发症的发生率。

1.4 统计学方法

应用SPSS 22.0软件对数据进行分析,计量资料采用($\bar{x} \pm s$)表示,行t检验,计数资料采用构成比表示,行 χ^2 分析,以 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 两组手术相关指标比较

观察组手术时间、术中出血量、住院时间均少于对照组,差异有统计学意义($P < 0.05$),两组淋巴结清扫个数、胸腔引流量比较,差异无统计学意义($P > 0.05$),见表2。

表2 两组手术相关指标比较 / ($\bar{x} \pm s$)

Table 2 Comparison of surgery-related indexes of the two groups / ($\bar{x} \pm s$)

Groups	n	Operation time (min)	Intraoperative bleeding (mL)	Lymph node dissection (n)	Chest flow (mL)	Length of stay (d)
Observation group	30	112.95 $\pm$ 28.84	193.48 $\pm$ 24.23	11.37 $\pm$ 2.84	422.84 $\pm$ 55.12	9.29 $\pm$ 2.16
Matched group	30	134.37 $\pm$ 33.71	216.83 $\pm$ 22.48	11.64 $\pm$ 3.15	446.48 $\pm$ 51.53	10.57 $\pm$ 2.11
t		2.644	3.869	0.348	1.716	2.321
P		0.010	<0.001	0.728	0.091	0.023

2.2 两组疼痛情况比较

两组患者手术前VAS的比较,差异无统计学意义($P < 0.05$),两组患者术后1 d、3 d VAS上升,术后7 d VAS下降,差

异有统计学意义($P < 0.05$),且观察组术后1 d、3 d VAS低于对照组,差异有统计学意义($P < 0.05$),见表3。

表3 两组疼痛情况比较 / ($\bar{x} \pm s$)

Table 3 Comparison of Pain in Two Groups / ($\bar{x} \pm s$)

Groups	n	VAS
Observation group	30	
Preoperative		2.18 $\pm$ 0.38
1 d after surgery		3.22 $\pm$ 1.25 ^a
3 d after surgery		4.57 $\pm$ 1.38 ^a
7 d after surgery		3.77 $\pm$ 0.59
Matched group	30	
Preoperative		2.21 $\pm$ 0.45
1 d after surgery		4.18 $\pm$ 1.35
3 d after surgery		5.31 $\pm$ 1.32
7 d after surgery		4.08 $\pm$ 0.65
Time F, P		219.23, <0.001
Interblock F, P		6.121, 0.012
Interactive F, P		5.121, 0.002

Note: VAS is visual simulation score; ^a $P < 0.05$ at the same time point with the matched group.

2.3 两组肺功能比较

两组患者术前FEV₁、FVC、FEV₁/FVC比较,差异无统计学意义($P > 0.05$),术后1 m、3 m FEV₁、FVC、FEV₁/FVC先下降后

上升,差异有统计学意义($P < 0.05$),两组患者术后1 m、3 m FEV₁、FVC、FEV₁/FVC比较,差异无统计学意义($P > 0.05$),见表4。

表 4 两组肺功能比较 / ($\bar{x} \pm s$)
Table 4 Comparison of lung function between the two groups / ($\bar{x} \pm s$)

Groups	n	FEV ₁ (L)	FVC(L)	FEV ₁ /FVC
Observation group	30			
Preoperative		1.83± 0.22	2.55± 0.28	75.38± 9.48
1 m after surgery		1.32± 0.25	1.83± 0.13	72.98± 8.28
3 m after surgery		1.55± 0.21	2.12± 0.21	73.74± 9.54
Matched group	30			
Preoperative		1.86± 0.14	2.53± 0.21	74.99± 10.42
1 m after surgery		1.28± 0.35	1.79± 0.22	72.56± 9.35
3 m after surgery		1.48± 0.24	2.03± 0.26	72.83± 8.48
Time F, P		18.278, <0.001	25.818, <0.001	13.048, <0.001
Interblock F, P		0.248, 0.621	0.582, 0.483	1.120, 0.393
Interactive F, P		1.849, 0.162	0.212, 0.810	2.929, 0.057

Note: FVC1 is one second forced breath volume, FVC is forced lung capacity, FEV₁/FVC is the ratio of FEV₁ to FVC; *P<0.05 at the same time point with matched group.

2.4 两组炎症因子比较 (P<0.05), 且观察组患者 1 d、3 d CPR、TNF-α、IL-6 均低于对照组(P<0.05), 见表 5。
两组患者术前 CPR、TNF-α、IL-6 比较, 差异无统计学意义 (P>0.05), 术后 1 d、3 d CPR、TNF-α、IL-6 先下降后上升

表 5 两组炎症因子比较 / ($\bar{x} \pm s$)
Table 5 Comparison of two Groups of inflammatory cytokines / ($\bar{x} \pm s$)

Groups	n	CPR(mg/L)	TNF-α (pg/mL)	IL-6(pg/mL)
Observation group	30			
Preoperative		6.12± 2.13	34.12± 6.22	16.98± 3.88
1 d after surgery		10.32± 2.85 ^a	35.87± 4.16 ^a	30.98± 5.12 ^a
3 d after surgery		7.15± 1.31 ^a	34.89± 3.32 ^a	15.74± 3.54 ^a
Matched group	30			
Preoperative		6.32± 1.95	33.76± 6.24	16.36± 3.35
1 d after surgery		13.28± 3.13	38.79± 4.58	34.54± 4.35
3 d after surgery		9.34± 1.74	36.89± 3.65	19.83± 3.48
Time F, P		82.685, 0.000	5.855, 0.004	221.236, 0.000
Interblock F, P		5.183, 0.021	6.791, 0.000	7.931, 0.000
Interactive F, P		13.073, 0.000	3.029, 0.052	5.654, 0.004

Note: CPR is C reactive protein, TNF-α is tumor necrosis factor-α, and IL-6 is interleukin-6; *P<0.05 at the same time point compared with the matched group.

2.5 两组并发症比较 两组患者并发症比较无统计学差异(P>0.05), 见表 6。

表 6 两组并发症比较 / [n (%)]
Table 6 Comparison of the two groups / [n (%)]

Groups	Pulmonary infection	Atelectasis	Chylopleura	Lung leak> 7 d	Abnormal heart rate	Incidence
Observation group	1(3.3)	0(0.0)	1(3.3)	1(3.3)	1(3.3)	4(13.3)
Matched group	1(3.3)	1(3.3)	0(0.0)	1(3.3)	2(6.7)	5(16.7)
χ^2						0.130
P						0.717

3 讨论

随着微创理念深入人心,肺癌手术由传统开胸逐渐过渡到多操作孔胸腔镜、再到单操作孔以及现在的单孔胸腔镜技术,手术创伤越来越小,而术中难度却逐渐增大^[8,9]。单操作孔胸腔镜肺叶切除术是在胸前切开一个 3~4 cm 的切口进行操作,由于切口较小,限制了术者的操作空间。对于肺裂发育不佳的肺叶进行手术时,狭小的空间限制了部分器械的应用,增加了难度^[10,11]。单操作孔胸腔镜单向式肺叶切除术是通过优化手术切口及入路、变革操作思路 and 切除流程提出的术式,由于手术操作层次清晰、操作简化已被广泛应用于临床实际^[7]。单操作孔胸腔镜单向式肺叶切除术摒弃了传统的肺门游离顺序,根据肺叶不同选择不同方向、沿肺门解剖层次逐一推进游离,对显露的血管、支气管进行逐一切除,最后处理肺裂,此方式更为流畅和精准,可缩短手术时间、减少术中出血、加速患者康复^[12-14]。本研究对比单操作孔胸腔镜单向式肺叶切除术与单操作孔胸腔镜常规肺叶切除术的相关指标发现,单操作孔胸腔镜单向式肺叶切除术手术更为流畅^[15]。

疼痛是术后常见的并发症,虽然单操作孔胸腔镜手术切口较开胸手术、多操作孔胸腔镜手术有了显著减少,术后康复也更快,但在有效改善患者术后疼痛的问题上仍有改进空间^[16-18]。相关研究显示,单操作孔胸腔镜术后 3 d 内疼痛较为明显^[19]。本研究对术后患者疼痛情况进行观察,研究结果显示,观察组患者术后 1 d、3 d VAS 均低于对照组,但术后 7 d 两组 VAS 无统计学差异,表明单操作孔胸腔镜单向式肺叶切除术可有效减轻患者术后 1 d、3 d VAS,可能是由于:(1)单操作孔胸腔镜单向式肺叶切除术手术时间明显缩短,减少了术中手术器械对肋间神经的刺激损伤。(2)术中避免了肺叶的反复翻动,进而减少对肺裂的损伤^[20,21],因此该手术可降低机体疼痛。

CPR、TNF- α 、IL-6 是临床上常见的炎症因子,不仅能反应机体的炎症反应,而且参与机体内多种生理活动^[22,23]。本研究中对患者术前、术后 1 d、术后 7 d 炎症因子进行观察发现,观察组患者术后 1 d、7 d 的 CPR、TNF- α 、IL-6 均低于对照组,可能是由于手术创伤后患者极易发生严重炎症反应。相关研究显示,手术时长越长、手术创伤越大,术后炎症反应越剧烈^[24],本研究中观察组患者术后时间显著低于对照组。相关研究显示:TNF- α 可通过上调趋化因子 CCL2 的释放,增加疼痛信号传导,而动物研究显示,当大鼠外周神经受损伤后,脊髓 IL-6 水平显著上升^[25,26]。吐尔逊等^[27]研究也报道了疼痛水平与患者炎症因子水平存在相关性,本研究亦有相似发现。其原因可能为:单操作孔胸腔镜单向式肺叶切除术相较传统手术而言,手术完成后机体创面较小;使用腹腔镜可避免视野不清晰这一弊端,提高手术效果;手术时间及出血量的减少可减轻患者的疼痛,降低患者机体对疼痛等刺激所引发的生理反应,进而减轻机体炎症反应。

无论是单操作孔胸腔镜单向式肺叶切除术还是单操作孔胸腔镜常规肺叶切除术,均会对肺功能产生影响^[28],周晓^[29]等研究显示,单操作孔胸腔镜单向式肺叶切除术根据肺部解剖学特点由表及里、层层递进,有利于患者术后肺功能恢复。本研究亦对患者术后肺功能进行研究,结果发现两组患者术后 1 个月、3

个月 FEV1、FVC 比较无统计学差异($P>0.05$),此研究结果与周晓^[30]研究结果不同,可能由于首先样本量较少,可能产生偏倚,再者由于单操作孔胸腔镜单向式肺叶切除术存在学习曲线,前期可能由于术者操作不够熟练使结果发生偏倚。本研究亦对患者术后并发症进行研究,发现两组患者并发症无统计学差异,表明两种手术安全性相当。

综上所述,单操作孔胸腔镜单向式肺叶切除术能缩短手术时间、减少术中出血、降低术后疼痛、降低炎症因子、加速康复。本研究仍有不足之处,首先,为单中心小样本研究,可能存在一定的偏倚。再者,本研究仅观察了患者术后相关指标,未对患者术后复发以及远期生存情况进行研究。因此,在后期的研究中,笔者团队拟增加样本量以观察研究结果的稳定性,同时将对患者远期生存及复发情况进行观察,以评价两种术式的远期效果。

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