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# 加速康复外科联合全胸腔镜在肺癌根治术患者中的应用研究

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**摘要 目的：**探讨加速康复外科（ERAS）联合全胸腔镜在肺癌根治术患者中的应用效果。**方法：**选择 2015 年 5 月 -2017 年 5 月西安交通大学第二附属医院收治的肺癌患者 80 例，根据随机数字表法将其分为对照组（n=40）与研究组（n=40）。两组患者均采取常规单操作孔全胸腔镜肺癌根治术治疗，对照组实施传统围手术期处理方法，研究组则应用 ERAS 模式进行围术期干预。评价两组患者术后各项临床指标、术后全身炎症反应综合征（SIRS）发生率及并发症发生情况，对比两组患者术后 1d、3d、5d 的视觉模拟量表（VAS）评分，以及术前、术后 3d 的 C 反应蛋白（CRP）水平。**结果：**研究组术后胸腔引流量、术后首次进食时间、术后住院天数、胸腔引流管拔除时间均低于对照组（*P<0.05*）。研究组术后 SIRS、并发症发生率分别为 0.00%、5.00%，均低于对照组的 15.00%、22.50%，差异有统计学意义（*P<0.05*）。两组患者术后 3d、术后 5d VAS 评分均低于术后 1d，且两组患者术后 5d VAS 评分低于术后 3d（*P<0.05*），研究组术后 1d、3d 与 5d 的 VAS 评分均低于对照组（*P<0.05*）。术前两组 CRP 水平对比差异无统计学意义（*P<0.05*），两组患者术后 3d CRP 水平高于术前，且研究组 CRP 水平显著低于对照组（*P<0.05*）。**结论：**对于肺癌根治术患者，ERAS 联合全胸腔镜可减轻患者疼痛，降低炎症因子水平，不良反应少，对患者早期康复具有良好的效果，值得临床推广。

**关键词：**加速康复外科；全胸腔镜；肺癌根治术；临床效果

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# Application of Enhanced Recovery after Surgery Combined with Full Thoracoscopy in Patients with Radical Resection of Lung Cancer

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**ABSTRACT Objective:** To investigate the effect of enhanced recovery after surgery (ERAS) combined with full thoracoscopy in patients with radical resection of lung cancer. **Methods:** Selected 80 patients with lung cancer who were treated in The Second Affiliated Hospital of Xi'an Jiaotong University from May 2015 to May 2017, and they were divided into the control group (n=40) and the study group (n=40) according to the random number table method. The patients in two groups were treated by conventional single operation hole full thoracoscopic radical resection of lung cancer. The control group were received traditional perioperative treatment, while the study group were received perioperative intervention of ERAS model. The clinical indicators, the incidence of systemic inflammatory response syndrome (SIRS) after operation and the incidence of complications in two groups were observed and evaluated, the score of visual analogue scale (VAS) in the two groups at 1d, 3d and 5d after operation were compared, and the level of C reactive protein (CRP) before operation and 3d after operation was compared. **Results:** Postoperative thoracic drainage volume, postoperative the first feeding time, postoperative hospitalization days and extraction time of thoracic drainage tube in study group were all lower than those in control group (*P<0.05*). The incidence of SIRS and complications after operation in the study group was 0.00% and 5.00% respectively, which were lower than 15.00% and 22.50% in the control group,and the difference was statistically significant (*P<0.05*). The scores of VAS 3d and 5d after operation in the two groups were lower than that of 1d after operation, and the scores of VAS 5d after operation in the two groups were lower than 3d after operation (*P<0.05*), the scores of VAS 1d, 3d and 5d after operation in the study group were lower than those of the control group (*P<0.05*). There was no significant difference in the level of CRP between the two groups before operation (*P>0.05*). The level of 3d CRP in the two groups was higher than that before operation, and the level of CRP in the study group was significantly lower than that of the control group (*P<0.05*). **Conclusion:** For patients with radical resection of lung cancer, ERAS combined with thoracoscopy can reduce pain, reduce the levels of inflammatory factors, and reduce adverse reactions. It has good effect on early rehabilitation of patients, which is worthy of clinical promotion.

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## 前言

近年来随着医学技术的不断发展和微创观念的增强,胸外科手术方式由开胸手术逐渐向胸腔镜手术转化[1,2]。与传统开胸手术相比,胸腔镜手术具有创伤较小、术后康复快、住院时间短等优点[3]。但是胸腔镜手术仍会破坏胸廓的完整性,并且会发生严重的胸痛等现象,对患者术后康复造成一定的影响。快速康复外科(enhanced recovery after surgery,ERAS)是以循证医学研究为基础,由多学科共同优化合作所设计出的一种新型技术与理念,其目的是通过优化一系列围术期措施来缓解手术应激反应,降低术后并发症,加快患者的康复速度[4-6]。目前国外已有研究显示 ERAS 在恶性肿瘤、妇产科手术、创伤手术中应用取得了很好的效果[7-9]。国内 ERAS 开展较晚,目前关于 ERAS 联合全胸腔镜治疗肺癌的报道较少。为了进一步完善肺癌患者的治疗方案, 本研究于 2015 年 5 月 -2017 年 5 月对西安交通大学第二附属医院 40 例肺癌患者应用了 ERAS 联合全胸腔镜治疗,疗效满意,现将研究结果整理报道如下。

## 1 资料与方法

### 1.1 一般资料

选择 2015 年 5 月 -2017 年 5 月西安交通大学第二附属医院收治的肺癌患者 80 例。纳入标准:(1)术前经细针穿刺或支气管镜检查诊断为肺癌,且术后经病理检查证实;(2)肿瘤直径在 6 cm 以下,无纵隔淋巴结肿大,病灶未累及胸壁;(3)术前 TNM 分期为Ⅰ-Ⅱ期;(4)无肢体功能障碍;(5)患者均对研究内容知情同意并签署知情同意书。排除标准:(1)术前接受过放化疗治疗者;(2)伴有严重心肺功能异常、慢性肾功能不全、肾病综合症、肝功能不全、肝硬化者;(3)伴有血液系统与自身免疫系统疾病者;(4)术中大出血而转开胸手术者。根据随机数字表法将其分为对照组(n=40)与研究组(n=40)。其中对照组男 30 例,女 10 例;年龄 48-76 岁,平均(61.57± 5.35)岁;病理类型:鳞癌 18 例,腺癌 22 例;TNM 分期:ⅠA 期 10 例,ⅠB 期 10 例,ⅡA 期 12 例,ⅡB 期 8 例;基础疾病:冠心病 8 例,糖尿病 10 例,高血压 10 例,慢性支气管炎 5 例。研究组男 28 例,女 12 例;年龄 47-81 岁,平均(60.86± 5.24)岁;病理类型:鳞癌 17 例,腺癌 23 例;TNM 分期:ⅠA 期 12 例,ⅠB 期 10 例,ⅡA 期 10 例,ⅡB 期 8 例;基础疾病:冠心病 9 例,糖尿病 9 例,高血压 10 例,慢性支气管炎 5 例。两组的性别、年龄、病理类型、TNM 分期与基础疾病构成比较无统计学差异(*P>0.05*)。本研究符合西安交通大学第二附属医院伦理委员会制定的相关规定,并已批准通过。

### 1.2 方法

两组患者均采取常规单操作孔全胸腔镜肺癌根治术治疗,术前认真询问患者的病史,并进行常规实验室、辅助检查与体格检查等,明确术前准备。在此基础上,对照组实施传统围手术期处理方法,研究组则应用 ERAS 模式进行围术期干预,具体方法如下。

**1.2.1 术中保温** (1)对照组:未采用任何保温措施。(2)研究组:采用加温毯加强术中保温,并对术中输注的液体进行加温,保证患者体温在 36-37℃。

**1.2.2 液体控制** (1)对照组:围术期进行常规补液,术前补液量为 33 mL/(kg·d),术中在 1500 mL 以上,术后约 1500 mL/d 左右。术后第 1d 给予半流质饮食,不限制饮水量。(2)研究组:术前将补液量控制在 33 mL/(kg·d)以下,术中控制在 1000 mL 以下,术后控制在 500 mL/d。术后第 1d 指导患者控制饮水量,但开放正常饮食。

**1.2.3 镇痛方案** (1)对照组:未预防性应用镇痛药物,根据视觉模拟量表(visual analogue scale,VAS)进行用药,当 VAS 评分≥ 4 分时肌注 75-100 mg 盐酸哌替啶。(2)研究组:术后 3d 内预防性应用镇痛药物,即每日静脉注射 50-100 mg 氟比洛芬酯注射液,1 次 /12h。

**1.2.4 下床活动** (1)对照组:手术当日绝对平躺卧床休息;手术次日将导尿管拔除、拍床边片;术后 3d 时拔除胸腔引流管,并根据躯体情况下床行走。(2)研究组:手术当日清醒后鼓励患者深呼吸、有效咳嗽并下床行走;不插导尿管或于术后次日将导尿管拔除,拍床边片;术后 1d 下地行走。

**1.2.5 胸管拔除** (1)对照组:血象、体温无异常,胸水量引流 100 mL/d 以下,胸管无漏气,咳嗽波动在 2 cm 以下,且无脓性、乳糜与血性引流,胸片显示肺复张较佳的情况下拔除胸管。(2)研究组:血象、体温无异常,胸水量引流 300 mL/d 以下,胸液性状正常,咳嗽波动在 2 cm 以下,胸片显示低于 20%肺压缩的情况下拔除胸管。引流管拔除时指导患者深吸气,在吸气末端时快速拔管,并在创口处覆盖凡士林纱布;引流管拔除后 24h 进行胸片复查,1 w 后再次行胸片复查; 针对术后肺部复张不良者,可嘱其有效咳嗽与排痰,并利用呼吸训练器给予肺复张训练;对于训练效果不佳者可给予持续负压吸引;若以上措施均未达到满意的肺复张水平,可实施胸腔穿刺术。胸腔穿刺指征:引流管拔除后 X 线片提示胸腔积液过多且伴有明显的胸闷气短症状,通过超声评价患者的胸腔积液量,并根据定位情况实施胸腔穿刺术。

### 1.3 观察指标

(1)观察评价两组患者术后各项临床指标,包括:术后胸腔引流量、术后首次进食时间、术后住院天数、胸腔引流管拔除时间。(2)评价两组术后全身性炎症反应综合征(systemic inflammatory response syndrome,SIRS)的发生率。(3)评价两组术后并发症情况。(4) 比较两组术后 1d、3d 与 5d 的 VAS 评分[10]。VAS 评分使用一条刻度标尺评估患者的疼痛情况, 从 0-10 共 10 个刻度,0 分表示无痛,以此类推,10 分表示剧痛。(5)两组术前与术后 3d 采集患者静脉血 3 mL,3000 r/min 离心 8 min,取上清液,采用酶联免疫吸附法检测其 C 反应蛋白(C-reactive protein,CRP)水平,试剂盒购自雅培生物科技工程有限公司,严格按照试剂盒操作说明书进行操作。

### 1.4 统计学方法

采用 SPSS15.0 软件处理，以($\bar{x}\pm s$)表示计量资料，实施 t 检验，以率表示计数资料，实施 $x^2$ 检验，以 α=0.05 为检验标准。

## 2 结果

### 2.1 两组患者术后各项临床指标及 SIRS 发生率对比

研究组术后胸腔引流量、术后首次进食时间、术后住院天数、胸腔引流管拔除时间均低于对照组（*P<0.05*），研究组术后 SIRS 发生率为 0.00%（0/40），低于对照组的 15.00%（6/40），差异有统计学意义（*P<0.05*）。见表 1。

**表 1 两组患者术后各项临床指标及 SIRS 发生率对比**

Table 1 Comparison of the clinical indexes of patients in the two groups and the incidence of SIRS after operation

| Groups | n | Postoperative thoracic drainage volume(ml) | Postoperative the first feeding time(d) | Postoperative hospitalization days(d) | Extraction time of thoracic drainage tube(d) | Incidence of SIRS(%) |
|---|---|---|---|---|---|---|
| Study group | 40 | 130.54± 3.53 | 4.23± 0.22 | 4.21± 0.53 | 2.86± 0.33 | 0.00 |
| Control group | 40 | 300.26± 5.25 | 17.55± 2.04 | 7.04± 0.32 | 5.45± 0.63 | 15.00 |
| $t/x^2$ | | 15.023 | 12.832 | 7.932 | 6.039 | 6.486 |
| *P* | | 0.000 | 0.000 | 0.000 | 0.000 | 0.011 |

### 2.2 两组患者术后并发症情况对比

研究组术后并发症发生率为 5.00%，对照组术后并发症发生率为 22.50%，研究组术后并发症发生率低于对照组（*P<0.05*）。见表 2。

**表 2 两组患者术后并发症情况对比 [n(%)]**

Table 2 Comparison of postoperative complications in two group[n(%)]

| Groups | n | Postoperative leakage of gas | Pulmonary infection | Atrial fibrillation | Pleural effusion | Incidence rate(%) |
|---|---|---|---|---|---|---|
| Study group | 40 | 1(2.50) | 0(0.00) | 0(0.00) | 1(2.50) | 2(5.00) |
| Control groups | 40 | 3(7.50) | 2(5.00) | 1(2.50) | 3(7.50) | 9(22.50) |
| $x^2$ | | | | | | 5.165 |
| *P* | | | | | | 0.023 |

### 2.3 两组患者术后 1d、3d 与 5d 的 VAS 评分比较

两组患者术后 3d、术后 5d VAS 评分均低于术后 1d，且两组患者术后 5d 低于术后 3d（*P<0.05*），研究组术后 1d、3d 与 5d 的 VAS 评分均低于对照组（P<0.05）。见表 3。

**表 3 两组患者术后 1d、3d 与 5d 的 VAS 评分比较(分，$\bar{x}\pm s$)**

Table 3 Changes in the degree of pain in two group 1d, 3d and 5d after operation(scores, $\bar{x}\pm s$)

| Groups | n | 1d after operation | 3d after operation | 5d after operation |
|---|---|---|---|---|
| Study group | 40 | 2.64± 0.53 | 1.02± 0.25* | 0.33± 0.45*& |
| Control group | 40 | 4.82± 0.63 | 2.04± 0.24* | 1.24± 0.36*& |
| t | | 6.084 | 4.538 | 5.892 |
| *P* | | 0.000 | 0.024 | 0.000 |

Note: compared with 1d after operation, **P<0.05*; compared with 3d after operation, &*P<0.05*.

### 2.4 两组患者 CRP 水平对比

术前两组 CRP 水平对比差异无统计学意义（*P>0.05*），两组患者术后 3d CRP 水平均高于术前，且研究组 CRP 水平显著低于对照组（*P<0.05*）。见表 4。

**表 4 两组患者 CRP 水平对比(mg/L, $\bar{x}\pm s$)**

Table 4 Comparison of level of CRP in two groups before operation and 3d after operation(mg/L, $\bar{x}\pm s$)

| Groups | n | Before operation | 3d after operation |
|---|---|---|---|
| Study group | 40 | 8.23± 1.24 | 22.53± 7.25* |
| Control group | 40 | 8.31± 1.55 | 34.2± 12.64* |
| t | | 0.257 | 14.922 |
| *P* | | 0.783 | 0.000 |

Note: compared with before operation, **P<0.05*.

## 3 讨论

近年来，随着人们抽烟人数的增多和环境的恶化，肺癌的发病率也不断攀升。肺癌是由支气管粘膜病理性变化所致，其发病机制比较复杂，目前还是以手术治疗方案为主[11,12]。胸腔镜是一种新型的微创手术治疗技术，相较于传统胸部后外侧切口入路，其具有术野清晰、对呼吸影响小、术后恢复快等优势[13]。虽然胸腔镜肺癌根治术已日渐成熟，但术后疼痛、感染等并发症情况仍不可避免[14]。因此，对传统围术期处理方法进行优化，保证患者早期康复、提高患者康复质量是十分必要的。ERAS模式是一种以循证医学为依据的围手术期处理措施，其目的是降低手术患者心理与生理方面的应激创伤，缩短住院时间，加速术后康复[15-17]。ERAS模式在术前、术中、术后均对患者进行相应的处理，使疾病诊断、治疗、护理、康复形成有机整体，促进患者康复[18-20]。

本研究结果显示，研究组术后胸腔引流量、术后首次进食时间、术后住院天数、胸腔引流管拔除时间均低于对照组（*P<0.05*）。研究组术后并发症发生率为5.00%，低于对照组的22.50%（*P<0.05*）。结果可见，相较于传统围术期处理措施，ERAS能够加快全胸腔镜肺癌手术患者的康复速度，降低并发症概率。在全胸腔镜手术过程中，患者一直处于裸露状态，同时麻醉也会影响外周温度与中枢调节机制，因此在手术过程中若未充分做好保温措施，可显著降低术中体温[21-23]。ERAS模式通过加温毯、加温输注液体等一系列方式，进一步保证了患者体温的稳定性，继而减少术后并发症，保证了康复效果[24,25]。有学者发现，术中与术后大量输液可以提高患者抗利尿激素的分泌量，增加心血管负担，延长肠麻痹时间，甚至出现胃肠功能紊乱[26,27]。同时，围术期大量补液还会抑制糖皮质激素与儿茶酚胺的分泌，造成肺间质水肿与感染[28]。ERAS模式中严格控制了患者补液量，以便保证其循环与代谢的稳定性。有研究指出，在不影响手术效果与术后恢复的前提下，尽早将胸腔引流管拔除能够降低患者的疼痛阈值，减少肺部并发症[29]。ERAS采用了新胸管拔除标准，将拔管指征调整为胸水量引流300 mL/d以下，肺基本复张，以便促使患者尽早下床活动，改善术后疼痛感。从康复质量来看，研究组术后SIRS的发生率为0.00%，低于对照组的15.00%（*P<0.05*）。SIRS可对血管张力和渗透性产生影响，引发循环障碍，是住院患者尤其是重症监护患者病情恶化甚至死亡的主要原因，因此术中应尽量减少此并发症的发生。本研究中研究组未出现SIRS现象，可能由于ERAS模式可维持患者术中机体正常微循环，抵抗力增加，从而降低并发症发生率。研究组术后1d、3d与5d的VAS评分均低于对照组（*P<0.05*）。术后疼痛是外科手术后待解决的重点与难点，持续的疼痛感不仅增加了患者的身心痛苦，且可以促使机体释放出多种激素，诱发心动过速、血压升高、心律失常等症状，不利于机体康复。ERAS模式提出了预防性镇痛方案，且不插或尽早拔除导尿管、鼓励患者尽早下床活动，在镇痛的同时利于患者加强血液循环，促使肺膨胀与复张，进一步保证了患者的康复质量[30]。CRP是机体受到炎症性刺激时的急性相蛋白，主要由肝细胞合成。CRP在术后开始升高，并在48h左右可达峰值，之后逐渐降至正常水平。本文研究结果显示，术后3d时研究组CRP水平显著低于对照组（*P<0.05*）。可见，通过ERAS一系列的干预措施可以有效抑制手术炎症反应，确保手术质量与安全。

综上所述，ERAS联合全胸腔镜可以有效地促进肺癌根治术术后康复，降低术后并发症和SIRS的发生率，患者术后疼痛和炎症反应显著降低，具有良好的应用效果。

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