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# 胶原蛋白海绵预防椎间孔镜治疗腰椎管狭窄症术后并发症的价值

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**[摘要]** 目的: 探讨胶原蛋白海绵预防椎间孔镜治疗腰椎管狭窄症术后并发症的价值。方法: 选择2017年2月至2019年6月秦皇岛市第二医院诊治的78例腰椎管狭窄症患者, 根据随机数字表法分为观察组与对照组, 每组39例。所有患者给予椎间孔镜治疗, 观察组在此基础上在术后使用胶原蛋白海绵覆盖创面, 记录两组术后并发症发生情况。结果: 所有患者顺利完成手术, 两组手术时间、术中出血量差异无统计学意义( $P>0.05$ ); 观察组术后引流量、术后卧床时间、术后住院时间均显著少于对照组( $P<0.05$ )。观察组术后7 d的肺部感染、切口感染、吻合口瘘、脑脊液漏等并发症发生率为5.1%, 显著低于对照组的30.8%( $P<0.05$ )。两组术后3 d的红细胞计数、血红蛋白水平均低于术前1 d, 且观察组高于对照组, 差异均有统计学意义( $P<0.05$ )。观察组术后1、3与7 d的疼痛VAS评分均显著低于对照组( $P<0.05$ )。观察组术后6个月的腰椎功能优良率为94.9%, 显著高于对照组的74.4%( $P<0.05$ )。结论: 胶原蛋白海绵能有效预防椎间孔镜治疗腰椎管狭窄症术后并发症的发生, 促进患者康复及腰椎功能恢复, 有利于缓解患者术后疼痛, 加快红细胞计数、血红蛋白恢复正常。

**[关键词]** 胶原蛋白海绵; 椎间孔镜; 腰椎管狭窄症; 并发症; 疼痛

## Efficacy of collagen sponge in preventing postoperative complications of lumbar spinal stenosis treated with intervertebral foraminoscope

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**Abstract** **Objective:** This study explored efficacy of collagen sponge in preventing postoperative complications of lumbar spinal stenosis treated with intervertebral foraminoscope. **Methods:** From February 2017 to June 2019, a total of 78 patients with lumbar spinal stenosis admitted to our hospital were selected as research objects and were divided into observation group and control group, with 39 cases in each group. All cases were treated with intervertebral foraminoscope, while the observation group was covered with collagen sponge after surgery. The postoperative

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complications of the two groups were recorded. **Results:** Operation on all patients were completed successfully. There was no significant difference in the operation time and intraoperative blood loss between the two groups. The postoperative drainage volume, postoperative bed-time, and postoperative hospital stay of patients in the observation group were significantly less than those in the control group ( $P<0.05$ ). The incidence of complications such as pulmonary infection, incision infection, anastomotic fistula, and cerebrospinal fluid leakage of patients in the observation group at 7 days after operation were 5.1%, which were significantly lower than those in the control group's 30.8% ( $P<0.05$ ). The red blood cell count and hemoglobin value at 3d after operation in both groups were lower than those at 1 day before operation. But the observation group were higher than the control group, and the differences were statistically significant ( $P<0.05$ ). The pain VAS scores of the observation group at 1, 3 and 7 d after operation were significantly lower than those of the control group ( $P<0.05$ ). The excellent rates of lumbar spine function in the observation group at 6 months after operation were 94.9%, which were significantly higher than the 74.4% in the control group ( $P<0.05$ ). **Conclusion:** Collagen sponge can effectively prevent the complications of lumbar spinal stenosis after laparoscopic surgery, promote the rehabilitation of patients and the recovery of lumbar spine function. It is helpful to alleviate postoperative pain, accelerate the red blood cell count, and restore hemoglobin to normal.

**Keywords** collagen sponge; intervertebral foramen; lumbar spinal stenosis; complications; pain

腰椎管狭窄症(lumbar spinal stenosis, LSS)为临床上导致腰背部及下肢疼痛、腰椎功能受限、感觉异常的常见脊柱疾病之一,其在病理上主要表现为黄韧带肥厚、腰椎间盘突出、小关节增生、硬膜囊及神经组织受压等<sup>[1-2]</sup>。随着我国老龄人口的增加,该病的发病率有不断上升的趋势。手术为该病的主要治疗方法,但是传统手术对于患者的创伤比较大,处理不当容易产生多种并发症,比如脑脊液漏、椎间隙感染等<sup>[3-4]</sup>。椎间孔镜技术是近年来出现的微创手术方法,能更好保护病变周围的正常解剖结构,具有可视化、创伤小等优点<sup>[5]</sup>。但是该手术的视野及手术器械的活动范围有限,同时目前常用的局部止血材料——明胶海绵具有止血较慢、与创面结合不紧等不足,且对脑脊液渗漏无明显作用,为此术后感染风险一直存在<sup>[6-7]</sup>。胶原蛋白具有典型的网状结构,是动物体内分布最广、含量最多的蛋白质,是机体的主要结构蛋白质,广泛存在于细胞外基质中。胶原蛋白海绵对组织活动性出血及封闭组织裂隙具有良好的即刻作用<sup>[8-10]</sup>。本研究探讨胶原蛋白海绵预防椎间孔镜治疗腰椎管狭窄术后并发症的价值,以明确胶原蛋白海绵的应用效果。

## 1 对象与方法

### 1.1 对象

选择2017年2月至2019年6月秦皇岛市第二医院诊治的78例腰椎管狭窄症患者。按随机数字表法分为观察组与对照组,每组39例。纳入标准:符合腰

椎管狭窄症的诊断标准;年龄30~70岁,具有手术指征;对本研究知情同意;医院医学伦理委员会批准了此次研究;经保守治疗时间 $\geq 3$ 个月症状不缓解或症状反复者。排除标准:严重后纵韧带骨化患者;伴较重心肺肝肾功能异常或凝血障碍者;马尾综合征者;临床资料缺乏者;吸毒人员、交流困难者。

### 1.2 方法

所有患者给予椎间孔镜治疗,手术均由经验丰富的同一主任医师操作。患者取俯卧位,全身麻醉,影像学确定椎间隙部位,在椎间隙上下缘水平1 cm处进行穿刺。切开皮肤,逐级扩张放置工作通道,生理盐水灌注,灌注压约30 mmHg(1 mmHg=0.133 kPa)。进行半椎板切除术与椎管减压,磨除关节突增生的骨赘,咬除增生的黄韧带压,电凝止血,取出工作通道,常规引流。

观察组:术后于椎管两侧、硬脊膜背侧骨创面覆盖胶原蛋白海绵[规格4.5 cm $\times$ 4.5 cm $\times$ 0.2 cm,无锡贝迪生物工程股份有限公司,批准文号:国食药监械(准)字2013第3640727号],保持粗糙面与周围骨性创面、硬脊膜紧密粘连。对照组除不使用明胶海绵覆盖创面外,其余操作与观察组相同。

### 1.3 观察指标

1)记录两组的手术时间、术中出血量、术后引流量、术后卧床时间、术后住院时间等。2)记录两组术后并发症发生情况,包括肺部感染、切口感染、吻合口瘘、脑脊液漏等。3)在术后1、3与7 d进行疼痛视觉模拟评分法(Visual Analogue

Scale, VAS)评分, 评分0~10, 分数越高, 疼痛越严重。4)在术前1 d与术后3 d测定红细胞计数、血红蛋白。5)在术后6个月对患者进行腰椎MacNab功能评分, 分为优、良、可、差等4个级别, 优良率=(优+良)/组内例数×100.0%。

#### 1.4 统计学处理

选择SPSS19.00软件分析数据。计量资料以均数±标准差( $\bar{x} \pm s$ )表示, 采用 $t$ 检验; 计数资料以%表示, 采用 $\chi^2$ 检验, 检验水准为 $\alpha=0.05$ 。

## 2 结果

### 2.1 一般资料

两组性别、年龄、临床分期、发病节段、体重指数等差异无统计学意义( $P>0.05$ , 表1)。

### 2.2 围手术期指标对比

所有患者顺利完成手术, 两组手术时间、术中出血量对比差异无统计学意义( $P>0.05$ ); 观察组

的术后引流量、术后卧床时间、术后住院时间都显著少于对照组( $P<0.05$ , 表2)。

### 2.3 并发症情况对比

观察组术后7 d的肺部感染、切口感染、吻合口瘘、脑脊液漏等并发症发生率为5.1%, 显著低于对照组的30.8%( $P<0.05$ , 表3)。

### 2.4 红细胞计数、血红蛋白水平对比

两组术后3 d的红细胞计数、血红蛋白水平都低于术前1 d, 不过观察组高于对照组, 对比差异都有统计学意义( $P<0.05$ , 表4)。

### 2.5 疼痛评分对比

观察组术后1、3与7 d的疼痛VAS评分都显著低于对照组( $P<0.05$ , 表5)。

### 2.6 腰椎功能优良率对比

观察组术后6个月的腰椎功能优良率为94.9%, 显著高于对照组的74.4%( $P<0.05$ , 表6)。

表1 两组一般资料对比( $n=39$ )

Table 1 Comparison of general data between the two groups ( $n=39$ )

组别	性别(男/女)/例	年龄/岁	临床分期(I期/II期/III期)/例	发病节段(L <sub>3</sub> /L <sub>4</sub> /L <sub>5</sub> )/例	体重指数/(kg·m <sup>-2</sup> )
观察组	20/19	56.59 ± 2.19	22/12/5	25/8/6	22.47 ± 2.82
对照组	22/17	56.14 ± 2.11	21/13/5	24/9/6	22.14 ± 1.72
$\chi^2/t$	0.206	0.455	0.063	0.079	0.364
$P$	0.650	0.682	0.969	0.961	0.788

表2 两组围手术期指标对比( $n=39$ ,  $\bar{x} \pm s$ )

Table 2 Comparison of perioperative indexes between the two groups ( $n=39$ ,  $\bar{x} \pm s$ )

组别	手术时间/min	术中出血量/mL	术后引流量/mL	术后卧床时间/d	术后住院时间/d
观察组	112.48 ± 8.93	45.29 ± 4.14	413.92 ± 31.77	3.11 ± 0.11	3.14 ± 0.13
对照组	113.09 ± 9.13	45.87 ± 3.15	563.67 ± 24.98	4.19 ± 0.12	5.29 ± 0.22
$t$	0.506	0.672	12.747	7.913	9.883
$P$	0.598	0.455	<0.001	0.004	0.001

表3 两组术后并发症发生情况对比( $n=39$ )

Table 3 Comparison of postoperative complications between the two groups ( $n=39$ )

组别	肺部感染/例	切口感染/例	吻合口瘘/例	脑脊液漏/例	合计/[例(%)]
观察组	0	1	0	1	2 (5.1%)
对照组	4	3	2	3	12 (30.8%)
$\chi^2$					9.563
$P$					0.0485

表4 两组手术前后红细胞计数、血红蛋白水平对比( $n=39, \bar{x} \pm s$ )

Table 4 Comparison of red blood cell count and hemoglobin value between the two groups before and after operation ( $n=39, \bar{x} \pm s$ )

组别	红细胞计数/ $(\times 10^{12} \cdot L^{-1})$				血红蛋白/ $(g \cdot L^{-1})$			
	术前1 d	术后3 d	<i>t</i>	<i>P</i>	术前1 d	术后3 d	<i>t</i>	<i>P</i>
观察组	3.67 ± 0.12	2.98 ± 0.09	8.768	0.002	110.87 ± 5.68	103.28 ± 6.01	8.883	0.002
对照组	3.68 ± 0.10	2.34 ± 0.32	15.954	<0.001	109.66 ± 6.01	92.77 ± 8.11	18.122	<0.001
<i>t</i>	0.034	7.834			0.244	10.983		
<i>P</i>	0.978	0.004			0.876	<0.001		

表5 两组术后不同时间点的疼痛评分对比( $n=39, \bar{x} \pm s$ )

Table 5 Comparison of pain scores at different time points after operation between the two groups ( $n=39, \bar{x} \pm s$ )

组别	疼痛评分		
	1 d	3 d	7 d
观察组	3.13 ± 0.22	1.87 ± 0.22	0.98 ± 0.13
对照组	4.87 ± 0.18	2.76 ± 0.11	1.98 ± 0.21
<i>t</i>	6.885	8.922	7.823
<i>P</i>	0.010	<0.001	0.004

表6 两组术后腰椎功能优良率对比( $n=39$ )

Table 6 Comparison of excellent and good rate of lumbar function between the two groups ( $n=39$ )

组别	优/例	良/例	可/例	差/例	优良率/%
观察组	30	7	2	0	94.9
对照组	19	10	7	3	74.4
<i>t</i>			6.303		
<i>P</i>			0.012		

### 3 讨论

腰椎管狭窄症以症状多、体征少为特点, 多见于中老年人, 其发病机制在于患者腰椎侧隐窝、中央椎管等发生退行性病变出现狭窄, 从而引起疼痛、神经损伤等症状<sup>[11]</sup>。后路开放式手术为该病的传统手术方式, 但是存在恢复慢、创伤大等缺点。椎间孔镜技术的创伤较小, 有利于患者术后康复<sup>[12]</sup>。但方法的术中视野相对比较局限, 可能存在减压不彻底, 导致术后依然存在一定的并发症<sup>[13]</sup>。使用胶原蛋白海绵的患者并发症发病率比未使用患者降低3.31%<sup>[14]</sup>。胶原蛋白海绵组有2例患者发生脑脊液漏, 而明胶海绵组有9例发生脑脊液漏<sup>[15]</sup>。椎间孔镜手术会出现术中失血, 当出血量过多时, 严重影响手术视野而导致手术失败。出血主要由椎管内静脉丛受损、腹腔

压力增高、翻修手术、女性月经期、凝血机制异常和手术磨除上关节突和椎板引起渗血导致。由于手术视野狭窄和出血导致的术野不清, 容易发生应急膜损伤、神经根受损<sup>[14-15]</sup>。本研究显示所有患者都顺利完成手术, 两组手术时间、术中出血量对比差异无统计学意义, 观察组的术后引流液量、术后卧床时间、术后住院时间都显著少于对照组; 观察组术后7 d的肺部感染、切口感染、脑脊液漏等并发症发生率为5.1%, 显著低于对照组的30.8%。本研究中对照组患者出现4例肺感染, 原因分析可能为其长期吸烟史有关。观察组切口感染人数下降可能与胶原蛋白免疫调节和出血量少有关。表明胶原蛋白海绵的应用能预防椎间孔镜治疗腰椎管狭窄症术后并发症, 促进患者康复。从机制上分析, 胶原占生物体内所有蛋白质的30%以上, 是细胞外基质的主要结构蛋白质, 胶原蛋白以纤维的形式存在<sup>[15-16]</sup>。胶原蛋白海绵系由亲水性胶体溶液经发泡、固化、灭菌、冻干而制成的一种海绵状固体制剂, 能够激活内源性凝血途径而达到止血效果。胶原蛋白也能提高机体免疫活性, 降低创面被感染的机会。同时, 减少出血也可以降低感染率, 从而减少并发症的发生<sup>[17]</sup>。

腰椎管狭窄症患者多表现为腰腿疼痛麻木, 椎间孔镜手术治疗可提高手术的效率, 但是很多患者术后依然伴随有剧烈的疼痛, 导致腰椎功能



恢复不佳<sup>[18]</sup>。胶原蛋白海绵对组织活动性出血及封闭组织裂隙具有良好的即刻作用,可激活局部凝血过程,长期放入人体而只产生很低的免疫反应能诱导上皮细胞的增殖、分化和移行,提高机体免疫活性,促进肉芽组织及上皮细胞再生,加速伤口愈合,促进渗斑部位止血<sup>[19-20]</sup>。本研究显示观察组术后1、3与7 d的疼痛VAS评分都显著低于对照组;观察组术后6个月的腰椎功能优良率为94.9%,显著高于对照组的74.4%,表明胶原蛋白海绵的应用能缓解患者术后疼痛,提高患者的腰椎功能优良率。当前也有研究显示胶原蛋白海绵通过分子筛网作用使血液成分聚集,不仅可迅速止血,而且还有利于原始骨痂的形成,具有促进骨愈合的作用<sup>[21-22]</sup>。并且胶原蛋白海绵植入人体后由机体产生的胶原蛋白酶降解为氨基酸单体,能够提高组织免疫力,能诱导成纤维细胞及血管内皮细胞的增殖、分化,也可为组织修复提供相关营养物质,从而促进腰椎功能的改善<sup>[23-24]</sup>。

椎间孔镜手术具有创伤小、恢复快、减压精准等优势,但是术中出血可导致患者术后血红蛋白降低<sup>[25]</sup>。

本研究显示两组术后3 d的红细胞计数、血红蛋白水平都低于术前1 d,不过观察组高于对照组,两组间差异都有统计学意义。从机制上分析,胶原蛋白海绵能有效地密封出血创面,可有效地吸附血小板,能稳定血管以及大多数器官的结构性骨架,从而有利于患者预后的快速恢复<sup>[26-27]</sup>。本研究也存在一定的不足:术后观察的时间比较短,没有进行深入的机制分析。这些将在后续研究中进行探讨。

综上,胶原蛋白海绵能有效预防椎间孔镜治疗腰椎管狭窄症术后并发症的发生,促进患者的康复与腰椎功能的恢复,有利于缓解患者术后疼痛,加快红细胞计数、血红蛋白恢复正常。

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