



# SHANGHAI JIAO TONG UNIVERSITY SCHOOL OF MEDICINE 学者介绍



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**郑民华**（1963—），上海交通大学医学院附属瑞金医院普外科主任、胃肠外科主任、外科教研室主任，上海市微创外科临床医学中心主任。2003 年获得上海交通大学外科学博士学位。现任中华医学会外科学分会常委、中华医学会外科学分会腹腔镜与内镜外科学组组长、中国抗癌协会大肠癌专业委员会腹腔镜学组组长、中国医师协会外科医师分会微创外科医师委员会副主委、*Annals of Laparoscopic and Endoscopic Surgery* 主编、《中华腔镜外科杂志（电子版）》主编、《中华消化外科杂志》副主编。

长期致力于胃肠道肿瘤微创外科治疗的临床研究。承担国家“863”项目、国家重点研发计划项目、国家自然科学基金项目及上海市科委重点项目等多项课题。主编、参编学术专著 10 余部，发表学术论文 200 余篇。以第一完成人获教育部科学技术进步奖一等奖、上海市科技进步奖一等奖、中华医学科技奖二等奖、上海医学科技奖一等奖等奖项，获全国“五一”劳动奖章，及国家卫健委“有突出贡献中青年专家”、上海市“十佳医生”等荣誉称号，享国务院特殊津贴。

该研究依托上海交通大学医学院“双一流”暨高水平地方高校建设“一流学科—临床医学—临床研究中心建设”项目。

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## 论著·临床研究

## 腹腔镜直肠双吻合术吻合口不同加固方式对吻合口漏的影响

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**[摘要]** **目的**·研究腹腔镜直肠双吻合术吻合口不同加固方式对吻合口漏的影响。**方法**·收集 2017 年 7 月—2018 年 9 月上海交通大学医学院附属瑞金医院胃肠外科 (上海市微创外科临床医学中心) 收治的接受腹腔镜下直肠双吻合术的患者资料, 根据吻合口加固方式的不同分为间断缝合加固组 ( $n=41$ )、连续缝合加固组 ( $n=41$ )、不加固组 (对照组,  $n=42$ ), 比较 3 组术中和术后的情况。采用单因素方差分析、 $\chi^2$  检验或 Fisher's 精确概率法、非参数检验进行统计学分析。**结果**·共纳入 124 例患者, 间断缝合加固组、连续缝合加固组的手术时间、术中失血量、术后住院天数、术后胃肠道排气时间、术后进食流质时间等指标与对照组比较, 差异无统计学意义。9 例被诊断为吻合口漏。间断缝合加固组、连续缝合加固组的严重吻合口漏发生率较对照组低。间断缝合加固组吻合口漏患者的平均住院天数为 31 (19 ~ 42) d, 连续缝合加固组为 41 (37 ~ 43) d, 均低于对照组的 64 (54 ~ 74) d。间断缝合加固组的平均治疗费用为 (71 142.6 ± 2 849.3) 元, 连续缝合加固组为 (71 360.1 ± 2 072.3) 元, 均少于对照组的 (91 386.0 ± 9 151.7) 元。**结论**·腹腔镜直肠双吻合术后, 应用间断缝合法和连续缝合法加固吻合口能够降低严重吻合口漏发生率、缩短住院时间、降低治疗费用, 未增加手术时间及术后并发症风险。

**[关键词]** 吻合口漏; 直肠癌; 双吻合技术; 加固缝合; 腹腔镜手术

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## Effect of different reinforcement methods on anastomotic leakage after laparoscopic double stapled technique

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**[Abstract]** **Objective**·To investigate the effect of different suture reinforcement methods on anastomotic leakage (AL) after laparoscopic double stapled technique (DST). **Methods**·Data were collected from patients undergoing laparoscopic radical resection of colon-rectal cancer from July 2017 to September 2018 in the Department of Gastrointestinal Surgery, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine (Shanghai Minimally Invasive Surgery Center). Patients were divided into 3 groups according to the different ways of suture reinforcement: intermittent suture reinforcement group ( $n=41$ ), continuous suture reinforcement group ( $n=41$ ) and non-reinforcement group (control group,  $n=41$ ). The intraoperative and postoperative conditions of the three groups were compared. One-way ANOVA,  $\chi^2$  test, Fisher's test and non-parametric test were used for statistical analysis. **Results**·A total of 124 patients were included in this study. There were no statistically significant differences in operation time, intraoperative blood loss, postoperative hospital stay, postoperative gastrointestinal exhaust time and postoperative fluid intake time of two experimental groups compared with control group. Nine subjects were clinically diagnosed with anastomotic leakage. The incidences of serious AL of intermittent suture reinforcement group and continuous suture reinforcement group were lower than that in the control group. The average length of stay in patients with AL in the intermittent suture reinforcement group was 31 (19–42) d, and the continuous suture reinforcement group was 41 (37–43) d, which were significantly lower when compared with the control group of 64 (54–74) d. In addition, the average treatment cost of the intermittent suture reinforcement group was (71 142.6 ± 2 849.3) yuan, and the continuous suture reinforcement group was (71 360.1 ± 2 072.3) yuan, which were significantly lower than the control group of (91 386.0 ± 9 151.7) yuan. **Conclusion**·Laparoscopic DST using intermittent suture and continuous suture can reduce the incidence of serious AL, shorten the length of hospital stay and reduce the cost of treatment without increasing the difficulty of surgery and other postoperative complications.

**[Key words]** anastomotic leakage; rectal cancer; double stapled technique; reinforcement suture; laparoscopic surgery

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目前,腹腔镜直肠手术中消化道的重建主要使用直肠双吻合术,即 Knight 和 Griffen<sup>[1]</sup> 于 1980 年首先报道的在低位直肠吻合时应用线性切割器和圆形吻合器进行端端吻合的方法。该方法极大程度地提高了腹腔镜下消化道重建的可操作性。虽然近年来技术和器械不断发展和改进,但是吻合口漏的发生率仍居高不下<sup>[2-3]</sup>,因此双吻合器应用的安全性在学界仍存在争议。应用直肠线性切割器进行离断时,远端直肠的线性切端与近端结肠的圆形切端无法完全对合,会在远端直肠的两侧形成 1~2 个由切割产生的切割线交叉点,称为“猫耳朵”(dog ear)<sup>[4]</sup>或“叹息角”<sup>[5]</sup>结构。有研究<sup>[6-7]</sup>显示这种横向切割形成的切割线交叉点是双吻合结构中的薄弱点,容易发生吻合口漏。本研究拟观察腹腔镜下直肠双吻合术后不同缝合加固方式对吻合口漏的影响。

## 1 资料与方法

### 1.1 患者资料

收集 2017 年 7 月—2018 年 9 月于上海交通大学医学院附属瑞金医院胃肠外科(上海市微创外科临床医学中心)接受腹腔镜下直肠双吻合术的患者资料。纳入标准:①年龄≥18 岁,男性或非孕女性。②美国麻醉医师协会(American Society of Anesthesiologists, ASA)分级Ⅰ~Ⅲ级。③影像学分期 T<sub>1</sub>~<sub>4a</sub> N<sub>0</sub>~<sub>2</sub> M<sub>0</sub>,评估肿瘤局部可以行根治性切除。④临床病理资料及随访资料完整。排除标准:①行结肠造瘘或末端回肠保护性造口的患者。②随访资料不完整者。研究获医院伦理委员会批准。

根据吻合口加固方式的不同分为 3 组:间断缝合加固

组、连续缝合加固组、不加固组(对照组)。

### 1.2 观察指标

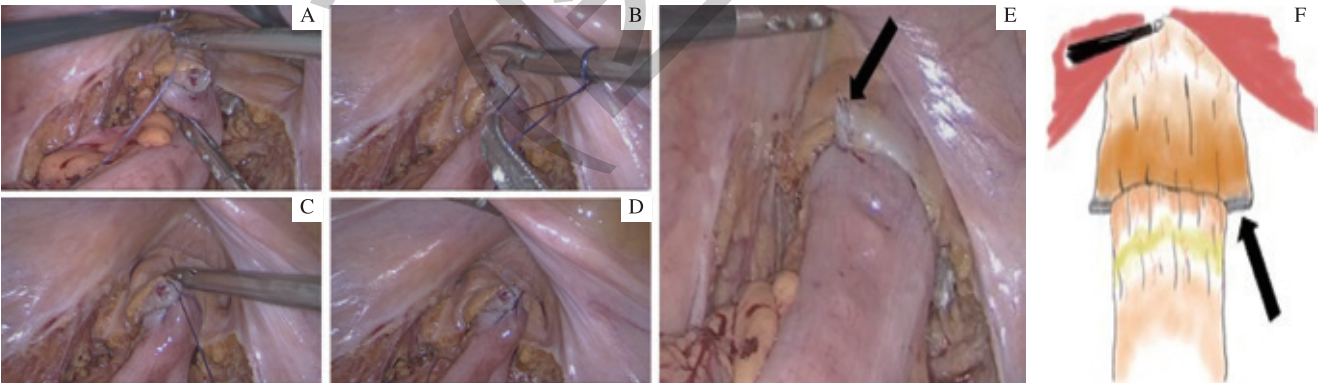
观察指标包括:①病理指标:记录肿瘤 TNM 分期<sup>[8]</sup>。②手术相关指标:手术方式、吻合口漏分级[根据国际直肠癌研究组(International Study Group of Rectal Cancer, ISREC)的吻合口漏分级标准<sup>[9]</sup>、手术时长、术中出血量、术中并发症。③术后相关指标:术后排气时间、术后进食流质时间、术后住院天数、住院费用。

### 1.3 手术方式

手术方式均按照《腹腔镜结直肠癌根治术操作指南(2018 版)》<sup>[10]</sup>中规定的全直肠系膜切除术或全结肠系膜切除术原则进行,进行吻合步骤时分为会阴组和腹腔组。会阴组完成扩肛及生理盐水清洗远端直肠,经肛门置入吻合器砧杆。腹腔组于距离肿瘤近端 10~15 cm 处裸化肠壁并以荷包钳钳夹离断肠管,去除标本,于近端乙状结肠断端置入抵钉座并送回盆腔,生理盐水冲洗盆腔后,吻合器砧杆经远端直肠靠近切割线处引出,将吻合器砧杆插入抵钉座,收紧吻合器,激发完成吻合。

### 1.4 吻合口加固方式

**1.4.1 间断缝合加固** 完成直肠双吻合术后,应用 3-0 薇乔可吸收缝线(Vircyl<sup>TM</sup>, Ethicon<sup>®</sup>),于远端肠管一侧的切割线交叉点入针,于近端肠管对应点处出针,行“8”字缝合加固两侧切割线交叉点,消除双吻合技术后的“猫耳朵”结构(图 1)。



**Note:** A. Using a 3-0 absorbable suture at the intersection of cutting lines. B. Doing the “8” suture on both or one side of anastomosis. C. Trying the knot. D. Finishing the intermittent suture reinforcement. E. The intersection of the cutting lines (arrow). F. Principle scheme of the intersection of the cutting lines (arrow).

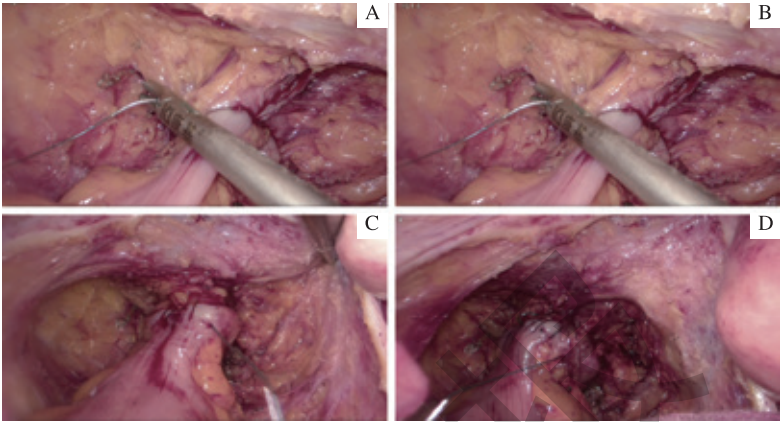
**图 1** 间断缝合加固及“猫耳朵”结构示意

**Fig 1** Intermittent suture reinforcement and “dog ear” structure



**1.4.2 连续缝合加固** 完成直肠双吻合术后,应用 1 根倒刺线 (V-Loc™, Medtronic®), 自远端肠管一侧的切割线交叉点入针, 行连续前壁全层缝合加固, 至对侧近端肠管

对应点止。消除双吻合技术后的切割线交叉点的同时, 加固吻合口前壁 (图 2)。



**Note:** A. Using a 3-0 barbed suture at the intersection of cutting lines and anterior wall of anastomosis. B. Doing the continuous full-layer suture. C. Finishing the suture at the other side of intersection of cutting line. D. Finishing the continuous suture reinforcement.  
**图 2** 连续缝合加固示意  
**Fig 2** Continuous suture reinforcement

**1.4.3 不加固** 完成直肠双吻合术后,对于无张力、血供良好、消化道准备完善的患者,主刀医师认为吻合满意,不进行缝合加固操作。

末端回肠保护性造口 7 例,体外手工吻合 2 例,更改手术方式为腹腔镜下经括约肌间切除术 1 例,更改为近端造瘘及远端封闭术 1 例)。最终纳入统计分析 124 例,分为间断缝合加固组 ( $n=41$ )、连续缝合加固组 ( $n=41$ )、对照组 ( $n=42$ )。

**1.5 统计学分析**

采用 SPSS 25.0 软件对数据进行统计学分析。定量数据以  $\bar{x} \pm s$  表示,采用单因素方差分析 (one-way ANOVA); 定性数据以  $n(\%)$  表示,采用  $\chi^2$  检验或 Fisher's 精确概率法;非连续型变量及其他变量采用非参数检验。 $P<0.05$  表示差异有统计学意义。

患者一般资料见表 1。患者的基线资料比较,差异无统计学意义。实际病灶定位一致率达 96.8% (120/124),病灶位置 3 组间比较,差异无统计学意义。所有患者均未出现中转开腹及术中严重并发症。3 组手术方式比较,差异无统计学意义。对 124 例患者进行 TNM 病理分期,结果: I 期患者 29 例, II 期患者 42 例, III 期患者 44 例, IV 期患者 3 例,无法评估或原位癌 6 例。3 组患者的肿瘤病理分期比较,差异无统计学意义。

**2 结果**

**2.1 患者一般资料**

共收集 135 例患者资料,排除 11 例 (因血供差加行

**表 1** 患者一般资料  
**Tab 1** Baseline data of patients

| Indicator                                | Interrupted suture group<br>( $n=41$ ) | Continuous suture group<br>( $n=41$ ) | Control group<br>( $n=42$ ) | $F/\chi^2$ value | $P$ value |
|--|--|---------------------------------------|-----------------------------|------------------|-----------|
| Age/year <sup>①</sup>                    | 61.7 ± 12.1                            | 61.0 ± 12.7                           | 61.6 ± 11.4                 | 0.050            | 0.952     |
| Male/Female <sup>②</sup>                 | 24/17                                  | 29/12                                 | 23/19                       | 2.426            | 0.297     |
| BMI/(kg · m <sup>-2</sup> ) <sup>③</sup> | 23.00 ± 3.15                           | 23.74 ± 2.50                          | 22.35 ± 2.95                | 2.391            | 0.096     |
| ASA classification/ $n$ (%) <sup>④</sup> |  |                                       |                             | 5.307            | 0.248     |
| I  | 13 (31.7)                              | 19 (46.3)                             | 23 (54.8)                   |                  |           |
| II                                       | 27 (65.9)                              | 20 (48.8)                             | 18 (42.9)                   |                  |           |

Continued Tab

| Indicator  | Interrupted suture group<br>(n=41) | Continuous suture group<br>(n=41) | Control group<br>(n=42) | $F/\chi^2$ value | P value |
|--|------------------------------------|-----------------------------------|-------------------------|------------------|---------|
| III  | 1 (2.4)                            | 2 (4.9)                           | 1 (2.4)                 |                  |         |
| Tumor location/n (%) <sup>①</sup>                  |                                    |                                   |                         | 7.797            | 0.258   |
| Low rectum   | 2 (4.9)                            | 1 (2.4)                           | 5 (11.9)                |                  |         |
| Middle rectum                                      | 13 (31.7)                          | 17 (41.5)                         | 20 (47.6)               |                  |         |
| Upper rectum                                       | 11 (26.8)                          | 11 (26.8)                         | 5 (11.9)                |                  |         |
| Sigmoid colon                                      | 15 (36.6)                          | 12 (29.3)                         | 12 (28.6)               |                  |         |
| Surgical procedure/n (%) <sup>②</sup>              |                                    |                                   |                         | 0.753            | 0.686   |
| Sigmoid colectomy                                  | 15 (36.6)                          | 12 (29.3)                         | 12 (28.6)               |                  |         |
| Anterior resection of rectum                       | 26 (63.4)                          | 29 (70.7)                         | 30 (71.4)               |                  |         |
| AJCC staging/n (%) <sup>③</sup>                    |                                    |                                   |                         | 2.068            | 0.913   |
| I  | 8 (19.5)                           | 10 (24.4)                         | 11 (26.2)               |                  |         |
| II   | 15 (36.6)                          | 13 (31.7)                         | 14 (33.3)               |                  |         |
| III  | 13 (31.7)                          | 16 (39.0)                         | 15 (35.7)               |                  |         |
| IV   | 2 (4.9)                            | 0 (0)                             | 1 (2.4)                 |                  |         |
| Other  | 3 (7.3)                            | 2 (4.9)                           | 1 (2.4)                 |                  |         |
| Chemoradio therapy/n (%) <sup>④</sup>              | 5 (12.2)                           | 2 (4.9)                           | 3 (7.1)                 | 1.553            | 0.460   |
| Diabetes/n (%) <sup>⑤</sup>                        | 4 (9.8)                            | 5 (12.2)                          | 4 (9.5)                 | 0.192            | 0.908   |
| Hemoglobin/ (g · L <sup>-1</sup> ) <sup>⑥</sup>    | 129 ± 19                           | 134 ± 17                          | 131 ± 19                | 0.786            | 0.458   |
| Serum albumin/ (g · L <sup>-1</sup> ) <sup>⑦</sup> | 39 ± 4                             | 40 ± 4                            | 38 ± 5                  | 1.327            | 0.270   |
| Prealbumin/ (mg · L <sup>-1</sup> ) <sup>⑧</sup>   | 220 ± 47                           | 230 ± 61                          | 229 ± 72                | 0.321            | 0.726   |

Note: <sup>①</sup> Analysis of variance (ANOVA) test-Welsh's test. <sup>②</sup> Pearson's  $\chi^2$  test. <sup>③</sup>  $\chi^2$  test-Fisher's exact test.

## 2.2 患者术中及术后情况

3组患者术中及术后情况见表2。平均手术时间为(105.7±30.6) min, 平均术中失血量为(90.5±51.9) mL, 平均术后首次排气或排便时间为(2.29±0.71) d, 恢复到进食流质饮食的平均时间为(3.21±1.31) d, 平均术后住

院时间为(10.10±9.47) d, 3组比较差异均无统计学意义。在随访期间内观察到6例术后短期并发症, 其中对照组1例发生吻合口出血, 间断缝合加固组及对照组各出现1例切口感染, 3组各出现1例术后麻痹性肠梗阻。3组术后并发症比较, 差异无统计学意义。

表2 3组患者术中及术后指标

Tab 2 Intraoperative and postoperative indicators of patients

| Indicator                            | Interrupted suture group<br>(n=41) | Continuous suture group<br>(n=41) | Control group (n=42) | $F/z/\chi^2$ value | P value |
|--------------------------------------|------------------------------------|-----------------------------------|----------------------|--------------------|---------|
| Operating time/min <sup>①</sup>      | 115.1 ± 41.2                       | 103.9 ± 30.3                      | 103.8 ± 26.2         | 2.420              | 0.091   |
| Blood loss/mL <sup>②</sup>           | 80.2 ± 43.5                        | 86.0 ± 59.9                       | 97.0 ± 47.9          | 2.152              | 0.118   |
| Time to first flatus/d <sup>③</sup>  | 2.29 ± 0.64                        | 2.22 ± 0.69                       | 2.50 ± 0.94          | 0.812              | 0.447   |
| Time to liquid/d <sup>④</sup>        | 3.34 ± 1.04                        | 3.07 ± 1.47                       | 3.28 ± 1.54          | 0.448              | 0.640   |
| Post-op hospital stay/d <sup>⑤</sup> | 6 (6-8)                            | 8 (7-9)                           | 8 (7-10)             | 1.681              | 0.093   |
| Complication/n (%) <sup>⑥</sup>      |                                    |                                   |                      | 1.247              | 0.536   |
| Anastomotic leakage                  | 2 (4.9)                            | 3 (7.3)                           | 4 (9.5)              | 0.725              | 0.908   |
| Anastomotic bleeding                 | 0 (0)                              | 0 (0)                             | 1 (2.4)              | 1.968              | 0.374   |
| Incision infection                   | 1 (2.4)                            | 0 (0)                             | 1 (2.4)              | 1.005              | 0.605   |
| Paralytic ileus                      | 1 (2.4)                            | 1 (2.4)                           | 1 (2.4)              | 0.000              | 1.000   |

Note: <sup>①</sup> One-way ANOVA test. <sup>②</sup> Nonparametric test-Kruskal Wallis test. <sup>③</sup>  $\chi^2$  test-Fisher's exact test.



2.3 患者吻合口漏情况

124 例患者中共有 9 例 (7.3%) 发生术后吻合口漏, 见表 3。无患者发生 A 级吻合口漏, 发生 B 级吻合口漏 4 例, 发生 C 级吻合口漏 5 例; 2 个加固组发生 C 级吻合口漏的患者少于对照组。所有发生吻合口漏的患者予以骶前

持续三腔冲洗, 同时禁食禁水。其中 5 例患者在保守治疗无效后接受外科干预 (手术方式为腹腔镜探查及局部冲洗引流, 同期行末端回肠造口), 对照组 4 例 C 级吻合口漏患者全部接受再次手术。对照组的术后住院天数明显大于其余 2 组, 对照组平均治疗费用明显高于其余 2 组。

表 3 吻合口漏患者的相关指标  
Tab 3 Indicators of patients diagnosed with anastomotic leakage

| Indicator                   | Interrupted suture group (n=2) | Continuous suture group (n=3) | Control group (n=4) |
|-----------------------------|--------------------------------|-------------------------------|---------------------|
| Classification/n (%)        |                                |                               |                     |
| Grade A                     | 0 (0)                          | 0 (0)                         | 0 (0)               |
| Grade B                     | 2 (100.0)                      | 2 (66.7)                      | 0 (0)               |
| Grade C                     | 0 (0)                          | 1 (33.3)                      | 4 (100.0)           |
| Treatment/n (%)             |                                |                               |                     |
| Lavage and drainage         | 2 (100.0)                      | 3 (10)                        | 4 (100.0)           |
| Re-operation                | 0 (0)                          | 1 (33.3)                      | 4 (100.0)           |
| Anal tube                   | 0 (0)                          | 0 (0)                         | 1 (25)              |
| Drainage                    | 0 (0)                          | 1 (33.3)                      | 0 (0)               |
| Anastomotic leakage time/ d | 3.5 (1.0–6.0)                  | 4.3 (3.0–5.0)                 | 4.4 (2.0–7.0)       |
| Treatment time/ d           | 31.0 (19.0–42.0)               | 41.0 (37.0–43.0)              | 64.0 (54.0–74.0)    |
| Treatment cost/ yuan        | 71 142.6±2 849.3               | 71 360.1±2 072.3              | 91 386.0±9 151.7    |

Note: The treatment of patients with anastomotic leakage can be superimposed. Multiple surgical interventions can be applied to the same patient.

3 讨论

DST 因其可操作性和安全性等优势, 已被广泛应用于腹腔镜下消化道重建。但有研究<sup>[3, 11-15]</sup>显示吻合口横向切割形成的交叉点结构是双吻合技术的薄弱点, 容易发生吻合口漏。有文献<sup>[16-17]</sup>报道了采用倒刺线加固胃肠、胰肠吻合口的案例, 为研究提供了新的思路, 即能否通过消化道重建后的缝合加固降低吻合口漏并降低其他吻合口相关并发症的风险。本研究分析应用 3-0 薇乔可吸收线间断加固吻合口远端直肠两端的切割线交叉点, 以及应用倒刺线连续缝合加固吻合口前壁及切割线交叉点 2 种方法, 与不进行缝合加固的方法进行比较, 观察其有效性及安全性。

研究结果提示连续缝合加固组、间断缝合加固组与不加固组比较, 患者手术时间无显著增加, 无中转开腹、无

术中死亡、无术中严重并发症。这 2 种直肠吻合口缝合加固的改良术式并未增加手术时间或其他并发症, 可操作性较高, 具有一定的可行性及安全性, 有腹腔镜经验的外科医师能够较快掌握并应用于低位直肠癌。本研究中, 9 例 (7.3%) 患者发生吻合口漏, 其中 2 个加固组发生较严重的 C 级吻合口漏的比例较对照组明显降低, 这可能是由于缝合增加了吻合口局部结构的强度, 同时消除了“猫耳朵”这一薄弱因素。间断缝合加固组及连续缝合加固组的住院天数、再手术率及住院治疗费用均低于对照组, 提示治疗难度的降低可能与吻合口薄弱结构得到加固从而减轻相关临床症状有关。

本研究结果初步证实了腹腔镜下连续缝合加固和间断缝合加固方式可减少直肠吻合口漏的发生, 并可预防吻合口漏所导致的严重并发症。本研究的病例数较少, 有待将来扩大样本量进行深入研究。

## 参·考·文·献

- [1] Knight CD, Griffen FD. An improved technique for low anterior resection of the rectum using the EEA stapler[J]. Surgery, 1980, 88(5): 710-714.
- [2] Parthasarathy M, Greensmith M, Bowers D, et al. Risk factors for anastomotic leakage after colorectal resection: a retrospective analysis of 17 518 patients[J]. Colorectal Dis, 2017, 19(3): 288-298.
- [3] Katsuno H, Shiomi A, Ito M, et al. Comparison of symptomatic anastomotic leakage following laparoscopic and open low anterior resection for rectal cancer: a propensity score matching analysis of 1014 consecutive patients[J]. Surg Endosc, 2016, 30(7): 2848-2856.
- [4] Roumen RM, Rahusen FT, Wijnen MH, et al. "Dog ear" formation after double-stapled low anterior resection as a risk factor for anastomotic disruption[J]. Dis Colon Rectum, 2000, 43(4): 522-525.
- [5] Kim JS, Cho SY, Min BS, et al. Risk factors for anastomotic leakage after laparoscopic intracorporeal colorectal anastomosis with a double stapling technique[J]. J Am Coll Surg, 2009, 209(6): 694-701.
- [6] Park JS, Choi GS, Kim SH, et al. Multicenter analysis of risk factors for anastomotic leakage after laparoscopic rectal cancer excision: the Korean laparoscopic colorectal surgery study group[J]. Ann Surg, 2013, 257(4): 665-671.
- [7] Kawada K, Hasegawa S, Hida K, et al. Risk factors for anastomotic leakage after laparoscopic low anterior resection with DST anastomosis[J]. Surg Endosc, 2014, 28(10): 2988-2995.
- [8] The American Joint Committee on Cancer (AJCC). AJCC cancer staging manual 8th[M]. New York: Springer, 2017: 93-99.
- [9] Rahbari NN, Weitz J, Hohenberger W, et al. Definition and grading of anastomotic leakage following anterior resection of the rectum: a proposal by the International Study Group of Rectal Cancer[J]. Surgery, 2010, 147(3): 339-351.
- [10] 郑民华, 张忠涛, 叶颖江. 腹腔镜结直肠癌根治术操作指南 (2018 版) [J]. 中华消化外科杂志, 2018, 17(9): 877-885.
- [11] Qu H, Liu Y, Bi DS. Clinical risk factors for anastomotic leakage after laparoscopic anterior resection for rectal cancer: a systematic review and meta-analysis[J]. Surg Endosc, 2015, 29(12): 3608-3617.
- [12] Kawasaki K, Fujino Y, Kanemitsu K, et al. Experimental evaluation of the mechanical strength of stapling techniques[J]. Surg Endosc, 2007, 21(10): 1796-1799.
- [13] Kuroyanagi H, Oya M, Ueno M, et al. Standardized technique of laparoscopic intracorporeal rectal transection and anastomosis for low anterior resection[J]. Surg Endosc, 2008, 22(2): 557-561.
- [14] Matsubara N, Miyata H, Gotoh M, et al. Mortality after common rectal surgery in Japan: a study on low anterior resection from a newly established nationwide large-scale clinical database[J]. Dis Colon Rectum, 2014, 57(9): 1075-1081.
- [15] Tanaka J, Nishikawa T, Tanaka T, et al. Analysis of anastomotic leakage after rectal surgery: a case-control study[J]. Ann Med Surg (Lond), 2015, 4(2): 183-186.
- [16] Lee SW, Nomura E, Tokuhara T, et al. Laparoscopic technique and initial experience with knotless, unidirectional barbed suture closure for staple-conserving, delta-shaped gastroduodenostomy after distal gastrectomy[J]. J Am Coll Surg, 2011, 213(6): e39-e45.
- [17] De Blasi V, Facy O, Goergen M, et al. Barbed versus usual suture for closure of the gastrojejunal anastomosis in laparoscopic gastric bypass: a comparative trial[J]. Obes Surg, 2013, 23(1): 60-63.

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