

# 中点优先缝合法应用于腹腔镜远端胃癌根治术消化道吻合的临床价值



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**【摘要】 目的** 探讨中点优先缝合法应用于腹腔镜远端胃癌根治术消化道吻合的临床价值。**方法** 采用回顾性队列研究方法。收集 2019 年 1 月至 2022 年 6 月厦门大学附属第一医院收治的 72 例胃癌患者的临床病理资料; 男 52 例, 女 20 例; 年龄为 (56±11) 岁。72 例患者均行完全腹腔镜远端胃癌根治术 (TLDG), 其中 2019 年 1—12 月收治的 50 例患者消化道吻合采用侧边优先缝合法, 设为侧边组; 2021 年 6 月至 2022 年 6 月收治的 22 例患者消化道吻合采用中点优先缝合法, 设为中点组。观察指标: (1) 手术情况。(2) 并发症情况。(3) 随访情况。正态分布的计量资料以  $\bar{x} \pm s$  表示, 组间比较采用独立样本  $t$  检验; 偏态分布的计量资料以  $M$  (范围) 表示, 组间比较采用 Mann-Whitney  $U$  检验。计数资料以绝对数或百分比表示, 组间比较采用  $\chi^2$  检验或 Fisher 确切概率法。等级资料比较采用秩和检验。**结果** (1) 手术情况。72 例患者顺利施行 TLDG, 无中转开腹患者。中点组和侧边组患者术后首次进食流质饮食时间比较, 差异有统计学意义 ( $t=-2.592, P<0.05$ )。(2) 并发症情况。中点组和侧边组患者术后发生近期并发症分别为 5 例和 20 例, 两组比较, 差异无统计学意义 ( $P>0.05$ )。两组患者术后并发症 Clavien-Dindo 评分、吻合口并发症比较, 差异均无统计学意义 ( $P>0.05$ )。所有患者并发症经治疗后痊愈出院。(3) 随访情况。中点组患者中, 19 例获得随访 (其中 11 例获得胃镜随访), 随访时间为 20 (1~24) 个月。侧边组患者中, 49 例获得随访 (其中 28 例获得胃镜随访), 随访时间为 18 (2~25) 个月。两组患者复发转移、远期并发症、术后胆汁反流、残胃炎、食物潴留比较, 差异均无统计学意义 ( $P>0.05$ )。**结论** 中点优先缝合法可应用于腹腔镜远端胃癌根治术消化道吻合。

**【关键词】** 胃肿瘤; 连续性手工缝合; 消化道重建; 完全腹腔镜远端胃癌根治术; 应用

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## Clinical value of the midpoint-priority suture in digestive tract anastomosis in laparoscopic distal gastrectomy of gastric cancer

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**【Abstract】 Objective** To investigate the clinical value of midpoint-priority suture (MPS) in digestive tract anastomosis in laparoscopic distal gastrectomy of gastric cancer. **Methods** The retrospective cohort study was conducted. The clinicopathological data of 72 patients with gastric

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cancer who were admitted to the First Affiliated Hospital of Xiamen University from January 2019 to June 2022 were collected. There were 52 males and 20 females, aged (56±11)years. All 72 patients underwent totally laparoscopic distal gastrectomy (TLDG), in which 50 patients being admitted from January to December 2019 and treated with the side-priority suture (SPS) method for digestive tract reconstruction were divided into the SPS group, and 22 patients being admitted from June 2021 to June 2022 and treated with MPS method for digestive tract reconstruction were divided into the MPS group, respectively. Observation indicators: (1) surgical conditions; (2) complications; (3) follow-up. Measurement data with normal distribution were represented as  $Mean \pm SD$ , and comparison between groups was conducted using the independent sample *t* test. Measurement data with skewed distribution were represented as *M*(range), and comparison between groups was conducted using the Mann-Whitney *U* test. Count data were described as absolute numbers or percentages, and comparison between groups was conducted using the chi-square test or Fisher exact probability. Comparison of ordinal data was conducted using the sum test. **Results** (1) Surgical conditions. All 72 patients underwent TLDG successfully, without conversion to open surgery. There was a significant difference in the time to postoperative first intake of liquid diet between the two groups ( $t=-2.592, P<0.05$ ). (2) Complications. Cases with postoperative short-term complications in the MPS group and the SPS group were 5 and 20, respectively, showing no significant difference between the two groups ( $P>0.05$ ). There was no significant difference in the Clavien-Dindo score of postoperative complications and anastomotic complications between the two groups ( $P>0.05$ ). All patients with complications were recovered and discharged after treatment. (3) Follow-up. Nineteen patients in the MPS group were followed up for 20(range, 1–24)months, including 11 case of gastroscopy follow-up. Forty-nine patients in the SPS group were followed up for 18(range, 2–25)months, including 28 cases of gastroscopy follow-up. There was no significant difference in recurrence and metastasis, long-term complications, postoperative bile reflux, residual gastritis, and food retention between the two groups ( $P>0.05$ ). **Conclusion** The MPS can be used into digestive tract anastomosis in laparoscopic distal gastrectomy of gastric cancer.

**【Key words】** Stomach neoplasms; Continuous manual suture; Digestive tract reconstruction; Totally laparoscopic distal gastrectomy of gastric cancer; Application

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随着腹腔镜器械发展与外科医师腔镜技术的成熟,完全腹腔镜远端胃癌根治术(totally laparoscopic distal gastrectomy, TLDG)与腹腔镜辅助远端胃癌根治术(laparoscopic-assisted distal gastrectomy, LADG)均广泛应用于临床<sup>[1-4]</sup>。TLDG 与 LADG 的区别为消化道重建是否在腹腔镜下完成。腹腔镜消化道重建是完全腹腔镜胃癌根治术开展的主要限制因素。相较于开腹视野下的手工缝合吻合口,腹腔镜下缝合消化道共同开口由于视野受限、操作空间狭小等原因,更容易出现共同开口关闭上的操作失误,导致消化道内假腔形成、吻合口狭窄梗阻、吻合口出血和吻合口漏等并发症。因此,探究腹腔镜下安全且简单、易行的消化道吻合技术对推广完全腹腔镜胃癌根治术至关重要。本研究回顾性分析 2019 年 1 月至 2022 年 6 月厦门大学附属第一医院胃肠肿瘤外科收治的 72 例胃癌患者的临床病理

资料,探讨中点优先缝合法应用于腹腔镜远端胃癌根治术消化道吻合的临床价值。

## 资料与方法

### 一、一般资料

采用回顾性队列研究方法。收集 72 例胃癌患者的临床病理资料;男 52 例,女 20 例;年龄为(56±11)岁。72 例患者均行 TLDG,其中 2019 年 1—12 月收治的 50 例患者消化道吻合采用侧边优先缝合法,设为侧边组;2021 年 6 月至 2022 年 6 月收治的 22 例患者消化道吻合采用中点优先缝合法,设为中点组。两组患者性别、年龄、BMI、ASA 分级、肿瘤长径、肿瘤位置、术前 Alb、术前 CA19-9、术前 CA125、术前 CEA、肿瘤分化程度、肿瘤 TNM 分期比较,差异均无统计学意义( $P>0.05$ ),具有可比性。见表 1。本研究通过厦门大学附属第一医院医学伦理委员



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二、纳入标准和排除标准

纳入标准:(1)经胃镜及病理学检查确诊为胃癌。(2)无腹部手术史及内镜胃癌切除手术史。(3)术前未行放疗或化疗。(4)影像学检查无远处转移。(5)接受腹腔镜远端胃癌根治术。(6)采用 Billroth II +Braun 消化道重建。

排除标准:(1)有腹部手术史。(2)合并多种肿瘤。(3)手术视频缺失。(4)急诊手术,包括梗阻、出血、穿孔。(5)接受其他消化道吻合方式。(6)联合其他手术。

三、手术方式

所有手术由具有≥1 年侧边优先缝合和中点优先缝合吻合经验的主刀医师进行。

(一)腹腔镜胃切除及 D<sub>2</sub> 淋巴结清扫

在全身麻醉下,建立气腹后进行腹腔镜检查评估手术适应证及排查禁忌证后进行手术。根据《日本胃癌治疗指南》进行淋巴结清扫后,十二指肠靠近幽门环处离断胃<sup>[5]</sup>。随后进行 Billroth II +Braun 消化道重建,距 Treitz 韧带约 25 cm 处行胃空肠吻合术。在距胃空肠吻合口约 10 cm 处行空肠空肠 Braun 吻合术。

(二)消化道重建

1. 侧边优先缝合法操作步骤:首先用直线切割闭合器建立胃大弯侧与空肠的共同开口或空肠空肠共同开口。明确共同开口的两侧端,从共同开口的一侧向对侧采用倒刺线连续缝合。最后用同 1 根

倒刺线进行浆肌层包埋。

2. 中点优先缝合法操作步骤:首先用直线切割闭合器建立胃大弯侧与空肠的共同开口或空肠空肠共同开口。明确共同开口的两侧端,分别命名为 A、B 点,主刀、助手医师分别牵拉 A、B 点展开共同开口,分别找到共同开口两侧开口的中点,命名为 M 点。中点优先缝合即第 1 针缝线分别穿过 M 点全层,缝合完第 1 针后内翻黏膜收紧并上提倒刺线,此时吻合口的形态基本形成。随后由 M 点向 A 点进行共同开口的全层连续缝合,最后反向从 A 点进行浆肌层包埋至共同开口的 M 点。此后从共同开口 M 点全层连续缝合至 B 点后,再进行浆肌层包埋共同开口至 M 点,完成共同开口的关闭。手术过程见图 1。手术示意图见图 2。

四、观察指标和评价标准

观察指标:(1)手术情况。(2)并发症情况。(3)随访情况。

评价标准:根据 Clavien-Dindo 分类评估术后并发症<sup>[6]</sup>。术后并发症以 30 d 为界,≤30 d 为近期并发症,>30 d 为远期并发症。

五、随访

采用电话和门诊方式进行随访,了解患者术后 1 年复发转移、远期并发症及胃功能情况(胃镜检查术后胆汁反流、残胃炎、食物潴留)。随访时间截至 2023 年 8 月。

六、统计学分析

应用 SPSS 23.0 统计软件进行分析。正态分布

表 1 中点组和侧边组胃癌患者的一般资料比较

Table 1 Comparison of general data of gastric cancer patients in the midpoint-priority suture group and the side-priority suture group

| 组别   | 例数 | 性别(例)          |    | 年龄<br>( $\bar{x}\pm s$ ,岁) | 体质量指数<br>( $\bar{x}\pm s$ ,kg/m <sup>2</sup> ) | 美国麻醉医师协会<br>分级(例)  |    | 肿瘤长径<br>( $\bar{x}\pm s$ ,cm) | 肿瘤位置(例)        |    |    |
|------|----|----------------|----|----------------------------|------------------------------------------------|--------------------|----|-------------------------------|----------------|----|----|
|      |    | 男              | 女  |                            |                                                | Ⅱ级                 | Ⅲ级 |                               | 胃窦             | 胃角 | 胃体 |
| 中点组  | 22 | 16             | 6  | 54±13                      | 23±4                                           | 21                 | 1  | 3.0±2.1                       | 15             | 3  | 4  |
| 侧边组  | 50 | 36             | 14 | 58±11                      | 21±3                                           | 44                 | 6  | 3.7±2.0                       | 32             | 6  | 12 |
| 统计量值 |    | $\chi^2=0.004$ |    | $t=-1.344$                 | $t=1.927$                                      | —                  |    | $t=-1.347$                    | $\chi^2=0.306$ |    |    |
| P值   |    | 0.949          |    | 0.183                      | 0.058                                          | 0.427 <sup>a</sup> |    | 0.182                         | 0.858          |    |    |

| 组别   | 例数 | 术前白蛋白<br>( $\bar{x}\pm s$ ,g/L) | 术前CA19-9<br>[M(范围),U/mL] | 术前CA125<br>( $\bar{x}\pm s$ ,U/mL) | 术前癌胚抗原<br>[M(范围),μg/L] | 肿瘤分化程度(例)  |     |     | 肿瘤TNM分期(例) |    |    |
|------|----|---------------------------------|--------------------------|------------------------------------|------------------------|------------|-----|-----|------------|----|----|
|      |    |                                 |                          |                                    |                        | 高分化        | 中分化 | 低分化 | Ⅰ期         | Ⅱ期 | Ⅲ期 |
| 中点组  | 22 | 41±5                            | 12.92(8.08~21.43)        | 5±3                                | 2(1~3)                 | 2          | 5   | 15  | 13         | 5  | 4  |
| 侧边组  | 50 | 42±7                            | 13.14(7.91~20.75)        | 4±4                                | 2(1~3)                 | 5          | 9   | 36  | 23         | 7  | 20 |
| 统计量值 |    | $t=-0.605$                      | $Z=-0.330$               | $t=1.048$                          | $Z=-1.168$             | $Z=-0.268$ |     |     | $Z=-1.446$ |    |    |
| P值   |    | 0.547                           | 0.741                    | 0.298                              | 0.245                  | 0.789      |     |     | 0.148      |    |    |

注:侧边组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用侧边优先缝合法,中点组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用中点优先缝合法;“—”为此项无;“a”采用 Fisher 确切概率法

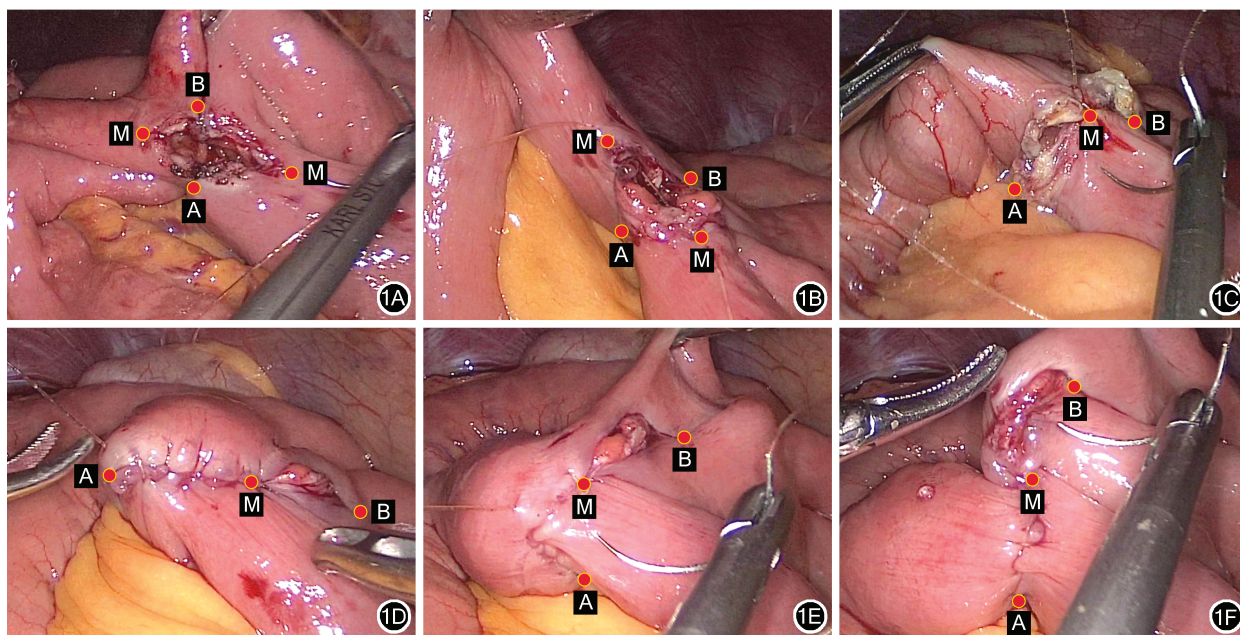


图1 中点优先缝合法手术过程 1A:充分显露共同开口两侧(A点和B点),确定共同开口两侧中点位置(M点);1B:全层缝合使共同开口两侧黏膜M点对合并内翻黏膜;1C:收紧并上提倒刺线;1D:由M点向A点连续全层缝合;1E:由A点向M点浆肌层包埋;1F:由M点向B点连续全层缝合,再由B点向M点浆肌层包埋

**Figure 1** Surgical procedure of the midpoint-priority suture 1A: Fully exposing both sides of the common opening (point A and B) and determining the midpoints position (points M) on both sides of the common opening; 1B: Full-thickness suture to make both sides of the M points anastomosis close together; 1C: Tighten and lifting up the barbed thread; 1D: Continuous full-thickness suture from point M to point A; 1E: Embedding seromuscular layer from point A to point M; 1F: Continuous full-thickness suture from point M to point B, and then embedding seromuscular from point B to point M

的计量资料以 $\bar{x} \pm s$ 表示,组间比较采用独立样本 $t$ 检验;偏态分布的计量资料以 $M$ (范围)表示,组间比较采用Mann-Whitney  $U$ 检验。计数资料以绝对数或百分比表示,组间比较采用 $\chi^2$ 检验或Fisher确切概率法。等级资料比较采用秩和检验。 $P < 0.05$ 为差异有统计学意义。

## 结 果

### 一、手术情况

72例患者顺利施行TLDG,无中转开腹患者。两组患者术后首次进食流质饮食时间比较,差异有统计学意义( $P < 0.05$ );两组患者手术时间、消化道重建时间、胃空肠吻合时间、空肠空肠吻合时间、术中出血量、术后肛门首次排气时间、术后首次进食半流质饮食时间、术后住院时间比较,差异均无统计学意义( $P > 0.05$ )。见表2。

### 二、并发症情况

中点组和侧边组患者术后发生近期并发症分别为5例和20例,两组比较,差异无统计学意义( $\chi^2 = 2.011, P = 0.156$ )。两组患者术后并发症Clavien-Dindo

评分、吻合口并发症比较,差异均无统计学意义( $P > 0.05$ )。见表3。中点组1例发生吻合口狭窄,侧边组发生吻合口漏和吻合口狭窄各1例,发生吻合口出血4例。所有患者并发症经治疗后痊愈出院。

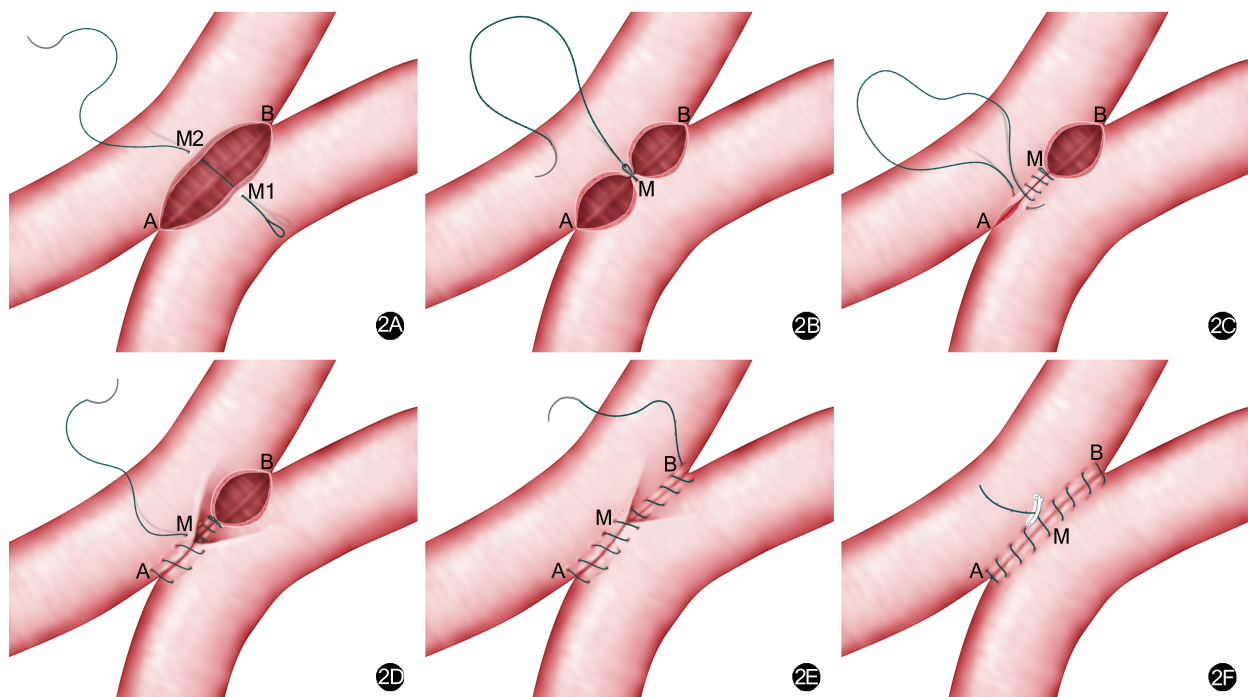
### 三、随访情况

中点组患者中,19例获得随访(其中11例获得胃镜随访),随访时间为20(1~24)个月。侧边组患者中,49例获得随访(其中28例获得胃镜随访),随访时间为18(2~25)个月。中点组患者发生复发转移、远期并发症、术后胆汁反流、残胃炎、食物潴留分别为2、0、9、8、1例;侧边组患者上述指标为6、1、15、25、2例,两组上述指标比较,差异均无统计学意义( $P = 1.000, 1.000, 0.150, 0.323, 1.000$ )。

## 讨 论

### 一、完全腹腔镜胃肠道吻合现状

我国CLASS-01在内的多项高质量临床研究证实腹腔镜胃癌根治术安全、可行,并与开腹胃癌根治术具有相似的疗效<sup>[7-12]</sup>。既往研究结果显示:完全腹腔镜相较腹腔镜辅助胃癌根治术具有缩短手术时间、促进术后早期进食、减少术中出血量及缩



注:蓝色线代表倒刺缝线

图2 中点优先缝合法关闭共同开口的示意图 2A:全层缝合使共同开口两侧黏膜M点对合并内翻黏膜;2B:收紧并上提倒刺线;2C:由M点向A点连续全层缝合;2D:由A点向M点浆肌层包埋,由M点向B点连续全层缝合;2E:再由B点向M点浆肌层包埋;2F:在共同开口的中点进行收针

Figure 2 Schematic diagram of closing the common opening in midpoint-priority suture 2A: Full-thickness suture to make both sides of the M points anastomosis close together and mucosa inverted; 2B: Tighten and lifting up the barbed thread; 2C: Continuous full-thickness suture from point M to point A; 2D: Embedding seromuscular layer from point A to point M, and continuous full-thickness suture from point M to point B; 2E: Embedding seromuscular layer from point B to point M; 2F: Suture the last stitch at the midpoint of the common opening

表2 中点组和侧边组胃癌患者的手术情况

Table 2 Surgical conditions of gastric cancer patients in the midpoint-priority suture group and the side-priority suture group

| 组别         | 例数 | 手术时间( $\bar{x} \pm s$ , min) | 消化道重建时间( $\bar{x} \pm s$ , min) | 胃空肠吻合时间( $\bar{x} \pm s$ , min) | 空肠空肠吻合时间( $\bar{x} \pm s$ , min) |
|------------|----|------------------------------|---------------------------------|---------------------------------|----------------------------------|
| 中点组        | 22 | 247 $\pm$ 42                 | 34 $\pm$ 5                      | 17 $\pm$ 3                      | 17 $\pm$ 3                       |
| 侧边组        | 50 | 247 $\pm$ 74                 | 36 $\pm$ 6                      | 18 $\pm$ 3                      | 18 $\pm$ 4                       |
| <i>t</i> 值 |    | -0.036                       | -1.257                          | -1.083                          | -1.188                           |
| <i>P</i> 值 |    | 0.971                        | 0.213                           | 0.282                           | 0.239                            |

| 组别         | 例数 | 术中出血量( $\bar{x} \pm s$ , mL) | 术后肛门首次排气时间( $\bar{x} \pm s$ , d) | 术后首次进食流质饮食时间( $\bar{x} \pm s$ , d) | 术后首次进食半流质饮食时间( $\bar{x} \pm s$ , d) | 术后住院时间( $\bar{x} \pm s$ , d) |
|------------|----|------------------------------|----------------------------------|------------------------------------|-------------------------------------|------------------------------|
| 中点组        | 22 | 54 $\pm$ 18                  | 4.2 $\pm$ 1.9                    | 5.1 $\pm$ 1.9                      | 7.9 $\pm$ 1.8                       | 11 $\pm$ 4                   |
| 侧边组        | 50 | 68 $\pm$ 37                  | 4.7 $\pm$ 1.6                    | 6.6 $\pm$ 2.4                      | 9.1 $\pm$ 2.6                       | 12 $\pm$ 3                   |
| <i>t</i> 值 |    | -1.684                       | -1.294                           | -2.592                             | -1.964                              | -1.000                       |
| <i>P</i> 值 |    | 0.097                        | 0.200                            | 0.012                              | 0.054                               | 0.321                        |

注:中点组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用中点优先缝合法;侧边组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用侧边优先缝合法

短住院时间等多方面优势,但TLDG的手术优势及安全性仍有待高质量多中心临床研究结果支持<sup>[13-21]</sup>。作为TLDG的核心步骤,腹腔镜下胃肠道共同开口的关闭通常包括使用切割闭合器的器械吻合法、使用针线的手工吻合法以及结合器械吻合

和手工吻合3种方式。既往研究结果显示:腹腔镜胃肠道共同开口关闭采用手工吻合与器械吻合具有相似安全性及疗效<sup>[22-25]</sup>。

## 二、腹腔镜胃肠道的倒刺线缝合

通常情况下,采用倒刺线缝合共同开口是从开



表3 中点组和侧边组胃癌患者术后并发症情况(例)

Table 3 Postoperative complications of gastric cancer patients in the midpoint-priority suture group and the side-priority suture group (case)

| 组别   | 例数 | Clavien-Dindo 评分 |    |    |    |    | 吻合口并发症             |   |
|------|----|------------------|----|----|----|----|--------------------|---|
|      |    | 0分               | 1分 | 2分 | 3分 | 4分 | 无                  | 有 |
| 中点组  | 22 | 17               | 2  | 2  | 1  | 0  | 21                 | 1 |
| 侧边组  | 50 | 30               | 3  | 12 | 3  | 2  | 44                 | 6 |
| 统计量值 |    | $Z=-1.555$       |    |    |    |    | -                  |   |
| P值   |    | 0.120            |    |    |    |    | 0.427 <sup>a</sup> |   |

注:中点组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用中点优先缝合法;侧边组患者行完全腹腔镜远端胃癌根治术中消化道吻合采用侧边优先缝合法;“-”为此项无;<sup>a</sup>采用Fisher确切概率法

口的一侧向另一侧进行连续缝合。既往研究结果显示:应用无结倒刺线对胃肠道共同开口缝合安全、可行<sup>[26-31]</sup>。与腹腔镜手工间断缝合法比较,采用倒刺线连续缝合有相似的疗效,具有缩短吻合时间及减少费用等优势<sup>[32-33]</sup>。如果共同开口过大或开口两侧不等长,采用传统侧边优先缝合方式难度较大,容易导致两侧不等长的黏膜内翻过多造成共同开口狭窄或扭曲。目前已经有多项研究致力于改良腹腔镜消化道倒刺线手工吻合方式<sup>[34-36]</sup>。Zhang等<sup>[37]</sup>运用单线双针的纯手工吻合法。Son等<sup>[36]</sup>采用双线辅助牵引缝合法。以及Lee等<sup>[38]</sup>和Tokuhara等<sup>[39]</sup>报道的双倒刺线法。但上述几种改良缝合法都属于侧边优先缝合法,与本研究提出的中点优先缝合法具有本质区别。

### 三、中点优先缝合法的特点及优势

中点优先缝合法有3个特点:(1)共同开口两侧中点优先第一针缝合,吻合口提前塑形,便于定位及提拉。(2)将吻合口一分为二,简化手术步骤。(3)不易误缝对侧黏膜,避免吻合口狭窄。中点优先缝合法不仅适用于Billroth II+Braun吻合,同样适用于Roux-en-Y、食管空肠吻合、小肠侧侧吻合、结肠回肠等共同开口的关闭。此外,该吻合方式应该注意4个操作关键点:(1)重视第1针缝合进出针点位置,进出针点分别位于共同开口两侧的中点。(2)第1针缝合后向上牵拉缝线,可避免误缝共同开口的对侧黏膜。(3)每针全层缝合后注意先内翻黏膜后再收紧缝线,以保证内翻缝合。(4)建议进出针点边距3~5 mm为宜,以避免黏膜过度内翻。中点组与侧边组患者手术时间、吻合的安全性、术后胃肠道功能的恢复及手术安全性比较,差异均无统

计学意义。在实际手术操作方面,中点优先缝合法能减少吻合过程中冗余的提拉钳夹动作,使吻合更快捷且容易掌握。

综上,中点优先缝合法可应用于腹腔镜远端胃癌根治术消化道吻合。本研究所得结论仍需多中心、大样本的前瞻性研究进行验证。

**利益冲突** 所有作者均声明不存在利益冲突

**作者贡献声明** 林和新、朱靖涛:数据采集,数据分析及解释,统计分析,获得资助,论文书写,重要内容手稿修订;洪清琦:研究构思与设计,获得资助,论文书写,重要内容手稿修订;余荒岛:数据采集,数据分析及解释,统计分析,论文书写,重要内容手稿修订;李永文:数据采集,获得资助,论文书写,重要内容手稿修订;陈逸南、陈东汉、王海滨、陈毅福、肖亮斌、徐志文:数据采集,重要内容手稿修订;尤俊:研究构思与设计,数据分析及解释,获得资助,论文书写,重要内容手稿修订

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## 读者·作者·编者

## 本刊可直接使用英文缩写词的常用词汇

本刊将允许作者对下列比较熟悉的常用词汇直接使用英文缩写词,即在论文中第1次出现时,可以不标注中文全称。

|      |            |                   |                 |                  |            |
|------|------------|-------------------|-----------------|------------------|------------|
| 4G   | 第四代移动通信技术  | Hb                | 血红蛋白            | PaO <sub>2</sub> | 动脉血氧分压     |
| 5G   | 第五代移动通信技术  | HBV               | 乙型肝炎病毒          | PCR              | 聚合酶链反应     |
| AFP  | 甲胎蛋白       | HBeAg             | 乙型肝炎e抗原         | PD-1             | 程序性死亡受体1   |
| Alb  | 白蛋白        | HBsAg             | 乙型肝炎表面抗原        | PD-L1            | 程序性死亡受体配体1 |
| AJCC | 美国癌症联合委员会  | HCV               | 丙型肝炎病毒          | PET              | 正电子发射断层显像  |
| ALP  | 碱性磷酸酶      | HE                | 苏木素-伊红          | PLT              | 血小板        |
| ALT  | 丙氨酸转氨酶     | HEV               | 戊型肝炎病毒          | PT               | 凝血酶原时间     |
| ASA  | 美国麻醉医师协会   | HIFU              | 高强度聚焦超声         | PTC              | 经皮肝穿刺胆道造影  |
| AST  | 天冬氨酸转氨酶    | HR                | 风险比             | PTCD             | 经皮经肝胆管引流   |
| AMP  | 腺苷一磷酸      | IBil              | 间接胆红素           | RBC              | 红细胞        |
| ADP  | 腺苷二磷酸      | ICG R15           | 吲哚菁绿 15 min 滞留率 | RCT              | 随机对照试验     |
| ATP  | 腺苷三磷酸      | ICU               | 重症监护室           | RFA              | 射频消融术      |
| ARDS | 急性呼吸窘迫综合征  | IFN               | 干扰素             | RECIST           | 实体瘤反应评价标准  |
| BCLC | 巴塞罗那临床肝癌   | Ig                | 免疫球蛋白           | RR               | 相对危险度      |
| BMI  | 体质量指数      | IL                | 白细胞介素           | RT-PCR           | 逆转录聚合酶链反应  |
| BUN  | 血尿素氮       | 抗-HBc             | 乙型肝炎核心抗体        | TACE             | 经导管动脉化疗栓塞术 |
| CEA  | 癌胚抗原       | 抗-HBe             | 乙型肝炎e抗体         | TBil             | 总胆红素       |
| CI   | 可信区间       | 抗-HBs             | 乙型肝炎表面抗体        | TC               | 总胆固醇       |
| Cr   | 肌酐         | LC                | 腹腔镜胆囊切除术        | TG               | 甘油三酯       |
| CT   | X射线计算机体层摄影 | MRCP              | 磁共振胆胰管成像        | TGF              | 转化生长因子     |
| DBil | 直接胆红素      | MRI               | 磁共振成像           | TNF              | 肿瘤坏死因子     |
| DSA  | 数字减影血管造影术  | MODS              | 多器官功能障碍综合征      | TP               | 总蛋白        |
| ERCP | 经内镜逆行胰胆管成像 | NCCN              | 美国国立综合癌症网络      | UICC             | 国际抗癌联盟     |
| EUS  | 内镜超声       | NK 细胞             | 自然杀伤细胞          | VEGF             | 血管内皮生长因子   |
| GGT  | 谷氨酰转氨酶     | OR                | 优势比             | WBC              | 白细胞        |
| HAV  | 甲型肝炎病毒     | PaCO <sub>2</sub> | 动脉血二氧化碳分压       |                  |            |