·论著·

腔内非离断式Roux-en-Y吻合术在腹腔镜全胃切除术消化道重建中的应用

沈祈远 杨常顺 王金泗 林孟波 蔡少鑫 李伟华
福建医科大学省立临床学院肿瘤外三科,福州 350001
沈祈远现在福建省漳州市医院普通外科 363000
沈祈远和杨常顺对本文有同等贡献
通信作者:李伟华,Email:liwh68@sina.com,电话:0591-88217150

【摘要】 目的 探讨腔内非离断式(Uncut) Roux-en-Y(URY)吻合术应用于腹腔镜全胃切除术消化道重建的安全性、可行性及近期疗效。**方法** 2015年11月至2018年1月间,福建省立医院肿瘤外科对67例胃癌患者行腹腔镜全胃切除术腔内URY吻合术重建消化道,男性41例,女性26例;年龄50~81(61.9±7.4)岁,体质指数(23.4±3.2) kg/m^2;其中胃贲门部癌19例,胃体癌33例,胃底癌15例;肿瘤大小(3.4±2.3)cm;Borrmann Ⅰ型22例,Ⅱ型15例,Ⅲ型21例,Ⅳ型9例;高、中分化腺癌29例,低分化腺癌23例,印戒细胞癌15例。行常规腹腔镜下胃癌D_2根治术后,采用Echelon-flex腔镜关节头直线型切割闭合器在幽门环下方2 cm闭合离断十二指肠,在食管胃结合部上方离断食管;腹腔镜直视下完成URY吻合消化道重建:(1)食管空肠侧侧吻合:食管闭合端左下缘开窗0.5 cm,距离Treitz韧带约25 cm处空肠上提至食管下端,在对系膜缘侧开窗0.5 cm,直线切割闭合器两臂分别经食管、空肠开窗处置入,切割闭合完成侧侧吻合;关闭食管空肠共同开口,完成食管空肠吻合,形成食糜流出道。(2)空肠侧侧Braun吻合:分别距食管空肠吻合口约10 cm处输入袢近端空肠和35~40 cm输出袢远端空肠对系膜缘分别开窗0.5 cm,行近远端空肠侧侧吻合;关闭共同开口形成胆胰十二指肠液流出道。(3)闭合食管空肠吻合口输入袢空肠:距食管空肠吻合口2~3 cm输入袢空肠无刀片直线闭合器(ATS45NK)闭合,阻断胆胰十二指肠液反流。收集这组病例临床资料进行回顾性系列研究,观察手术及消化道功能恢复情况、围手术期并发症,术后营养状态;通过术后随访时的内镜及影像学检查,评估吻合口功能及肿瘤复发等相关指标。**结果** 67例患者均成功完成手术。手术时间(259.4±38.5) min,消化道重建时间(38.2±13.2) min,术中出血量(73.4±38.4) ml;淋巴结清扫数(36.2±14.2)枚,上切缘距肿瘤上缘(3.3±1.2) cm,上切缘距齿状线(1.2±0.7) cm,上切缘阳性1例(1.5%),经再次切除为阴性。辅助切口平均长度(3.2±0.4) cm。术后肠道排气时间(52.8±26.4) h,进食流质时间(64.8±28.8) h,术后住院时间(8.4±2.5) d。术后并发症发生率10.4%(7/67),其中Clavien-Dindo分级Ⅲa级4例,分别为食管空肠吻合口漏2例、十二指肠残端漏1例和腹腔感染1例,均予保守治疗痊愈。67例均完成随访,术后12个月营养指数为53.4±4.2,食管空肠吻合口直径(3.9±0.6) cm,Roux-en-Y滞留综合征发生率3.0%(2/67),反流性食管炎发生率4.5%(3/67),无食管空肠吻合口输入袢闭合再通,无吻合口狭窄、梗阻、无吻合口肿瘤复发。**结论** 腹腔镜全胃切除术腔内URY吻合术重建消化道安全可行,术后消化道功能恢复快,近期疗效好。

【关键词】 胃肿瘤; 全胃切除术; 消化道重建; 非离断式Roux-en-Y吻合

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Application of intracorporeal uncut Roux-en-Y anastomosis in digestive tract reconstruction after laparoscopic total gastrectomy

Shen Qiyuan, Yang Changshun, Wang Jinsi, Lin Mengbo, Cai Shaoxin, Li Weihua
Department of Oncology Surgery, Fujian Provincial Hospital, Fuzhou 350001, China

Shen Qiyuan is working on The Third Department of General Surgery, Zhangzhou Hospital, Fujian Zhangzhou 363000, China

Shen Qiyuan and Yang Changshun are contributed equally to the article

Corresponding author: Li Weihua, Email: liwh68@sina.com, Tel: 0591-88217150

【**Abstract**】 **Objective** To explore the safety, feasibility and short-term efficacy of intracavitary uncut Roux-en-Y (URY) anastomosis in digestive tract reconstruction following laparoscopic total gastrectomy (LTG). **Methods** From November 2015 to January 2018, 67 gastric cancer patients underwent intracavitary URY following LTG to reconstruct the digestive tract at Oncological Surgery Department of Fujian Provincial Hospital. There were 41 males and 26 females with age of 50 to 81 (61.9±7.4) years and body mass index (BMI) of (23.4±3.2) kg/m^2. Among 67 patients, 19 were gastric cardia carcinomas, 33 were gastric body carcinomas, and 15 were gastric fundus carcinomas; tumor size was (3.4±2.3) cm; 22 were Borrmann type I, 15 were type II, 21 were type III, and 19 were type IV; 29 were highly or moderately differentiated adenocarcinoma, 23 were lowly differentiated adenocarcinoma, and 15 were signet-ring cell carcinoma. After conventional laparoscopic D2 radical gastrectomy, the duodenum was closed and dissociated at 2 cm below the pyloric ring using the Echelon-flex endoscopic articulated linear Endo-GIA stapler, and the esophagus was dissociated above the esophagogastric junction (EGJ). URY and digestive tract reconstruction were performed under the direct vision of laparoscope: (1) Side-to-side esophagojejunostomy: An incision of 0.5 cm was made in the left lower edge of the esophageal closed end; jejunum about 25 cm distal away from the Treitz ligament was elevated to the lower end of esophagus; another incision of 0.5 cm was made in the contralateral of mesenteric side; both arms of the linear Endo-GIA stapler were inserted into the windows opened through esophagus and jejunum respectively to complete side-to-side anastomosis. The common opening of esophagus and jejunum was closed to complete esophagojejunostomy, forming the chyme outflow tract. (2) Side-to-side Braun jejunojejunostomy: Incisions of 0.5 cm were made in the proximal jejunum about 10 cm away from the esophagojejunal anastomosis and 35-40 cm away from the contralateral of mesenteric side of distal jejunum respectively for proximal-distal side-to-side jejunojejunostomy. The common opening was closed to form the biliopancreatic duodenal juice outflow tract. (3) Closure of the input loop jejunum in the esophagojejunal anastomosis: The input loop jejunum 2-3 cm away from the esophagojejunal anastomosis was closed using the non-blade linear stapler (ATS45NK), and the biliopancreatic duodenal juice reflux was blocked. Clinical data of these patients were collected for retrospective case series study. Surgical and digestive tract functional recovery, perioperative complications, as well as postoperative nutritional status were observed. Moreover, related indexes, such as anastomosis function and tumor recurrence were evaluated through endoscopic and imaging examinations during postoperative follows-up. **Results** All the 67 patients completed the surgery successfully. The mean operative time was (259.4±38.5) minutes, digestive tract reconstruction time was (38.2±13.2) minutes, intraoperative blood loss was (73.4±38.4) ml, and number of harvested lymph node was 36.2±14.2. The mean distance from upper resection margin to upper tumor edge was (3.3±1.2) cm, distance from upper resection margin to dentate line was (1.2±0.7) cm, and 1 case had positive upper incisal margin, which became negative after the second resection. Moreover, the average length of the auxiliary incision was (3.2±0.4) cm. The mean postoperative intestinal exhaust time was (52.8±26.4) hours, time to liquid diet was (64.8±28.8) hours, and postoperative hospital stay was (8.4±2.5) days. The morbidity of postoperative complication was 10.4%(7/67). Among these 7 cases, 4 cases were grade IIIa of Clavien-Dindo classification, including 2 with esophagojejunal anastomosis leakage, 1 with duodenal stump leakage, and 1 with abdominal infection, and all these patients were recovered after conservative treatment. All the 67 patients were followed up. The mean nutrition index 12 months after surgery was 53.4±4.2, diameter of esophagojejunal anastomosis was (3.9±0.6) cm, the incidence of Roux-en-Y stasis syndrome was 3.0% (2/67), and the incidence of reflux esophagitis was 4.5% (3/67). No patient had

recanalization of the closed input loop of esophagojejunal anastomosis, anastomotic stenosis, obstruction, or tumor recurrence at anastomosis. **Conclusion** Intracavitary URY anastomosis following LTG for digestive tract reconstruction is safe and feasible, leading to fast postoperative recovery of digestive tract function and favorable short-term efficacy.

【**Key words**】 Total gastrectomy; Digestive tract reconstruction; Uncut Roux-en-Y anastomosis

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随着腹腔镜胃癌手术水平的提高和手术器械不断发展以及术者微创意识的加强,完全腹腔镜胃癌手术因具有创伤小、术后胃肠道功能恢复快及住院时间短等优势,得到越来越广泛的应用[1-2]。目前,腹腔镜全胃切除后难点问题主要集中在消化道重建[3]。如何选择一种相对安全、简单易行的消化道重建方式,一直是外科医师探索的热点[4-7]。福建省立医院肿瘤外科于2015年11月至2018年1月间,采用腔内非离断式Roux-en-Y(Uncut Roux-en-Y,URY)吻合术对67例胃癌患者进行腹腔镜全胃切除术后的消化道重建,现从手术操作相关因素和重建后消化道功能等方面进行总结分析,进一步探讨这种消化道重建方式的安全性和可行性。

资料与方法

一、病例资料

病例纳入标准:(1)术前病理检查确诊胃癌,无非治愈性因素;(2)肿瘤TNM分期为Ⅰ~Ⅲ期,胃中上部癌;(3)知情同意并接受全腹腔镜胃癌根治术,同时成功完成腹腔镜全胃切除术D_2淋巴结清扫及腹腔镜下腔内URY吻合术重建消化道。排除标准:(1)术前临床分期或术后病理学分期检查证实为Ⅳ期胃癌;(2)中转开放手术或小切口辅助吻合病例;(3)因消化道穿孔、梗阻、出血等行急诊手术者。

根据上述标准,纳入2015年11月至2018年1月间在福建省立医院肿瘤外科收治的67例胃癌患者的临床资料进行回顾性病例系列研究。男性41例,女性26例;年龄50~81(61.9±7.4)岁,体质指数(23.4±3.2) kg/m^2。其中胃贲门部癌19例,胃体癌33例,胃底癌15例。肿瘤大小(3.4±2.3) cm;Borrmann Ⅰ型22例,Ⅱ型15例,Ⅲ型21例,Ⅳ型9例;高、中分化腺癌29例,低分化腺癌23例,印戒细胞癌15例。所有患者对于本回顾性研究均获知情同意。

二、手术方法

所有患者采用气管插管全身麻醉,取头高足低,剪刀仰卧位。根据2014版《日本胃癌处理规约》行常规腹腔镜下胃癌D_2根治术[8]。常规手术均由同组手术医师完成。

Echelon-flex腔镜关节头直线型切割闭合器(美国强生公司)在幽门环下方2 cm闭合离断十二指肠,见图1a。依据胃镜标记,在食管胃结合部上方离断食管,见图1b。腹腔镜直视下按如下步骤完成URY吻合消化道重建:(1)食管空肠侧侧吻合:食管闭合端左下缘开窗0.5 cm,距离Treitz韧带约25 cm处空肠上提至食管下端,在对系膜缘侧开窗0.5 cm,直线切割闭合器两臂分别经食管、空肠开窗处插入,闭合完成侧侧吻合,见图1c和图1d;关闭食管空肠共同开口,见图1e;完成食管空肠吻合,形成食糜流出道,见图1f。(2)空肠侧侧Braun吻合:分别距食管空肠吻合口约10 cm处近端空肠和35~40 cm远端空肠对系膜缘分别开窗0.5 cm,行近远端空肠侧侧吻合,见图1g和图1h。关闭共同开口形成胆胰十二指肠液流出道,见图1i。(3)闭合食管空肠吻合口输入袢空肠:距食管空肠吻合口2~3 cm输入袢空肠无刀片直线闭合器(ATS45NK,美国强生公司)闭合,阻断反流的胆胰十二指肠液,见图1j。完成URY吻合,吻合示意图见图2。

三、观察指标和随访方法

手术观察指标:淋巴结清扫数,切缘距离,切缘阳性率,手术时间,消化道重建时间,术中出血量,辅助切口长度。术后观察指标:肠道排气时间,进食流质时间,术后住院时间,术后并发症。术后门

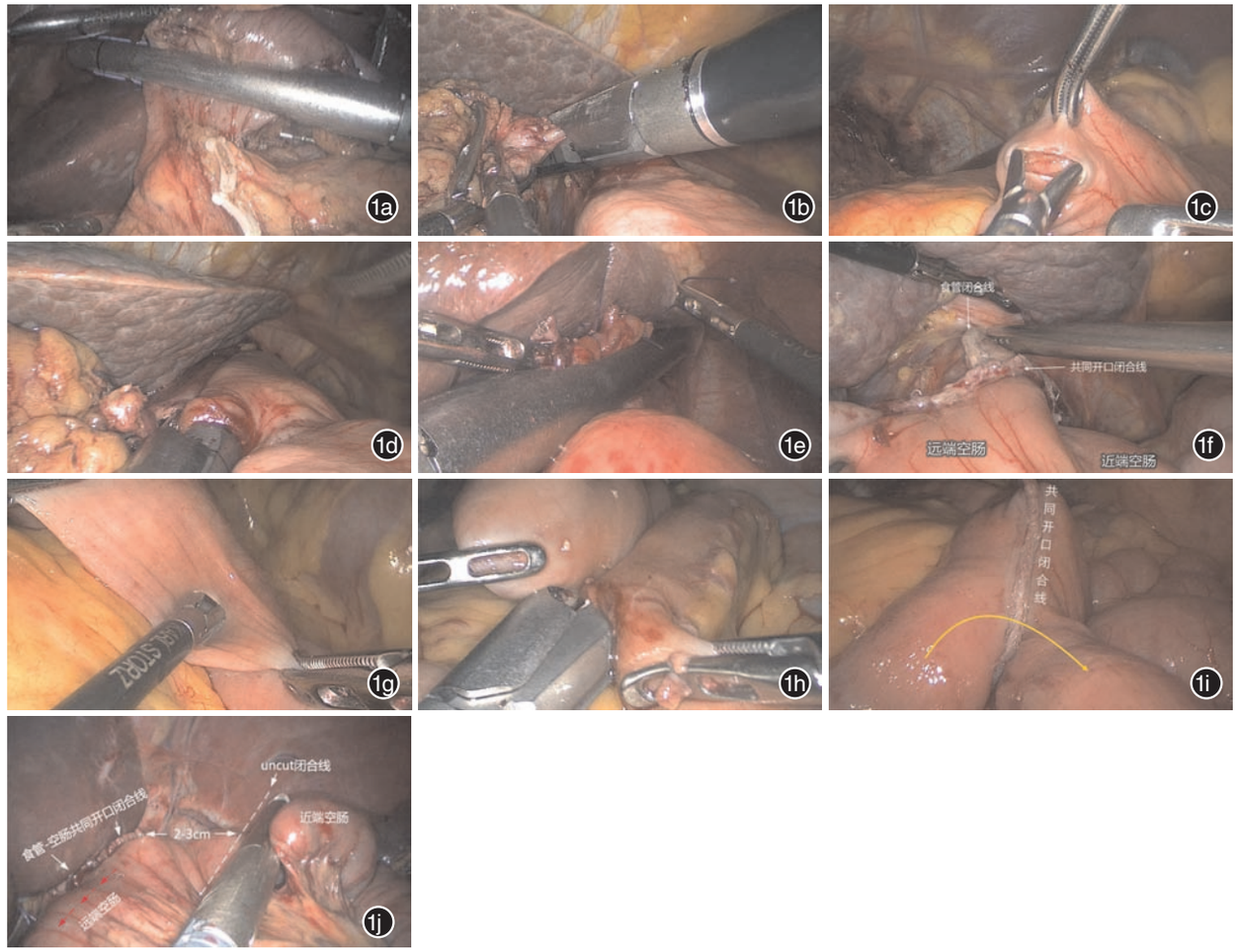

图1 腔内非离断式Roux-en-Y吻合术操作步骤 1a.幽门环下方2 cm直线切割闭合器离断十二指肠；1b.依据胃镜标记，在食管胃结合部上方离断食管；1c.空肠对系膜缘侧开窗0.5 cm；1d.60 mm直线切割闭合器吻合食管空肠；1e.以食管空肠前后闭合线起点连线为轴线，关闭食管空肠共同开口；1f.完成食管空肠吻合形成食糜流出道；1g.分别距食管空肠吻合口约10 cm处近端空肠和35~40 cm远端空肠对系膜缘分别开窗0.5 cm；1h.60 mm直线切割闭合器行近远端空肠侧侧吻合；1i.以空肠前后闭合线起点连线为轴线关闭肠肠共同开口形成胆胰十二指肠液流出道；1j.阻断胆胰十二指肠液流向食管空肠吻合口

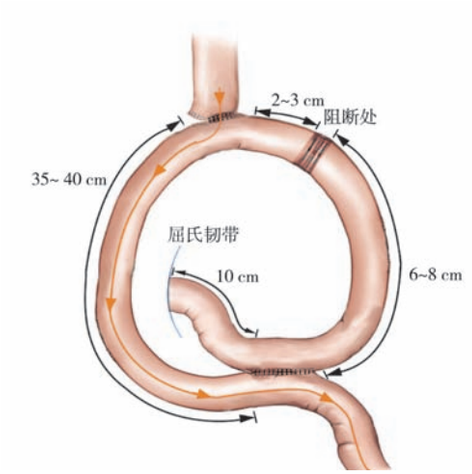

图2 非离断式(Uncut)Roux-en-Y吻合完成示意图(橘红色箭头示食物流动方向)(自绘)

诊随访观察指标：消化道造影及胃镜检查评估吻合口情况；检测并计算营养状况，包括术后6个月血清白蛋白(serum albumin，ALB)、外周血淋巴细胞计数(total lymphocyte count，TLC)、预后营养指数(prognosis nutrition index，PNI)[计算方法：PNI=ALB(g/L)+5×TLC(×10^9/L)][9-10]及肿瘤复发转移情况。随访截止日期为2018年4月。

结 果

一、手术及术后情况

67例患者均完成腹腔镜下全胃切除D_2淋巴结清扫、腔内URY食管空肠吻合术。手术时间(259.4±38.5) min，消化道重建时间(38.2±13.2) min，术中出血量(73.4±38.4) ml，术中清扫淋巴结数(36.2±

14.2)枚,上切缘距肿瘤上缘(3.3±1.2) cm,上切缘距齿状线(1.2±0.7) cm,其中上切缘阳性1例,经再次切除上切缘阴性;辅助切口长度(3.2±0.4) cm。术后初次肠道排气时间(52.8±26.4) h,初次进食流质时间(64.8±28.8) h,术后住院时间(8.4±2.5) d。

手术相关并发症发生率10.4%(7/67),Clavien-Dindo分级Ⅰ级1例(1.5%),为辅助切口感染;Ⅱ级2例(3.0%),均为炎性肠梗阻。Ⅲa级4例(6.0%),其中食管空肠吻合口漏2例,十二指肠残端漏1例,腹腔感染1例。所有患者均予保守治疗痊愈,无手术相关死亡。

二、随访结果

67例患者均完成随访。全组患者PNI:术前为54.5±8.4,术后6个月时为48.3±5.6,术后12个月时为53.4±4.2。术后6个月时体质量丢失量为(3.3±3.0) kg,中度以上贫血7例(10.4%);术后12个月时体质量丢失量为(1.5±3.5) kg,只有1例(1.5%)中度以上贫血。

随访期间,2例(3.0%)出现Roux-en-Y滞留综合征;3例(4.5%)出现反流性食管炎,其中A级2例,B级1例。术后6个月检查,全组患者无食管空肠吻合口输入袢闭合再通,无吻合口狭窄、梗阻,无吻合口肿瘤复发,见图3和图4。食管空肠吻合口直径(3.9±0.6) cm。

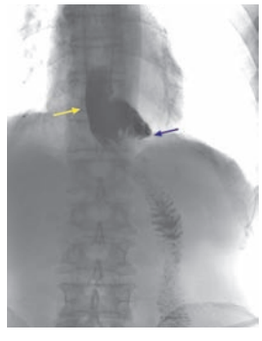

图3 术后6个月消化道造影检查结果(黄色箭头提示食管空肠吻合口通畅,蓝色箭头指示非离断式(Uncut)闭合盲端未见再通)

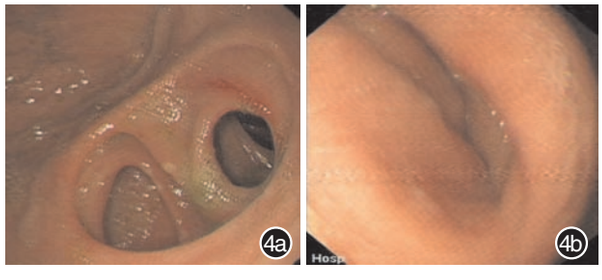

图4 术后胃镜检查所见 4a.术后6个月未见阻断处再通;4b.术后6个月时的吻合口情况

讨 论

Uyama等[11]最早于2005年报道完成全腔镜URY吻合术,即采用闭合而不离断空肠输入袢,阻断胆胰十二指肠液改进Roux-en-Y吻合术。我们通过前期的摸索,克服了学习曲线后于2015年11月开始开展全胃切除术后腔镜直视下URY吻合术。

腔镜直视下URY吻合术不改变气腹压力,操作视野好,依据肿瘤所在部位腔镜下充分精细游离和裸化食管下段,有利于保证足够的肿瘤切除距离和吻合食管的长度,避免肿瘤残留,本组上切缘距肿瘤上缘(3.3±1.2) cm,上切缘阳性仅占1.5%,经再次切除为阴性,因而腔镜直视下对切缘可疑阳性标本取出检查后再吻合,可以保证肿瘤根治切缘安全。与小切口辅助不同,腔镜直视下URY吻合术采用直线切割闭合器完成,避免管型吻合器的置入需延长Trocar切口、食管残端置入底钉座困难、空肠管腔狭小管型吻合器置入困难等繁琐过程,简化手术操作,减少了重建时间[12]。本组消化道重建时间为(38.2±13.2) min,与文献报道较为接近[13-14]。无需因吻合扩大切口,减少患者疼痛感及镇痛药物的使用,有利促进患者早期下床活动。我们的结果表明,术后肠道排气时间和进食流质时间短,提示腔内直视下URY吻合更符合微创和加速康复的理念。

腔内URY吻合术操作技术方面,首先要熟练掌握直线切割闭合器的使用方法,根据组织厚度合理选择吻合钉的型号,对于减少吻合口出血、吻合口爆裂等并发症有重要意义。其次要充分理解正确的吻合方法和技巧,原则上避免在切割线间形成缺血区,导致吻合口组织缺血坏死。为保证吻合口宽度足够和通畅,侧侧吻合尽可能在小肠对系膜缘,关闭共同开口切割闭合线与肠管轴线垂直(可分别在切割闭合线两起点及两点中间各缝合1针提拉悬吊),避免发生吻合口漏或吻合口狭窄等并发症。吻合技术的难点在于食管-空肠以及空肠-空肠吻合,尤其是食管-空肠吻合,其效果将直接影响患者的预后及生活质量。通过腔镜下直视观察和检查URY吻合过程,可以避免盲目操作和吻合不确切所引发的严重并发症。腔镜直线切割闭合器6排吻合钉闭合止血效果更好,侧侧吻合时切割线与空肠肌纤维平行,损伤肌纤维数少,与管型吻合器横断损伤肌纤维数多不同,能有效避免瘢痕导致吻合口狭

窄发生，形成的吻合口径较大，本组食管空肠吻合口径（3.9±0.6）cm，没有出现吻合口出血和狭窄。本组手术相关并发症发生率10.5%，其中食管空肠吻合口漏3.0%，十二指肠残端漏1.5%，低于文献报道[15-16]。本组患者术后随访12个月时，大部分患者体质量和PNI恢复到接近术前水平，提示腔内URY吻合重建消化道术后消化、吸收功能良好，是腹腔镜全胃切除术后有效消化道重建方法。

尽管Tu等[17]研究发现，URY输入袢空肠阻断处可能出现复通并发症，导致严重反流性食管炎，再次改行Roux-en-Y手术而备受争议。我们应用无刀片直线闭合器（ATS45NK）6排钉交替重叠，形成闭合区宽度约1.0 cm，闭合输入袢空肠难以再通，术后随访时胃镜和消化道造影检查未发现复通。因此，ATS45NK可以安全有效地阻断胆胰液反流，避免发生反流性食管炎，并保持空肠的连续性，保护十二指肠正常起搏电位向远端空肠扩布，有效减少Roux-en-Y滞留综合征（Roux-en-Y stasis syndrome，RSS）的发生。本组术后RSS发生率仅占3.0%。

综上所述，应用腹腔镜直视下URY吻合术重建消化道，只要合理掌握吻合适应证和吻合技术，技术上安全可行。

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