doi:10.7659/j.issn.1005-6947.2021.10.001
http://dx.doi.org10.7659/j.issn.1005-6947.2021.10.001
Chinese Journal of General Surgery, 2021, 30(10):1127-1132.

·述评·

食管胃结合部腺癌腹腔镜手术消化道重建方式的进展

何子锐，臧潞

（上海交通大学医学院附属瑞金医院 普通外科/上海市微创外科临床医学中心，上海 200025）

臧潞

摘 要 食管胃结合部腺癌已成为上消化道肿瘤中发病率上升最快的恶性肿瘤之一，且远处转移率高，预后较差。其特殊的发病部位及上皮来源，决定了其临床特点的异质性，以及不同的手术策略。得益于近年来胃癌保功能手术临床研究的不断深入，使我们在面对不同肿瘤部位时拥有更多的吻合方式选择。本文作者将结合个人经验，介绍并探讨不同分型食管胃结合部腺癌，行腹腔镜下手术的不同消化道重建方式的现状及进展。

关键词 胃肠肿瘤；食管胃接合处；消化道重建；腹腔镜

中图分类号： R735

Advances in laparoscopic digestive tract reconstruction for adenocarcinoma of the esophagogastric junction

HE Zirui, ZANG Lu

(Department of General Surgery, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine/Shanghai Clinical Medical Center for Minimally Invasive Surgery, Shanghai 200025, China)

Abstract Adenocarcinoma of the esophagogastric junction has become one of the malignant tumors of the upper digestive with most rapidly increasing incidence, and it also has a high distant metastasis rate and poor prognosis. Its special tumor location and epithelial origin determine the heterogeneity of its clinical features and different surgical strategies. Thanks to the deepening of functional surgery theory for gastric cancer in recent years, there are more anastomotic options for different tumor sites. Here, the authors, based on personal experience, introduce and discuss the status and progress of different methods of digestive tract reconstruction for different types of esophagogastric junction adenocarcinoma under laparoscopic surgery.

Key words Gastrointestinal Neoplasms; Esophagogastric Junction; Gastrointestinal Reconstruction; Laparooscopes

CLC number: R735

基金项目： 上海市卫健委先进适宜技术推广基金资助项目（2019SY030）。

收稿日期： 2021-09-04；**修订日期：** 2021-10-08。

作者简介： 臧潞，上海交通大学医学院附属瑞金医院主任医师，主要从事胃肠道肿瘤外科治疗方面的研究。

通信作者： 臧潞， Email: zanglu@yeah.net

食管胃结合部腺癌定义为跨越食管胃结合处的腺癌[1]。在近几十年来，食管胃结合部腺癌逐渐成为上消化道肿瘤中发病率上升最快的恶性肿瘤之一[2]，其远处转移率高，预后较差[3-4]。由于食管胃结合部是食管鳞状上皮与胃腺上皮移行区域，因此食管胃结合部肿瘤的生物学特性与胃其他部位恶性肿瘤不尽相同[5]，这提示我们应将其视为特定部位肿瘤进行治疗。而得益于近年来胃癌保功能手术理论的提出，各类吻合方式使我们在面对不同部位肿瘤时拥有更多选择。本文重点探讨并介绍不同分型的食管胃结合部腺癌，行腹腔镜下手术的不同消化道重建方式的进展。

目前针对食管胃结合部腺癌的手术切除及重建方式有较多争议，根据国际抗癌联盟（UICC）第8版指南：Siewert I型及Siewert II型食管胃结合部腺癌的TNM分期应参照下段食管癌，而Siewert III型的TNM分期则应参照胃癌。但同时，有学者[6-7]指出，Siewert I型肿瘤（肿瘤中心位于齿状线上方，距齿状线1~5 cm，且累及齿状线）应行经胸入路食管次全切及近端胃切除术，而Siewert II型（肿瘤中心介于齿状线以上1 cm和齿状线以下2 cm之间，且累及齿状线）及III型AEG（肿瘤中心位于齿状线以下，距齿状线2~5 cm，且累及齿状线）更适于行经腹入路全胃切除伴经裂孔食管下段切除术。有研究[8]对比了全胃切除与近端胃切除的肿瘤学预后和营养差异，对Siewert II型AEG是否应行全胃切除提出质疑。笔者认为，对于Siewert II型AEG位于小弯侧且处于早期时，可以保证3 cm下切缘且残胃>1/2的情况下可行近端胃切除，而对于Siewert III型AEG行全胃切除[9-11]。以下我们根据Siewert分型分别分析其不同吻合方式。

1 Siewert I型AEG

此类AEG根治手术多为经胸入路食管次全切及纵隔淋巴结清扫，根据传统食管癌根治术Ivor-Lewis吻合方式行近端胃切除术加食管-管状胃吻合[12]，由于此类手术多由胸外科进行，在此不作赘述。

2 Siewert II型AEG

不论传统手术，腹腔镜手术或是全腹腔镜下手术，此类型AEG的手术重建方式存在争议，对于Siewert II型AEG，经腹手术安全性优于经胸切除术[13-15]。近端胃切除最初的吻合方式为食管残胃吻合，但由于手术切除了贲门，术后消化液反流症状较明显。有研究[16]证明在进行单纯食管残胃吻合后有38.2%的患者发生反流性食管炎，29.8%的患者发生吻合口狭窄。为了改善相关并发症，学者们提出了不同的吻合方式，其中包括双通道吻合及管状胃吻合等。近端胃切除术的重建主要分为两大类：食管空肠吻合与食管残胃吻合。

2.1 食管空肠吻合

由于早期提出的食管残胃直接吻合术后发生反流性食管炎较高，因此各类新吻合方式都以在保留残胃的基础上探索减少胃食管反流的方式[17]。其中应用较为普遍的包括双通道吻合及空肠间置。

2.1.1 双通道吻合 双通道的全腔镜吻合方式如下：在Treiz韧带下方20 cm处切断空肠，空肠远端与食管以圆形吻合器行腔镜下端侧吻合或者直线切割吻合器行侧侧吻合。再以食管空肠吻合口下10~15 cm空肠与残胃行侧侧吻合，在此吻合口下方40 cm行空肠-空肠侧侧吻合[18]。一项回顾性II期临床研究（JCOG1401）探讨了腹腔镜近端胃切除或全胃切除术后，食管胃吻合或食管空肠吻合口的安全性问题，其中，腹腔镜近端胃切除行双通道吻合的比例最高，体现出了该吻合方式更受研究者认可[19]。此类吻合方式与传统食管残胃吻合相比可以有效减少胃食管反流，从而降低反流性食管炎的发生率，且相较于全胃切除，患者术后对维生素B_{12}和铁的吸收以及营养水平都有较大提升[20-22]。但由于存在双通道，且食管空肠段较为垂直，因此比起残胃，食物较多直接进入空肠，也成为此吻合方式的缺点之一[23]。韩国的KLASS-05研究比较了腹腔镜近端胃切除双通道吻合及腹腔镜全胃切除，主要研究终点为术后2年内的血红蛋白变化，次要终点为术后反流性食管炎及吻合口狭窄的发生概率，术后并发症，术后病死率，2年内的生活质量，以及3年的无病生存（DFS），其研究结果尚未公布。

2.1.2 空肠间置法 PGSAS-45研究提示，近端胃切除术后，空肠储袋间置的生活质量最佳，尤其是对于残胃体积较小的患者[24]。Nomura等[25]进行的病例对照研究发现，空肠间置术后患者BMI显著高于双通道法患者。但腹腔镜下行空肠间置较为复杂，随着腹腔镜下双通道吻合的成熟，有研究[25]将双通道吻合的残胃空肠吻合口下方以无刀片直线切割吻合器进行阻断，使食物全部流经残胃，

达到类似空肠间置的效果。但该研究也显示空肠间置患者血清胰岛素及胃泌素水平在卧位与立位之间波动较大，因此提示我们对于不同基础体质的患者可选用不同的吻合方式，尤其对于糖耐量较差的患者，双通道吻合不失为更优选择。

2.2　食管残胃吻合

早在 1897 年，Mikulicz 便描述了第 1 例近端胃切除术后的食管残胃吻合，但其所带来的诸如残胃内容物的反流，吻合口狭窄，营养不良，残胃潴留等术后并发症一直困扰着我们[3]。因此不断有人在食管残胃吻合基础上对吻合方式进行改进，尽可能恢复正常消化道结构且减少术后相关并发症。

2.2.1　管状胃吻合　这类吻合方式要求在离断部分胃大弯及胃小弯血管后，在保证肿瘤切缘的前提下移除小弯侧胃组织，留下管状的大弯侧胃体，再将其与食管吻合，吻合方式可选择圆形吻合或线性吻合。由于圆形吻合可能会带来吻合口狭窄的问题，线性吻合可有效地降低吻合口狭窄发生风险[26-27]。该方法可以在保证食管残胃吻合口无张力的同时保留正常消化道结构。该方法简单可行，且术后反流症状不明显，笔者近年来较多采用腹腔镜下食管–管状胃侧侧吻合的术式。

2.2.2　Side overlap(SOFY)法　该吻合方式 2017 年由 Yamashita 等[28]首先报道，在以直线切割闭合器切断食管后，将食管逆时针旋转 90°与残胃体行侧侧吻合，使得食管残胃吻合口之间形成一定角度，让背侧食管在功能上模仿贲门肌瓣，又由于吻合口上方被固定在膈肌脚，尚有一定残胃形成胃底结构，因此能有效减少反流性食管炎发生，也较易在腹腔镜下实现。在该研究中，14 例患者中有 13 例在 SOFY 法吻合后没有应用质子泵抑制剂控制反流症状。而这一吻合方式的长期随访数据也值得我们期待。

2.2.3　Double-flap 肌瓣成形术(DFT)　Kamikawa 等在 2001 年提出了双肌瓣成形术，具体为在残胃近端 3~4 cm 处“H”形切开胃壁黏膜下层及肌层之间的间隙，制作浆肌瓣，食管后壁距残端 5 cm 处与“H”形上端间断缝合，切开食管残端后，食管后壁断端全层与残胃黏膜层及黏膜下层连续缝合，食管前壁和残胃做全层内翻缝合，浆肌瓣做“Y”形间断缝合包绕吻合口，如此可以使浆肌瓣代替贲门结构，在尽量还原正常消化道结构的同时有效减少胃食管反流[29-30]。这种吻合方式最早被用于 Ivor Lewis 食管癌根治术后的吻合，但近年来在食管胃结合部肿瘤手术后的吻合中也展现出了较好的效果[31]。与此类似的还有 Hisahiro 等[32]在行管状胃吻合时制作类似胃底的穹窿结构，以此减少吻合口的张力，降低吻合口狭窄率，并且适用于肿瘤体积较大因而需要切除更大部分近端胃的患者。由于肌瓣的制作依靠手工缝合，腹腔镜下实施难度较高，并且该方式存在术后吻合口狭窄的问题，Shoji 等[33]发现术前 CT 提示膈肌角水平食管直径 18 mm，是 DFT 术后吻合后狭窄的临界值。

3　Siewert III 型 AEG

Siewert 在提出相应分型时指出，Siewert III 型 AEG 应施行全胃切除术，但全胃切除后，患者缺乏胃酸及各类激素调控，术后随访发现其生活质量及营养状况不及远端胃或近端胃切除术后患者，因此，Yura 等[8]对 Siewert II 型及 III 型患者进行全胃及近端胃切除术后的回顾性研究表明，在肿瘤学方面全胃切除术与近端胃切除术之间并无显著差异。但由于目前尚缺乏更高证据等级的试验，因此目前笔者仍以全胃切除术作为 Siewert III 型 AEG 的标准根治性手术方式。

自 Cesar Roux 提出 Roux-en-Y 吻合后，这一直是全胃切除后的标准消化道重建方式[34]。这种吻合方式可以保证十二指肠内消化液的排出而无反流，但尚有研究发现该吻合方式所带来的营养改善不及预期[35]。近年来多个中心研究证明，全胃切除行全腔镜吻合可以加速术后肠道功能恢复[36]，因此各类基于全腹腔镜下的食管空肠吻合方式近年来报道较多[37]。

3.1　overlap 吻合

overlap 吻合是在食管空肠功能性端端吻合的基础上进行了改良，将食管与空肠行侧侧吻合，一项纳入 490 例的回顾性研究[38]证明，与功能性端端吻合相比，overlap 法可以有效减少患者术后疼痛，术后随访也表明患者的长期并发症尤其是吻合口相关并发症有显著性减少。另外多项回顾性研究也证明 overlap 吻合可以有效减少如吻合口狭窄或吻合口漏等并发症[39-40]。笔者认为，overlap 吻合安全可行，近期和远期疗效好，其主要优势在于行食管空肠吻合前先移除标本，明确上切缘阴性后再行吻合，更符合肿瘤根治原则，但对食管侵犯>2 cm 的 AEG 患者行 overlap 法食管空肠吻合术，纵隔内空间狭小，吻合难度较大，存在一定局限性。

3.2 π吻合

该类吻合方法在切断食管前，将腹段食管与远端空肠之间以直线切割吻合器行侧侧吻合，再以直线切割吻合器关闭共同开口，形成类似π的结构，同样以最小创伤完成吻合，手术难度较低。有报道[41]表明此类吻合方式相比overlap吻合更可能引起吻合口狭窄。且由于吻合需要预留较长的腹段食管进行侧侧吻合，因此Chen等[42]建议π吻合仅适用于未侵犯食管胃结合部的胃上部癌和胃体癌。与此类似的还有国内学者提出的自牵引后离断食管空肠吻合法（SPLT），用结扎带牵引食管下段，在结扎点近端2~3 cm打孔，与空肠肠段行侧侧吻合后，以直线吻合器切断食管及近端空肠，并交错前后壁，形成三角形结构[43]。但不论如何改良，先行食管空肠吻合再移除标本，如何保证AEG手术食管切缘的安全问题一直存在争议。

3.3 Orvil™食管空肠吻合

由于吻合口位置较高，完全腹腔内行食管空肠重建时食管荷包缝合与抵座钉置入的困难难以克服，而Orvil™吻合可以较好得解决该问题，并尽可能提高吻合高度[44-46]。在全胃切除术中，与传统荷包缝合方式置入抵钉座相比，使用Orvil™可以在不增加术中并发症的前提下，更快更便捷地完成吻合[44]。应用时先将气管插管的导管气囊放小，经口置入抵钉座，球形面朝上颚，将抵钉座的导引胃管通过口腔缓慢送至食管残端，术者用剪刀在食管残端剪一小口，将导引胃管拉出，直至暴露抵钉座。但由于抵钉座经口引入，因此可能引发术后咽痛以及食管损伤等并发症，且也有研究表明Orvil™吻合有可能增加术后吻合口狭窄的风险，尤其内镜下难治性狭窄更令人感到棘手[47]，其狭窄的发生因素有很多，其中，吻合时过分牵拉食管和空肠捆绑过紧被认为是主要因素，笔者现将吻合器杆的置入切口放在左上腹，以减少抵钉座和吻合器尖端对合时对食管和空肠的牵拉，并使腹腔镜可以有更好的视角来监视吻合过程，从而降低了术后吻合口狭窄的发生风险[48]。

4 总 结

食管胃结合部肿瘤的高发态势促使我们探索更为有效、安全、微创的根治手术及消化道重建方式。目前以Siewert分型进行的手术切除范围基本达成共识，但消化道重建方式各异，无论是近端胃切除还是全胃切除，均有不同的吻合方式选择。相关研究多为回顾性，缺乏更高证据等级的研究，我们应当关注患者的个体化差异，针对不同个体结合术者经验，采用适合的吻合方式。笔者根据自身的实践经验，在临床工作中，对于Siewert II型AEG，多采用腹腔镜近端胃切除+食管管状胃侧侧吻合，对于Siewert III型AEG，多采用腹腔镜全胃切除术+食管空肠Overlap法或者Orvil™法吻合。相信随着今后的不断随访以及多中心随机对照研究的开展，一些有争议的问题会有更好的解答。

参考文献

[1] Kauppila JH, Lagergren J. The surgical management of esophagogastric junctional cancer[J]. Surg Oncol, 2016, 25(4):394–400. doi: 10.1016/j.suronc.2016.09.004.

[2] Jung MK, Schmidt T, Chon SH, et al. Current surgical treatment standards for esophageal and esophagogastric junction cancer[J]. Ann N Y Acad Sci, 2020, 1482(1):77–84. doi: 10.1111/nyas.14454.

[3] Nunobe S, Ida S. Current status of proximal gastrectomy for gastric and esophagogastric junctional cancer: A review[J]. Ann Gastroenterol Surg, 2020, 4(5):498–504. doi: 10.1002/ags3.12365.

[4] Tepper JE, O'Neil B. Transition in biology and philosophy in the treatment of gastroesophageal junction adenocarcinoma[J]. J Clin Oncol, 2009, 27(6):836–837. doi: 10.1200/JCO.2008.19.5982.

[5] Kumamoto T, Kurahashi Y, Niwa H, et al. True esophagogastric junction adenocarcinoma: background of its definition and current surgical trends[J]. Surg Today, 2020, 50(8):809–814. doi: 10.1007/s00595–019–01843–4.

[6] Huang Y, Liu G, Wang X, et al. Safety and feasibility of total laparoscopic radical resection of Siewert type II gastroesophageal junction adenocarcinoma through the left diaphragm and left thoracic auxiliary hole[J]. World J Surg Oncol, 2021, 19(1):73. doi: 10.1186/s12957–021–02183–9.

[7] Kumar NA, Desouza A, Bhandare MS, et al. Curative resection for adenocarcinoma of the gastro-esophageal junction following neo-adjuvant chemotherapy-thoraco-abdominal vs. trans-abdominal approach[J]. Langenbecks Arch Surg, 2021, 406(3):613–621. doi: 10.1007/s00423–020–02020–9.

[8] Yura M, Yoshikawa T, Otsuki S, et al. Oncological safety of proximal gastrectomy for T2/T3 proximal gastric cancer[J]. Gastric Cancer, 2019, 22(5): 1029–1035. doi: 10.1007/s10120–019–00938–8.

[9] Mariette C, Piessen G, Briez N, Gronnier C, Triboulet JP. Oesophagogastric junction adenocarcinoma: which therapeutic approach?[J]. Lancet Oncol, 2011, 12(3):296–305. doi: 10.1016/S1470–2045(10)70125-X.

[10] Kurokawa Y, Sasako M, Sano T, et al. Ten-year follow-up results of

a randomized clinical trial comparing left thoracoabdominal and abdominal transhiatal approaches to total gastrectomy for adenocarcinoma of the oesophagogastric junction or gastric cardia[J]. Br J Surg, 2015, 102(4):341–348. doi: 10.1002/bjs.9764.

[11] 中华医学会外科学分会胃肠学组, 中国医师协会外科医师分会肿瘤外科学组, 中国医师学会外科医师分会上消化道学组, 等. 中国胃癌保功能手术外科专家共识(2021版)[J]. 中华胃肠外科杂志, 2021, 24(5): 377–382. doi: 10.3760/cma. j. issn. 441530–20210305–00102.
Gastrointestinal Surgery Group, BranchSurgery, Chinese Medical Association, Oncology Surgery Group, Branch of Surgery, Chinese Medical Doctor Association, Upper Gastrointestinal Group, Branch of Surgery, Chinese Medical Doctor Association, et al. Chinese expert consensus on function-preserving gastrectomy for gastric cancer (2021 edition)[J]. Chinese Journal of Gastrointestinal Surgery, 2021, 24(5): 377–382. doi: 10.3760/cma. j. issn. 441530–20210305–00102.

[12] Li KK, Bao T, Wang YJ, et al. The Postoperative outcomes of thoracoscopic-laparoscopic Ivor-Lewis surgery plus D2 celiac lymphadenectomy for patients with adenocarcinoma of the esophagogastric junction[J]. Surg Endosc, 2020, 34(11): 4957–4966. doi: 10.1007/s00464–019–07288–7.

[13] Sugita S, Kinoshita T, Kuwata T, et al. Long-term oncological outcomes of laparoscopic versus open transhiatal resection for patients with Siewert type II adenocarcinoma of the esophagogastric junction[J]. Surg Endosc, 2021, 35(1): 340–348. doi: 10.1007/s00464–020–07406–w.

[14] Wu H, Shang L, Du F, et al. Transhiatal versus transthoracic surgical approach for Siewert type adenocarcinoma of the esophagogastric junction: a meta-analysis[J]. Expert Rev Gastroenterol Hepatol, 2020, 14(11): 1107–1117. doi: 10.1080/17474124.2020.1806710.

[15] Xing J, Liu M, Xu K, et al. Short-Term and Long-Term Outcomes Following Transhiatal versus Right Thoracoabdominal Resection of Siewert Type II Adenocarcinoma of the Esophagogastric Junction[J]. Cancer Manag Res, 2020, 12: 11813–11821. doi: 10.2147/CMAR.S275569.

[16] An JY, Youn HG, Choi MG, et al. The difficult choice between total and proximal gastrectomy in proximal early gastric cancer[J]. Am J Surg, 2008, 196(4):587–591. doi: 10.1016/j.amjsurg.2007.09.040.

[17] Adachi Y, Inoue T, Hagino Y, et al. Surgical results of proximal gastrectomy for early-stage gastric cancer: jejunal interposition and gastric tube reconstruction[J]. Gastric Cancer, 1999, 2(1): 40–45. doi: 10.1007/s101200050019.

[18] Fujimoto D, Taniguchi K, Kobayashi H. Double-Tract Reconstruction Designed to Allow More Food Flow to the Remnant Stomach After Laparoscopic Proximal Gastrectomy[J]. World J Surg, 2020, 44(8):2728–2735. doi: 10.1007/s00268–020–05496–0.

[19] Katai H, Mizusawa J, Katayama H, et al. Single-arm confirmatory trial of laparoscopy-assisted total or proximal gastrectomy with nodal dissection for clinical stage I gastric cancer: Japan Clinical Oncology Group study JCOG1401[J]. Gastric Cancer, 2019, 22(5): 999–1008. doi: 10.1007/s10120–019–00929–9.

[20] Miyauchi W, Matsunaga T, Shishido Y, et al. Comparisons of Postoperative Complications and Nutritional Status After Proximal Laparoscopic Gastrectomy with Esophagogastrostomy and Double-Tract Reconstruction[J]. Yonago Acta Med, 2020, 63(4): 335–342. doi: 10.33160/yam.2020.11.019.

[21] Kim DJ, Kim W. Laparoscopy-assisted Proximal Gastrectomy with Double Tract Anastomosis Is Beneficial for Vitamin B12 and Iron Absorption[J]. Anticancer Res, 2016, 36(9): 4753–4758. doi: 10.21873/anticanres.11031.

[22] 倪道勇, 周蒙滔. 不同胃癌根治性切除术及重建术式临床效果分析[J]. 中国普通外科杂志, 2015, 24(4): 565–569. doi: 10.3978/j.issn.1005–6947.2015.04.019.
Ni DY, Zhou MT. Clinical analysis of different types of radical gastrectomy and reconstruction for proximal gastric cancer[J]. Chinese Journal of General Surgery, 2015, 24(4): 565–569. doi: 10.3978/ j.issn.1005–6947.2015.04.019.

[23] Yun L, Zhiwei J, Junsheng P, et al. Comparison of Functional Outcomes between Functional Jejunal Interposition and Conventional Roux-en-Y Esophagojejunostomy after Total Gastrectomy for Gastric Cancer[J]. Dig Surg, 2020, 37(3):240–248. doi: 10.1159/000501677.

[24] Yabusaki H, Kodera Y, Fukushima N, et al. Comparison of Postoperative Quality of Life among Three Different Reconstruction Methods After Proximal Gastrectomy: Insights From the PGSAS Study[J]. World J Surg, 2020, 44(10):3433–3440. doi: 10.1007/s00268–020–05629–5.

[25] Nomura E, Kayano H, Lee SW, et al. Functional evaluations comparing the double-tract method and the jejunal interposition method following laparoscopic proximal gastrectomy for gastric cancer: an investigation including laparoscopic total gastrectomy[J]. Surg Today, 2019, 49(1):38–48. doi: 10.1007/s00595–018–1699–7.

[26] Li Z, Ma Y, Liu G, et al. Proximal gastrectomy with gastric tube reconstruction or jejunal interposition reconstruction in upper-third gastric cancer: which offers better short-term surgical outcomes? [J]. BMC Surg, 2021, 21(1):249. doi: 10.1186/s12893–021–01239–7.

[27] Aihara R, Mochiki E, Ohno T, et al. Laparoscopy-assisted proximal gastrectomy with gastric tube reconstruction for early gastric cancer[J]. Surg Endosc, 2010, 24(9): 2343–2348. doi: 10.1007/s00464–010–0947–8.

[28] Yamashita Y, Yamamoto A, Tamamori Y, et al. Side overlap esophagogastrostomy to prevent reflux after proximal gastrectomy[J]. Gastric Cancer, 2017, 20(4):728–735. doi: 10.1007/s10120–016–0674–5.

[29] Omori T, Yamamoto K, Yanagimoto Y, et al. A Novel Valvuloplastic Esophagogastrostomy Technique for Laparoscopic Transhiatal Lower Esophagectomy and Proximal Gastrectomy for Siewert Type II Esophagogastric Junction Carcinoma-the Tri Double-Flap Hybrid Method[J]. J Gastrointest Surg, 2021, 25(1): 16–27. doi: 10.1007/s11605–020–04547–0.

　

[30] Wang B, Wu Y, Wang H, et al. Semi-embedded valve anastomosis a new anti-reflux anastomotic method after proximal gastrectomy for adenocarcinoma of the oesophagogastric junction[J]. BMC Surg, 2020, 20(1):230. doi: 10.1186/s12893–020–00894–6.

[31] Mine S, Nunobe S, Watanabe M. A Novel Technique of Anti-reflux Esophagogastrostomy Following Left Thoracoabdominal Esophagectomy for Carcinoma of the Esophagogastric Junction[J]. World J Surg, 2015, 39(9): 2359–2361. doi: 10.1007/s00268–015–3079–4.

[32] Hosogi H, Yoshimura F, Yamaura T, et al. Esophagogastric tube reconstruction with stapled pseudo-fornix in laparoscopic proximal gastrectomy: a novel technique proposed for Siewert type II tumors [J]. Langenbecks Arch Surg, 2014, 399(4): 517–523. doi: 10.1007/s00268–015–3079–4.

[33] Shoji Y, Nunobe S, Ida S, et al. Surgical outcomes and risk assessment for anastomotic complications after laparoscopic proximal gastrectomy with double-flap technique for upper-third gastric cancer[J]. Gastric Cancer, 2019, 22(5): 1036–1043. doi: 10.1007/s10120–019–00940–0.

[34] Vauthey JN, Maddern GJ, Gertsch P. César Roux--Swiss pioneer in surgery[J]. Surgery, 1992, 112(5):946–950.

[35] Lehnert T, Buhl K. Techniques of reconstruction after total gastrectomy for cancer[J]. Br J Surg, 2004, 91(5): 528–539. doi: 10.1002/bjs.4512.

[36] 李佑, 臧潞, 胡伟国, 等. 腹腔镜与开腹胃癌根治术治疗早期胃癌的临床对照研究[J]. 中华胃肠外科杂志, 2010, 13(12):899–902. doi:10.3760/cma.j.issn.1671–0274.2010.12.007.
Li Y, Zang L, Hu WG, et al. Comparative study of laparoscopic-assisted radical gastrectomy versus open radical gastrectomy for early gastric cancer[J]. Chinese Journal of Gastrointestinal Surgery, 2010, 13(12): 899–902. doi: 10.3760/cma. j. issn. 1671–0274.2010.12.007.

[37] Song KY, Park CH, Kang HC, et al. Is totally laparoscopic gastrectomy less invasive than laparoscopy-assisted gastrectomy?: prospective, multicenter study[J]. J Gastrointest Surg, 2008, 12(6): 1015–1021. doi: 10.1007/s11605–008–0484–0.

[38] Ko CS, Gong CS, Kim BS, et al. Overlap method versus functional method for esophagojejunal reconstruction using totally laparoscopic total gastrectomy[J]. Surg Endosc, 2021, 35(1): 130–138. doi: 10.1007/s00464–020–07370–5.

[39] Kitagami H, Morimoto M, Nakamura K, et al. Technique of Roux-en-Y reconstruction using overlap method after laparoscopic total gastrectomy for gastric cancer: 100 consecutively successful cases[J]. Surg Endosc, 2016, 30(9): 4086–4091. doi: 10.1007/s00464–015–4724–6.

[40] Jeong O, Jung MR, Kang JH, et al. Reduced anastomotic complications with intracorporeal esophagojejunostomy using endoscopic linear staplers (overlap method) in laparoscopic total gastrectomy for gastric carcinoma[J]. Surg Endosc, 2020, 34(5): 2313–2320. doi: 10.1007/s00464–019–07362–0.

[41] Zhang S, Khaliq J, Li D, et al. Robotic total gastrectomy with pi-shaped esophagojejunostomy using a linear stapler as a novel technique[J]. World J Surg Oncol, 2018, 16(1): 238. doi: 10.1186/s12957–018–1542–z.

[42] Chen K, Pan Y, Cai JQ, et al. Intracorporeal esophagojejunostomy after totally laparoscopic total gastrectomy: A single-center 7-year experience[J]. World J Gastroenterol, 2016, 22(12):3432–3440. doi: 10.3748/wjg.v22.i12.3432.

[43] 蒿汉坤, 洪军, 王雅平, 等. 自牵引后离断食管-空肠吻合术100例安全性评价[J]. 中华胃肠外科杂志, 2018, 21(2): 206–211. doi: 10.3760/cma.j.issn.1671–0274.2018.02.017.
Hao HK, Hong J, Wang YP, et al. Safety evaluation on initial 100 consecutive procedures of self-pulling and latter transected esophagojejunostomy[J]. Chinese Journal of Gastrointestinal Surgery, 2018, 21(2): 206–211. doi: 10.3760/cma. j. issn. 1671–0274.2018.02.017.

[44] Marangoni G, Villa F, Shamil E, et al. OrVil™-assisted anastomosis in laparoscopic upper gastrointestinal surgery: friend of the laparoscopic surgeon[J]. Surg Endosc, 2012, 26(3): 811–817. doi: 10.1007/s00464–011–1957–x.

[45] Kawamura H, Ohno Y, Ichikawa N, et al. Anastomotic complications after laparoscopic total gastrectomy with esophagojejunostomy constructed by circular stapler (OrVil™) versus linear stapler (overlap method) [J]. Surg Endosc, 2017, 31 (12):5175–5182. doi: 10.1007/s00464–017–5584–z.

[46] Nomura E, Kayano H, Seki T, et al. Preventive procedure for stenosis after esophagojejunostomy using a circular stapler and transorally inserted anvil (OrVil™) following laparoscopic proximal gastrectomy and total gastrectomy involving reduction of anastomotic tension[J]. BMC Surg, 2021, 21(1): 47. doi: 10.1186/s12893–021–01054–0.

[47] Zuiki T, Hosoya Y, Kaneda Y, et al. Stenosis after use of the double-stapling technique for reconstruction after laparoscopy-assisted total gastrectomy[J]. Surg Endosc, 2013, 27(10): 3683–3689. doi: 10.1007/s00464–013–2945–0.

[48] Tokuhara T, Nakata E, Tenjo T, et al. Stenosis after esophagojejunostomy with the hemi-double-stapling technique using the transorally inserted anvil (OrVil ™) in Roux-en-Y reconstruction with its efferent loop located on the patient's left side following laparoscopic total gastrectomy[J]. Surg Endosc, 2019, 33 (7):2128–2134. doi: 10.1007/s00464–018–6484–6.

（本文编辑　姜晖）

本文引用格式：何子锐, 臧潞. 食管胃结合部腺癌腹腔镜手术消化道重建方式的进展[J]. 中国普通外科杂志, 2021, 30(10):1127–1132. doi:10.7659/j.issn.1005–6947.2021.10.001

Cite this article as:He ZR, Zang L. Advances in laparoscopic digestive tract reconstruction for adenocarcinoma of the esophagogastric junction[J]. Chin J Gen Surg, 2021, 30(10): 1127–1132. doi: 10.7659/j.issn.1005–6947.2021.10.001