论著·临床医学

锥形管状胃与常规管状胃在双镜同步食管癌根治术中近期临床疗效对比:一项倾向性评分匹配的回顾性队列研究

龙 谦[1],孙 香[2],赵祖源[3],朱紫茵[2],姚舒桓[2],韦海涛[4],李 丽[2,4],李霞鹏[4] [1]贵州省人民医院胸外科,贵州贵阳;[2]河南大学护理与健康学院慢病研究所,河南开封;[3]成都医学院临床医学院,四川成都;[4]河南大学淮河医院胸外科,河南开封

[**摘要**] **目的** 食管癌是我国高发消化道恶性肿瘤,外科手术是其主要根治手段。充气式纵隔镜同步腹腔镜食管癌根治术逐步应用于食管癌外科治疗,消化道重建的胃塑形方式直接影响术后恢复与并发症发生,常规管状胃仍存在胸胃扩张、反流等问题,而锥形管状胃在此术式中的优劣尚不明确。本研究旨在比较常规管状胃和锥形管状胃在充气式纵隔镜同步腹腔镜食管癌根治术中的临床应用效果。**方法** 采用单中心回顾性队列研究设计,纳入2023年1月至2025年1月在河南大学淮河医院胸外科行充气式纵隔镜同步腹腔镜食管癌根治术的患者共139例,根据临床实践中不同消化道重建方式分为常规管状胃组(77例)和锥形管状胃组(62例),所有患者均采用手工分层吻合,使用倾向性评分匹配(propensity score matching,PSM)对患者进行1∶1匹配。首要主要结局指标为术后并发症发生率,次要主要结局指标为术后主客观营养指标,次要结局指标包括炎症因子、胃肠功能指标及生活质量。**结果** 经PSM匹配后,2组各纳入55例,匹配后患者基线资料比较,差异均无统计学意义($P>0.05$)。锥形管状胃组术后首次排气时间[(1.16±0.96) *vs* (1.58±1.20)d,$P=0.045$]、首次经口进食时间[(4.43±2.10) *vs* (5.48±2.98)d,$P=0.035$]显著短于常规管状胃组。锥形管状胃组胃食管反流($P=0.015$)、胸胃扩张($P=0.026$)发生率显著低于常规管状胃组,2组吻合口瘘、吻合口狭窄发生率无显著差异(均$P>0.05$)。术后6个月随访提示,锥形管状胃组营养恢复更优,PG-SGA评分显著更低(2.41±1.03 *vs* 2.93±1.29,$P=0.021$),血清总蛋白、白蛋白、前白蛋白、血红蛋白等客观营养指标亦显著优于常规管状胃组(均$P<0.05$)。次要结局指标中,术后1周锥形管状胃组炎症反应更轻微,IL-10[(7.85±0.61) *vs* (8.47±0.65)ng/L,$P<0.001$]、IL-6[(21.37±4.72) *vs* (26.10±3.52)ng/L,$P<0.001$]、TNF-α[(14.18±2.94) *vs* (19.12±3.23)ng/L,$P<0.001$]水平显著低于常规管状胃组。术后2周锥形管状胃组胃肠功能恢复更佳,MTL[(117.85±16.61) *vs* (110.49±16.76)ng/L,$P=0.023$]、GAS[(62.58±15.72) *vs* (55.12±16.11)ng/L,$P=0.016$]水平更高,术后6个月生活质量评估显示,锥形管状胃组生活质量评分显著更高(75.38±7.16 *vs* 70.53±7.24,$P<0.05$)。**结论** 在充气式纵隔镜同步腹腔镜食管癌根治术中,相较于常规管状胃,锥形管状胃可显著改善患者术后胃肠功能,降低胸胃扩张、胃食管反流等并发症发生风险,改善术后营养状态并提升近期生活质量,具有临床应用价值。

[**关键词**] 食管癌;食管切除术;锥形管状胃;手工分层吻合;充气式纵隔镜同步腹腔镜

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[**通信作者**] 李 丽,E-mail:10210051@vip.henu.edu.cn

李霞鹏,E-mail:258096@henu.edu.cn

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Short-term clinical efficacy between coniform and conventional gastric tube in inflatable mediastinoscopy combined with laparoscopic esophagectomy: a propensity score-matched retrospective cohort study

Long Qian[1], Sun Xiang[2], Zhao Zuyuan[3], Zhu Ziyin[2], Yao Shuhuan[2], Wei Haitao[4], Li Li[2,4], Li Xiapeng[4]
[1]Department of Thoracic Surgery, Guizhou Provincial People's Hospital, Guiyang, Guizhou; [2]Institute of Chronic Diseases, School of Nursing and Health, Henan University, Kaifeng, Henan; [3]School of Clinical Medicine, Chengdu Medical College, Chengdu, Sichuan; [4]Department of Thoracic Surgery, Huaihe Hospital of Henan University, Kaifeng, Henan, China

[**Abstract**] **Objective** Esophageal cancer, a highly prevalent gastrointestinal malignancy in China, is primarily treated by surgical resection. Inflatable mediastinoscopy combined with laparoscopic esophagectomy has been gradually adopted in the surgical treatment for esophageal cancer. The gastric-shaping strategy for digestive tract reconstruction directly affects postoperative recovery and complication occurrence. Conventional gastric tube reconstruction is still associated with problems such as intrathoracic gastric dilatation and gastroesophageal reflux, whereas the advantages and disadvantages of the coniform gastric tube in this surgical procedure remain unclear. This study aims to compare the clinical outcomes between conventional gastric tube and coniform gastric tube reconstruction after inflatable mediastinoscopy combined with laparoscopic esophagectomy. **Methods** A single-center retrospective cohort study was conducted on 139 patients who underwent inflatable mediastinoscopy combined with laparoscopic esophagectomy in Department of Thoracic Surgery of Huaihe Hospital of Henan University between January 2023 and January 2025. According to different digestive tract reconstruction strategies, the patients were divided into a conventional gastric tube group (n=77) and a coniform gastric tube group (n=62). All patients received hand-sewn anastomosis. Propensity-score matching (PSM) was performed at a 1∶1 ratio. The primary outcome was the incidence of postoperative complications, the secondary outcome was postoperative subjective and objective nutritional indicators, and secondary outcomes included inflammatory factors, gastrointestinal function indicators, and quality of life. **Results** After PSM, 55 patients were included in each group, with no statistically significant differences in baseline characteristics between groups (all P>0.05). The coniform gastric tube group demonstrated significantly shorter time to first postoperative flatus [(1.16±0.96) *vs* (1.58±1.20) d, P=0.045] and time to first oral intake [(4.43±2.10) *vs* (5.48±2.98) d, P=0.035] than the conventional gastric tube group. The incidences of gastroesophageal reflux (P=0.015) and intrathoracic gastric dilatation (P=0.026) were markedly lower in the coniform gastric tube group, whereas no significant intergroup differences were observed in the incidences of anastomotic leakage or anastomotic stricture (P>0.05). At 6-month postoperative follow-up, better nutritional recovery was observed in the coniform gastric tube group, with significantly lower Patient-Generated Subjective Global Assessment (PG-SGA) scores (2.41±1.03 *vs* 2.93±1.29, P=0.021), and objective nutritional indicators including serum total protein, albumin, prealbumin and hemoglobin were also significantly better than the conventional gastric tube group (all P<0.05). For the secondary outcomes, the coniform gastric tube group exhibited milder inflammatory responses at 1 week postoperatively, with significantly lower levels of IL-10 [(7.85±0.61) *vs* (8.47±0.65) ng/L, P<0.001], IL-6 [(21.37±4.72) *vs* (26.10±3.52) ng/L, P<0.001], and TNF-α [(14.18±2.94) *vs* (19.12±3.23) ng/L, P<0.001]. At 2 weeks postoperatively, gastrointestinal function recovery was obviously better in the coniform gastric tube group, with higher levels of motilin (MTL) [(117.85±16.61) *vs* (110.49±16.76) ng/L, P=0.023] and gastrin (GAS) [(62.58±15.72) *vs* (55.12±16.11) ng/L, P=0.016]. Quality of life assessment at 6 months postoperatively showed significantly higher scores in the coniform gastric tube group (75.38±7.16 *vs* 70.53±7.24, P<0.05). **Conclusion** For patients undergoing inflatable mediastinoscopy combined with laparoscopic esophagectomy, coniform gastric tube reconstruction can effectively improve postoperative gastrointestinal function, reduce the risks of intrathoracic gastric dilatation and gastroesophageal reflux,

promote postoperative nutritional status and enhance short-term quality of life, demonstrating clinical application value.

[**Key words**] esophageal cancer; esophagectomy; coniform gastric tube; hand-sewn anastomosis; inflatable mediastinoscopy combined with laparoscopy

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食管癌是世界范围内常见的癌症类型,病死率较高[1]。我国是全球食管癌的高发地区,其食管癌新发病例数约占全球的一半[2]。微创食管癌切除术是治疗中早期食管癌的首选方法,其中,McKeown术式为颈-胸-腹三切口食管癌根治术,是目前食管癌的主流术式[3],虽能实现充分的淋巴结清扫和安全的切缘距离,但其开胸操作及术中体位变换带来的肺功能受损尤为显著[4]。与之相比,Ivor-Lewis术式虽降低了喉返神经损伤风险,但胸腔内吻合口瘘导致的严重感染风险亦令人担忧[5]。为规避开胸带来的胸部创伤、降低肺部相关并发症,Fujiwara等[6-7]首创了经颈纵隔镜联合腹腔镜的非经胸食管癌根治术。本研究团队在双镜联合的基础上,进一步优化并推广充气式纵隔镜同步腹腔镜食管癌根治术。该术式通过纵隔充气建立操作空间,不经胸、无需单肺通气,术中保持仰卧位,纵隔与腹腔操作可同步开展,既保障纵隔淋巴结清扫视野,又显著减轻胸部创伤,降低肺部并发症。其中消化道重建是影响其手术效果与患者生活质量的关键核心步骤[8]。目前,在重建方式上,胃因血供丰富,常被作为首选器官。管状胃因术中需离断胃网膜左动脉,原来由其供血的管状胃头端约3~4 cm区域成为血运最差的部位[9],该缺血区域恰是食管-胃吻合的常规部位,仅能依赖侧支循环建立的微循环网络,从而增加了术后吻合口愈合不良的风险。因此,肖鑫等[10]提出锥形管状胃概念,该方式在制作过程中保留双支胃右动脉,并切除血供较差的胃底组织,同时使吻合口位置更靠近胃右血管弓,有效保证了吻合口血供,降低吻合口瘘发生率。现有研究多为探讨单一管状胃的临床疗效分析,尚未在充气式纵隔镜同步腹腔镜食管癌根治术这一非经胸微创术式中,对常规管状胃与锥形管状胃进行多维度、系统性的对照研究,2种塑形方式的优劣差异及临床适用价值仍缺乏循证支撑。因此,本研究在充气式纵隔镜同步腹腔镜食管癌根治术中,系统比较常规管状胃和锥形管状胃在手工分层吻合方式下的围术期指标、吻合口相关并发症、炎症因子、胃肠功能、营养状况及患者生活质量方面的差异。旨在明确锥形管状胃在充气式纵隔镜同步腹腔镜食管癌根治术中的应用价值,为该术式消化道重建方案的标准化、规范化实施提供可靠的循证医学依据。

1 资料和方法

1.1 研究设计

本研究为单中心回顾性队列研究,研究前期收集符合纳入、排除标准的临床病例资料,通过倾向性评分匹配(propensity score matching,PSM)对患者基线混杂因素进行均衡校正,完成1∶1匹配分组以消除组间基线偏倚,保障组间各项临床指标具有可比性。由于手术操作的特殊性,本研究未对术者及患者实施盲法,但数据分析和结果评估由设盲的独立团队完成。

1.2 研究对象与伦理审批

选取2023年1月至2025年1月,在河南大学淮河医院胸外科同一组手术团队行充气式纵隔镜同步腹腔镜食管癌根治术患者,根据患者在临床实践中接受的消化道重建方式分为常规管状胃组和锥形管状胃组。纳入标准:①经胃镜及病理确诊为T1-2N0-1M0或T3N1M0(Ⅲa)的患者;②符合根治性切除手术条件;③临床资料完整,可完成全程随访。排除标准:①合并其他恶性肿瘤者;②既往存在胃肠道手术史、胸部手术史,或合并严重胸廓畸形、重度胸膜腔粘连、肺功能严重异常,无法耐受根治手术者;③消化道重建采用非胃代食管重建方式(如小肠代食管、结肠代食管等)的患者。此次研究共纳入139例患者,77名患者被分配到常规管状胃组,62名患者被分配到锥形管状胃组。本研究符合《赫尔辛基宣言》的规定,经河南大学医学院伦理委员会批准(HUSOM2023-348)。

1.3 手术方法

患者取人字形分腿平卧位、头高脚低体位,行单腔气管插管全身麻醉,同步实施纵隔、腹腔手术。纵隔组:于左颈部做3~4 cm切口,沿左侧喉返神经走行清扫淋巴结,全程保护神经。置入切口保护套及手套建立操作腔道,纵隔内灌注CO_2气体,维持压力10~12 mmHg;按左→前→右→后顺序游离食管至下肺静脉水平,经气管后间隙清扫右侧喉返神经旁淋巴结,同时清除胸段食管旁、隆突下淋巴结。腹腔组:建立人工气腹,腹

腔内CO_2压力维持10~14 mmHg,采用常规腹腔镜五孔法操作。腹腔镜下游离胃体,超声刀离断胃结肠韧带、胃脾韧带。游离胃左动静脉旁脂肪组织,血管夹夹闭两端后离断,同步清扫周围淋巴结。超声刀切开食管裂孔,扩大术野,钝性分离周边组织,清扫食管裂孔及食管下段周围淋巴结;继续向上游离食管,至隆突水平与纵隔组汇合。剑突下做约5 cm切口,将食管及胃体牵出体外。

(1)制作常规管状胃:①以胃小弯胃角为起点,使用直线切割缝合器垂直胃大弯进行裁剪;②随后沿胃小弯平行于胃大弯逐步裁剪;③贲门处垂直胃大弯切除,保留胃底,制成宽度约4 cm的管状胃。

(2)制作锥形管状胃:①于胃小弯侧幽门(距幽门约4~5 cm),选取胃右动脉第2或第3分支处作为起始点,7号丝线结扎离断血管;②使用直线切割闭合器自该点小倾角首次切割,构建宽大的胃底;③沿上一钉合线末端继续向上裁剪,每次推进时钉仓头端逐渐偏向胃大弯侧,通过增大切割角度纳入更多胃组织,形成上窄下宽的锥形结构;④将管状胃上提至颈部吻合区,在确保无张力的前提下,选择血供较优的胃大弯侧低位(近胃网膜右动脉)作为吻合口;⑤于吻合口上方2~3 cm处完成末次切割,切除血运较差的胃底区域,形成锥形管状胃(图1A);⑥将锥形管状胃送至颈部。

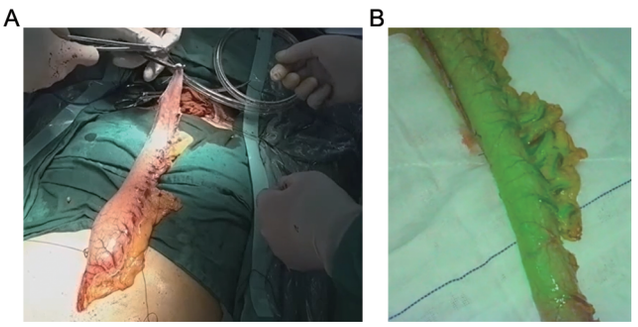
颈部吻合:①将管状胃无张力上提至食管吻合区域;②距胃尖段约2~3 cm处用三叶钳固定胃壁与食管残端;③分别剪开胃、食管的浆肌层及黏膜层,将黏膜层多剥离3~4 mm;④用5-0薇乔线间断吻合后壁,4-0抗菌薇乔线先间断缝合黏膜层,再连续缝合肌层或外层,最后以5-0薇乔线间断吻合前壁,完成食管胃颈部的分层吻合。

术中采用吲哚菁绿增强荧光法评估胃管及吻合口灌注情况(图1B)。吻合操作结束后,为患者置入胃管与空肠营养管。随后核对手术器械及敷料数目无误,缝合切口。

1.4 评价指标

1.4.1 基线资料 记录2组患者的人口统计学数据(年龄、性别)、肿瘤临床病理特征(病理分期、肿瘤发病部位、淋巴结转移)、术前临床资料(是否接受新辅助治疗、术前合并症)。

1.4.2 主要结局指标 (1)首要主要结局为术后并发症(吻合口瘘、吻合口狭窄、胃食管反流等)发生率,术后并发症的界定主要参照食管切除术并发症共识组(Esophagectomy Complications Consensus Group,ECCG)[11]的诊断标准。(2)次要主要结局,①术后营养指标:收集术前及术后6个月血清总蛋白、血清白蛋白等变化情况;②患者主观整体营养评估:采用患者主观整体营养评估表(patient generated subjective global assessment,PG-SGA)[12]进行评价,量表总分为0~23分,评分≥4分为有营养风险。



A: Construction of the coniform gastric tube; B: Indocyanine green-enhanced green fluorescence of the coniform gastric tube

图1 锥形管状胃

Figure 1 coniform gastric tube

1.4.3 次要结局指标 ①围术期结果(手术时间、术中出血量、术后引流量等);②炎症因子(IL-10、IL-6、TNF-α)水平;③胃肠功能指标:血清胃动素(motilin,MTL)、胃泌素(gastrin,GAS)水平变化;④生活质量:采用欧洲癌症研究与治疗组织(European Organization for Research and Treatment of Cancer,EORTC)开发的生命质量量表(quality of life questionnaire-C30,QLQ-C30)[13]进行生活质量评估,得分越高生命质量越佳。

1.5 随访

患者术后6个月接受门诊随访复查,检测血清总蛋白、血清白蛋白、血清前白蛋白与血红蛋白水平;采用PG-SGA评估营养状况,采用QLQ-C30评价生活质量。

1.6 统计学分析

采用PSM以1∶1比例匹配,以年龄、性别、肿瘤位置、病理分期、淋巴结转移、术前新辅助化疗等变量为协变量,将卡钳值设置为0.2。采用卡方检验与标准化均数差(standardized mean difference,SMD)评估匹配后2组间各变量的均衡性;SMD<0.1,差异可忽略不计。采用SPSS 26.0软件进行统计分析;定量资料若符合正态分布以$\bar{x}\pm s$表示,采用独立样本t检验,非正态分布以$M(P_{25},P_{75})$表示,采用Wilcoxon秩和检验;分类变量以频次(%)表示,组间比较采用χ^2检验,若理论频数<5,则改用Fisher确切概率法;双侧P<0.05为差异有统计学意义。

2 结果

2.1 2组患者一般临床资料比较

此次研究共纳入139例食管癌患者,其中77名患者被分配到常规管状胃组,62名患者被分配到锥形管

状胃组,经PSM分析,每组各有55名患者。匹配后2组患者基线资料,差异无统计学意义(P>0.05),且SMD<0.1,具有可比性。见表1。

2.2 锥形管状胃术后首次排气时间与经口进食时间较短

110例患者均顺利完成手术,无中转开胸、开腹病例,且术后均康复出院,无围术期死亡病例。围术期相关指标结果显示,2组患者手术时长、术中出血量、术后首次下床活动时间及住院天数对比差异均无统计学意义。而锥形管状胃组术后首次排气时间[(1.16±0.96) *vs* (1.58±1.20)d,P=0.045]、首次经口进食时间[(4.43±2.10) *vs* (5.48±2.98)d,P=0.035]均短于常规管状胃组。见表2。

2.3 术后1周锥形管状胃组的血清炎症因子水平显著低于常规管状胃组

术前2组患者血清IL-10、IL-6及TNF-α水平差异均无统计学意义。术后1周,2组患者炎症因子水平较术前均呈显著升高,组间比较进一步显示,锥形管状胃组IL-10[(7.85±0.61) *vs* (8.47±0.65) ng/L, P<

表1 2组患者一般临床资料($例,\bar{x}\pm s$)

Table 1 General clinical characteristics of the 2 groups of patients undergoing inflatable mediastinoscopy combined with laparoscopic esophagectomy with reconstruction strategies of coniform and conventional gastric tube ($n,\bar{x}\pm s$)

Items	Before PSM					After PSM				
	Conventional gastric tube group (n=77)	Coniform gastric tube group (n=62)	$t/\chi^2/F$	P	SMD	Conventional gastric tube group (n=55)	Coniform gastric tube group (n=55)	$t/\chi^2/F$	P	SMD
Sex			0.228	0.633	0.212			0.367	0.545	0.067
Male	49	37				38	35			
Female	28	25				17	20			
Age/years	64.98±6.22	66.32±6.39	−1.247	0.214	0.116	64.76±6.13	64.83±6.47	−0.058	0.954	0.011
Pathological staging			0.493	0.781	0.072			0.268	0.883	0.057
Stage Ⅰ	25	21				16	17			
Stage Ⅱ	36	31				28	29			
Stage Ⅲ	16	10				11	9			
Tumor location			0.075	0.963	0.032			0.049	0.976	0.025
Upper	14	11				9	9			
Middle	38	32				31	30			
Lower	25	19				15	16			
Lymph node metastasis			0.934	0.334	0.172			0.806	0.369	0.035
Yes	23	14				15	11			
No	54	48				40	44			
Preoperative neoadjuvant therapy			1.276	0.259	0.195			0.192	0.661	0.083
Yes	24	14				15	13			
No	53	48				40	42			
Preoperative complications			0.074	0.785	0.177			1.533	0.216	0.024
Hypertension	8	6				7	5			
Diabetes	5	4				5	4			
Cardiovascular diseases	4	2				2	1			
Cerebrovascular diseases	2	1				1	1			
Lung disease	5	5				5	3			

PSM: propensity score matching; SMD: standardized mean difference

表2 2组患者围术期结果($\bar{x}\pm s$)

Table 2 Postoperative outcomes in the 2 groups of patients($\bar{x}\pm s$)

Groups	Operative time/h	Intraoperative blood loss/mL	First postoperative movement from bed/d	Time to first postoperative emptying/d	First postoperative oral taking/d	Length of hospital stay/d
Conventional gastric tube group	103.52±8.36	41.70±15.41	1.81±1.32	1.58±1.20	5.48±2.98	10.66±1.76
Coniform gastric tube group	105.27±7.51	42.54±12.36	1.72±1.57	1.16±0.96	4.43±2.10	10.83±1.39
t	−1.155	−0.315	0.325	2.027	2.136	−0.562
P	0.215	0.753	0.746	0.045	0.035	0.575

0.001]、IL-6[(21.37±4.72) *vs* (26.10±3.52)ng/L, *P*<0.001]、TNF-α[(14.18±2.94) *vs* (19.12±3.23)ng/L, *P*<0.001]水平均显著低于常规管状胃组。见表3。

2.4 术后2周锥形管状胃组胃肠激素指标显著优于常规管状胃组

术前2组患者MTL及GAS水平差异无统计学意义。术后2周,2组MTL及GAS水平较术前均出现不同程度的降低。血清锥形管状胃组MTL[(117.85±16.61) *vs* (110.49±16.76) ng/L, *P*=0.023]、GAS[(62.58±15.72) *vs* (55.12±16.11)ng/L, *P*=0.016]水平均显著高于常规管状胃组。见表4。

2.5 锥形管状胃组术后胃食管反流、胸胃扩张及总体并发症发生率显著降低

常规管状胃组术后共发生19例并发症,而锥形管状胃组发生3例,2组总体并发症发生率差异具有显著统计学意义(χ^2=14.545, *P*<0.001)。其中,锥形管状胃组的胃食管反流(χ^2=5.930, *P*=0.015)及胸胃扩张(χ^2=4.950, *P*=0.026)发生率均显著降低。而在吻合口相关并发症方面,2组吻合口狭窄、吻合口瘘发生率对比无明显统计学差异。见表5。

2.6 术后6个月锥形管状胃组患者营养指标、营养状态及生活质量显著优于常规管状胃组

术后6个月,锥形管状胃组总蛋白、血清白蛋白、血清前白蛋白以及血红蛋白指标均高于常规管状胃组(*P*<0.05,图2),且2组患者PG-SGA评分和生活质量评分较术前均有不同程度升高。组间对比结果显示,锥形管状胃组PG-SGA评分为(2.41±1.03)分,显著低于常规管状胃组的(2.93±1.29)分,差异有统计学意义(*P*<0.05);锥形管状胃组生活质量评分为(75.38±7.16)分,显著高于常规管状胃组的(70.53±7.24)分,差异具有统计学意义(*P*<0.05)。见表6。

表3 2组患者炎症因子水平比较($\bar{x}\pm s$)

Table 3 Serum levels of inflammatory factors in the 2 groups before and at 1 week after operation($\bar{x}\pm s$)

Groups	IL-10/(ng/L)		IL-6/(ng/L)		TNF-α/(ng/L)	
	Preoperatively	One week after surgery	Preoperatively	One week after surgery	Preoperatively	One week after surgery
Conventional gastric tube group	6.47±0.76	8.47±0.65	16.13±3.32	26.10±3.52	12.19±5.09	19.12±3.23
Coniform gastric tube group	6.46±0.82	7.85±0.61	16.08±3.38	21.37±4.72	12.07±5.18	14.18±2.94
t	0.066	5.518	0.063	5.983	0.051	8.388
P	0.947	<0.001	0.950	<0.001	0.962	<0.001

表4 2组患者胃肠功能指标对比($\bar{x}\pm s$)

Table 4 Gastrointestinal function indicators in the 2 groups before and in 2 weeks after operation($\bar{x}\pm s$)

Groups	MTL/(ng/L)		GAS/(ng/L)	
	Preoperatively	Two weeks after surgery	Preoperatively	Two weeks after surgery
Conventional gastric tube group	149.57±22.76	110.49±16.76	77.12±16.32	55.12±16.11
Coniform gastric tube group	151.32±23.18	117.85±16.61	76.63±15.12	62.58±15.72
t	−0.400	−2.313	0.163	−2.458
P	0.690	0.023	0.871	0.016

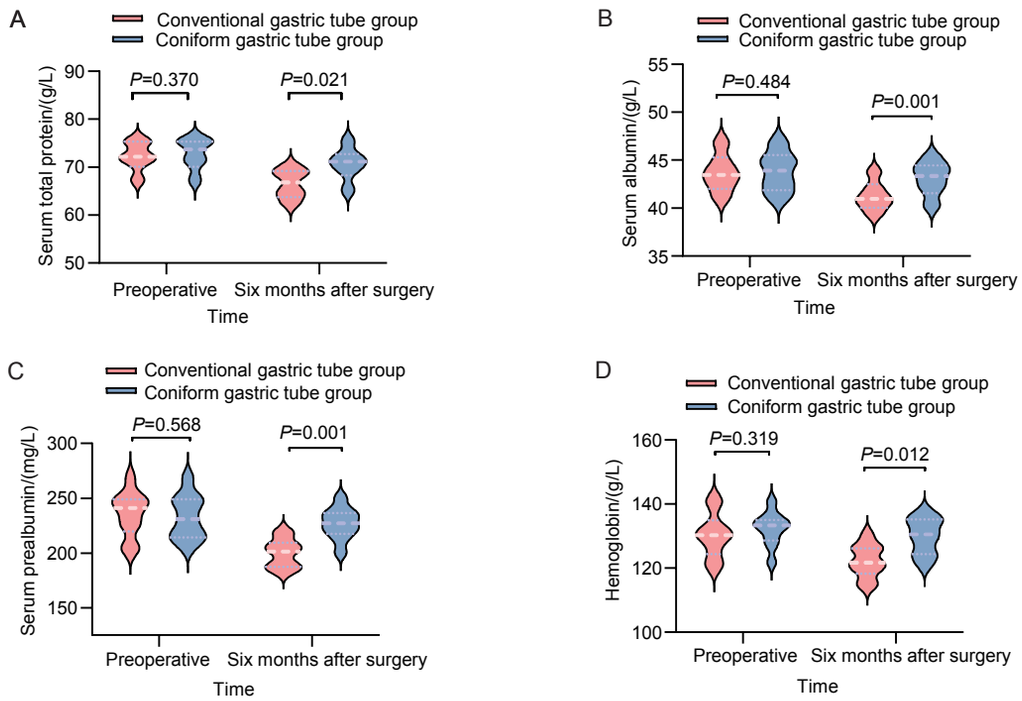
MTL: motilin; GAS: gastrin

表5 2组患者术后并发症发生情况(例)

Table 5 Postoperative complications in the 2 groups(n)

Groups	Anastomotic stricture	Anastomotic leak	Gastroesophageal reflux	Dilatation of the chest and stomach	Total postoperative complications
Conventional gastric tube group	1	1	8	9	19
Coniform gastric tube group	0	0	1	2	3
χ^2/F	-	-	5.930	4.950	14.545
P	1.000	1.000	0.015	0.026	<0.001

Postoperative complications included anastomotic stricture, anastomotic leak, gastroesophageal reflux, and dilatation of the chest and stomach



A: Serum total protein; B: Serum albumin; C: Serum prealbumin; D: Hemoglobin

图2 2组患者营养状况比较

Figure 2 Comparison of nutritional status between the 2 groups

表6 2组患者PG-SGA及生活质量评分比较($\bar{x}\pm s$)

Table 6 Comparison of PG-SGA and quality-of-life scores between the 2 groups before and in 6 months after operation($\bar{x}\pm s$)

Groups	PG-SGA		Quality of life	
	Preoperatively	Six months after surgery	Preoperatively	Six months after surgery
Conventional gastric tube group	2.01±1.28	2.93±1.29	60.03±5.10	70.53±7.24
Coniform gastric tube group	1.99±1.32	2.41±1.03	59.35±4.61	75.38±7.16
t	0.081	2.336	0.734	−3.642
P	0.936	0.021	0.465	<0.001

PG-SGA: patient-generated subjective global assessment

3 讨论

3.1 锥形管状胃的解剖及血供优势对应激炎症与胃肠内分泌功能的调控效应

手术创伤可诱发全身炎症[14],其中IL-6、TNF-α为临床常见的促炎因子,与机体炎症反应呈正相关[15],而IL-10为抗炎因子,在术后代偿性升高以抑制过度炎症反应。本研究结果显示,术后1周,锥形管状胃组患者的IL-10水平显著低于常规管状胃组,同时促炎因子水平亦较低。该结果表明,锥形管状胃组术后全身炎症反应程度更轻,机体无需代偿性分泌大量IL-10即可维持炎症稳态,提示采用锥形管状胃颈部端端手工分层吻合,可能更有助于减轻术后炎症反应。从手术解剖机制分析,常规管状胃在裁剪制作过程中,会破坏胃壁原有血管走行与血供体系,易导致残余胃组织出现一过性缺血、缺氧状态,进而激活炎症通路,刺激促炎因子释放,加重术后炎症反应。而锥形管状胃的裁剪方式可最大程度保留胃壁血管网络,维持残余胃组织充足、稳定的血液灌注,有效规避了组织缺血缺氧引发的继发性炎症损伤。研究表明,术后2组患者胃肠激素均低于术前水平,这与手术创伤应激及胃肠道解剖结构改变密切相关。手术操作中对胃肠道的牵拉、剥离与重塑损伤,会刺激机体交感神经异常兴奋,扰乱胃肠道神经-内分泌调节通路,抑制胃肠激素的合成与分泌。且锥形管状胃组患者胃肠激素水平高于常规管状胃组,MTL是调控胃肠道移行性复合运动的关键激素[16],常规管状胃端端吻合口靠近胃底部,胃底部是胃壁内血管分布的相对“末梢”区域,血

供较差,术后胃壁组织代谢与功能恢复速度缓慢,直接影响胃肠激素的正常分泌。GAS是由胃窦部G细胞分泌,锥形管状胃保留胃窦组织,而常规管状胃有时为制作足够长度的管状胃,其裁剪路径会不可避免地切除大部分的胃窦组织。国外相关研究也证实,该类手术涉及切除部分胃窦组织,并将残余胃部组织重塑为管状结构,这种术式能维持消化道解剖结构完整性,减少胃泌素与胃酸分泌[17]。结合本研究数据及既往文献报道可明确,常规管状胃术式对患者术后早期胃肠动力恢复存在明显不利影响,该术式所致的胃肠激素分泌下降,会进一步延缓胃肠功能康复进程,不仅会延长患者术后首次排气、进食时间,导致胃肠功能恢复延迟,还会阻碍患者术后营养状态的改善,不利于患者术后整体康复。

3.2 锥形管状胃解剖构型对术后胸胃扩张及反流效果的控制作用

本研究结果显示,2组在吻合口瘘、吻合口狭窄并发症发生率上并无统计学差异($P>0.05$),该研究结论与肖鑫[18]报道的锥形管状胃能够降低吻合口相关并发症发生率的结果并不完全一致。分析原因可能与本研究为单中心回顾性研究、样本量相对有限有关。此外,本研究所有患者均采用颈部手工分层吻合技术,该吻合方式能够较好地保证吻合口张力及血供条件,在一定程度上降低了吻合相关并发症的发生风险,从而减弱了不同胃管构型之间的差异。值得注意的是,本研究发现锥形管状胃组胃食管反流及胸胃扩张发生率明显低于常规管状胃组。胸胃扩张被认为是食管癌术后胃食管反流的重要危险因素之一,其不仅影响胃排空功能,还可导致胃内容物反流增加。锥形管状胃通过优化胃管构型,在保留胃储存功能的同时减小胸顶段胃管管径,有助于减轻胸腔负压对胃组织的牵拉作用,降低胸胃扩张发生风险,进而减少胃食管反流的发生。Zheng等[19]研究同样证实,锥形管状胃通过切除血供较差的胃底组织、优化吻合位置及改善胃管微循环灌注,可有效降低胸胃扩张及反流症状。本研究结果与既往研究基本一致,进一步证实了锥形管状胃在改善术后功能恢复方面的优势。

3.3 锥形管状胃术后功能优势对营养预后及生活质量的远期影响

营养状况评估结果显示,锥形管状胃组术后6个月客观营养指标及PG-SGA评分均优于常规管状胃组。分析认为,这一结果可能与锥形管状胃组较低的反流和胸胃扩张发生率有关。反流及胸胃扩张的减少有助于改善患者进食耐受性,提高营养摄入效率,从而促进术后营养状态恢复。此外,锥形管状胃保留了相对充足且功能良好的胃组织,也有利于食物储存和消化功能的维持。生活质量评估结果进一步显示,锥形管状胃组QLQ-C30评分明显高于常规管状胃组。食管癌患者术后生活质量与反流症状、进食困难及营养状态密切相关。锥形管状胃通过降低胸胃扩张和胃食管反流发生率,改善患者进食体验和营养状况,减少术后不适及再次医疗干预需求,从而促进患者躯体功能、心理状态及社会功能恢复,最终提高患者整体生活质量。

3.4 本研究局限性

本研究存在以下局限性:①本研究仅为单中心回顾性研究,样本来源单一、样本量有限,存在一定的选择偏倚,研究结论的外部代表性与推广效度有限,有待多中心、大样本的临床研究进一步验证。②本研究随访周期仅为术后6个月,观察时长较短,仅探讨了2种术式对患者术后短期炎症指标、胃肠功能、并发症、营养状态及生活质量的影响,未长期追踪患者远期肿瘤复发、远期生存预后及长期胃肠功能、生活质量的动态变化,无法揭示不同术式对患者长期预后的作用规律。

本研究系统探讨了锥形管状胃与常规管状胃在充气式纵隔镜同步腹腔镜食管癌根治术中的应用效果,证实锥形管状胃联合颈部手工分层吻合术具备显著的临床应用优势。该术式可有效减轻患者术后炎症应激反应、保护胃肠内分泌功能,加速术后胃肠功能康复;同时能够显著降低术后胸胃扩张、胃食管反流的发生风险,优化患者术后消化道功能,并有效改善患者术后远期营养状态,提升整体生活质量,可作为食管癌患者消化道重建的优选方案,为临床术式选择及患者术后快速康复管理提供一定的实践参考。

利益冲突 本文所有作者声明不存在利益冲突

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