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· 专题论坛 ·

末端回肠造口并发症与术式优化：聚焦一针法技术

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摘要

末端回肠造口是低位直肠癌保肛手术中减轻临床吻合口漏严重程度与降低再手术率的重要策略, 但其本身可引发造口周围皮肤损伤、高流量造口、造口回缩或坏死、脱垂、造口旁疝及还纳相关并发症, 显著影响患者生活质量并增加医疗负担。随着直肠癌发病率上升及保肛手术比例提高, 回肠造口相关并发症的规范化防治与术式优化愈发重要。近年来, 在遵循造口基本原则的基础上, 围绕缩短构建时间、减少皮肤黏膜分离与渗漏等目标, 国内学者提出并逐步推广一针法及其改良术式, 通过单点缝合完成肠袢牵出与固定, 从而简化操作、减少组织损伤。本文结合国内外循证证据与指南, 系统总结回肠造口及还纳等相关并发症、风险因素及防治策略, 重点阐述一针法及改良术式的技术要点与临床证据, 以期回肠造口手术策略优化提供参考。

关键词

回肠造口术; 一针法; 并发症; 造口还纳; 切口疝
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Complications and surgical optimization of terminal ileostomy: focus on the one-stitch technique

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Abstract

Terminal ileostomy is an essential strategy in sphincter-preserving surgery for low rectal cancer to reduce the severity of anastomotic leakage and reoperation rates. However, it is associated with various complications, including peristomal skin injury, high-output stoma, stoma retraction or necrosis, prolapse, parastomal hernia, and stoma reversal-related complications, which impair quality of life and increase healthcare burden. With the rising incidence of rectal cancer and increasing use of sphincter-preserving procedures, optimizing ileostomy-related management has become increasingly important. In recent years, based on fundamental principles of stoma construction, the one-stitch technique and its modifications have been proposed and gradually adopted in China to simplify procedures, shorten operative time, and reduce mucocutaneous separation, leakage and the incidence of stoma retraction by

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achieving loop exteriorization and fixation with a single suture. This review summarizes ileostomy- and reversal-related complications, risk factors, and management strategies, with a particular focus on the technical details and clinical evidence of the one-stitch technique, aiming to provide references for optimizing surgical strategies.

Key words Ileostomy; One-Stitch method; Complications; Stoma Reversal; Incisional Hernia

CLC number: R656.7

结直肠癌是全球最常见的消化道恶性肿瘤之一，根据 GLOBOCAN 2022 最新数据，结直肠癌在全球癌症发病与死亡负担中均位居第三位，且在许多国家仍呈持续上升趋势^[1]。我国结直肠癌患者基数大、直肠癌占比高，伴随新辅助治疗、全直肠系膜切除与微创技术普及，低位/超低位直肠癌保肛手术比例提高。全国性结直肠癌手术登记研究提示，预防性末端回肠临时造口仍是直肠癌低位吻合的重要围手术期策略之一^[2]。

吻合口漏是低位直肠吻合最严重的并发症之一，可能引发脓毒症、再手术、肿瘤后续治疗延迟以及长期功能损害。多项随机对照试验、系统评价与 Cochrane 综述证实，保护性回肠造口可降低临床吻合口漏发生率、再手术率及吻合口漏相关严重结局^[3-7]，指南亦将其推荐用于低位吻合、接受新辅助治疗或存在多重高危因素的患者^[8-9]。然而，造口本身可引发一系列短期与长期并发症，并在一定程度上抵消其获益。因此，围绕“适宜人群选择-规范造口构建-并发症预防与处理-优化还纳策略”的全流程管理，是提升低位直肠癌围手术期质量的关键。

1 末端回肠造口的适应证与策略选择

末端回肠造口的核心目的在于分流肠内容物，降低吻合口漏发生后的腹腔污染与脓毒症风险，从而降低再手术与永久造口率。有研究^[8-10]支持其在低位吻合（特别是肿瘤距离肛缘 ≤ 5 cm）、男性窄骨盆、肥胖、术中血供/张力边界、术前放化疗、免疫抑制、糖尿病或低白蛋白等风险叠加时的价值。在术式选择上，袢式回肠造口因构建相对简便、对远端结直肠残端影响小而应用最广。与横结肠造口相比，末端回肠造口在部分研究中提示造口相关并发症发生率更低，但需综合患者肠功能与电解质风险评估^[11]。我国学者^[12]亦报道预防性

造口在低位直肠癌保肛术中的应用现状与获益，但强调需严格把握指征与规范化管理。

需要注意的是，临时造口并非均可顺利还纳。研究提示部分保肛直肠癌患者的预防性临时造口最终会永久化，与肿瘤复发、吻合口并发症、合并症及辅助治疗等因素相关，因此术前应充分沟通并将“无法还纳风险”纳入决策^[13]。

2 末端回肠造口相关并发症

造口并发症的发生受患者因素（营养状况、肥胖/腹壁厚度、合并症、放化疗）、手术因素（孔径、牵出长度、血供、固定方式、皮肤黏膜对合）与护理因素（造口器械匹配、皮肤保护、随访）共同影响。研究^[14]显示造口相关并发症总体发生率可达 20%~70%，其中皮肤黏膜分离、刺激性皮炎与渗漏最为常见。同时，造口存留时间与还纳技术又决定了切口感染、肠梗阻及造口部位切口疝等并发症负担^[15-17]。

2.1 造口周围皮肤并发症与皮肤黏膜分离

造口周围皮肤损伤多由渗漏与粪水刺激引起，呈进行性红斑、糜烂与疼痛，严重者可并发感染。预防要点包括：术前造口定位（避开皮肤皱褶、骨性突起与瘢痕区）、术中充分外翻与黏膜皮肤严密对合、术后早期评估造口器械底盘孔径与贴合度、联合使用皮肤屏障膜/粉等。简化固定技术（如一针法）通过减少多点缝合与黏膜牵拉，有望降低皮肤黏膜分离与渗漏相关皮炎^[18-19]。

2.2 造口回缩、缺血性坏死与脱垂

造口回缩与缺血性坏死多与牵出肠管张力大、系膜血供受损、孔径过小或腹壁过厚有关；脱垂则常与孔径过大、腹内压升高及固定不足相关。术中应确保肠袢牵出无扭转、系膜血供良好，筋膜孔径与肠管直径匹配（既避免压迫亦避免过大），并进行腹壁多层固定以减少滑脱。回缩早期

可尝试更换造口器械与凸面底盘、加强支持;缺血性坏死需评估坏死范围并及时手术处理;脱垂可在急性嵌顿时急诊复位/切除,择期可行局部修补或还纳。部分研究提示,一针法及改良一针法在回缩发生率方面可能优于传统方法^[18,20]。

2.3 高流量造口与脱水

高流量造口通常指造口24 h排出量>1.5~2.0 L,可导致低钠、低镁、脱水与急性肾损伤。研究显示,造口相关脱水是回肠造口患者再入院的主要原因之一^[21]。风险因素包括小肠长度减少、感染或药物诱导肠蠕动增强、术后早期肠功能紊乱等。管理强调:分层评估排出量与电解质、限制低渗液体摄入、补充口服补液盐、必要时应用洛哌丁胺、可待因或质子泵抑制剂,并在短肠综合征背景下遵循相关指南进行营养与液体管理^[22-24]。

2.4 造口旁疝

造口旁疝属于腹壁切口疝的特殊类型,发病率随时间延长而上升,可导致造口器械密闭困难、皮肤损伤、疼痛甚至嵌顿。其发生与筋膜孔径过大、腹壁结构薄弱、肥胖及慢性咳嗽等因素相关。欧洲疝学会指南^[25]对造口旁疝的预防与治疗提出了分层建议,并支持在高危人群进行预防性补片加固的探索。随机试验提示,在永久性造口形成时预防性补片可降低造口旁疝发生风险,但补片类型与放置层次仍需结合污染风险与长期并发症权衡^[26-27]。对于临时回肠造口,是否常规预防性放置补片尚缺乏高质量证据,仍应以规范孔径与固定为基础,同时重视随访筛查。

2.5 造口还纳相关并发症

造口还纳术总体安全,但围手术期并发症并不少见。研究^[15]显示,切口感染与肠梗阻是最常见的短期并发症。此外,造口部位切口疝长期发生率可达约30%,且相当比例需二次修补^[16-17]。在预防方面,除优化筋膜关闭与避免张力外,随机对照试验提示在造口关闭时采用生物补片加固可降低24个月内临床可检出切口疝发生率^[28];后续系统评价亦支持补片加固对造口部位切口疝的潜在获益,但补片类型、放置层次及感染风险需进一步研究^[29]。皮肤关闭方式方面,荷包缝合较线性一期关闭可降低切口感染并改善美容结局,这已在多项随机对照试验中得到验证^[30-34]。

2.6 生活质量、随访与多学科管理

除躯体并发症外,造口对患者心理状态、社

交与性功能亦有持续影响;造口器械渗漏与皮炎常与焦虑、睡眠障碍和回避行为相关。因此,应将患者报告结局纳入随访,并建立外科-造口治疗师-营养-护理-康复的多学科管理路径。出院早期(尤其术后2~4周)是脱水与皮肤问题的高发窗口,应开展结构化宣教(出量记录、补液策略、警示症状)、远程随访与快速回诊通道,以降低再入院风险^[14,21-22]。

3 术式优化与研究进展

3.1 回肠造口构建的通用关键点

无论采用何种固定方式,回肠造口构建需遵循共同的原则:(1)术前规范造口定位并与造口治疗师协作;(2)选择血供良好、系膜活动度足够的肠袢,牵出过程避免扭转;(3)筋膜孔径与肠袢直径匹配,既避免压迫缺血亦避免过大导致脱垂/疝;(4)完成皮肤、皮下、筋膜与腹膜/肌层多层固定,形成稳定的腹壁通道;(5)黏膜外翻充分(通常1.5~2.0 cm)并保证黏膜-皮肤对合严密,以减少渗漏与皮炎^[8]。

3.2 一针法及其改良术式

传统袢式回肠造口多采用多点缝合固定肠袢与腹壁,并以数针完成皮肤黏膜对合。在微创手术背景下,外置造口切口较小且术者期望缩短造口构建时间、减少缝线牵拉与黏膜损伤。基于此,国内学者提出一针法造口构建理念:以单点(或单线)缝合完成肠袢牵出与固定的关键环节,并通过标准化外翻与器械贴合,达到“简化步骤、缩短时间、减少渗漏相关并发症”的目标。需要强调的是,一针法并非放弃多层通道与血供原则,而是在满足通道稳定与对合严密前提下减少冗余缝合。

3.2.1 适应证与术前准备 (1)适应证:主要用于预防性末端回肠袢式造口[如低位/超低位直肠吻合、括约肌间切除术(intersphincter resection, ISR)、疑难盆腔手术等],尤其适合微创手术需要缩短造口构建时间者。对腹壁肥厚、既往多次腹部手术、系膜短或肠袢牵出张力大者,应谨慎选择或改用更稳妥的多点固定法。(2)术前准备:标准化造口定位(坐/立/卧位评估皮肤皱褶与腰带线),明确预期造口高度(通常外翻1.5~2.0 cm)和器械型号;术前向患者宣教记录造口排出量、脱水警示症状与皮肤护理。

3.2.2 固定技术关键操作流程 (1)造口切口与通道建立：按定位点选取腹直肌外侧区域，做纵行切口（3~4横指）进腹，根据患者胖瘦决定，避免过紧致缺血或过大致脱垂/疝。(2)选择肠袢与牵出：选择血供良好、系膜活动度足够的末端回肠袢，牵出过程中持续确认无扭转（系膜朝向、血管走行、肠管蠕动方向），并避免过度牵拉造成系膜撕裂或血供障碍。(3)关键“一针”固定：距离皮缘

1.0 cm处用角针（2-0/3-0不可吸收或延迟吸收线）缝入小肠系膜无血管区，再自对侧正中距离皮缘处1.0 cm穿出。然后，自穿出侧反针距离皮缘0.5 cm处缝入，穿过小肠系膜无血管区，再自对侧正中距离皮缘处0.5 cm穿出，并收紧打结（拉紧皮肤和小肠系膜，形成类似支撑棒作用）。(4)切开肠管完成造口：将造口肠管纵向切开2~3 cm，外接造口袋完成造口（图1）。

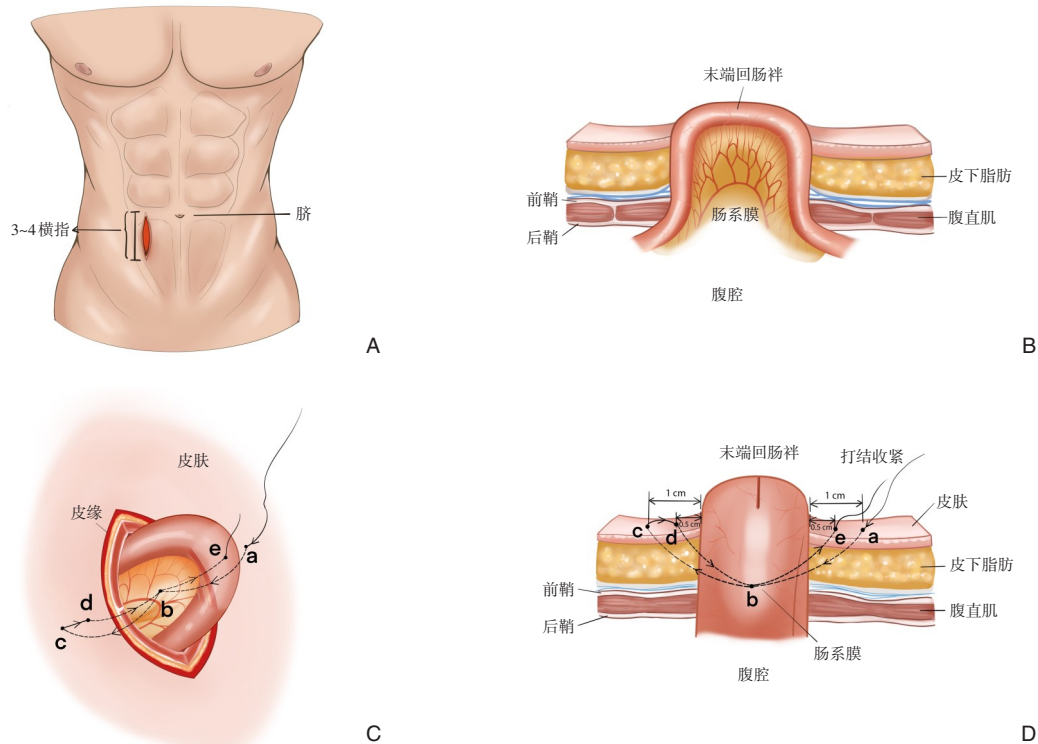


图1 一针法固定技术关键操作示意图 A: 造口切口与通道建立; B: 选择肠袢与牵出 (图示方向: 垂直身体长轴); C: 关键“一针”固定方向, 缝针进出关键点及顺序 (a→b→c→d→b→e); D: 关键“一针”固定距离 (图示方向: 平行身体长轴), 缝针进出关键点及顺序 (a→b→c→d→b→e)

Figure 1 Key procedural steps of the one-stitch fixation technique A: Stoma incision and channel creation; B: Selection and exteriorization of the ileal loop (Direction of illustration: perpendicular to the long axis of the body); C: Direction of the key "one-stitch" fixation, and the key points and sequence for the stitches to enter and exit(a→b→c→d→b→e); D: Distance of the key "one-stitch" fixation (Direction of illustration: parallel to the longitudinal body axis), and the key points and sequence for the stitches to enter and exit(a→b→c→d→b→e)

3.2.3 注意事项 (1)避免单针切割：关键“一针”需选择合适针距与咬合厚度，避免线在筋膜孔缘割裂造成回缩/缺血；肥厚腹壁可考虑改良一针法（增加筋膜加强针）。(2)孔径优先：一针法能否稳定很大程度取决于筋膜孔径是否规范，孔过大将显著增加脱垂与旁疝风险，孔过小则增加缺血性坏死与梗阻风险。(3)外翻高度与器械匹配：外翻不足易导致底盘渗漏与皮炎，外翻过高易造成黏膜水肿与供血受限；建议术中结合预计底盘开孔

大小进行调整。

3.3 一针法疗效与安全性

截至目前，国内已发表多项临床研究对一针法及改良一针法进行评估。黄平等^[19]较早提出一针法在预防性末端回肠造口术中的可行性，强调其操作简化与学习曲线优势。前瞻性对照研究^[18]显示，一针法可显著缩短造口构建时间，并在皮肤黏膜分离、粪水性皮炎与造口回缩等方面优于传统方法。改良一针法在腹腔镜低位前切除

患者中的研究亦提示类似趋势,同时关注了造口相关并发症的谱系与护理配合^[20]。在还纳阶段,前瞻性分析表明,一针法造口在后期还纳手术中具有一定操作便利性,可能缩短还纳时间并降低部分并发症,但其机制与可重复性仍需进一步验证^[35]。此外,不同预防性回肠造口术式在ISR等超低位直肠癌手术中的对比研究,为一针法在特殊人群中的选择提供了补充证据^[36]。一项开放标签随机对照试验^[37]比较改良一针法与常规回肠造口,显示改良一针法可减少造口周围皮炎发生并缩短造口构建与还纳时间。另外两项基于倾向评分匹配的回溯性队列^[38-39]提示,暂时回肠造口时的单针法比传统方法更简便、更有效且节省时间,并未增加术后并发症和造口相关并发症的发生率。总体而言,一针法在短期围手术期结局方面具有一致优势,但高质量随机对照研究仍相对有限。

尽管上述研究总体方向一致,但仍存在若干方法学局限:其一,多数为回顾性或非随机对照研究,潜在选择偏倚难以完全消除;其二,对“造口相关并发症”的定义与分级不统一(如皮肤黏膜分离、皮炎严重度、回缩/脱垂判定标准),不利于横向比较;其三,随访多聚焦短期并发症,造口旁疝、造口部位切口疝等远期结局报告不足。建议未来研究采用前瞻性设计并预先注册,明确核心终点(造口构建时间、皮肤并发症、回缩/脱垂、造口旁疝、再入院),同时对术式关键步骤(孔径、固定层次、外翻长度、器械型号)进行可复核记录,以提升证据质量与可推广性。

3.4 关键技术要点与潜在机制

一针法可能通过以下路径影响并发症发生:(1)减少黏膜多点缝合与牵拉,降低局部缺血与黏膜撕裂,从而减少皮肤黏膜分离;(2)固定点更集中、外翻更标准化,有助于造口“突起高度”稳定,提高底盘密闭性,减少渗漏与皮炎;(3)操作时间缩短,可能降低暴露与污染时间,对感染风险具有间接意义。但一针法也存在理论风险:单点固定是否足以抵抗腹内压、是否会增加脱垂/造口旁疝等远期并发症,取决于其是否仍保留了稳定的多层通道与筋膜层处理。

实际上,一针法并非与多层固定的基本原则相悖,而是对该理念的精简与优化。其核心在于通过精准的单点贯穿实现多层结构的同步固定:皮肤-皮下组织(筋膜、腹膜)-小肠系膜-皮下组

织(筋膜、腹膜)-皮肤,最后在皮肤打结。这一过程实质上完成了肠管与腹壁多个层次的固定,只是将传统的“多点、多层”缝合简化为“单点、多层”固定。关键在于确保该固定点能够提供足够的径向和轴向稳定性,这需要术者准确判断腹壁各层次的厚度和张力,并选择恰当的缝合层次(是否包含筋膜、腹膜)。因此,一针法是否能够有效抵抗腹内压,取决于该单点固定是否包含了足够强度的腹壁层次,以及外翻肠管与腹壁切口的匹配度。因此,未来研究需对“筋膜孔径处理、腹壁层次固定方式、外翻长度、造口器械标准化”进行严格描述与质控,并将造口旁疝、造口脱垂、造口部位切口疝等远期结局纳入核心终点。

此外,针对远期造口旁疝预防,国际指南与近年系统评价/网络Meta分析提示:在永久性结肠造口构建时预防性网片可降低造口旁疝发生率,但对回肠造口的推荐强度相对不足,且需权衡感染、粘连等并发症;而在造口还纳中,预防性加固网片被认为可降低造口部位切口疝(SSIH)的发生风险^[40-44]。

3.5 与一针法相衔接的还纳策略

造口还纳策略与一针法并非割裂,一针法若能降低造口周围炎症与皮肤黏膜分离,可能为顺利还纳创造条件。还纳时机方面,研究提示,在严格筛选(无吻合口漏证据、营养状况允许、拟行/已完成辅助治疗评估)的前提下,早期还纳(如 ≤ 2 周或在初次住院期内)可能不增加并发症,甚至减少造口期相关负担^[45-47]。肠管处理方面,手缝端端吻合与切除后吻合、吻合器侧侧吻合等均可采用;多中心随机试验与Meta分析^[48-51]提示吻合器侧侧吻合在减少术后肠梗阻、缩短手术时间方面可能具有优势,但吻合口漏发生率相近。皮肤关闭方面,荷包缝合可显著降低切口感染并改善瘢痕外观,适合在污染风险较高的造口还纳切口中推广^[30-34]。此外,针对还纳后肠功能恢复与术后肠梗阻风险,部分研究^[52]探索经回肠造口逆行灌洗以促进肠道准备与术后功能恢复,提示可缩短排气/排便时间并降低住院费用,但其适用人群与安全边界仍需进一步明确。

3.6 造口技术优化及进展

3.6.1 构建通道与固定方式的演进 除一针法外,近年来回肠造口构建的优化主要围绕“通道路径、支撑方式、固定材料”三方面展开:(1)腹膜外或

斜行通道用于增强抗回缩能力并可能降低旁疝发生风险；(2) 去支撑杆或皮肤桥替代传统支撑杆，可减少压迫坏死与皮肤损伤；(3) 部分中心探索筋膜层加强缝合、可吸收补片或网片预防旁疝，但需结合感染风险与长期随访证据慎重选择^[53-55]。

3.6.2 造口周围皮肤与高流量造口的围手术期策略 在围手术期管理方面，“标准化宣教+随访”与“路径化补液”可降低脱水相关再入院风险^[56]；针对高流量造口，可综合使用口服补液盐、抗分泌药物（如洛哌丁胺、质子泵抑制剂等）、个体化饮食与营养支持，并以出量阈值触发随访^[57-58]。

3.6.3 还纳切口疝预防与微创还纳 SSIH是近年来关注的远期并发症之一。研究提示切口设计、关闭方式、患者风险因素（肥胖、吸烟、营养不良）等均影响 SSIH 发生^[59]；随机临床试验^[60]提示在适当人群中于造口还纳时行预防性合成网片加强，可降低1年 SSIH 发生且不增加手术部位感染。微创还纳与吻合器侧侧吻合亦用于缩短手术时间与降低粘连相关梗阻。

4 小结与展望

末端回肠造口在低位直肠癌保肛手术中具有明确的循证获益，但造口与还纳相关并发症负担不容忽视。一针法及改良一针法作为我国提出并不断演进的简化固定技术，现有证据支持其在缩短造口构建时间、减少皮肤黏膜分离与渗漏相关皮炎、降低回缩等方面的潜在优势，但对造口旁疝、造口脱垂及造口部位切口疝等远期结局的影响仍需高质量研究证实。建议未来开展多中心、前瞻性、注册研究或随机对照试验：建立统一术式描述与培训质控，采用核心结局集（包括患者报告结局与成本-效果），并进行≥12~24个月随访，以形成可推广、可复制的证据链条，最终推动回肠造口全流程管理的标准化与个体化。

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