

# 结直肠手术吻合口漏的预测模型及预防策略

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**【摘要】** 吻合口漏始终是困扰结直肠外科医生的一个顽疾,技术和设备的进步并未降低其发生率。随着循证医学的发展,越来越多的吻合口漏高危因素被发现。如何高效而系统地组合利用这些孤立的风险因子并量化之,给临床提供科学的吻合口漏风险预警,从而帮助术者制定围手术期预防策略,对降低术后吻合口漏的发生率有重要意义。目前,结直肠吻合口漏的预测模型大体可以分为预后型模型(术前和术中用于预测吻合口漏发生的风险)和诊断型模型(早期预警,辅助提高吻合口漏早期诊断率)两类。针对结直肠吻合口漏的防治策略主要有控制基础疾病和纠正贫血及低蛋白血症、选择合适的手术时间窗、重视和改进吻合技术(包括选择合适的吻合器型号)等,但预防性肠造口仍然是目前最主要的防治措施。如何降低预防性造口的并发症率,如何降低预防性造口的永久化率都是当前临床需要探讨的重要问题。

**【关键词】** 结直肠肿瘤; 吻合口漏; 预测模型; 预防性肠造口

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## Predictive models and prophylactic strategies for anastomotic leakage in colorectal surgery

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**【Abstract】** Anastomotic leakage (AL) has always been a persistent issue for colorectal surgeons. It is still difficult to reduce the incidence of AL despite the advances in technology and equipment. With the development of evidence-based medicine, increasing high-risk factors for AL have been identified. How to efficiently and systematically combine and quantify these isolated risk factors to provide a scientific early warning of AL in clinical practices and help surgeons in choosing the optimal prophylactic strategies, is of great significance for reducing the incidence of AL. There are generally two types of AL prediction models in colorectal surgery, including prognostic models (for preoperative and intraoperative AL prediction) and diagnostic models (for early warning and improving the early diagnosis rate of AL). Prophylactic strategies for AL include stabilizing the underlying diseases, improving anemia and hypoalbuminemia, choosing an appropriate operative time window, and emphasizing and improving anastomotic techniques (including choosing an appropriate size of stapler). However, a prophylactic ostomy is still the most common method for surgeons. However, how to reduce the morbidity of complications following prophylactic ostomy and how to avoid the conversion of the prophylactic stoma to permanent stoma need further study.

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**【Key words】** Colorectal neoplasms; Anastomotic leakage; Prediction model; Prophylactic enterostomy

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一直以来,吻合口漏都是胃肠外科医生最担忧的严重术后并发症之一。吻合口漏的发生将导致更长的住院时间、更多的住院费用以及更高的病死率,容易触发医患矛盾。此外,一些研究认为,吻合口漏的发生可能会增加结直肠癌(特别是直肠癌)手术后的局部复发率,并对长期肿瘤学结局有负面影响<sup>[1-7]</sup>。即使在微创外科迅猛发展以及加速康复外科理念被广泛接受的今天,结直肠手术后吻合口漏的发生率并没有显著减少。因此,有效鉴别围手术期的高危因素,科学预测吻合口漏发生的风险,并积极合理地采用相应的预防策略,值得研究。

吻合口漏的高危因素包括但不限于:男性、美国麻醉师协会(American Society of Anesthesiologists, ASA)分级、体质指数(body mass index, BMI)、糖尿病、术前低蛋白血症、长期使用糖皮质激素、肿瘤位置、吻合口高度、术中出血过多、近端肠管血供不良、术中离断直肠的切割闭合器钉匣数量过多等<sup>[8-10]</sup>。如何量化这些风险因素,并给临床提供科学的吻合口漏风险预警,以帮助术者制定围手术期预防策略,对降低吻合口漏的发生率有重要意义。

### 一、吻合口漏的预测模型

吻合口漏的预测模型大体可以分为两类。(1)预后型模型:术前和术中用于预测吻合口漏发生的风险,辅助术者制定预防策略;(2)诊断型模型:术后用于辅助提高吻合口漏早期诊断率,即通过模型早期预警已经发生的吻合口漏。

1. 预后型模型(prognostic model):按模型的使用方式简单划分为定量预测模型和分类预测模型。前者由评价者提供计量数据,属于连续变量。后者由评价者提供计数数据,属于分类变量。

定量预测模型包括:(1)用于评价左侧结肠与直肠手术后的吻合口漏风险程度的结肠渗漏评分(colon leakage score, CLS)<sup>[11]</sup>。作者通过验证集的结果认为,CLS >11 分的患者具有 3% 的吻合口漏风险,需要实施预防性肠造口。外部验证和改良后的结果表明,CLS 模型具有较好的可行性和有效性<sup>[12-13]</sup>。(2)预测结肠术后的吻合口漏风险的 ANACO 列线图<sup>[14]</sup>。虽然被证实,其在预测结肠癌术后吻

合口漏风险有效、可行<sup>[15-16]</sup>;但也有研究认为,该列线图无法被来自其他数据库人群的信息有效验证<sup>[17]</sup>。(3)预测结直肠癌术后吻合口漏风险的 PROCOLE 评分,针对超低位前切除和低位前切除等不同情况,采用不同的组合表格打分,当其评分高于 4.83 分时,则推荐尝试预防性肠造口<sup>[18]</sup>。(4)其他预测模型:针对 65 岁以上的老年患者,基于手术路径、性别、ASA 分级、慢性阻塞性肺病史、伤口感染、类固醇、糖尿病、体质量减轻和手术时间等影响因素构建的列线图,可以准确预测老年患者结肠切除术后吻合口漏风险<sup>[19]</sup>;将转流造口列入风险因子的模型<sup>[20]</sup>。

分类预测模型包括:(1)直肠吻合口漏(rectal anastomotic leak, REAL)评分,研究认为,虽然该模型对吻合口漏风险预测的准确性偏弱,但对术者的医疗决策仍有一定帮助<sup>[21]</sup>。该预测工具可以在线使用(<http://www.real-score.org>)。(2)RALAR 研究的直肠前切除术术后吻合口漏风险预测模型<sup>[22]</sup>。该模型也是迄今唯一将钉匣数量(>1)纳入风险因子的模型。可以在线使用(<http://www.marianotomatis.it/RALARscore/>)。(3)长海医院的预测模型<sup>[23]</sup>。已共享在线计算(<http://www.changhai-rc-al-prediction.org>)。(4)其他,包括一项发现性别和心肌梗死病史是权重很高的危险因素的预测直肠术后吻合口漏风险的术后并发症风险模型<sup>[24]</sup>。

2. 诊断型模型(diagnostic model):较为知名的是荷兰评分(DULK 评分)以及改良后的荷兰评分<sup>[25-26]</sup>。可通过观察术后每日患者体温、心率、呼吸、尿量、精神和进食以及有无肠梗阻、胃潴留、腹壁筋膜层切口裂开以及腹痛等,结合白细胞、C 反应蛋白和肾功能检查等实验室结果,对吻合口漏作出预警。类似荷兰评分的 DIACOLE 评分囊括了术后发热、输血、伤口感染、肠梗阻、腹泻、腹痛、心肺并发症、白细胞增多以及 C 反应蛋白增高等风险因子<sup>[27]</sup>。作者团队的研究发现,术后白蛋白下降分数 [ $\Delta$ ALB=(术前白蛋白水平-术后白蛋白水平)/术前白蛋白水平 $\times$ 100%]对于预测吻合口漏风险有较高的价值,提示将其纳入预测模型有较高的可行性<sup>[28]</sup>。

## 二、吻合口漏的预防策略

按预防策略实施干预的时机,分为术前策略和术中策略两类。常用的策略包括:控制基础疾病、纠正贫血及低蛋白血症、选择合适的手术时间窗、遵循加速康复外科原则、术前机械性肠道准备+口服抗生素、重视和改进吻合技术、选择合适吻合器型号、保留左结肠动脉以及荧光血管造影评估肠管血供、漏气测试、预防性肠造口和预置肛管引流等。

1. 术前肠道准备:吻合口的愈合需要经历胶原蛋白的沉积和降解的动态平衡。研究发现,肠道中的一些菌群(例如铜绿假单胞菌和粪肠球菌)可能与术后吻合口漏发生有关<sup>[29-32]</sup>。因此,如何科学制定术前肠道准备方案,尽可能地保留肠道中的有益菌群,减少有害菌群是未来研究的方向之一。愈来愈多的研究证明,术前抗生素肠道准备可显著降低术后手术部位感染,包括吻合口漏<sup>[33-36]</sup>。

2. 改善吻合口血供:术中使用吲哚菁绿荧光血管造影(indocyanine green fluorescence angiography, ICG-FA)被认为有助于术者在术中评估吻合口近端肠管的血供。一项纳入 25 项研究的 Meta 分析结果显示,ICG-FA 的使用可显著降低结直肠手术后吻合口漏的发生率<sup>[37]</sup>。但新近的随机对照试验(randomized controlled trial, RCT)研究结果并不支持该结论<sup>[38]</sup>。如何量化 ICG-FA 荧光值并提供一个切实可行的阈值也是今后关注的问题。

近年来讨论比较多的另一项技术,则是左结肠动脉的保留问题。早在 2011 年, Sekimoto 等<sup>[39]</sup>就在他们的研究中展示了保留左结肠动脉的可行性。一项纳入了 17 项研究的 Meta 分析结果显示,保留左结肠动脉的乙状结肠和直肠癌手术有更低的吻合口漏发生率<sup>[40]</sup>。我们前期的研究结果也表明,直肠癌根治术中保留左结肠动脉可显著减低吻合口漏发生率,不增加出血量及围手术期并发症,且不影响淋巴结清扫数量及肿瘤学疗效<sup>[41]</sup>。

3. 预防性肠造口:关于预防性肠造口对吻合口漏的预防作用,目前仍有较大的争议。一项纳入了 5 项 RCT 研究的 Meta 分析结果虽然支持预防性造口可降低吻合口漏发生率的结论,但由于所纳入研究在不同程度上存在各种偏倚,结论仍然存疑<sup>[42]</sup>。无论如何,目前的主流观点仍然赞同预防性肠造口至少可以降低吻合口 C 级漏的发生率,或者说可以降低吻合口漏发生后的严重程度,降低再手术率。

因此,预防性肠造口目前依然是临床上较为常用的预防措施。

需要特别指出的是,2017 年一项囊括 10 项研究的 Meta 分析显示,有 19% 的预防性造口最终没有得到逆转(即还纳)<sup>[43]</sup>。而且,预防性肠造口的相关并发症也屡见不鲜<sup>[8,44]</sup>。这警示每位胃肠外科医生在做预防性造口的决定时要科学合理,同时应兼顾二期还纳的便利性和避免预防性造口永久化的问题。

4. 经肛门引流管引流:近年来,经肛门引流管引流也是被热烈讨论的话题之一。一些回顾性研究都肯定了其在预防直肠前切除术吻合口漏方面的作用<sup>[45-47]</sup>。但最近连续报道的两项 RCT 研究均给出了阴性结果<sup>[48-49]</sup>。从理论上来说,经肛门引流后直肠腔内压力降低有利于吻合口的愈合,但仍缺乏科学数据支持,目前仍没有明确吻合口漏与直肠腔内静息压力过高有关。另一方面,经肛门引流转流了肠腔内容物,似乎也有利于减轻局部污染。但一些设计更为精妙的吻合口保护鞘相关研究也未能证实这个理论<sup>[50]</sup>。

我们牵头了上述的其中一项中国多中心 RCT,结果未能证明预置肛管在预防吻合口漏中的价值<sup>[48]</sup>。我们理解,阴性结果表示目前没有足够的证据证明其有效,但也不能证明其无效。肛管材质与样式、安置方法与时间等多方面因素也会影响研究结果,存在改良余地。但同时,我们团队的 Meta 分析结果提示,经肛门引流管可能降低 C 级吻合口漏发生率<sup>[51]</sup>。因此,经肛门引流管引流对于预防直肠前切除术后吻合口漏的价值,仍有待进一步深入研究。

**结语** 由于预测模型的构建是建立在对已知风险因子的识别和研究人群的选择基础之上,存在较大的选择偏倚,预测的准确度与实用性尚未得到广泛验证。目前,外科医师更多地凭借自己的感觉和经验做出预防措施。如何整合这些信息,构建普适性更好的预测模型,是今后研究的方向。预防性造口仍然是当前国际上最主流的吻合口漏防治措施。尽管存在争议,但不能否认的是,预防性造口仍然是外科医师对吻合口安全的最后一道防线。未来,研究如何提高预防性造口的质量、减少造口并发症和避免预防性造口的永久化是更现实的问题。

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