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· 文献综述 ·

## 消化道吻合口瘘内镜微创治疗的现状及进展

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### 摘要

吻合口瘘是消化道手术后较为严重的并发症之一。目前内镜下治疗吻合口瘘正逐步发展, 与传统外科手术相比, 具有安全、微创、低治疗成本等诸多优势。治疗方式包括内镜下空肠营养管置入术、金属夹闭合术、支架封堵术、组织胶封堵术、缝合术、真空辅助闭合治疗等。其相关的特点涉及: 置入空肠营养管可以有效改善患者的营养状况; 经内镜钳道内镜夹联合尼龙绳圈套器治疗直径 <1.0 cm 的吻合口瘘具有优势; 外置内镜夹适用于瘘口较大、张力较大的吻合口瘘; 内镜支架可以直接覆盖整个瘘口, 早期控制渗漏, 对于有腔道狭窄风险的患者有较高收益, 但可能出现支架移位、移除困难等情况; 组织胶联合内镜夹或支架有助于提高瘘口封堵成功率; 内镜下缝合术用于预防支架移位安全有效; 内镜下真空辅助闭合治疗能充分引流瘘口周围炎性环境, 对于继发纵膈炎或胸腔内炎症的吻合口瘘患者具有更好的适用性。内镜微创治疗吻合口瘘避免了再次手术, 可作为部分患者的优先治疗方式之一。

### 关键词

吻合口瘘; 消化系统外科手术; 最小侵入性外科手术; 综述文献  
中图分类号: R656

## Endoscopic minimally invasive treatment of gastrointestinal anastomotic fistula: current status and progress

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### Abstract

Anastomotic fistula is one of the most severe complications after digestive tract surgery. At present, endoscopic treatment for anastomotic fistula is developing gradually, and it has many advantages such as safety, minimally invasiveness, low cost of treatment compared with traditional surgery. The treatment methods include endoscopic jejunal nutrition tube placement, metal clip closure, stent placement, tissue sealants, suturing, vacuum-assisted closure therapy. The relevant characteristics of them include: jejunal nutrition tube can effectively improve the nutritional status of the patients; through-the-scope clip combined with nylon rope trap has advantages in the treatment of anastomotic fistula with diameter less than 1.0 cm; over-the-scope clip is suitable for anastomotic fistula with large defect and high tension; endoscopic stent can cover the fistula orifice entirely and control the leakage early, and it has a higher benefit for patients at risk of stenosis of the lumen, but stent displacement, removal difficulties and other circumstances are possibly occur; tissue sealant combined with endoscopic clip or stent can improve the success rate of leak occlusion; endoscopic suturing is safe and effective in preventing stent

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displacement; endoscopic vacuum-assisted closure therapy can sufficiently drain the inflammatory environment around the leakage, and has better applicability for anastomotic leak patients with secondary mediastinitis or intrathoracic inflammation. Endoscopic minimally invasive treatment of anastomotic fistula can avoid repeated operation and be the preferred treatment option for some patients.

## Key words

Anastomotic Leak; Digestive System Surgical Procedures; Minimally Invasive Surgical Procedures, Review

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在消化道手术众多的术后并发症中，吻合口瘘一直是困扰外科医生的一大难题，并且随外科手术技术在不断提高、吻合器械的不断改进，吻合口瘘是导致术后发病率及病死率仍居高不下的主要原因<sup>[1]</sup>，且瘘的发生率因吻合口位置的不同而不同，包括食管（2%~16%）<sup>[2-4]</sup>、胃（1%~9%）<sup>[5-8]</sup>、胰腺（9%~16%）<sup>[9-11]</sup>、胆道（10%~16%）<sup>[12-13]</sup>、小肠（1%~3%）<sup>[14-15]</sup>、结肠（3%~29%）<sup>[16-17]</sup>以及直肠（8%~41%）<sup>[18]</sup>，同时瘘的相关病死率高达35%<sup>[19]</sup>。

目前对于消化道吻合口瘘最有效的治疗方式仍存在争议，一些专家认为应积极行外科再次手术，另一些专家则推荐保守治疗，包括广谱抗生素、留置鼻肠管、肠外营养、充分引流等<sup>[20]</sup>。然而，传统的治疗方式势必会带来诸如住院时间延长、住院费用增加、病死率升高等问题<sup>[21]</sup>。在过去的10年中越来越多的文献报道内镜微创治疗这一治疗新手段，与传统治疗方式相比，其具有安全、微创、恢复快、低治疗成本等诸多优势。现就消化道吻合口瘘内镜微创治疗方式的现状及进展综述如下。

## 1 内镜下空肠营养管置入术

空肠营养管的出现已逐渐取代了空肠造瘘术，成为上消化道瘘患者早期建立肠内营养通道的主要方式<sup>[22]</sup>。内镜直视下置入空肠营养管，避免了营养管盘曲于腔内、误入气管或瘘道的风险，保证放置的有效性。该方法操作简便，适用于多数食管及胃吻合口瘘的患者，部分患者因为残胃与食管之间的倾斜角度较大、食管吻合口处直径较大或者瘘口较大，无法置入支架或者不能行手术治疗，在充分引流的基础上，放置空肠营养管进行肠内营养可以有效解决患者无法进食的问题，改善营养状况，促进瘘口愈合<sup>[23]</sup>。目前临床

上单纯应用空肠管行肠内营养治疗效果差，通常将其作为治疗基础辅助其他内镜下治疗方式<sup>[22]</sup>。

## 2 内镜下金属夹闭合术

### 2.1 经内镜钳道内镜夹（through-the-scope clip, TTSC）

Hayashi等<sup>[24]</sup>于1975年首次报道了胃肠镜下应用内镜夹。内镜夹最初主要用于治疗消化道出血，自20世纪90年代起被广泛应用于各个方面，其非止血应用包括：闭合自发性或医源性穿孔、消化道术后瘘和漏；预防息肉切除术后出血；标记病变位置以进一步外科或透视引导下治疗；预防内镜支架移位等<sup>[21,25]</sup>。1998年，Rodella等<sup>[26]</sup>首次采用TTSC夹治疗了胃食管瘘的患者，涉及应用钛夹钳夹瘘口后机械封闭创面。一般来说，TTSC内镜夹的使用需经过内镜钳道，大小受到钳道内径的限制，一般直径在7~8 mm。TTSC内镜夹一般可以闭合直径<1 cm的瘘口<sup>[27]</sup>，但对于直径超过1 cm或超过内镜夹翼展、张力较大的瘘口，往往需要多枚内镜夹同时夹闭即采用TTSC内镜夹联合尼龙绳圈套器的组合技术<sup>[22]</sup>，该方法类似于外科手术中的“荷包”缝合技术，其方法为：应用多个内镜夹将尼龙绳圈套器固定在瘘口周围，随着圈套器的逐步收紧可以实现瘘口的封闭。需要注意的是，当瘘口周围的组织出现炎症水肿或硬化时，TTSC内镜夹的应用会变得更加困难，为了提高内镜夹应用的成功率，在夹子闭合前应该适当增加负压，使瘘口的边缘内翻并靠近内镜夹，以便内镜夹双臂咬合更多的组织<sup>[28]</sup>。

### 2.2 外置内镜夹（over-the-scope clip, OTSC）

OTSC是2008年德国新研发的用于消化道穿孔和缺口修补及止血的新型金属夹OTSC吻合夹，其由镍钛超弹性记忆合金制成。方法涉及将OTSC吻合夹以开放状态预先安装在内镜前端的透明帽

内,并将透明帽对准病灶,利用配套的抓持钳抓取病灶旁组织,同时给予充分负压吸引将病变部位和周围组织拉入透明帽内,再利用配套的旋转扳机系统经过连线把 OTSC 吻合夹牵拉释放,吻合夹脱离套帽后迅速恢复其原有的对合状态,将组织牢固咬合在一起,从而起到闭合瘘口或止血的作用。目前 OTSC 吻合夹主要有 3 种类型:圆齿型夹(a型)、尖齿型夹(t型)和长、尖齿型夹(gc型)。其主要特点如下:(1) 闭合内径较大(10~14 mm),可以有效闭合较大直径的瘘口和穿孔(10~30 mm)<sup>[29]</sup>,实现消化道全层闭合;(2) 咬合力强,闭合牢靠,不易脱漏,同时其齿状设计能保证齿间有足够的血流通,不会压榨组织引起缺血坏死<sup>[30]</sup>;(3) 配有专门的操作管道和定位释放装置,使操作不受内镜管道直径的限制、定位也更为精准;(4) 与内镜下缝合修补术相比,其为腔内操作,避免损伤腔外脏器<sup>[31-32]</sup>。

根据目前相关文献,OTSC 吻合夹治疗消化道瘘的成功率差别较大,Kobara 等<sup>[33]</sup>对 9 年内 1 517 例消化道难治性并发症作了回顾性分析,其中消化道吻合口瘘的治疗成功率达 66%,OTSC 吻合夹相关并发症发生率为 1.7%,严重并发症发生率为 0.59%,其安全性及有效性值得推广。一项回顾性的多中心研究<sup>[34]</sup>指出,30 例消化道吻合口瘘患者应用 OTSC 吻合夹治疗其操作成功率为 90% (27/30),远期成功率为 73.3% (22/30),操作失败的 3 例患者均为下消化道瘘,Haito-Chavez 等<sup>[34]</sup>认为其可能的原因是瘘口周围组织局部的纤维化导致了吻合的失败,组织纤维化的主要原因是感染。Dişibeyaz 等<sup>[35]</sup>得出了相似的结论。一项国际性的多中心研究回顾了 188 例应用 OTSC 夹治疗急性穿孔以及吻合口瘘的患者,发现其远期闭合率分别达到 90%、73.3%<sup>[36]</sup>。Winder 等<sup>[37]</sup>认为,OTSC 治疗效果可靠且安全有效,改善患者营养状况、控制瘘口周围感染是 OTSC 治疗消化道瘘成功的关键。

### 3 内镜下支架封堵术

消化道支架通主要包括自膨式金属支架(self-expanding metal stent, SEMS)和自膨式塑料支架(self-expanding plastic stent, SEPS),其中自膨式金属支架又分为完全覆膜和部分覆膜

两类,常被用于姑息性治疗食管癌或结肠癌引起的管腔狭窄,大量的研究<sup>[38-39]</sup>表明,应用内镜支架治疗消化道瘘及穿孔是有效、微创、安全的。通过覆膜支架的置入可暂时性阻止腔内容物从消化道缺口内溢出,其主要优势在于可以即刻控制渗漏,在黏膜修复愈合的早期保护消化道内壁,同时允许患者早期开放进食以及预防腔道狭窄形成<sup>[40]</sup>。塑料支架其材料质地偏软,表面的硅膜可以防止组织长入支架中,但因其外表面材料光滑致使移位率较高,针对此类情况可以通过置入直径更大的支架或联合内镜夹固定在支架边缘以减少移位的可能。金属支架虽然移位风险低,但因组织长入其中可导致支架移除困难,对此,多数专家建议治疗后 6~10 周内取除支架<sup>[40-42]</sup>。Lamazza 等<sup>[38]</sup>应用自膨式金属支架对 22 例患者进行了内镜下支架封堵术治疗,所有患者均成功置入 SEMS 支架,在 19 例覆膜支架患者中,瘘治愈率达到 84% (16/19),3 例非覆膜支架患者均成功治愈,总体治愈率为 86% (19/22)。内镜下食管支架治疗胃肠道瘘失败的原因可能在于以下几点:(1) 瘘口位于近端颈段食管;(2) 支架位于食管胃交界部;(3) 食管损伤 >6 cm<sup>[43]</sup>。目前,关于内镜下支架封堵治疗结肠癌术后吻合口瘘的相关病例报道甚少,其临床应用较少的原因可能在于结肠蠕动相较上消化道更强,增加了肠道支架移位的可能。对于下消化道瘘的支架治疗,仍需要大量临床依据支持。

### 4 内镜下组织胶封堵术

临床上最常用的组织胶有两种,一种是生物纤维蛋白胶,另一种是氰基丙烯酸酯<sup>[44-45]</sup>。根据成分不同,生物纤维蛋白胶分为两种溶液,一种含人纤维蛋白原和抑肽酶,另一种含凝血酶和氯化钙。两种溶液经双腔通道混合后可在瘘口表面形成一层纤维蛋白膜,类似于机体止血过程,以达到封堵的效果<sup>[21]</sup>。氰基丙烯酸酯在与水分接触后会发生聚合,导致组织坏死和炎症反应。它不受消化酶的影响,此外还具有抗菌性能,可以应用于感染部位<sup>[44-45]</sup>。在最近的一项研究中<sup>[44]</sup>,内镜下应用组织胶治疗吻合口瘘成功封闭了 63 例患者中的 61 例,闭合成功率达到 96.8%,中位生物蛋白

凝胶使用量为12 mL, 中位氰基丙烯酸酯使用量为1.5 mL, 首次治疗后中位住院时间14 d; 2例患者治疗失败, 1例为老年女性患者在小肠坏死后出现肠皮肤瘘, 另1例为袖状胃切除术后的肥胖女性, 在3次纤维蛋白治疗无效后决定对其进行手术治疗<sup>[44]</sup>。对于高排出量的消化道瘘, 建议联合组织胶与内镜夹或支架有助于提高瘘口封堵成功率<sup>[46]</sup>。Victorzon等<sup>[47]</sup>在内镜下联合应用组织胶及支架治疗6例胃空肠瘘的患者, 成功率达到100%, 且无瘘相关死亡。Merrifield等<sup>[48]</sup>联合应用了氩等离子凝固、止血夹、纤维蛋白胶、支架置入以及远端胃空肠狭窄扩张相结合的方法修复Roux-en-Y胃旁路术后的慢性胃瘘患者, 3例患者临床症状均完全缓解, 相比传统手术方式其侵入性更低。

## 5 内镜下缝合术

内镜缝合装置可以实现组织的全层缝合, 适用于组织缺损或缝合面积较大的瘘口, 现主要被用于胃食管反流病(gastroesophageal reflux disease, GERD)的内镜治疗、胃减容及缩窄手术、大型切口、穿孔的缝合和胃肠道的吻合重建等<sup>[49]</sup>。目前最常用的内镜缝合器有Endogastric Solutions公司的缝合装置EsophyX, Apollo Endosurgery公司的OverStitch。缝合器的基本装置包括固定在内镜顶端的端帽、控制缝合的手柄和锚定的换线导管; 针体固定在端帽上, 缝合手柄控制缝针, 经内镜的工作通道可以置入额外的辅助装置<sup>[21]</sup>。缝合装置支持间断或连续缝合, 且可反复安装, 不需要从患者体内将内镜移出<sup>[50]</sup>。内镜缝合器存在的弊端主要有以下几点<sup>[49]</sup>: (1) 操作过程繁琐, 学习周期长; (2) 缝合强度难以控制; (3) 器械尺寸较大, 进入人体时可能产生损伤; (4) 柔顺性不佳, 部分区域的缝合较困难; (5) 器械成本大。

一项多中心研究<sup>[51]</sup>回顾性分析了122例应用内镜下缝合技术修补胃肠道缺损以及支架固定的患者, 远期临床成功率为78.8%, 各项成功率分别为支架固定91.4%、穿孔93%、瘘管80%、吻合口瘘27%。内镜缝合装置用于预防支架移位安全有效, 治疗吻合口瘘技术上是否可行仍需进一步临床数据支持。

## 6 内镜下真空辅助闭合治疗

内镜下真空辅助闭合治疗(endoscopic vacuum-assisted closure therapy, EVAC), 亦称作内镜下负压闭合治疗(endoscopic negative pressure therapy, ENPT), 这项技术的创新演变自慢性开放式伤口经典的真空辅助闭合治疗<sup>[52]</sup>。方法涉及: EVAC在内镜下将聚氨酯海绵放入缺损部位, 海绵用缝线固定在引流管的远端并将侧孔包裹在其中, 经鼻胃管连接到外界负压源, 持续给予80~125 mm Hg(1 mm Hg=0.133 kPa)的负压, 通过引流消化液及渗液、减少细菌定植、辅助肉芽组织形成等作用实现瘘口的局部愈合。海绵根据与消化道管腔的相对位置分为管腔内海绵及管腔外海绵, 每次更换海绵需重新评估创面的大小及深度, 及时调整海绵的大小。2008年Wedemeyer等<sup>[53]</sup>首次应用EVAC技术治疗2例食管癌术后出现胸腔内吻合口瘘的患者, 第1例患者为58岁的男性, 术后第10天出现脓毒血症并于术后第12天内镜下置入SEMS支架, 留置胸管以及CT引导下置入猪尾引流管均未能缓解症状, 术后第57天开始应用EVAC治疗15 d, 期间更换聚氨酯海绵3次, 治疗后行食管镜及造影均提示瘘口完全闭合。第2例患者为83岁的男性, 于术后第5天发现2处吻合口瘘, 内镜夹及支架未能起到良好效果, 在EVAC治疗14 d以及2次更换海绵后, 较小处的吻合口瘘得到闭合, 同时较大处的吻合口瘘在治疗25 d及5次更换海绵后也得到闭合。Virgilio等<sup>[54]</sup>在归纳整合了29项研究总计209例患者后指出EVAC治疗吻合口瘘的治愈率可达66.7%~100%, 吻合口狭窄是其最常见的远期相关并发症。对于继发纵膈炎或胸腔内炎症的吻合口瘘患者, 最重要的是充分引流纵膈及胸腔内液体, 内镜夹、支架以及组织胶等均不能有效解决这一问题, EVAC对此类患者具有更好的适用性<sup>[54]</sup>。

消化道术后吻合口瘘的治疗一直是临床工作中的重点及难点, 内镜技术作为一种微创治疗手段正在逐步发挥它的优势。内镜下置入空肠营养管可以有效改善患者的营养状况。对于瘘口较小(直径小于1.0 cm)的吻合口瘘, 可予以内镜下TTSC夹夹闭, 联合尼龙绳圈套器其治疗效果更具有优势。OTSC夹适用于瘘口较大、张力较大的吻

合口瘘,改善患者营养状况、控制瘘口周围感染是OTSC治疗消化道瘘成功的关键。内镜下支架封堵术可以直接覆盖整个瘘口,早期控制渗漏,对于有腔道狭窄风险的患者有较高收益,但可能出现支架移位、移除困难等情况。内镜下组织胶封堵术单纯应用治疗效果可观,联合内镜夹或支架有助于提高瘘口封堵成功率。内镜下缝合术用于预防支架移位安全有效,治疗吻合口瘘技术上是否可行仍需进一步临床数据支持。内镜下真空辅助闭合治疗能充分引流瘘口周围炎性环境,对于继发纵膈炎或胸腔内炎症的吻合口瘘患者具有更好的适用性。

内镜微创治疗消化道术后吻合口瘘避免了再次手术,相比传统外科手术治疗,其具有安全、微创、低治疗成本等优势。掌握不同内镜技术的适应证及禁忌证,联合运用现有的内镜技术,使患者充分获益,是临床目前发展的主要方向。

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