Advances in Clinical Medicine 临床医学进展, 2024, 14(4), 471-477
Published Online April 2024 in Hans. https://www.hanspub.org/journal/acm
https://doi.org/10.12677/acm.2024.1441046

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小儿急性非复杂性阑尾炎临床治疗进展

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收稿日期：2024年3月9日；录用日期：2024年4月2日；发布日期：2024年4月9日

摘　要

急性阑尾炎是小儿外科急腹症最常见原因之一，通常需要及时治疗。儿童急性阑尾炎发展迅速，症状体征可能不典型，其治疗方法和手术选择愈发受到关注。本文旨在总结儿童急性非复杂性阑尾炎的治疗最新进展，以及对比不同治疗方法的效果，以期为临床实践提供参考和指导。

关键词

急性非复杂性阑尾炎，阑尾切除术，非手术治疗，儿童

Progress in Clinical Treatment of Uncomplicated Acute Appendicitis in Children

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Received: Mar. 9th, 2024; accepted: Apr. 2nd, 2024; published: Apr. 9th, 2024

Abstract

Acute appendicitis is one of the most common causes of pediatric acute abdomen in pediatric surgery and usually requires prompt treatment. Acute appendicitis in children develops rapidly, and

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文章引用: 白珊, 何昀. 小儿急性非复杂性阑尾炎临床治疗进展[J]. 临床医学进展, 2024, 14(4): 471-477.
DOI: 10.12677/acm.2024.1441046

the symptoms and signs may be atypical. Its treatment methods and surgical options have attracted more and more attention. The purpose of this review is to summarize the recent advances in the treatment of acute uncomplicated appendicitis in children, and to compare the outcomes and complications of different treatment methods, with the aim of providing guidance for clinical practice.

Keywords

Uncomplicated Acute Appendicitis, Appendectomy, Non-Operative Management, Children

1. 引言

急性阑尾炎(acute appendicitis, AA)为小儿外科常见急腹症，约占所有腹痛病例的 1%~8%。1886 年由 Reginald Fitz 最先给其命名，并强调早期手术治疗的必要性。18 岁以下儿童发病率约为 2.5% [1]，发病高峰年龄为 10~19 岁，男性较多见。急性非复杂性阑尾炎(uncomplicated acute appendicitis, UCAA)是指没有形成盆腹腔脓肿、蜂窝织炎或穿孔坏疽的阑尾炎。随着医学技术的不断进步，针对儿童阑尾炎的治疗方法和手术技术也在不断完善和创新，但在临床实践中仍存在一些争议。因此，对 UCAA 的治疗方法进行全面系统的总结和分析，对于指导临床、提高治疗效果具有重要意义。

AA 的诊断往往基于临床判断，在资源允许的情况下，结合影像学检查越来越普遍。典型症状包括脐周疼痛转移至右下腹、恶心呕吐以及发热。许多临床体征，如 Blumberg 征、Rovsing 征或腰大肌征均可进一步助于 AA 的诊断。广泛提倡将临床体征与炎症血清标志物相结合的评分系统。常用的评分系统包括改良 Alvarado 评分、儿童阑尾炎评分(PAS)、阑尾炎炎症反应评分(AIR)、RIPASA 评分(RIPASA)和 Tzanakis 评分、PALabS 评分[2]等。影像学检查使用广泛，已成为不可或缺的一部分，儿童 AA 常使用彩超作为帮助诊断、排除鉴别诊断和协助手术计划的辅助手段。儿童 AA 由于不典型的临床特征和难以获得可靠的病史和体格检查，早期诊断仍然具有挑战性。儿童 AA 通常表现为非典型特征，进展更快，并发症发生率更高，所以准确的治疗显得尤其重要。本文对儿童急性非复杂性阑尾炎临床治疗进行综述。

2. 非手术治疗

在过去的 20 年里，非手术治疗(non-operative management, NOM)儿童急性非复杂性阑尾炎引起了人们的兴趣，仅使用抗生素进行 NOM 已成为一种有希望的替代方法[3] [4] [5]。越来越多的研究对 NOM 作为影像学确诊的儿童无并发症急性阑尾炎的潜在安全性和有效性，进行了大量讨论，并积累了有力的证据。世界急诊外科学会 2020 年指南建议抗生素作为无阑尾结石的非复杂性急性阑尾炎手术的安全替代方法(证据质量高，强烈推荐) [6]。

NOM 作为儿童无并发症急性阑尾炎的初始治疗是可行的选择，在一项前瞻性队列研究中，158 例患儿中有 138 例(87.3%)在初次入院时采用非手术方法症状缓解，其中 13 例(9.4%)患儿 NOM 成功后症状复发并行阑尾切除术，术后均未出现并发症，功率约为 78% [7]。经研究，阑尾粪石的存在与高失败率有关，影像学上有阑尾粪石的初始 NOM 失败率是无阑尾粪石患者的两倍多[8] [9]。Talishinskiy 等人[10]报告称，症状持续时间长、入院白细胞计数高和粪石的存在与非手术治疗失败有关。NOM 更有可能在症状持续时间 ≤ 24 h、白细胞计数 ≤ 12×10^9/L 和超声阑尾直径 ≤ 8 mm 的患者中成功[7]。另一项大型前瞻性试验

也得出相似结果：儿童 NOM 在年龄 < 13 岁、阑尾直径 < 7.8 mm 和白细胞计数 < 14 × 10^9/L 时成功率更高[11]。成人 5~7 年复发率约 39% [12] [13]，由于抗生素疗法可能复发的局限性，并可能增加遗漏偶发肿瘤的负担[14]，儿童需更多长时间随访研究；NOM 成功出院后，须告知家长复发需行进一步治疗的可能性。

在最近的一项研究中，一个有趣的问题是关于口服抗生素与静脉注射抗生素在 UCAA 治疗中的作用。Sipola [15]等将经 CT 证实的 UCAA 成人患者随机分为两组，一组口服莫西沙星 7 d，另一组静脉滴注厄他培南 2 d，然后口服左氧氟沙星和甲硝唑 5 d。单独接受口服抗生素的患者有 70.2%的治疗成功率(无需手术且出院 1 年内无阑尾炎复发)，而接受静脉注射后口服抗生素的患者为 73.8%，与静脉注射后口服抗生素相比，口服抗生素的治疗成功率未达到非劣效性。但目前对于口服或静脉抗生素治疗儿童 UCAA 的相关研究较少，有待进一步验证。

人们普遍认为阑尾没有任何功能，而是原始盲肠的残余，这一假设受到了广泛的争议。近期研究揭示，阑尾在肠道微生物平衡及机体免疫反应等方面有重要作用[16]。多项研究证明了阑尾作为共生细菌储存库的作用[17] [18]。阑尾中的生物膜被认为是一种有效保护机制，可以有效防止病原体的定植。因此可以积极地协助阑尾进行顺行蠕动，从而在感染或抗生素治疗后，恢复肠道微生物群的健康状态[18]。一项来自中国的研究通过基因测序对既往接受过阑尾切除的健康个体(HwA)的粪便样本进行了肠道微生物组分析，并与没有阑尾切除史的健康个体(HwoA)的粪便样本进行比较，发现 HwA 样本的肠道细菌组成多样性低于 HwoA 样本，而其肠道真菌的组成和多样性高于 HwoA [19]。

3. 手术治疗

自 19 世纪开展阑尾切除术以来，开腹手术曾被认为是阑尾切除术的标准术式。随着腹腔镜技术出现，腹腔镜阑尾切除术(laparoscopic appendectomy, LA)已成为阑尾炎手术治疗的金标准[20]。尽管目前急性非复杂性阑尾炎有非手术治疗的趋势，但阑尾切除术仍然是无并发症阑尾炎患儿的标准治疗方法[21]，阑尾切除术不仅有效率较高，同时也明确了阑尾的组织病理学。目前有研究表明手术治疗的患者生活质量更好[22]。

在 1983 之前，使用 McBurney 切口的开放手术一直是首选手术方法，直至 Semm 完成了首例腹腔镜阑尾切除术。对于 UCAA，以前常认为手术治疗与并发症发生率增加有关。但是最近的两项研究[23] [24]并未观察到手术治疗组的并发症发生率较高。这可能归因于腹腔镜手术占比越来越高。腹腔镜阑尾切除术具有切口小，疼痛较小，伤口感染发生率较低，恢复正常活动更早，住院时间更短等优势[25] [26]。此外，腹腔镜手术还是一种很有价值的诊断方式，尤其对于阑尾切除术阴性的病例。手术瘢痕是形成粘连性小肠梗阻的因素之一[27]。Hakanson 等[28]回顾性分析了 619 例行阑尾切除术的患儿，术后小肠梗阻的风险与穿孔或术后腹腔内脓肿显著相关，而与手术方法关系不大。微创入路是否能减少 AA 患者术后粘连、小肠梗阻的发生率仍值得探讨。

传统腹腔镜阑尾切除术(conventional laparoscopic appendectomy, CLA)是通过腹部分散置入 3 个 Trocar 建立三角形穿刺通道的手术方法。它是目前临床应用最广泛的一种术式，能充分暴露视野，操作较简便，效果确切。

经脐部单切口 LA(Single-Incision Laparoscopic Appendectomy, SILA)，将穿刺孔集中于脐部，利用脐部先天皱褶遮盖切口瘢痕，更为美观。可经脐部单切口放置单孔三通道或多通道进行手术，或通过切开脐部、分离皮下，于切口置入多个 Trocar 作为操作孔进行手术，两者手术操作相似。Kim 等[29]的研究报告称，与三孔 LA 相比，SILA 缩短了住院时间，而不会增加并发症或再入院率。不同的研究结果报道，与三孔技术相比，虽然 SILA 住院时间较短、总体并发症发生率等无明显差异，但手术时间较长，且增

加了更改手术方式的风险[30]，更高的疼痛程度和更严重的手术创伤[31]。另一项多中心前瞻试验发现SILA 就儿童术后 FLACC 评分和外观而言比三孔 LA 更具优势[32]。2020 年更新的 WSES 耶路撒冷指南表明 SILA 在急性阑尾炎患儿中与腹腔镜三孔技术一样安全[6]。因 SILA 的“筷子”效应，手术难度具有挑战性，应根据外科医生技术水平等进行选择。经脐单孔腹腔镜辅助阑尾切除术(transumbilical laparoscopic-assisted appendectomy, TULAA)是经脐单切口放入伞状穿刺通道，利用儿童回盲部较游离，腹壁柔软度好的特点，通过脐部切口放置切口固定器，将包括系膜在内的阑尾经脐部提出腹腔，以开放式手术切除阑尾。研究比较了 TULAA 与 CLA 治疗儿童 UCAA，显示 TULAA 的手术时间更短，住院时间更短和成本更低[33] [34]。TULAA 组的手术部位感染率(surgical site infection, SSI)略高(6% vs 4%, p = 0.19) [33]。

内镜逆行性阑尾炎治疗术(endoscopic retrograde appendicitis therapy, ERAT)是一种新型微创技术，通过内镜治疗急性非复杂性阑尾炎，由学者刘冰熔[35]于 2012 年提出。ERAT 通过对阑尾进行插管、造影、冲洗、放置支架引流实现治疗的目的。改良 ERAT (mERAT)用超声代替内镜下阑尾腔造影，避免射线影响。回顾性研究发现 ERAT 术后 1 年内的治愈率为 92.1%，ERAT 组治疗后 6 h 疼痛视觉模拟评分 ≤ 3 的患者比例为 94.7%，显著高于腹腔镜阑尾切除术组的 83.3%，且 ERAT 组的手术时间和住院时间显著较低[36]；1 年时，ERAT 组中位复发时间为 50 天，总体不良事件发生率在腹腔镜阑尾切除术组为 24.4%，ERAT 组为 18.4%，无显著差异。Zhang [37]等人也获得相似的研究结果，在 UCAA 患儿中，mERAT 管理的初始成功率为 96.9%，mERAT 组 1 年内复发率为 6.9%，LA 组为 1.7%，差异无统计学意义，且 mERAT 组的不良事件发生率较低。与阑尾切除术相比，ERAT 是一种技术上可行的治疗 UCAA 的方法，其优势包括无皮肤伤口、器官保存、术后疼痛减轻、进食早、恢复快、术后并发症少、住院时间短[38]。但未解决的问题是阑尾炎的复发，可能需要多次内镜逆行治疗或转为阑尾切除术，这需要更长时间的随访研究。

阑尾残端的闭合是阑尾切除术中关键且必不可少的步骤。并发症可导致残株炎、残端瘘、腹膜炎和脓毒症等并发症。常见的阑尾残端管理方案包括：机械性阑尾残端闭合(吻合器、夹子或电热装置)与结扎(圈套线、Roeder 环或体内打结术)。阑尾残端的闭合方法选择主要取决于手术情况、外科医生的偏好、机构购入的耗材和费用等。儿童腹腔镜阑尾切除术中，与圈套器相比，用不可吸收聚合物夹闭合阑尾残端可缩短手术时间，可能有望成为一种经济高效且更简单的替代方案[39]。但部分患者出现了术后脓肿或肠梗阻，可能与夹闭部位残端坏死或夹子脱落有关。最近，Zenon Pogorelić [40]等研究使用无夹谐波手术刀(clipless harmonic scalpel)作为一种安全有效的阑尾残端闭合方法，与聚合物夹闭合阑尾的腹腔镜阑尾切除术相比，并发症少，手术时间短，但费用相对较高。

关于手术时机的选择，多年来，人们一直在探讨是否应在夜间进行阑尾切除术，至今仍未达成共识。主张夜间手术的人认为，这样可以缩短延迟时间，提高患者舒适度，减少住院时间，降低费用。主张将手术推迟到白天的研究者认为，如果能及时抗生素治疗，等待 8~24 小时是安全的，治疗结局和并发症发生率相似[41] [42]。在白天手术的患者中，手术持续时间明显缩短(26 分钟 vs.37 分钟；p < 0.001) [42]，患者的舒适度可能更高。综上，对于无并发症的小儿急性阑尾炎患者安排手术的时间不宜超过入院 24 小时。近期研究还发现，儿童 UCAA 腹腔镜阑尾切除术后 24 小时内出院是安全可行的[43]，患儿家属满意度高，术后早期恢复快以及节约医院和社会成本。

关于 UCAA 围手术期抗生素的使用仍有争议。对于预防 UCAA 发生 SSI 的抗生素选择，Isabella Bielicki 等人[44]对 6207 例 UCAA 进行了回顾性分析，提示术后 5 年内 SSI 累积发生率为 1.9% (n = 119)。在接受头孢呋辛加甲硝唑的儿童中，SSI 累积发生率为 1.1% (25/2348)，接受阿莫西林克拉维酸钾的儿童为 2.8% (42/1491, p < 0.001)；与阿莫西林克拉维酸钾相比，接受头孢呋辛加甲硝唑治疗的儿童阑尾切除术后 SSI 的几率更低。术后使用抗生素的最佳疗程也仍有争议，有学者认为已经实现源头控制，切除了

发炎的阑尾，术后 24 小时内可以停止使用抗生素[45]。Abounozha 等[46]报道，单纯性 AA 患者术后使用抗生素不会减少 SSI，但会增加住院时间和费用。但是，Mennie, Nicole MBBS 等研究发现 UCAA 阑尾切除术后静脉注射 2 次抗生素，伤口感染率显著降低[47]。

4. 总结

总的来说，儿童阑尾炎是一种常见的急腹症，对于不同临床类型和病情严重程度的患者，选择合适的治疗方法和手术方案至关重要。通过本综述的系统总结，希望能够为临床医生提供参考，促进对小儿急性非复杂性阑尾炎的深入了解和规范化治疗。随着医学技术的不断进步和研究的深入，相信针对儿童阑尾炎的治疗方法和手术技术会取得更大的突破，为患儿的治疗带来更多的希望和机遇。

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