

粘连性小肠梗阻术后早期小肠梗阻危险因素分析

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摘要

目的: 探讨粘连性小肠梗阻发生术后早期小肠梗阻(Early postoperative small bowel obstruction, EPSBO)的危险因素。方法: 回顾性分析2023年1月至2024年12月期间在青岛大学附属医院接受粘连性小肠梗阻手术治疗的256例患者的临床数据。根据是否发生术后早期小肠梗阻, 将患者分为两组: EPSBO组和非EPSBO组。通过单因素和多因素Logistic回归分析, 分析粘连性小肠梗阻术后早期小肠梗阻危险因素。结果: 共纳入256例患者, EPSBO的发生率为12.50% (32/256)。在单因素分析中, 术前低血清白蛋白水平($P < 0.001$)、手术时间长($P = 0.020$)、腹水($P = 0.007$)、肠壁水肿($P = 0.030$)与EPSBO的发生差异有统计学意义。将上述临床因素纳入多因素Logistic回归分析结果显示, 术前低白蛋白水平($OR = 0.91$, 95%CI: 0.86~0.97)、肠壁水肿($OR = 2.71$, 95%CI: 1.09~6.78)和腹水($OR = 2.83$, 95%CI: 1.26~6.36)是发生术后早期小肠梗阻的独立危险因素。结论: 术前低白蛋白水平、肠壁水肿和腹水是早期预测粘连性小肠梗阻术后发生早期小肠梗阻的重要指标。

关键词

粘连性小肠梗阻, 手术, 术后早期小肠梗阻, 回顾性研究

Risk Factors for Early Postoperative Small Bowel Obstruction after Adhesive Small Bowel Obstruction Surgery

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Abstract

Purpose: This study aims to determine risk factors for early postoperative small bowel obstruction (EPSBO) following adhesive small bowel obstruction. **Methods:** A retrospective analysis was conducted on the clinical data of 256 patients who underwent surgical treatment for adhesive small bowel obstruction (ASBO) at Qingdao University Affiliated Hospital between January 2023 and December 2024. The patients were divided into two groups based on the occurrence of early postoperative small bowel obstruction (EPSBO): the EPSBO group and the non-EPSBO group. Univariate and multivariate logistic regression analyses were performed to identify the risk factors for early postoperative small bowel obstruction following adhesive small bowel obstruction surgery. **Results:** A total of 256 patients were included in the study, with an incidence of early postoperative small bowel obstruction (EPSBO) of 12.50% (32/256). Univariate analysis revealed that preoperative low serum albumin levels ($P < 0.001$), prolonged surgery duration ($P = 0.020$), ascites ($P = 0.007$), and bowel wall edema ($P = 0.030$) were statistically significant factors associated with the occurrence of EPSBO. Multivariate logistic regression analysis, incorporating these clinical factors, showed that preoperative low albumin levels (OR = 0.91, 95% CI: 0.86~0.97), bowel wall edema (OR = 2.71, 95% CI: 1.09~6.78), and ascites (OR = 2.83, 95% CI: 1.26~6.36) were independent risk factors for the development of early postoperative small bowel obstruction. **Conclusion:** Preoperative low albumin levels, bowel wall edema, and ascites are important indicators for the early prediction of the occurrence of early postoperative small bowel obstruction following adhesive small bowel obstruction surgery.

Keywords

Adhesive Small Bowel Obstruction, Operation, Early Postoperative Small Bowel Obstruction, Retrospective Studies

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1. 引言

小肠梗阻是常见的外科急症，而粘连性小肠梗阻(Adhesive Small Bowel Obstruction, ASBO)是最常见的类型[1]-[3]。腹腔粘连物通常形成于手术后愈合过程中，尤其是在腹部手术后，如剖腹产、阑尾切除、胃肠手术等[4][5]。随着腹部手术技术的进步和手术方式的多样化，尽管粘连性小肠梗阻的发生率得到了有效控制，但它仍然是导致患者住院和术后并发症的重要原因[4][6]-[8]。根据流行病学研究，约有 30% 至 50% 的腹部手术患者会经历粘连性小肠梗阻，粘连性小肠梗阻大多数情况下可以通过保守治疗缓解，但仍有部分病人需要手术进行干预[3][9]-[13]。而部分接受手术治疗的小肠梗阻患者术后会出现早期小肠梗阻，使患者住院天数增加，再入院率上升。

术后早期小肠梗阻(Early postoperative small bowel obstruction, EPSBO)通常指术后 30 天内出现的小肠梗阻[14]。90% 以上的 EPSBO 患者通过保守治疗即可缓解，但 EPSBO 的发生与住院时间的延长，住院费用的增加以及死亡率的上升密切相关[15]。EPSBO 是粘连性小肠梗阻术后重要的并发症之一，明确术后早期小肠梗阻的危险因素，对于提高患者预后、改善治疗方案具有重要意义。

目前，粘连性小肠梗阻术后发生 EPSBO 的危险因素尚未得到完全明确。研究粘连性小肠梗阻发生

EPSBO 的危险因素，特别是在不同患者群体中，如何通过精准的术后干预降低早期小肠梗阻的发生率，仍然是临床上亟待解决的问题。本研究旨在评估粘连性小肠梗阻术后发生 EPSBO 的危险因素，对易患 EPSBO 的患者尽早干预，为个体化的临床决策提供理论依据。

2. 研究对象和方法

2.1. 研究对象

本研究收集了 2022 年 1 月至 2024 年 12 月在青岛大学附属医院接受手术治疗的粘连性小肠梗阻患者的临床资料。纳入标准：(1) 术前经 CT 确诊为小肠梗阻的患者；(2) 行手术治疗；(3) 病例资料完整。排除标准：(1) 年龄 < 18 岁；(2) 术中发现由腹腔肿瘤、腹壁疝、肠道异物等非腹腔粘连所导致的小肠梗阻；(3) 术前存在小肠穿孔、血流动力学不稳定的患者。

2.2. 术后早期小肠梗阻(EPSBO)的定义

在术后 7 天内出现恶心、呕吐、腹痛、腹胀、排气排便减少等小肠梗阻的症状并由腹部平片或 CT 扫描证实的小肠梗阻。

2.3. 观测指标

本研究纳入的患者一般临床资料包括患者的年龄、性别、BMI、吸烟史、饮酒史、基础疾病情况(高血压、糖尿病、冠心病)、ASA 评分、手术据入院时间，并根据入院检验结果统计患者的 C-反应蛋白、血红蛋白、血清白蛋白、降钙素原水平。纳入的手术相关资料包括手术时间、术中出血量、是否行肠切除。纳入分析的 CT 影响特征包括是否存在肠系膜静脉淤血、肠系膜水肿、小肠粪石征、肠壁水肿、肠系膜漩涡征、鸟嘴征、C-或 U-型肠袢、脂肪切迹征及腹水。监测患者住院期间的临床表现、腹部症状及体征，如患者术后持续腹胀且伴有恶心、呕吐、排气排便减少等症状，则行 CT 检查，判断是否患有 EPSBO。

2.4. 统计学方法

研究应用统计学软件 SPSS26.0 进行统计分析，计量资料采用中位数(第 25 百分位数，第 75 百分位数)即 $M(P_{25}, P_{75})$ 表示，计数资料用例(%)表示，比较采用卡方检验或 Fisher 确切概率法进行组间比较。通过 Logistic 回归检验对粘连性小肠梗阻发生术后早期小肠梗阻的危险因素进行分析， $P < 0.05$ 为差异有统计学意义。

3. 结果

2022 年 1 月至 2024 年 12 月共 563 名患者因小肠梗阻行手术治疗，最终纳入 256 例行手术治疗的粘连性小肠梗阻患者，其中 EPSBO 的发生率为 12.50% (32/256)。发生 EPSBO 的患者经过禁饮食、胃肠减压等保守治疗均治愈出院。

两组的临床特征对比见表 1。在临床特征方面，EPSBO 组与非 EPSBO 组在术前血清白蛋白水平方面差异有统计学意义[40.80 (35.48, 45.10) g/L vs. 32.50 (30.61, 38.35) g/L, ($P < 0.001$)], 在年龄、性别、BMI、吸烟史、饮酒史、基础疾病情况(高血压、糖尿病、冠心病)、ASA 评分、手术据入院时间，术前 C-反应蛋白、血红蛋白、降钙素原水平方面差异无统计学意义。在手术特征方面，两组在术中出血量、是否行肠切除方面差异无统计学意义，而在手术时长方面差异有统计学意义[100.00 (75.00, 135.00) min vs. 122.50 (110.00, 147.00 min), ($P = 0.020$)]. 在术前 CT 特征方面，两组在肠壁水肿(58.04% vs. 78.12%, $P = 0.030$)和腹水(21.88% vs. 43.75%, $P = 0.007$)差异有统计学意义，而在是否存在肠系膜静脉淤血、肠系膜水肿、小肠粪石征、肠系膜漩涡征、鸟嘴征、C-或 U-型肠袢、脂肪切迹征无统计学差异。

Table 1. Comparison of clinical characteristics between the EPSBO group and the NEPSBO group
表 1. EPSBO 组与非 EPSBO 组临床特征对比

临床特征	总数(n = 256)	非 EPSBO (n = 224)	EPSBO (n = 32)	统计值	P
年龄(岁)	58.00 (49.75, 65.00)	58.00 (48.75, 65.00)	57.50 (53.75, 62.50)	$Z = -0.13$	0.893
性别, n (%)				$\chi^2 = 0.00$	0.961
男	161 (62.89)	141 (62.95)	20 (62.50)		
女	95 (37.11)	83 (37.05)	12 (37.50)		
BMI (Kg/m ²)	22.34 (19.99, 24.22)	22.23 (19.83, 24.19)	22.69 (20.75, 24.26)	$Z = -1.32$	0.188
吸烟史, n (%)	57 (22.27)	50 (22.32)	7 (21.88)	$\chi^2 = 0.00$	0.955
饮酒史, n (%)	53 (20.70)	45 (20.09)	8 (25.00)	$\chi^2 = 0.41$	0.521
高血压, n (%)	92 (35.78)	80 (34.14)	12 (35.16)	$\chi^2 = 0.39$	0.542
糖尿病, n (%)	20 (7.81)	18 (8.04)	2 (6.25)	$\chi^2 = 0.00$	1.000
冠心病, n (%)	32 (12.50)	29 (12.95)	3 (9.38)	$\chi^2 = 0.08$	0.775
ASA 评分, n (%)				$\chi^2 = 0.13$	0.936
1	0 (0.00)	0 (0.00)	0 (0.00)		
2	89 (34.77)	78 (34.82)	11 (34.38)		
3	156 (60.94)	136 (60.71)	20 (62.50)		
4	11 (4.30)	10 (4.46)	1 (3.12)		
手术时机, n (%)				$\chi^2 = 0.16$	0.925
小于 24 小时	109 (42.58)	96 (42.86)	13 (40.62)		
24~48 小时	42 (16.41)	36 (16.07)	6 (18.75)		
超过 48 小时	105 (41.02)	92 (41.07)	13 (40.62)		
C-反应蛋白(mg/L)	2.44 (0.61, 11.51)	2.41 (0.60, 11.09)	2.84 (0.69, 13.31)	$Z = -0.48$	0.629
血红蛋白(g/L)	133.00 (119.75, 149.00)	132.00 (119.75, 148.25)	138.50 (119.75, 152.00)	$Z = -0.76$	0.445
白蛋白(g/L)	39.75 (34.06, 44.93)	40.80 (35.48, 45.10)	32.50 (30.61, 38.35)	$Z = -3.84$	<0.001
降钙素原(ng/ml)	0.07 (0.03, 0.97)	0.06 (0.03, 0.89)	0.32 (0.03, 1.44)	$Z = -1.35$	0.177
肠切除, n (%)	154 (60.16)	137 (61.16)	17 (53.12)	$\chi^2 = 0.75$	0.385
手术时长(min)	110.00 (80.00, 135.00)	100.00 (75.00, 135.00)	122.50 (110.00, 147.00)	$Z = -2.32$	0.020
出血量(ml)	20.00 (10.00, 50.00)	20.00 (10.00, 50.00)	20.00 (10.00, 100.00)	$Z = -0.21$	0.836
肠系膜静脉淤血, n (%)	11 (4.30)	10 (4.46)	1 (3.12)	$\chi^2 = 0.00$	1.000
肠系膜水肿, n (%)	146 (57.03)	129 (57.59)	17 (53.12)	$\chi^2 = 0.23$	0.633
粪石征, n (%)	46 (17.97)	39 (17.41)	7 (21.88)	$\chi^2 = 0.38$	0.538
肠壁水肿, n (%)	155 (60.55)	130 (58.04)	25 (78.12)	$\chi^2 = 4.73$	0.030
C-或 U-型肠袢, n (%)	23 (8.98)	20 (8.93)	3 (9.38)	$\chi^2 = 0.00$	1.000
脂肪切迹征, n (%)	14 (5.47)	14 (6.25)	0 (0.00)	$\chi^2 = 1.08$	0.299
腹水, n (%)	63 (24.61)	49 (21.88)	14 (43.75)	$\chi^2 = 7.22$	0.007

Z: Mann-Whitney test, χ^2 : 卡方检验。

将 $P < 0.05$ 的临床因素纳入多因素 Logistic 回归分析结果显示, 术前低白蛋白水平($OR = 0.91, 95\%CI: 0.86 \sim 0.97$)、肠壁水肿($OR = 2.71, 95\%CI: 1.09 \sim 6.78$)和腹水($OR = 2.83, 95\%CI: 1.26 \sim 6.36$)是发生 EPSBO 的独立危险因素(表 2)。

Table 2. Multivariate logistic regression analysis
表 2. 多因素 Logistic 回归分析结果

临床特征	β	S.E	Z	P	OR (95%CI)
肠壁水肿	1.00	0.47	2.14	0.032	2.71 (1.09~6.78)
腹水	1.04	0.41	2.51	0.012	2.83 (1.26~6.36)
白蛋白	-0.09	0.03	-3.17	0.002	0.91 (0.86~0.97)
手术时长	0.00	0.00	1.07	0.287	1.00 (1.00~1.01)

OR: 比值比, CI: 置信区间。

4. 讨论

EPSBO 的发生与术后炎症反应密切相关。在手术过程中, 尤其是在腹腔操作较为广泛的情况下, 腹腔内的血管和组织受到损伤, 易引起局部的炎症反应[16]。除了手术创伤和炎症反应外, 患者的基础病情、营养状态、术前肠道功能等也对术后并发症的发生有重要影响[15]。

白蛋白作为体内最重要的血浆蛋白之一, 具有维持血管内压力、运输小分子物质以及调节体内液体平衡的多重功能, 而低白蛋白血症不仅反映了患者的营养状态不良, 还可能是机体处于慢性炎症或免疫抑制状态的标志[17]。在本研究中, 我们发现术前低白蛋白水平($OR = 0.91, 95\%CI: 0.86 \sim 0.97$)与粘连性小肠梗阻术后早期小肠梗阻的发生密切相关。已有研究表明, 低白蛋白水平与腹部手术后的并发症, 尤其是肠梗阻的发生率密切相关[17][18]。低白蛋白可能通过影响血管通透性, 增加局部炎症反应, 以及降低机体修复能力, 促进术后粘连性小肠梗阻的发生。建议在手术前对患者进行综合评估, 特别是在肠道手术前, 应对营养状态进行评估, 并根据需要进行适当的干预, 营养支持在改善术前低白蛋白水平、增强机体免疫功能、促进术后恢复等方面具有重要作用[19]。通过改善术前低白蛋白水平, 可能在一定程度上减少术后并发症的发生。

在本研究中, 我们发现术前 CT 影像中的肠壁水肿($OR = 2.71, 95\%CI: 1.09 \sim 6.78$)和腹水($OR = 2.83, 95\%CI: 1.26 \sim 6.36$)是术后早期小肠梗阻的独立危险因素。术后肠壁水肿和腹水的出现通常反映了腹腔内的炎症反应和液体平衡紊乱, 这些病理状态可能通过多种机制促进术后小肠梗阻的发生和发展[20]。肠壁水肿的发生与腹腔内的慢性或急性炎症反应密切相关, 炎症介质(如细胞因子、趋化因子)可以引发肠壁血管通透性增高, 导致肠壁内液体渗漏和水肿的形成。这种水肿不仅影响肠壁的正常运动功能, 还可能导致肠腔的压迫, 进一步加剧小肠梗阻的发生[21]。腹水通常由腹腔内的炎症反应、血管通透性增加或淋巴回流障碍等因素引起, 其积聚往往伴随有腹腔内的炎症反应, 这种持续的炎症刺激可能导致肠道粘连的形成, 从而进一步增加术后小肠梗阻的风险[22]。腹水的存在往往提示患者处于较为严重的全身炎症状态, 腹腔内的炎症反应不仅增加术后并发症的风险, 还可能导致肠道微环境的改变, 从而促进术后肠梗阻的发生[23]。肠壁水肿和腹水在术后小肠梗阻的发生中扮演了重要的角色, 这些病理现象的存在反映了患者术后炎症反应的严重程度, 因此其作为临床预警指标具有重要意义。针对肠壁水肿和腹水的干预措施, 包括合理的液体管理、使用抗炎药物、加强早期肠道功能恢复等, 可能有助于降低术后小肠梗阻的发生率[16]。有研究表明, 通过控制术后液体平衡、减少腹腔内压力以及及时处理腹水, 能够有效降低术

后并发症的发生[20]。

本研究仍存在一定的局限性：研究受其回顾性和潜在相关选择偏倚的限制，并非所有与该决定相关的临床指标被纳入，如手术方式、麻醉方式、术后用药等，这些因素都可能影响 EPSBO 的发生，未记录或无法控制的因素可能影响结果的准确性。

5. 结论

综上所述，术前低血清白蛋白水平、肠壁水肿和腹水是粘连性小肠梗阻术后炎性肠梗阻的独立危险因素，可通过以上危险因素预测粘连性小肠梗阻发生术后炎性肠梗阻的高风险人群，围手术期对其进行针对性临床干预。

声 明

该病例报道已获得病人的知情同意。

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