

非重症肺挫伤患者预后危险因素分析

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摘要

目的: 探究预防性抗生素使用对胸部钝挫伤后非重症肺挫伤患者的疗效, 分析该类伤患发生肺部感染的危险因素。方法: 纳入2022年9月至2023年5月在福建中医药大学附属第二人民医院急诊科就诊的胸部钝挫伤后非重症肺挫伤患者60例, 按照随机数表法分为研究组(30例)和对照组(30例), 对照组予镇痛等常规治疗, 研究组在常规治疗的同时给予预防性抗生素治疗, 记录两组的肺部感染情况。再将所有纳入患者以是否发生肺部感染分为感染组和未感染组, 对预后的相关危险因素进行单因素及多因素分析。结果: 研究组剔除2例, 对照组剔除1例, 均为自愿退出。两组基线资料比较均无统计学差异($P > 0.05$), 肺部感染发生率亦无统计学差异($P > 0.05$)。多因素分析表明吸烟史($OR = 41.225, P < 0.01$)、肋骨骨折根数($OR = 1.623, P < 0.05$)是影响肺部感染的独立危险因素。结论: 抗生素的预防性用药并不能减少非重症肺挫伤患者肺部感染的发生, 吸烟史及肋骨骨折根数是发生肺部感染的独立危险因素。

关键词

肺挫伤, 肺部感染, 危险因素, 抗生素

Analysis of Prognostic Risk Factors in Patients with Nonsevere Pulmonary Contusion

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Abstract

Objective: To explore the efficacy of prophylactic antibiotics in patients with nonsevere pulmo-

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nary contusion after blunt chest trauma and analyze the risk factors for pulmonary infection in patients with such injuries. **Methods:** 60 patients with nonsevere pulmonary contusion after blunt chest trauma who visited the emergency department of the Second People's Hospital Affiliated to Fujian University of Traditional Chinese Medicine from September 2022 to May 2023 were included. They were randomized into two groups. The both group received conventional treatment such as analgesia, and the intervention group added antibiotic prophylaxis at the same time. The pulmonary infection of the two groups were recorded. Then all included patients were divided into infection group and non-infection group based on whether they had pulmonary infection. Monofactor analysis and multivariate analysis were performed on the relevant risk factors for prognosis. **Results:** There was no statistical difference in the baseline data between intervention group and control group ($P > 0.05$), and there was also no statistical difference in the incidence of pulmonary infection between two groups group ($P > 0.05$). Multivariate analysis showed that smoking history (OR = 41.225, $P < 0.01$) and number of rib fractures (OR = 1.623, $P < 0.05$) were independent risk factors for pulmonary infection. **Conclusions:** Antibiotic prophylaxis cannot reduce the occurrence of pulmonary infection in patients with nonsevere pulmonary contusion. Smoking history and the number of rib fractures are independent risk factors for the occurrence of pulmonary infection in patients with such injuries.

Keywords

Lung Injury, Pneumonia, Risk Factors, Antibiotic Prophylaxis

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1. 引言

胸部外伤在急诊临床工作中十分常见, 占全部创伤病例的 15%, 约 60% 的多发伤患者合并有胸部创伤[1]。常见的胸部创伤包括肺、肋骨、胸骨的损伤, 其中肺损伤可分为肺挫伤、肺撕裂伤、气管支气管损伤等[2]。肺挫伤通常是由于移动中的胸部撞击到固定物时发生剧烈减速导致的[3], 是胸部钝挫伤中最常见的损伤, 可见于 17%~75% 的病例[1]。目前对肺挫伤的研究大多围绕重症患者[4]-[6], 对非重症患者的关注少, 但在急诊日常工作中此类患者绝非少数, 可占 48%~65% [7] [8]。故本研究选择胸部钝挫伤后非重症的肺挫伤患者为研究对象, 旨在研究干预措施的有效性及其预后危险因素。

2. 资料与方法

2.1. 临床资料

纳入于 2022 年 9 月 1 日至 2023 年 5 月 31 日在福建中医药大学附属第二人民医院急诊科就诊的胸部钝挫伤后肺挫伤患者 60 例。纳入标准: 1) 经胸部 CT 等检查, 临床确诊为肺挫伤; 2) 根据简明损伤定级标准(Abbreviated Injury Scale, AIS) 2005 版进行评估[9], 损伤严重度评分(Injury Severity Score, ISS) < 16 分; 3) 年龄大于 18 岁; 4) 患者知情自愿参加, 并已经签署知情同意书。排除标准: 1) 合并重型颅脑外伤、胸腹部联合伤、腹腔大出血或开放性损伤、心脏、大血管或食道损伤的患者; 2) 合并恶性肿瘤的患者; 3) 孕妇及哺乳期妇女; 4) 有相关药物过敏史。病例入组后剔除标准包括: 1) 入组后自愿退出或中断试验; 2) 因病情不宜继续原方案治疗; 3) 出现严重不良事件; 4) 病例资料不完整或失访。本研究已通过我院伦理委员会审批。

2.2. 研究方法

按照随机数表法将入组患者分为研究组和对照组各 30 例。所有患者均予完善胸部 CT 检查。按照 AIS 2005 版[9]对各部位损伤评分并计算 ISS 分值。根据人民卫生出版社第九版《外科学》“肺损伤”治疗原则[10], 两组患者都即时处理合并伤, 予以必要的镇痛, 发生肋骨骨折行胸带固定, 必要时手术干预。因纳入皆为非重症患者, 同时考虑到肾上腺皮质激素的疗效及风险争议[11] [12], 故本研究中两组均不使用该类药物。研究组予以预防性抗生素治疗, 首选头孢类抗生素, 若既往有头孢过敏史, 则选择左氧氟沙星, 疗程为 2 天。高龄患者或肝肾功能不全者, 依据说明书调整用药情况。对照组则不予抗生素。预后结局以肺部感染作为观察指标评估预防性抗生素治疗的有效性。

之后, 再将所有纳入患者重新以是否发生肺部感染分为感染组和未感染组, 通过研究过程中收集的临床资料行单因素及多因素分析, 筛选出影响预后的危险因素。

2.3. 观察指标

收集所有患者的临床资料, 包括性别、年龄、就诊距受伤时间、高血压病、糖尿病、心脏病、脑病史、吸烟史、伤因、去向、损伤严重程度评分、肋骨骨折、骨折根数、骨折是否移位、手术干预情况、肺部感染发生情况、症状缓解时间情况。

因为肺挫伤的影像学上已存在改变, 所以在临床工作中, 我们若发现患者出现了以下情况, 即诊断为肺部感染: 1) 出现发热, 且体温 $> 38.5^{\circ}\text{C}$; 2) 原有的呼吸道症状加重; 3) 血常规提示白细胞计数 $\geq 10 \times 10^9/\text{L}$ 或 $< 4 \times 10^9/\text{L}$ [6]。

2.4. 随访

门诊病例以首次就诊时间为起始、留观或住院病例以出院时间为起始, 第一个月每周随访 1 次, 之后每月随访 1 次。

2.5. 统计分析

采用 SPSS 25.0 统计软件进行数据处理。符合正态分布的计量资料以均数 \pm 标准差 ($\bar{x} \pm s$) 表示, 组间比较采用 t 检验; 不服从正态分布的计量资料以中位数(四分位间距)表示, 组间比较采用非参数秩和检验; 计数资料以频数与构成比表示, 组间比较采用 χ^2 检验。采用 χ^2 检验或 Fisher 确切概率法行单因素分析, 单因素分析有统计学差异的纳入多因素分析, 多因素分析采用二元 Logistic 回归法。 $P < 0.05$ 表示差异具有统计学意义。

3. 结果

3.1. 研究组与对照组基线资料及疗效比较

研究组 30 例中剔除 2 例, 均为入组后自愿退出。对照组 30 例中剔除 1 例, 为自愿退出。故最后研究组 28 例, 对照组 29 例。两组在基线资料的比较上均无统计学差异 ($P > 0.05$, 见表 1)。在创伤后肺部感染发生率、临床症状缓解时间方面, 预防性抗生素治疗的研究组与未经预防性抗生素治疗的对照组间差异无统计学意义 ($P > 0.05$, 见表 2)。

3.2. 发生肺部感染相关危险因素的单因素分析

依据肺部感染发生情况将 57 例患者分为感染组(12 例), 未感染组(45 例), 单因素分析提示, 年龄、高血压、糖尿病、吸烟史、肋骨骨折根数是影响非重症肺挫伤患者发生肺部感染的相关因素, 其他观察指标在两组间的差异无统计学意义(见表 3)。

Table 1. Baseline and clinical characteristics of the patients in the two groups**表 1.** 研究组与对照组基线资料比较

项目	研究组(n = 28)	对照组(n = 29)	<i>P</i>
性别			0.851
男	19 (67.9%)	19 (65.5%)	
女	9 (32.1%)	10 (34.5%)	
年龄(岁)	53.5 (37.75, 65.75)	57 (49, 68)	0.371
就诊距受伤时间(小时)	2 (1, 7.75)	3 (1, 42)	0.376
高血压	5 (17.9%)	7 (24.1%)	0.561
糖尿病	3 (10.7%)	5 (17.2%)	0.706
心脏病	0 (0%)	3 (10.3%)	0.237
脑病史	1 (3.6%)	3 (10.3%)	0.611
吸烟史	11 (39.3%)	11 (37.9%)	0.916
伤因			0.800
车祸	12 (42.9%)	16 (55.2%)	
撞击	6 (21.4%)	6 (20.7%)	
摔伤	7 (25.0%)	6 (20.7%)	
高坠伤	2 (7.1%)	1 (3.4%)	
殴打	1 (3.6%)	0 (0%)	
去向			0.896
门诊	14 (50.0%)	15 (51.7%)	
留观或住院	14 (50.0%)	14 (48.3%)	
ISS 分值	9.5 (9, 12)	9 (9, 10)	0.201
肋骨骨折	18 (64.3%)	21 (72.4%)	0.509
骨折根数	1 (0, 2.75)	2 (0, 3.5)	0.334
骨折是否移位	9 (32.1%)	7 (24.1%)	0.501
手术处理	1 (3.6%)	0 (0%)	0.491

Table 2. Clinical efficacy of the patients in the two groups**表 2.** 研究组与对照组疗效比较

项目	研究组(n = 28)	对照组(n = 29)	<i>P</i>
发生肺部感染	6 (21.4%)	6 (20.7%)	0.945
临床症状缓解时间(天)	8 (3, 14)	10 (5, 14)	0.459

Table 3. Univariate analysis of lung infection in patients with non-severe pulmonary contusion
表 3. 非重症肺挫伤患者发生肺部感染单因素分析

项目	感染(n = 12)	未感染(n = 45)	P
性别			0.301
男	10 (83.3%)	28 (62.2%)	
女	2 (16.7%)	17 (37.8%)	
年龄(岁)	67 (49.5, 78)	54 (41.5, 60.5)	0.037
就诊距受伤时间(小时)	4 (2, 21)	2 (1, 23.5)	0.177
高血压	6 (50.0%)	6 (13.3%)	0.012
糖尿病	5 (41.7%)	3 (6.7%)	0.007
心脏病	1 (8.3%)	2 (4.4%)	0.515
脑病史	1 (8.3%)	3 (6.7%)	1
吸烟史	8 (66.7%)	14 (31.1%)	0.043
伤因			0.296
车祸	4 (33.3%)	24 (53.3%)	
撞击	3 (25.0%)	9 (20.0%)	
摔伤	3 (25.0%)	10 (22.2%)	
高坠伤	2 (16.7%)	1 (2.2%)	
殴打	0 (0%)	1 (2.2%)	
ISS 分值	9.5 (9, 12.25)	9 (9, 11)	0.367
肋骨骨折	11 (91.7%)	28 (62.2%)	0.080
骨折根数	3 (1.25, 6)	1 (0, 2)	0.009
骨折是否移位	5 (41.7%)	11 (24.4%)	0.287
手术处理	1 (8.3%)	0 (0%)	0.211
预防性抗生素	6 (50.0%)	22 (48.9%)	0.945

3.3. 发生肺部感染相关危险因素的多因素分析

以发生肺部感染为因变量，单因素分析中 $P < 0.05$ 的变量为自变量，行二分类 Logistic 回归分析，结果提示吸烟史、肋骨骨折根数是影响预后的独立危险因素(见表 4)。

Table 4. Multivariate analysis of risk factors for lung infection in patients with non-severe pulmonary contusion
表 4. 非重症肺挫伤患者发生肺部感染的多因素 Logistic 回归分析

项目	B	OR	95%CI	P
年龄	0.083	1.086	0.986~1.197	0.094
高血压	0.674	1.962	0.207~18.614	0.557
糖尿病	2.259	9.573	0.486~188.405	0.137

续表

吸烟史	3.719	41.225	2.678~634.721	0.008
骨折根数	0.484	1.623	1.054~2.499	0.028

4. 讨论

肺挫伤是由于胸部外伤引起的肺实质或间质受损,使肺泡内血液积聚或肺间质水肿,导致肺组织的生理结构和功能改变[13],包括肺内气体交换减少、肺循环阻力增加、肺顺应性降低以及机体免疫功能抑制[11]。肺挫伤后炎症反应及免疫调节失控,肺泡巨噬细胞等免疫细胞激活并释放炎症因子,导致肺部损伤加重,免疫功能受到破坏,容易继发感染,甚至发生急性呼吸窘迫综合征(ARDS)等严重并发症[14]。现代社会随着城市发展和工业化进程,以交通事故为首的各类创伤病例数量激增[15],除了病情严重、情况复杂的创伤患者,其中超过 50%的病例为非重症患者[16]-[18],占了极大比例。但即便是轻症病例有时候也不一定都能获得良好的预后,这点在颅脑创伤患者中已得到证实[19][20]。此外,伤患的年龄、性别、基础疾病、治疗方案等诸多因素皆有可能影响预后[21][22]。再者,就肺挫伤而言,该病本身就是呼吸系统并发症的危险因素[23]。因此,探索能预测非重症肺挫伤患者发生肺部感染的危险因素,关注病情可能进展的高危患者,以期能早发现、早诊断、早治疗改善患者预后,是本研究的重点。

本研究中 57 例肺挫伤患者的肺部感染发生率为 21.1% (12 例),研究组与对照组基本相当,在现有的文献报道中,肺挫伤后肺炎发生率为 21%~45.5% 不等[24]-[26],且因创伤的严重程度不同而预后差异大。对于可能的感染,就接诊医师角度而言,如何选择合理的干预措施是最为关键的。当前对该病的治疗措施主要包括呼吸支持、液体复苏、疼痛控制、并发症处理、抗生素和激素应用等[13][27]。但对于非重症患者,疼痛控制和抗生素使用是仅剩的可能选项,控制疼痛的必要性在此无需多言,但对于抗生素治疗却争议极大。D. Dante Yeh 等强烈建议肺挫伤患者不要使用预防性抗生素[28],而 Alvaro Sanabria 的 meta-分析则提示胸部外伤患者预防性使用抗生素可降低脓胸和肺炎的发生[29]。另一项观察性研究中,则发现危重肺挫伤患者持续 48 小时以上的经验性抗生素治疗与较低的院内肺炎发生率相关[30]。故本研究首先评估预防性抗生素应用的有效性,结果显示在研究组与对照组基线水平无统计学差异的情况下,该干预并不能使患者在肺部感染发生率、临床症状缓解时间方面获益。其次,在对发生肺部感染的相关危险因素分析中,也未提示预防性抗生素用药与其相关。以上结果也与近期全球外科感染联盟(GAIS)发布的指南观点相印证,指南提及对于遭受胸部钝挫伤的患者,不建议使用预防性抗生素(中等推荐,中等质量证据)[31]。但需要注意的是,本研究中行外科手术干预的仅 1 例患者,手术为胸腔镜下肋骨骨折内固定,根据指南的建议,对接受手术探查(开胸或胸腔镜检查)的钝性胸部创伤病例需预防性使用抗生素(中等推荐,中等质量证据)[31]。

本研究中还表明,非重症肺挫伤患者发生肺部感染的危险因素为吸烟史、肋骨骨折根数。Carolyn S. Calfee 的研究显示,主动吸烟与中至重度被动吸烟是严重钝性创伤后发生急性肺损伤的独立危险因素[32]。在动物实验中,Katja Wagner 等人也已发现,香烟烟雾暴露下的小鼠模型肺部炎症和亚硝化应激加剧,在胸部钝性损伤后出现了肺部气体交换障碍以及更明显的组织学损伤,最终导致细胞凋亡和损伤严重程度增加[33]。而且,当前研究已经表明吸烟会增加呼吸道感染性疾病的风险,并以剂量依赖性的方式显著增加感染的发生率,导致不良的预后[34]-[37]。另外,关于肋骨骨折则是讨论胸部外伤所不可避免的一个问题,它是胸部外伤中最常见的病理改变,占比达 35%~40% [38],损伤好发于撞击部位或肋骨最薄弱的后外侧弯[39]。需要强调的是,并非所有的肋骨骨折都提示着患者病情严重,还应考虑到肋骨骨折的根数,因为数目的差异与创伤中受到的外力强度有关。通常胸部外伤的严重程度与骨折的肋骨数量成

正比[39],且数量越多提示预后越差[40]-[44]。本研究中,随着伤患肋骨骨折数的增加,发生肺部感染的风险亦不断增加(OR = 1.623, 95%CI: 1.054~2.499)。Serife Tuba Liman 认为存在两处以上肋骨骨折即为严重损伤的标志[40]。Kazunori Fukushima 的研究显示超过 3.5 根的肋骨骨折与死亡率、创伤严重程度、并发症和肺损伤的风险增加显著相关[44]。在另一项系统评价中,有 3 处或以上的肋骨骨折、以及年龄 ≥ 65 岁、基础疾病、伤后肺炎发生是胸部钝性伤患者死亡的危险因素是[42]。Nikita O Shulzhenko 在老年患者中的研究,则提示至少 5 处肋骨骨折是预后不佳的重要预测因素[43]。

综上所述,对于胸部钝挫伤后 ISS < 16 分的非重症肺挫伤患者,抗生素的预防性用药并不能减少肺部感染的发生,故不推荐无指征用药,以避免滥用抗生素。吸烟史及肋骨骨折根数是该类伤患创伤后发生肺部感染的独立危险因素,接诊医师应高度重视,密切随访,对伤情发展做出准确判断。

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