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炎症生物标记物对急性胰腺炎病情评估及预测价值分析

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摘　要

目的：探讨急性胰腺炎(AP)患者入院初期外周血中炎症指标，包括血小板淋巴细胞比值(PLR)、中性粒细胞淋巴细胞比值(NLR)及全身免疫炎症指数(SII)，对疾病预后及预测价值评估。方法：选取康复大学青岛中心医院2023年1月至2023年12收治的136例确诊为AP患者为研究对象，收集AP患者急诊入院24小时内血常规结果及各类比值结果，根据患者疾病轻重程度进行分组，以受试者工作特征曲线(ROC)分析外周血PLR、NLR、SII水平对急性胰腺炎预后的预测价值评估。结果：136例AP患者中，轻症组为118例(86.76%)，非轻症组为18例(13.24%)。两组患者临床资料中白细胞计数、中性粒细胞计数、血小板计数、PLR、NLR及SII结果差异具有统计学意义($p < 0.05$)。ROC结果分析示，PLR、NLR及SII指数的曲线下面积(AUC)分别为(0.8051, 0.8185, 0.9195)，灵敏度分别为(75.00, 83.33, 91.67)，特异度分别为(69.49, 63.56, 81.36)。结论：非轻症急性胰腺炎患者组入院初期外周血中PLR、NLR及SII指数较轻症患者组高，外周血PLR、NLR及SII指数水平具有一定的早期重症预测效能。

关键词

急性胰腺炎，血小板淋巴细胞比值，中性粒细胞淋巴细胞比值，全身免疫炎症指数，早期预测

Analysis of the Evaluation and Predictive Value of Inflammatory Biomarkers in Acute Pancreatitis

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Abstract

Objective: Exploring inflammatory markers in the peripheral blood of patients with acute pancreatitis (AP) during the initial admission period, including platelet lymphocyte ratio (PLR), neutrophil lymphocyte ratio (NLR), and Systemic Immune Inflammation index (SII), to evaluate their prognostic and predictive value for the disease. Method: 136 patients diagnosed with AP admitted to Qingdao Central Hospital of Rehabilitation University from January 2023 to December 2023 were selected as the research subjects, collect blood routine results and various ratio results of AP patients within 24 hours of emergency admission, group them according to the severity of the disease, and evaluate the predictive value of peripheral blood PLR, NLR, and SII levels on the prognosis of acute pancreatitis using receiver operating characteristic curve (ROC) analysis. Result: Among 136 patients with AP, there were 118 cases (86.76%) in the mild group and 18 cases (13.24%) in the non mild group. The clinical data of the two groups of patients showed statistically significant differences in white blood cell count, neutrophil count, platelet count, PLR, NLR, and SII results ($p < 0.05$). The ROC result analysis showed that the area under the curve (AUC) of PLR, NLR, and SII index were (0.8051, 0.8185, 0.9195), sensitivity were (75.00, 83.33, 91.67), and specificity were (69.49, 63.56, 81.36), respectively. Conclusion: The PLR, NLR, and SII index in the peripheral blood of patients with non mild acute pancreatitis were higher than those of patients with mild acute pancreatitis at the initial admission stage. The levels of PLR, NLR, and SII index in peripheral blood have certain predictive power for early severe illness.

Keywords

Acute Pancreatitis, Platelet Lymphocyte Ratio, Neutrophil Lymphocyte Ratio, Systemic Immune Inflammation Index, Early Prediction

1. 引言

急性胰腺炎(Acute Pancreatitis, AP)是指在各种病因的基础上，经不同诱因刺激，导致机体中胰酶异常激活，对胰腺自身及周围器官产生消化作用，进而发生胰腺局部炎性反应，病情较重时可诱导全身炎症发生，出现包含胰腺在内的器官功能障碍的急腹症。急性胰腺炎是临床常见急腹症，近年来由于生活水平的提高，临床中发病率有上升趋势，得到了越来越多临床工作者的重视[1]。根据患者有无伴随器官功能障碍或局部并发症，将急性胰腺炎分为轻症急性胰腺炎(MAP)、中重症急性胰腺炎(MSAP)及重症急性胰腺炎(SAP)，其中轻症占比约 80%~85%左右，不同严重程度的急性胰腺炎其预后有明显差异，为实现早期干预及针对性处理，早期的预测性诊断显得尤为重要[2]，然而遗憾的是目前现有的诊断及分类方式均有相对“滞后性”，均不能做到临床早期的准确病情预测[3]。本研究通过回顾性分析急性胰腺炎入院 24 小时内血常规结果，通过比较白细胞计数、中性粒细胞计数、淋巴细胞计数、血小板计数、血小板淋巴细胞比值(PLR)、中性粒细胞淋巴细胞比值(NLR)及全身免疫炎症指数(SII)与急性胰腺炎轻重程度关系，评价各项指标与急性胰腺炎疾病发展关系，评估各项指数对于轻重症急性胰腺炎的预测可行性。

2. 资料与方法

2.1. 研究对象

选取康复大学青岛中心医院 2023 年 1 月至 2023 年 12 收治的 136 例确诊为 AP 患者为研究对象。根据 Atlanta 分级标准(Revised Atlanta Classification, RAC)将研究患者分为轻症患者组(MAP)及非轻症患者组(MSAP 及 SAP) [4]。

2.2. 纳入及排除标准

纳入标准：① 符合急性胰腺炎诊断标准(上腹部持续性疼痛；血清淀粉酶和/或脂肪酶至少高于正常值上限 3 倍以上；腹部影像学检查结果符合急性胰腺炎影像学改变。上述诊断标准 3 项符合 2 项即可诊断为急性胰腺炎[1])；② 年龄 ≥ 18 岁；③ 发病至我院急诊时间 < 24 小时。

排除标准：① 处于妊娠期或哺乳期患者；② 合并其他炎症性疾病；③ 合并其他免疫相关性疾病；④ 合并其他严重性疾病(如：恶性肿瘤患者、慢性肝肾功能衰竭患者，慢性呼吸功能衰竭患者等)。

2.3. 观察指标

① 收集 AP 患者的一般资料，包括性别、年龄、住院时长；② 收集 AP 患者急诊入院 24 小时内血常规结果及各类比值结果，包括白细胞计数、中性粒细胞计数、淋巴细胞计数、血小板计数、血小板淋巴细胞比值(PLR)、中性粒细胞淋巴细胞比值(NLR)及全身免疫炎症指数(SII)。

2.4. 统计学分析

采用 GraphPad Prism 10.0 软件对数据进行处理和分析。计量资料以均值 ± 标准差进行分析，示以($\bar{x}$ ± s)，两组间比较行独立样本 t 检验；计数资料以[n (%)]表示，组间比较行独立样本 χ^2 检验；预测价值采用受试者工作特征曲线(ROC 曲线)进行分析，曲线下面积(AUC)用以评估预测价值。于统计结果中，p 值 < 0.05 表示为具有统计学差异。

3. 结果

3.1. AP 患者临床资料对比

经数据分析及统计，轻症组及非轻症组 AP 患者临床资料中性别、年龄、淋巴细胞计数均与患者病情轻重差异无统计学意义($p > 0.05$)。白细胞计数、中性粒细胞计数、血小板计数、PLR、NLR 及 SII 结果差异具有统计学意义($p < 0.05$)，除血小板计数外，其他指标具有显著性统计学差异($p < 0.001$)。见表 1。

Table 1. Comparison of clinical data statistics for AP patients [$\bar{x} \pm s$, n (%)]
表 1. AP 患者临床资料统计对比[$\bar{x} \pm s$, n (%)]

类别		轻症组	非轻症组	p 值
性别	男	79 (0.669)	10 (0.556)	0.4260
	女	39 (0.331)	8 (0.444)	
年龄(岁)		53.53 ± 1.716	49.56 ± 4.574	0.4029
白细胞计数($\times 10^9$/L)		11.08 ± 0.342	14.96 ± 1.466	<0.001
中性粒细胞计数($\times 10^9$/L)		8.69 ± 0.324	12.62 ± 1.425	<0.001
淋巴细胞计数($\times 10^9$/L)		1.59 ± 0.069	1.42 ± 0.1780	0.3638

续表

血小板计数(×10^9/L)	219.4 ± 6.477	258.7 ± 24.51	0.0418
血小板淋巴细胞比值(PLR)	170.7 ± 9.569	281.5 ± 31.35	<0.001
中性粒细胞淋巴细胞比值(NLR)	7.151 ± 0.474	14.61 ± 2.669	<0.001
全身免疫炎症指数(SII)	1479 ± 85.59	4258 ± 609.0	<0.001

3.2. 外周血中 PLR、NLR 及 SII 水平对急性胰腺炎预后不良的预测价值评估

经 ROC 分析并绘制患者工作特征曲线(ROC 曲线)发现，PLR、NLR 及 SII 指数的曲线下面积(AUC)分别为(0.8051, 0.8185, 0.9195)，其对应的 95% CI 分别为(0.6841 to 0.9261, 0.7214 to 0.9156, 0.8643 to 0.9747)，均有一定的预测价值。其最佳截断点分别为(188.0, 7.150, 2314)，灵敏度分别为(75.00, 83.33, 91.67)，特异度分别为(69.49, 63.56, 81.36)，见表 2、图 1。

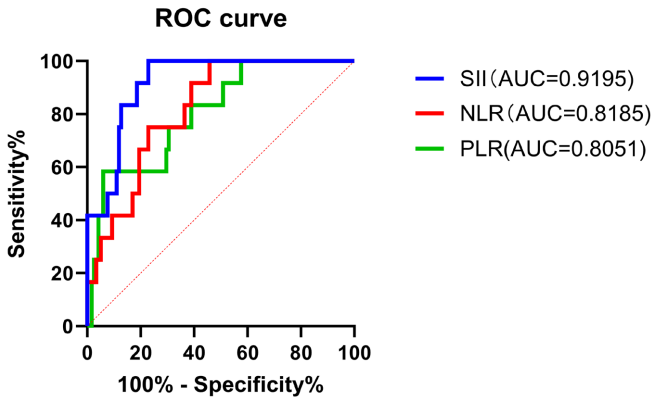

Figure 1. Evaluation of ROC curves with different indices
图 1. 不同指数 ROC 曲线评估

Table 2. Prediction and evaluation of ROC curve at PLR, NLR, and SII index levels
表 2. PLR、NLR 及 SII 指数水平 ROC 曲线预测评估

指标	截断点	灵敏度(%)	特异度(%)	AUC	95% CI
PLR	188.0	75.00	69.49	0.8051	0.6841 to 0.9261
NLR	7.150	83.33	63.56	0.8185	0.7214 to 0.9156
SII	2314	91.67	81.36	0.9195	0.8643 to 0.9747

4. 讨论

急性胰腺炎(AP)是一种复杂性疾病，在不同患者中，其严重程度及疾病发展过程不尽相同[5]。轻症胰腺炎患者占急性胰腺炎 80%~85%，经临床对症及支持治疗，常在 1~2 周内恢复，病死率极低，然而随着疾病进展，患者有发展为重症胰腺炎可能，占急性胰腺炎 5%~10%，伴有持续性(>48 小时)器官功能障碍，病死率较高[6]。所以在急性胰腺炎的疾病发展及诊疗过程中，早期预测、及时干预有着至关重要的作用[5]。

前人对于急性胰腺炎患者的严重分层及预后预测做了大量工作，根据患者的临床特征及疾病发展过程，总结归纳出各种评分方式(APACHE II 评分、Ranson 评分、BISAP 评分、MCTSI 评分等)，但是仍存

在评分项目多、耗时长、操作较繁琐且无法在患者入院早期(<24 小时)做出准确预测等不足[7]。所以对于经济、便捷并可用于急性胰腺炎早期预测的生物标记物探索工作显得尤为重要。

血小板淋巴细胞比值(PLR)及中性粒细胞淋巴细胞比值(NLR)作为一种简单、廉价且快速的生物标记物，被认为是肿瘤相关性疾病的预测及治疗评价的重要指标[8]。有学者认为此类生物标记物与非小细胞性肺癌、喉癌、胃癌、结直肠癌、膀胱癌等恶性肿瘤的疾病预后及治疗密切具有相关性，有证据表明高NLR 及 PLR 水平与高死亡率及较低的化疗治疗有效率等较差临床预后结果密切相关，具有一定的肿瘤预测价值意义[9] [10] [11] [12] [13]。除此之外，他们也被认为与泌尿系统感染、呼吸道感染及类风湿性关节炎等多种炎症性疾病相关，可用于炎症性疾病的诊断及疗效评估[14] [15] [16]。全身免疫炎症指数(SII)是一种基于中性粒细胞、淋巴细胞及血小板计数的新型血液学生物标记物，目前研究表明其与各种恶性肿瘤的治疗效果及预后相关[17] [18] [19] [20] [21]。有学者认为，SII 与炎症性疾病及血管性疾病密切相关[22] [23] [24]。本研究发现：PLR、NLR 及 SII 水平为急性胰腺炎疾病轻重独立危险因素，结果差异具有显著性统计学差异($p < 0.001$)。进一步的 ROC 曲线表明，PLR、NLR 及 SII 均具有急性胰腺炎预后不良的预测价值，其中 SII 具有更高的预测能力，可能作为评估急性胰腺炎患者预后指标，除此外上述生物标记物临床获取便捷，为临床更早的发现重症患者并制定相应的治疗计划有一定帮助。

综上所述，PLR、NLR 及 SII 可作为 AP 患者早期预测生物标记物，临床获取便捷且廉价，可作为临床 AP 患者常规的早期预测指标，但由于本研究样本量较少，且具体的炎症代谢机制不明确，故评估价值尚需进一步研究。

参考文献

[1] Boxhoorn, L., Voermans, R.P., Bouwense, S.A., *et al*. (2020) Acute Pancreatitis. *The Lancet*, **396**, 726-734. https://doi.org/10.1016/S0140-6736(20)31310-6

[2] 李非, 曹锋. 中国急性胰腺炎诊治指南[J]. 中国实用外科杂志, 2021, 41(7): 739-746.

[3] 郭喆, 关键. 重症急性胰腺炎预防与阻断急诊专家共识[J]. 临床急诊杂志, 2022, 23(7): 451-462.

[4] Banks, P.A., Bollen, T.L., Dervenis, C., Gooszen, H.G., Johnson, C.D., Sarr, M.G., *et al*. (2012) Classification of Acute Pancreatitis—2012: Revision of the Atlanta Classification and Definitions by International Consensus. *Gut*, **62**, 102-111. https://doi.org/10.1136/gutjnl-2012-302779

[5] Mederos, M.A., Reber, H.A. and Girgis, M.D. (2021) Acute Pancreatitis. *JAMA*, **325**, 382-390. https://doi.org/10.1001/jama.2020.20317

[6] Zerem, E., Kurtcehajic, A., Kunosić, S., Zerem Malkočević, D. and Zerem, O. (2023) Current Trends in Acute Pancreatitis: Diagnostic and Therapeutic Challenges. *World Journal of Gastroenterology*, **29**, 2747-2763. https://doi.org/10.3748/wjg.v29.i18.2747

[7] Zhou, H., Mei, X., He, X., Lan, T. and Guo, S. (2019) Severity Stratification and Prognostic Prediction of Patients with Acute Pancreatitis at Early Phase: A Retrospective Study. *Medicine*, **98**, e15275. https://doi.org/10.1097/md.0000000000015275

[8] Zhou, X., Du, Y., Huang, Z., Xu, J., Qiu, T., Wang, J., *et al*. (2014) Prognostic Value of PLR in Various Cancers: A Meta-Analysis. *PLOS ONE*, **9**, e101119. https://doi.org/10.1371/journal.pone.0101119

[9] Mandaliya, H., Jones, M., Oldmeadow, C. and Nordman, I.I.C. (2019) Prognostic Biomarkers in Stage IV Non-Small Cell Lung Cancer (NSCLC): Neutrophil to Lymphocyte Ratio (NLR), Lymphocyte to Monocyte Ratio (LMR), Platelet to Lymphocyte Ratio (PLR) and Advanced Lung Cancer Inflammation Index (ALI). *Translational Lung Cancer Research*, **8**, 886-894. https://doi.org/10.21037/tlcr.2019.11.16

[10] Li, P., Li, H., Ding, S. and Zhou, J. (2022) NLR, PLR, LMR and MWR as Diagnostic and Prognostic Markers for Laryngeal Carcinoma. *American Journal of Translational Research*, **14**, 3017-3027.

[11] He, B. and Wu, J. (2022) Clinical Value of PLR, MLR, and NWR in Neoadjuvant Chemotherapy for Locally Advanced Gastric Cancer. *Computational and Mathematical Methods in Medicine*, **2022**, Article 8005975. https://doi.org/10.1155/2022/8005975

[12] Chen, W., Xin, S. and Xu, B. (2022) Value Research of NLR, PLR, and RDW in Prognostic Assessment of Patients with Colorectal Cancer. *Journal of Healthcare Engineering*, **2022**, Article 7971415.

https://doi.org/10.1155/2022/7971415

[13] Chen, H., Wu, X., Wen, Z., Zhu, Y., Liao, L. and Yang, J. (2022) The Clinicopathological and Prognostic Value of NLR, PLR and MLR in Non-Muscular Invasive Bladder Cancer. *Archivos Españoles de Urología*, **75**, 467-471. https://doi.org/10.56434/j.arch.esp.urol.20227505.68

[14] Asik, Z. (2021) The Role of the NLR and PLR in Urinary Tract Infection. *Clinical Laboratory*, **67**, 2292-2297. https://doi.org/10.7754/clin.lab.2021.210133

[15] Damar Çakırca, T., Torun, A., Çakırca, G. and Portakal, R.D. (2021) Role of NLR, PLR, ELR and CLR in Differentiating COVID-19 Patients with and without Pneumonia. *International Journal of Clinical Practice*, **75**, e14781. https://doi.org/10.1111/ijcp.14781

[16] Li, M. and Xie, L. (2021) Correlation between NLR, PLR, and LMR and Disease Activity, Efficacy Assessment in Rheumatoid Arthritis. *Evidence-Based Complementary and Alternative Medicine*, **2021**, Article ID: 4433141. https://doi.org/10.1155/2021/4433141

[17] Li, C., Wu, J., Jiang, L., Zhang, L., Huang, J., Tian, Y., *et al*. (2023) The Predictive Value of Inflammatory Biomarkers for Major Pathological Response in Non-Small Cell Lung Cancer Patients Receiving Neoadjuvant Chemoimmunotherapy and Its Association with the Immune-Related Tumor Microenvironment: A Multi-Center Study. *Cancer Immunology, Immunotherapy*, **72**, 795. https://doi.org/10.1007/s00262-022-03294-2

[18] Fu, H., Zheng, J., Cai, J., Zeng, K., Yao, J., Chen, L., *et al*. (2018) Systemic Immune-Inflammation Index (SII) Is Useful to Predict Survival Outcomes in Patients after Liver Transplantation for Hepatocellular Carcinoma within Hangzhou Criteria. *Cellular Physiology and Biochemistry*, **47**, 293-301. https://doi.org/10.1159/000489807

[19] Aziz, M.H., Sideras, K., Aziz, N.A., Mauff, K., Haen, R., Roos, D., *et al*. (2019) The Systemic-Immune-Inflammation Index Independently Predicts Survival and Recurrence in Resectable Pancreatic Cancer and Its Prognostic Value Depends on Bilirubin Levels: A Retrospective Multicenter Cohort Study. *Annals of Surgery*, **270**, 139-146. https://doi.org/10.1097/sla.0000000000002660

[20] Fankhauser, C.D., Sander, S., Roth, L., Gross, O., Eberli, D., Sulser, T., *et al*. (2018) Systemic Inflammatory Markers Have Independent Prognostic Value in Patients with Metastatic Testicular Germ Cell Tumours Undergoing First-Line Chemotherapy. *British Journal of Cancer*, **118**, 825-830. https://doi.org/10.1038/bjc.2017.467

[21] van der Willik, K.D., Koppelmans, V., Hauptmann, M., Compter, A., Ikram, M.A. and Schagen, S.B. (2018) Inflammation Markers and Cognitive Performance in Breast Cancer Survivors 20 Years after Completion of Chemotherapy: A Cohort Study. *Breast Cancer Research*, **20**, Article No. 135. https://doi.org/10.1186/s13058-018-1062-3

[22] Geraghty, J.R., Lung, T.J., Hirsch, Y., Katz, E.A., Cheng, T., Saini, N.S., *et al*. (2021) Systemic Immune-Inflammation Index Predicts Delayed Cerebral Vasospasm after Aneurysmal Subarachnoid Hemorrhage. *Neurosurgery*, **89**, 1071-1079. https://doi.org/10.1093/neuros/nyab354

[23] Wang, R., Wen, W., Jiang, Z., Du, Z., Ma, Z., Lu, A., *et al*. (2023) The Clinical Value of Neutrophil-to-Lymphocyte Ratio (NLR), Systemic Immune-Inflammation Index (SII), Platelet-to-Lymphocyte Ratio (PLR) and Systemic Inflammation Response Index (SIRI) for Predicting the Occurrence and Severity of Pneumonia in Patients with Intracerebral Hemorrhage. *Frontiers in Immunology*, **14**, Article 1115031. https://doi.org/10.3389/fimmu.2023.1115031

[24] Ye, C., Yuan, L., Wu, K., Shen, B. and Zhu, C. (2023) Association between Systemic Immune-Inflammation Index and Chronic Obstructive Pulmonary Disease: A Population-Based Study. *BMC Pulmonary Medicine*, **23**, Article No. 295. https://doi.org/10.1186/s12890-023-02583-5