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DOI: 10.46903/gjms/22.4.suppl.1936

CASE REPORT

SEVERE LEUKOMOID REACTION FOLLOWING NOREPINEPHRINE ADMINISTRATION IN A YOUNG ADULT WITH SEPTIC SHOCK: A CASE REPORT

I Gede Eka Handrean, I Putu Pradiva Satriya Kirana

Department of Internal Medicine, Faculty of Medicine, Universitas Mahasaraswati Denpasar, Indonesia

ABSTRACT

Background: Leukomoid reaction, defined as leukocytosis exceeding 50,000 cells/μL, is a rare hematological condition that can occur in various clinical settings. While commonly associated with severe infections and malignancies, its occurrence following vasopressor administration remains poorly documented in medical literature.

Case Presentation: A 23-year-old female presented with bacterial pneumonia that progressed to septic shock requiring vasopressor support. Following norepinephrine administration (0.1 mcg/kg/min), she developed severe leukomoid reaction with white blood cell count peaking at 61.99 x10^3/μL. Serial complete blood counts demonstrated a clear temporal relationship between norepinephrine administration and extreme leukocytosis. The patient was managed with appropriate antibiotics and careful vasopressor weaning.

Results: Upon norepinephrine discontinuation, WBC counts decreased from 61.99 to 31.30x10^3/μL within 24 hours and normalized to 15.63 x10^3/μL over subsequent days. The patient maintained hemodynamic stability throughout the weaning process and achieved complete clinical recovery.

Conclusion: This case highlights a potentially underrecognized association between norepinephrine administration and leukomoid reaction, emphasizing the importance of hematological monitoring in patients receiving vasopressor therapy. Our findings suggest that medication-induced effects should be considered in the differential diagnosis of extreme leukocytosis in patients receiving vasopressor therapy.

KEY WORDS: Leukomoid reaction; Norepinephrine; Drug-induced leukocytosis; Septic shock; Bacterial pneumonia

Cite as: Handrean IGE, Kirana IPPS. Severe leukomoid reaction following norepinephrine administration in a young adult with septic shock: a case report. Gomal J Med Sci 2024 Oct-Dec ;22(4)Suppl:459-62. https://doi.org/1046903/gjms/22.4.suppl.1936

INTRODUCTION

Leukomoid reaction (LR) represents a significant hematological response characterized by extreme leukocytosis exceeding 50,000 cells/μL in the absence of hematological malignancy. First described by Krumbhaar in 1926, this condition typically occurs in response to severe infections, malignancies, or other systemic conditions.[1,2] While the exact prevalence remains undocumented, LR is recognized as a relatively uncommon finding in clinical practice, particularly in critical care settings.[3]

The pathophysiology of LR involves complex interactions between inflammatory mediators, growth factors, and bone marrow response. In septic patients, this reaction is typically attributed to the inflammatory cascade and cytokine release.[4,5] Medication-induced LR represents a distinct entity that requires recognition for appropriate management.[6]

Norepinephrine, a commonly used vasopressor in septic shock, acts primarily through α-adrenergic stimulation to maintain hemodynamic stability. While its effects on the cardiovascular system are well-documented, its potential impact on hematopoiesis through β-adrenergic stimulation of bone marrow remains less explored.[7,8]

We present a unique case of severe leukomoid reaction temporally associated with norepinephrine administration in a young adult with septic shock. This case highlights a potentially underrecognized phenomenon and contributes to our understanding of medication-induced hematological effects in critical care settings. This case report follows the CARE (CAse REport) guidelines checklist to ensure comprehensive and transparent reporting of case

Corresponding Author:

Dr. I Gede Eka Handrean
Department of Internal Medicine
Faculty of Medicine, Universitas Mahasaraswati Denpasar, Indonesia
E-mail: handrean@unmas.ac.id

Date Submitted: 17-06-2024
Date Revised: 19-11-2024
Date Accepted: 28-11-2024

studies, providing a standardized framework for clinical observations and findings. The CARE guidelines were specifically developed to increase the accuracy, transparency, and usefulness of case reports for clinicians, researchers, and healthcare stakeholders.

CASE PRESENTATION

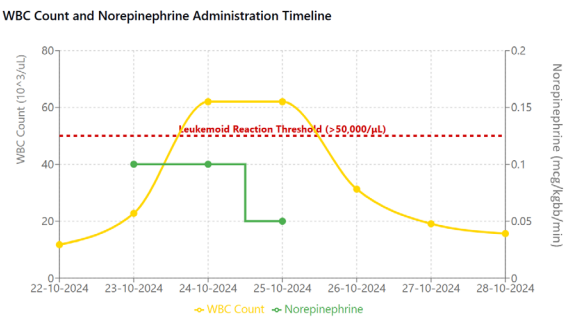
A 23-year-old previously healthy female presented to the emergency department with progressive dyspnea, productive cough, and fever. Her initial vital signs showed mild tachycardia (103 beats/min) with normal blood pressure (100/66 mmHg) and oxygen saturation (97% on room air). Physical examination revealed right-sided rhonchi and epigastric tenderness. The patient had no significant past medical history.

Upon initial presentation on October 22, 2024, she was diagnosed with bacterial pneumonia and started on levofloxacin 750mg IV daily. Within 24 hours, her condition deteriorated as she developed septic shock with hypotension (BP 85/palpable) and increasing leukocytosis (WBC 22.76 x10^3/UL). This prompted her transfer to the high-care unit and initiation of norepinephrine at 0.1 mcg/kg/min. Despite appropriate antibiotic therapy and supportive care, including acetylcysteine for secretion clearance, her WBC count increased dramatically to 61.99 x10^3/UL by October 25, even though she was clinically stable on minimal vasopressor support (0.05 mcg/kg/min).

The unexpected extreme leukocytosis prompted careful evaluation of potential causes. Regular monitoring of complete blood counts, electrolytes, and renal function continued throughout her hospitalization. The temporal relationship between norepinephrine administration and the dramatic increase in WBC count raised suspicion for a drug-induced leukomoid reaction. Given her clinical stability, a decision was made to discontinue norepinephrine while maintaining close hemodynamic monitoring.

Following norepinephrine discontinuation, her WBC count showed remarkable improvement, decreasing to 31.30 x10^3/UL within 24 hours and further normalizing to 15.63 x10^3/UL over the next two days. This rapid resolution strongly supported the hypothesis of a norepinephrine-induced leukomoid reaction. Throughout her hospital stay, the patient demonstrated steady clinical improvement, with complete resolution of both respiratory symptoms and leukocytosis.

The patient tolerated all interventions well without adverse effects and completed her prescribed course of antibiotics. Her recovery progressed smoothly, allowing transfer to the regular ward and subsequent discharge. Follow-up evaluations confirmed sustained clinical improvement and normal white blood cell counts. This case provides valuable insights into the potential hematologic effects of norepinephrine and emphasizes the importance of careful monitoring in patients receiving vasopressor therapy.



Picture 1. WBC Count and Norepinephrine Administration Timeline

Tabel 1. Complete blood count during hospitalized

Parameter	22-10-2024	23-10-2024	25-10-2024	26-10-2024	27-10-2024	28-10-2024
Hemoglobin (g/dL)	13.48	11.59	14.71	12.47	12.17	14.06
Hematokrit (%)	41.4	35.4	45.4	38.3	37.0	43.5
Leukosit (10 ^ 3/uL)	11.79	**22.76**	**61.99**	**31.30**	**19.09**	**15.63**
Neutrofil (%)	87.27	**95.11**	**94.17**	**92.02**	**81.41**	73.85
Limfosit (%)	8.81	2.14	2.47	4.47	10.22	17.74
Basofil (%)	0.09	0.03	0.23	0.28	0.80	1.26
Eosinofil (%)	0.70	0.88	0.73	0.39	0.61	1.33
Monosit (%)	3.13	1.83	2.41	2.84	6.95	5.81
Trombosit (10 ^ 3/mm ^ 3)	183	65	124	94	98	157

DISCUSSION

This case presents a unique interplay between vasopressor therapy and extreme leukocytosis in a young, previously healthy patient. A 23-year-old female who initially presented with bacterial pneumonia developed septic shock requiring norepinephrine support, leading to an unexpected and dramatic leukemoid reaction. The temporal sequence of events provides compelling insights into this rarely reported phenomenon, consistent with previously documented cases of drug-induced leukemoid reactions.[9,10]

Our experience with this young patient adds a unique perspective to the limited literature on vasopressor-induced leukemoid reactions. [11,12] It emphasizes that even standard doses of norepinephrine can trigger dramatic hematologic responses in otherwise healthy young patients, challenging us to reconsider monitoring protocols and management strategies in similar cases.

CONCLUSION

This case illuminates a significant yet underrecognized phenomenon of norepinephrine-induced leukemoid reaction in a young patient with septic shock. This case contributes uniquely to the medical literature by documenting a clear, reversible association between norepinephrine administration and leukemoid reaction in a young adult with septic shock, providing valuable insights for clinicians managing similar cases.

PATIENT PERSPECTIVE

“Initially, I was very worried when I came to the emergency department with difficulty breathing. The experience in the high-care unit was challenging, especially during the first few days when I needed special medication to maintain my blood pressure. The medical team kept me well-informed about my condition, including the unexpected blood count changes they discovered. I appreciated how they carefully monitored my progress and adjusted the treatment accordingly.

The improvement after they stopped the blood pressure medication was quite rapid, and I felt progressively better each day. Now, I’m back to my normal activities and following up regularly at the clinic. I’m grateful for the attentive care I received and hope my experience can help other patients in similar situations.”

INFORMED CONSENT

Written informed consent was obtained from the patient for the publication of this case report. The patient was fully informed about the unique nature of her case and its potential contribution to medical knowledge. She understood that while her personal information would remain confidential, the clinical details and laboratory findings would be shared with the medical community. The patient also specifically consented to sharing her perspective on the treatment experience.

Availability of Data and Material

The datasets used during the current study are available from the corresponding author on reasonable request.

Acknowledgements

The authors would like to thank the nursing staff of the high-care unit for their excellent care of the patient.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	IGEH
Acquisition, Analysis or Interpretation of Data:	IGEH, IPPSK
Manuscript Writing & Approval:	IGEH, IPPSK

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.