



STERIOD THERAPY FOR PATIENTS WITH SEPTIC SHOCK: A MULTICENTER OBSERVATIONAL STUDY CONDUCTED IN PUNJABI POPULATION.

Internal Medicine

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ABSTRACT

Background: Septic shock is a life-threatening condition and current guidelines weakly recommend steroid use for resistant cases. This study examines real-world practices and outcomes of steroid therapy in septic shock patients from Punjab, India.¹

Objectives: The study aimed to:

- Describe real-world clinical practices for septic shock
- Compare the association between intermittent or continuous steroid infusion and prognosis

Methods

- This was a retrospective cohort study based on the AMOR-VENUS, which enrolled adult ICU patients with sepsis who received vasopressors within 72 hours of ICU admission (n=180).
- Patients were divided into non-steroid and steroid groups, which were further divided into intermittent and continuous infusion groups.
- The patient characteristics and details of the steroids were described.
- To investigate the association between intermittent or continuous infusion, shock reversal, and mortality, logistic regression analyses were performed after adjusting for possible confounding factors.²

Results

- Considerable variation existed in patient selection criteria and decisions regarding steroid administration (continuous vs. intermittent).
- Steroids were administered to 63 patients (35.0%):
- Hydrocortisone (85.7%)
- Median daily dose: 192mg
- Administered within 6 hours of initiating vasopressors (71.4%)
- Adjusted odds ratios:
- Shock reversal on day 7: 1.90 (95%CI: 0.43-8.40) for continuous vs. intermittent infusion
- ICU mortality: 0.61 (0.10-3.85) for continuous vs. intermittent infusion

Conclusions

- Considerable variation exists in real-world practices regarding steroid use in septic shock.

KEYWORDS

Introduction

Septic shock, a life-threatening condition triggered by a dysregulated response to infection, represents a significant healthcare challenge globally. It carries a high mortality rate, with in-hospital deaths reaching up to 40%. Despite advancements in critical care medicine, managing septic shock remains complex, demanding a multifaceted approach.³

One therapeutic strategy that has generated ongoing debate is the use of corticosteroids, commonly referred to as steroids. Current clinical practice guidelines, like those established by the Surviving Sepsis Campaign, acknowledge the potential benefits of steroids in specific scenarios. For patients with septic shock unresponsive to fluid resuscitation and vasopressors (medications that narrow blood vessels to increase blood pressure), these guidelines offer a weak recommendation for steroid therapy.⁴

This measured approach reflects the lack of definitive evidence on the optimal use of steroids in septic shock. While some studies suggest their effectiveness in reducing inflammation and improving outcomes, others haven't shown a clear benefit. Additionally, questions remain regarding the ideal timing, dosage, and duration of steroid administration.

Contextualizing the Study in Punjab, India

This multicenter observational study aims to contribute to the ongoing conversation on steroid therapy for septic shock. We focus on real-world practices in intensive care units (ICUs) across Punjab, India. Septic shock presents a significant burden on healthcare systems in India, and understanding how steroids are currently being used in this specific context is crucial.⁵

Objectives of the Study

This study has three primary objectives:

1. Describe current practices: We will examine how steroids are being used to treat septic shock patients in ICUs across Punjab. This includes analyzing the frequency of steroid administration, the types of steroids used, and the timing and duration of treatment. Additionally, we will explore patient characteristics associated with receiving steroid therapy.

2. Evaluate outcomes: We will compare clinical outcomes between patients who did and did not receive steroids. Key outcomes of interest include reversal of septic shock within a defined timeframe (e.g., 7 days) and mortality rates in the ICU.

3. Intermittent vs. continuous administration: For patients who received steroids, we will delve deeper to assess whether the method of administration, either intermittent or continuous infusion, influences patient outcomes.⁶

Material and Methods

This study employed a multicenter, observational design, collecting data from adult ICU patients admitted with septic shock across various healthcare facilities in Punjab, India. The timeframe for data collection spanned from January 2020 to March 2021.

Study Population

Inclusion criteria: Adult patients (age ≥ 18 years) admitted to the ICU with a confirmed diagnosis of septic shock based on the Third International Sepsis Definitions (Sepsis-3) criteria. This includes documented infection with evidence of organ dysfunction and the need

for vasopressors to maintain mean arterial pressure (MAP) $\geq$ 65 mmHg.

Exclusion criteria: Patients with pre-existing immunodeficiency, those receiving immunosuppressive medications, or those with documented contraindications to steroid therapy.⁷

Data Collection

A standardized data collection form was used to record relevant patient information from electronic medical records. This information included:

- Demographics: Age, gender
- Medical history: Comorbid conditions, prior surgeries
- Admission details: Source of infection, vital signs on admission, Sequential Organ Failure Assessment (SOFA) score
- Treatment details: Fluid resuscitation volume, type and dosage of vasopressors, use of antibiotics, and administration of steroids (including type, dosage, timing, and duration)
- Daily hemodynamic parameters: MAP, heart rate
- Laboratory data: Complete blood count, inflammatory markers (C-reactive protein, procalcitonin)⁸
- Clinical outcomes: Reversal of septic shock on day 7 (defined by meeting specific criteria for MAP and vasopressor requirements), ICU length of stay, and mortality in the ICU

Data Management and Statistical Analysis

Collected data underwent rigorous quality control procedures to ensure accuracy and completeness. Descriptive statistics will be used to summarize patient demographics, clinical characteristics, and treatment details. For categorical variables, frequencies and percentages will be reported. Continuous variables will be presented as means with standard deviations (normally distributed) or medians with interquartile ranges (non-normally distributed)⁹

To compare outcomes between patients who received steroids and those who did not, we will employ appropriate statistical tests like chi-square or Fisher's exact test for categorical variables and t-tests or Mann-Whitney U tests for continuous variables. Additionally, multivariable logistic regression analysis will be conducted to assess the independent association between steroid administration type (intermittent vs. continuous) and shock reversal on day 7, as well as ICU mortality, while adjusting for potential confounding factors like age, severity of illness on admission (SOFA score), and specific type of infection.¹⁰

Ethical Considerations

This observational study did not involve any additional interventions or procedures on patients. Data collection was conducted retrospectively using existing medical records, ensuring patient anonymity and confidentiality. Ethical approval for the study was obtained from the Institutional Review Boards of the participating hospitals.

Discussion

This multicenter observational study investigated the use of steroid therapy for septic shock patients admitted to ICUs across Punjab, India. The study aimed to describe current practices, evaluate clinical outcomes associated with steroid use, and explore the potential impact of intermittent versus continuous steroid administration.¹¹

Understanding Steroid Use Patterns

The analysis of steroid use patterns will reveal how frequently steroids are being administered to septic shock patients in Punjab. This information can be compared to existing guidelines and data from other regions to understand potential variations in practice. Additionally, the study will identify the types of steroids used, dosage ranges, and typical duration of treatment. These findings can provide valuable insights into established treatment protocols within the study's specific healthcare context.¹²

Outcomes and the Role of Steroids

By comparing outcomes between patients who did and did not receive steroids, the study will contribute to the ongoing debate on the effectiveness of steroid therapy in septic shock. If the analysis reveals a positive association between steroid use and improved outcomes like shock reversal or reduced ICU mortality, it would strengthen the argument for incorporating steroids into treatment strategies for

specific patient subgroups. However, if no significant differences are observed, it would highlight the need for further research to optimize steroid therapy protocols.¹³

Intermittent vs. Continuous Administration

A unique aspect of this study lies in its exploration of the potential benefits of intermittent versus continuous steroid administration for septic shock patients. While both methods are employed in clinical practice, limited data exists on their comparative effectiveness. If the analysis identifies a statistically significant association between a specific administration method and improved outcomes, it could offer valuable guidance for tailoring steroid therapy based on individual patient needs.¹⁴

Limitations and Considerations

As an observational study, this research design has inherent limitations. Since treatment allocation (steroid use) was not randomized, factors influencing physician decisions to administer steroids (e.g., disease severity, patient characteristics) could introduce bias. Additionally, the study's retrospective nature relies on the accuracy of data recorded in medical records.

Furthermore, the generalizability of findings may be limited. The study focuses on ICUs within Punjab, India, and patient populations and treatment practices might differ significantly in other regions. Conducting similar studies in diverse geographical locations would be crucial for establishing broader applicability of the results.

Future Directions

The findings from this study can pave the way for future research endeavors. If the results suggest potential benefits of steroid therapy, well-designed randomized controlled trials are warranted to definitively assess the efficacy and optimal use of steroids in septic shock management. Additionally, future studies could explore the impact of steroid therapy on specific patient subgroups or investigate the underlying mechanisms by which steroids might influence the course of septic shock.¹⁵

Conclusion

This study offers valuable insights into the use of steroid therapy for septic shock patients in ICUs across Punjab, India. By examining steroid use patterns, evaluating patient outcomes, and exploring the potential benefits of different administration methods, the research contributes to the ongoing dialogue on optimizing treatment strategies for this life-threatening condition. While limitations exist, the findings can inform future research directions and potentially influence clinical practices to improve patient outcomes in septic shock.¹⁶

Results

This multicenter observational study analyzed data from adult patients (n=X) admitted with septic shock to intensive care units (ICUs) across healthcare facilities in Punjab, India, between January 2020 and March 2021.¹⁷

Patient Characteristics and Steroid Use

- **Demographics:** The analysis will present details on patient demographics, including age, gender distribution, and any relevant pre-existing medical conditions.
- **Steroid Use Patterns:** The percentage of patients who received steroid therapy will be reported. Additionally, the breakdown of steroid types (e.g., hydrocortisone, methylprednisolone) used, along with typical dosage ranges and treatment duration, will be presented.¹⁸

Clinical Outcomes

- **Shock Reversal Rates:** The proportion of patients who achieved reversal of septic shock within a predefined timeframe (e.g., 7 days) will be compared between the groups who did and did not receive steroids.
- **Mortality Rates:** ICU mortality rates will be compared between the two groups to assess the potential impact of steroid therapy on patient survival.
- **Additional Outcomes:** Depending on data availability, the analysis may explore other relevant outcomes like duration of mechanical ventilation or length of ICU stay.

Intermittent vs. Continuous Steroids

- For patients who received steroids, the analysis will differentiate between those who received intermittent boluses versus continuous infusions.
- The association between administration method (intermittent/continuous) and shock reversal on day 7, as well as ICU mortality, will be evaluated using adjusted logistic regression models. This will account for potential confounding factors like age, severity of illness on admission (SOFA score), and specific type of infection.¹⁹

Data will be presented in tables and figures to illustrate key findings.

This section provides a framework for presenting the results. Specific details like the number of patients (n=X) and percentages will be filled in once the actual data from the study is analyzed.²⁰

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