

Review began 08/23/2025  
Review ended 10/11/2025  
Published 10/19/2025

© Copyright 2025

Jalodi et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.94928

# Rapid Clinical Recovery in Streptococcal Toxic Shock Syndrome With Intravenous Immunoglobulin (IVIG): A Case Report

Suhad Jalodi <sup>1</sup>, Muhammad Naseem <sup>1</sup>, Syed Abubacker <sup>1</sup>, Aima Hameed <sup>2</sup>, Aymen Rasool <sup>3</sup>

1. Internal Medicine, Kettering General Hospital, Kettering, GBR 2. General Internal Medicine, Kettering General Hospital, Kettering, GBR 3. Acute Medicine, Kettering General Hospital, Kettering, GBR

**Corresponding author:** Muhammad Naseem, naseemsahar552@gmail.com

---

## Abstract

Streptococcal toxic shock syndrome (STSS) is a rare but life-threatening condition, with an estimated incidence of 1-3 cases per 100,000 population annually and reported mortality rates exceeding 30% and reaching up to 44% in some series. It is characterized by rapid systemic deterioration due to toxin-producing *Streptococcus pyogenes*. Prompt recognition and escalation of therapy, including the use of adjunctive intravenous immunoglobulin (IVIG), are critical to improving outcomes. We report the case of a previously healthy 37-year-old man who presented with high-grade fever, hypotension, and a widespread erythematous rash. Initial antibiotic therapy targeting skin and soft tissue infection yielded a limited response. Culture from an ulcerated lesion confirmed beta-hemolytic *Streptococcus*. Despite broad-spectrum antibiotics and intensive care support, the patient continued to deteriorate. A diagnosis of STSS was made, and IVIG was administered with rapid clinical improvement. This case highlights the importance of early diagnosis, multidisciplinary management, and the potential role of IVIG in severe STSS.

---

**Categories:** Internal Medicine, Infectious Disease, Dermatology

**Keywords:** intravenous immunoglobulin (ivig), sepsis and septic shock, streptococcal toxic shock syndrome (stss), streptococcus pyogenes infections, stss

## Introduction

Streptococcal toxic shock syndrome (STSS) is a rare but life-threatening toxin-mediated condition caused by invasive *Streptococcus pyogenes* (group A *Streptococcus*), with an estimated incidence of 2-4 cases per 100,000 people per year [1,2]. Despite its rarity, STSS carries a high mortality rate exceeding 25-30%, often due to the rapid onset of shock and multiorgan dysfunction [3].

The pathophysiology of STSS is primarily driven by pyrogenic exotoxins that act as superantigens, bypassing conventional antigen processing and directly activating large numbers of T lymphocytes [4]. This massive T-cell activation leads to excessive cytokine release, widespread endothelial damage, capillary leak, and subsequent circulatory collapse [5].

Clinically, the Centers for Disease Control and Prevention (CDC) defines STSS by the presence of hypotension, isolation of group A *Streptococcus* from a sterile or non-sterile site, and involvement of at least two organ systems, including renal, hepatic, hematologic, pulmonary, or cutaneous manifestations [6]. These diagnostic criteria underscore the rapid systemic deterioration that often characterizes the disease.

While the mainstay of treatment remains early antimicrobial therapy, source control, and organ support, recent evidence suggests a potential role for intravenous immunoglobulin (IVIG) in improving outcomes, particularly when used alongside clindamycin [7-10]. This case highlights the importance of early recognition and multidisciplinary management and the potential impact of adjunctive IVIG in the management of STSS.

## Case Presentation

A 37-year-old previously healthy man presented to the emergency department with a 48-hour history of high-grade fever, hypotension, and a widespread non-blanching erythematous rash (Figures 1-2). He also reported malaise and dizziness. On examination, he was febrile (39.2°C), hypotensive (BP 85/50 mmHg), and tachycardic (HR 110 bpm). A 2×3 cm ulcerative lesion with surrounding erythema was noted below his left ear (Figure 3), the origin being traumatic.

### How to cite this article

Jalodi S, Naseem M, Abubacker S, et al. (October 19, 2025) Rapid Clinical Recovery in Streptococcal Toxic Shock Syndrome With Intravenous Immunoglobulin (IVIG): A Case Report. Cureus 17(10): e94928. DOI 10.7759/cureus.94928



**FIGURE 1: Rash across the chest**



**FIGURE 2: Rash on both legs (before treatment)**



**FIGURE 3: Ulcerative lesion behind the left ear**

Laboratory investigations revealed leukocytosis (WBC  $14.1 \times 10^9/L$ ), neutrophilia ( $13.0 \times 10^9/L$ ), and markedly elevated C-reactive protein (CRP) (226 mg/L). Renal functions (sodium 123 mmol/L, creatine 114  $\mu\text{mol/L}$ , and estimated glomerular filtration rate (eGFR) 66.6) and liver function tests (bilirubin 22  $\mu\text{mol/L}$ , albumin 31 g/L, alanine aminotransferase (ALT) and alkaline phosphatase (ALP) normal) were slightly deranged on admission. Clotting profile was within normal limits. The patient was started on intravenous flucloxacillin (2 g every six hours) targeting a presumed skin and soft tissue infection.

A wound swab from the ulcerative lesion cultured beta-hemolytic *Streptococcus*, sensitive to penicillin (Table 1). Despite appropriate antimicrobial coverage, he remained febrile ( $38.2^\circ\text{C}$ ) and hypotensive (BP 89/56 mmHg). Substantial fluid resuscitation was administered, totaling approximately 6-7 litres over a 24-hour period. Subsequently, the patient developed generalized oedema secondary to fluid overload (Figure 4). Despite this, renal function improved significantly, with an eGFR exceeding 90 mL/min/1.73 m<sup>2</sup>.

| Specimen  | Organism isolated                           | Antibiotic     | Result |
|-----------|---------------------------------------------|----------------|--------|
| Swab skin | Beta-hemolytic group A <i>Streptococcus</i> | Penicillin     | S      |
|           |                                             | Erythromycin   | R      |
|           |                                             | Doxycycline    | R      |
|           | <i>Staphylococcus aureus</i>                | Penicillin     | R      |
|           |                                             | Erythromycin   | S      |
|           |                                             | Doxycycline    | S      |
|           |                                             | Flucloxacillin | S      |

TABLE 1: Swab culture and antibiotic susceptibility (May 14, 2025)



FIGURE 4: Oedema noted after fluid resuscitation

Ongoing clinical deterioration prompted the escalation of antibiotic therapy to intravenous piperacillin-tazobactam (4.5 g TDS) and clindamycin (1200 mg QDS initially for the first day and then 900 mg QDS for the remaining four days) for its anti-toxin properties. Dermatology and microbiology input supported a clinical diagnosis of STSS. Given ongoing deterioration despite antibiotic therapy and fluid resuscitation, a discussion was made with both microbiology and dermatology teams, and he was promptly commenced on IVIG (Kiovig 70 g administered for two days) as it was presumed to be a life-threatening condition.

Following IVIG therapy, the patient exhibited rapid clinical improvement. Fever resolved, blood pressure normalized without vasopressors, and the rash significantly improved (Figures 5-6). He was de-escalated to oral co-amoxiclav three days post-IVIG and discharged home in stable condition on day 4. He remained clinically well on outpatient follow-up.



**FIGURE 5: Desquamation of the skin following IVIG treatment**

IVIG: intravenous immunoglobulin



**FIGURE 6: Resolution of rash over the legs after treatment with IVIG**

IVIG: intravenous immunoglobulin

## Discussion

STSS remains a rapidly progressive, life-threatening illness caused by *Streptococcus pyogenes*, with mortality often exceeding 25-30% despite optimal care [1-3]. Clinically, it typically presents with a sudden onset of high-grade fever, hypotension, and multiorgan dysfunction, frequently in association with a soft tissue focus of infection [7,8].

In our patient, the diagnosis of STSS was supported by persistent hypotension despite fluid resuscitation, high-grade fever, and markedly elevated inflammatory markers, together with a confirmed soft tissue infection on microbiological culture. These features, in combination with rapid clinical deterioration despite broad-spectrum antimicrobial therapy and aggressive fluid resuscitation, prompted escalation to adjunctive therapy.

The cornerstones of management are early recognition, prompt initiation of effective antimicrobials (including clindamycin for its antitoxin properties), aggressive hemodynamic support, and surgical source

control where indicated [7,8].

Adjunctive IVIG has been proposed due to its potential to neutralize streptococcal superantigens and modulate the host inflammatory response [7,11]. Meta-analyses combining one randomized trial and several observational studies have shown a reduction in mortality from approximately 33.7% to 15.7% in clindamycin-treated patients who received IVIG [7]. A prospective cohort from Sweden demonstrated significantly improved 28-day survival with IVIG use (adjusted odds ratio 5.6) despite greater severity in the IVIG group [8]. Similarly, a Canadian study reported a survival rate of 67% in IVIG recipients compared to 34% in controls (odds ratio 8.1), alongside reductions in inflammatory cytokine responses [9].

Although the only randomized controlled trial was underpowered due to early termination, it did demonstrate improved organ failure scores and a trend toward lower mortality in the IVIG group [7]. The proposed mechanism includes neutralization of streptococcal superantigens and modulation of the host inflammatory response [4,7].

However, a recent large Japanese observational study involving a broader cohort of invasive group A streptococcal infections reported no significant mortality benefit with IVIG, though STSS-specific subgroup analysis was limited [11]. This discrepancy highlights the need for larger, STSS-focused randomized trials.

In our patient, the decision to escalate to IVIG was made after persistent fever, hypotension, and inflammatory marker elevation despite optimal antimicrobial therapy and fluid resuscitation. The rapid clinical improvement and marked biochemical response, demonstrated by the trends in CRP and WBC (Table 2 and Figure 7), support its potential role as an adjunctive therapy in refractory STSS.

| Date       | CRP (mg/L) | Reference range CRP (mg/L) | WBC (×10 <sup>9</sup> /L) | Reference range WBC (×10 <sup>9</sup> /L) |
|------------|------------|----------------------------|---------------------------|-------------------------------------------|
| 12/05/2025 | 226        | <5                         | 12.7                      | 4.0-11.0                                  |
| 13/05/2025 | 233        | <5                         | 12.7                      | 4.0-11.0                                  |
| 14/05/2025 | 158        | <5                         | 11.6                      | 4.0-11.0                                  |
| 15/05/2025 | 144        | <5                         | 12.0                      | 4.0-11.0                                  |
| 16/05/2025 | 98         | <5                         | 10.2                      | 4.0-11.0                                  |
| 18/05/2025 | 27         | <5                         | 10.5                      | 4.0-11.0                                  |
| 19/05/2025 | 14         | <5                         | 8.7                       | 4.0-11.0                                  |
| 20/05/2025 | 8          | <5                         | 7.5                       | 4.0-11.0                                  |

TABLE 2: Trend of inflammatory markers (CRP and WBC) during hospital admission. A marked decline in CRP and WBC was observed following the initiation of IVIG therapy on day 4, indicating the rapid resolution of systemic inflammation

CRP: C-reactive protein; WBC: white blood cell; IVIG: intravenous immunoglobulin



**FIGURE 7: Trend of CRP and WBC over time**

CRP: C-reactive protein; WBC: white blood cell

## Conclusions

This case underscores the importance of early recognition and aggressive multidisciplinary management of STSS. Clinicians should maintain a high index of suspicion for STSS in patients with rapidly progressive sepsis and confirmed streptococcal infection, even in previously healthy individuals. IVIG may serve as a valuable adjunct in cases where standard antimicrobial therapy and supportive care are insufficient.

## Additional Information

### Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

**Concept and design:** Muhammad Naseem, Suhad Jalodi, Syed Abubacker, Aima Hameed, Aymen Rasool

**Acquisition, analysis, or interpretation of data:** Muhammad Naseem, Suhad Jalodi, Syed Abubacker, Aima Hameed, Aymen Rasool

**Drafting of the manuscript:** Muhammad Naseem, Suhad Jalodi, Syed Abubacker, Aima Hameed, Aymen Rasool

**Critical review of the manuscript for important intellectual content:** Muhammad Naseem, Suhad Jalodi, Syed Abubacker, Aima Hameed, Aymen Rasool

**Supervision:** Suhad Jalodi

### Disclosures

**Human subjects:** Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

## References

1. Nelson GE, Pondo T, Toews KA, et al.: Epidemiology of invasive group A streptococcal infections in the United States, 2005-2012. *Clin Infect Dis*. 2016, 63:478-86. [10.1093/cid/ciw248](https://doi.org/10.1093/cid/ciw248)
2. O'Loughlin RE, Roberson A, Cieslak PR, et al.: The epidemiology of invasive group A streptococcal infection and potential vaccine implications: United States, 2000-2004. *Clin Infect Dis*. 2007, 45:853-62. [10.1086/521264](https://doi.org/10.1086/521264)
3. Carapetis JR, Steer AC, Mulholland EK, Weber M: The global burden of group A streptococcal diseases. *Lancet Infect Dis*. 2005, 5:685-94. [10.1016/S1473-3099\(05\)70267-X](https://doi.org/10.1016/S1473-3099(05)70267-X)

4. Stevens DL: Streptococcal toxic shock syndrome associated with necrotizing fasciitis . *Annu Rev Med.* 2000, 51:271-88. [10.1146/annurev.med.51.1.271](https://doi.org/10.1146/annurev.med.51.1.271)
5. Proft T, Fraser JD: Streptococcal superantigens. *Chem Immunol Allergy.* 2007, 93:1-23. [10.1159/000100851](https://doi.org/10.1159/000100851)
6. Clinical guidance for streptococcal toxic shock syndrome. (2025). Accessed: 2025: <https://www.cdc.gov/group-a-strep/hcp/clinical-guidance/streptococcal-toxic-shock-syndrome.html>.
7. Ambrosioni J, Urrea X, Llopis J, Moreno A, Chamorro A, Miró JM: Polyspecific intravenous immunoglobulin in clindamycin-treated patients with streptococcal toxic shock syndrome: a systematic review and meta-analysis. *Clin Infect Dis.* 2018, 67:1146-7.
8. Darenberg J, Ihendyane N, Sjölin J, et al.: Intravenous immunoglobulin G therapy in streptococcal toxic shock syndrome: a European randomized, double-blind, placebo-controlled trial. *Clin Infect Dis.* 2003, 37:333-40. [10.1086/376630](https://doi.org/10.1086/376630)
9. Kaul R, McGeer A, Norrby-Teglund A, et al.: Intravenous immunoglobulin therapy for streptococcal toxic shock syndrome-a comparative observational study. *Clin Infect Dis.* 1999, 28:800-7. [10.1086/515199](https://doi.org/10.1086/515199)
10. Norrby-Teglund A, Kaul R, Low DE, McGeer A, Andersson J, Andersson U, Kotb M: Evidence for the presence of streptococcal-superantigen-neutralizing antibodies in normal polyspecific immunoglobulin G. *Infect Immun.* 1996, 64:5395-8. [10.1128/iai.64.12.5395-5398.1996](https://doi.org/10.1128/iai.64.12.5395-5398.1996)
11. Nakamura K, Hayakawa K, Tsuzuki S, et al.: Clinical outcomes and epidemiological characteristics of bacteremia in the older Japanese population. *J Infect Chemother.* 2023, 29:971-7. [10.1016/j.jiac.2023.06.015](https://doi.org/10.1016/j.jiac.2023.06.015)