

Management of Patients with Guillain-Barré Syndrome and Severe Community-Acquired Pneumonia in the Intensive Care Unit (ICU)

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ABSTRACT

Introduction: Guillain-Barré Syndrome (GBS) is an immune-mediated polyneuropathy that leads to respiratory failure requiring mechanical ventilation. The neurological deficits in GBS, including airway obstruction, ineffective coughing, and difficulty swallowing, increase pneumonia risk, which worsens patient condition. Community-Acquired Pneumonia (CAP) is a lung infection contracted outside hospitals, and its severity relates to mortality. Appropriate antibiotic therapy is crucial for reducing treatment duration and mortality.

Case Report: We report a case of a 20-year-old male who developed respiratory failure due to GBS complicated by severe CAP. The patient was admitted to the ICU, where he received plasmapheresis for GBS treatment, which led to gradual improvement. Due to respiratory failure, the patient required mechanical ventilation. Empirical antibiotic therapy was initiated, considering the severity of CAP and the potential for bacterial resistance. After 13 days of intensive care, the patient was successfully weaned off mechanical ventilation.

Conclusion: This case highlights the importance of a timely and comprehensive approach to treating GBS and CAP in the ICU. Plasmapheresis for GBS and appropriate antibiotic therapy for CAP were key in the patient's recovery. Early intervention and appropriate supportive care, including mechanical ventilation when necessary, are essential for improving patient outcomes. Further studies and refined treatment protocols are needed to optimize care for patients with complex conditions like GBS complicated by CAP.

Guillain-Barré Syndrome, Community-Acquired Pneumonia, Mechanical Ventilation

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INTRODUCTION

Guillain-Barré Syndrome (GBS) is an acute polyneuropathy characterized by flaccid paralysis with or without sensory or autonomic dysfunction. GBS occurs in approximately 1 in 100,000 people globally [1]. Patients with GBS often experience acute respiratory failure as a result of progressive weakness in respiratory muscles, with around 30% requiring mechanical ventilation [2]. Two-thirds of GBS cases are preceded by symptoms of respiratory or gastrointestinal infections [3]. The disease is marked by acute neuromuscular paralysis, frequently leading to respiratory failure, with approximately 25% of patients requiring mechanical ventilation and intensive care unit (ICU) management [4-6].

Community-Acquired Pneumonia (CAP) is an acute disease caused by a parenchymal lung infection acquired outside the hospital environment [4,5]. According to the 2013 Indonesian Health Research data (Riskesdas), the prevalence of pneumonia in Indonesia is 0.63%. The mortality rate for CAP in hospitalized patients ranges from 5% to 15%, and it increases to 20% to 50% for those requiring ICU care [5]. This

manuscript presents a case of GBS complicated by CAP, requiring mechanical ventilation. The patient received treatment in the ICU for a period of 14 days.

CASE REPORT

A 20-year-old male was admitted to the Emergency Department (ED) of RSHS with complaints of weakness in all four limbs for 2 days prior to hospital admission. The weakness began with tingling and numbness in both lower limbs and fingers 1 day before the weakness appeared. Initially, the patient could drag both legs but later was only able to shift them. He could still grip objects but felt difficulty in doing so, and now he could lift his hands, but they would fall back. The patient remained conscious, alert, and able to follow commands. However, he had difficulty speaking normally, though his speech was still understandable. The patient also complained of difficulty swallowing and trouble opening his eyes. Two weeks prior to admission, the patient experienced a fever lasting for 5 days, along with a cough for 1 week and diarrhea occurring twice daily for 3 days. One day before admission to RSHS, the patient visited a local hospital and was referred to RSHS with a diagnosis of Guillain-Barré Syndrome (GBS) for further management.

Upon admission, the patient was initially cared for in the High Care Unit (HCU) for 1 day, but his condition deteriorated, and he was subsequently referred for airway management and ICU care. Upon arrival at the ICU, the patient presented with the following vital signs: an apatic state, blood pressure of 170/100 mmHg, heart rate of 137 beats per minute, respiratory rate of 32 breaths per minute, and oxygen saturation of 80% on a non-rebreathing mask at 15 liters per minute. He was intubated, sedated with midazolam (3 mg/hour), and placed on a mechanical ventilator with the following settings: SIMV mode, frequency 14, tidal volume 409-440 mL, PEEP 5, and FiO2 50%. Chest X-ray revealed bilateral infiltrates consistent with pneumonia. The patient was diagnosed with respiratory failure due to GBS and pneumonia, confirmed by leukocytosis (45,600/mm³) and the clinical signs observed. The patient was treated with mecobalamin (3x500 mg), ceftriaxone (2x1 g IV), and levofloxacin (750 mg IV), while plasmapheresis was planned. Sputum culture was performed for further investigation.

Clinical Course and ICU Management

Over the following days, the patient’s clinical condition improved. The ventilator settings were adjusted, and after 13 days of ICU care, including 3 cycles of plasmapheresis, the patient was successfully extubated. He was then transferred to a High Care Unit (HCU) for continued monitoring and rehabilitation. The gradual recovery of his respiratory function was evident from the improvement in chest X-rays and weaning from mechanical ventilation. The motor recovery was slower, as plasmapheresis treatment began on the 10th day. By the 14th day, the patient’s condition stabilized, allowing his transfer out of the ICU.

Table 1: Patient’s Condition During ICU Treatment

Day	Heart Rate (bpm)	Blood Pressure (mmHg)	Respiratory Rate (breaths/min)	Oxygen Saturation (%)	Ventilator Settings	Leukocyte (/μL)
1	108-112	96/104	20	98	SIMV, FiO2 50%, PEEP 5	45,600
3	96-113	130/140	19-22	100	PSV, FiO2 50%, PEEP 5	29,560
4	89-93	118/123	16-22	98-99	PSV, FiO2 50%, PEEP 5	15,240
6	90-115	130-136	16-18	99-100	PSV, FiO2 50%, PEEP 5	11,790
9	82-98	125-138	20-22	99-100	PSV, FiO2 50%, PEEP 5	16,610
12	89-112	121-132	20 breaths/min	99-100	PSV, FiO2 50%, PEEP 5	26,300

This case highlights the complex clinical management of a young male patient with GBS complicated by CAP, requiring intensive care and mechanical ventilation. The key interventions included plasmapheresis for GBS and aggressive antibiotic therapy for CAP. Monitoring of respiratory function and gradual weaning from the ventilator were critical to the patient’s recovery. The timely intervention in the ICU, coupled with a multidisciplinary approach, allowed for significant improvement in the patient's condition, illustrating the importance of early diagnosis and comprehensive care in managing GBS complicated by CAP. Further studies and clinical reports are essential to refine the treatment strategies for these complex cases.

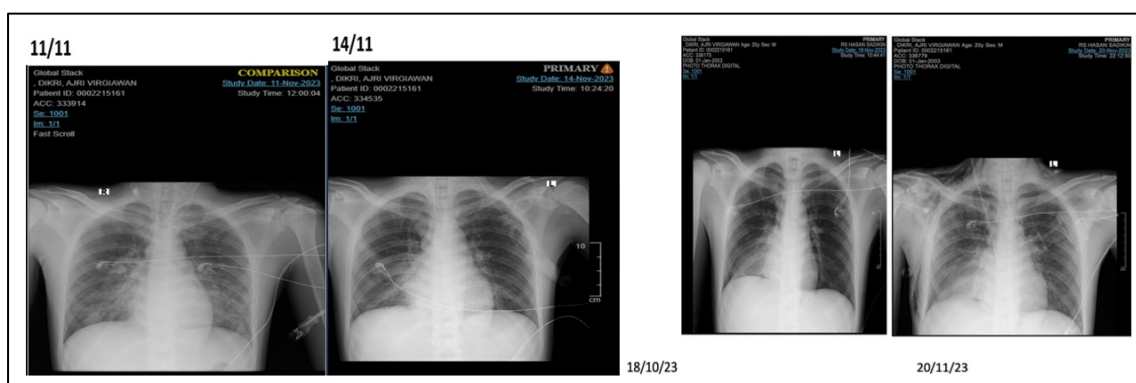


Figure 1. Chest X-ray at ICU Admission (Displayed showing bilateral infiltrates)

DISCUSSION

Guillain-Barré Syndrome (GBS) is a rare, immune-mediated peripheral neuropathy that can be fatal, often leading to severe complications including respiratory failure. The incidence of GBS is approximately 0.81–1.89 cases per 100,000 people, with a higher prevalence in men. GBS typically follows an upper respiratory or gastrointestinal infection, with symptoms developing approximately four weeks post-infection [1,6,7]. This syndrome usually begins with distal paresthesia, followed by progressive limb weakness, and can reach a clinical nadir within 2 weeks in 50% of cases and over 90% within 4 weeks. Once the progressive phase is over, patients enter a plateau phase, which can last weeks to months, after which recovery typically begins, with 60-80% of patients regaining the ability to walk independently [6, 8-10]. However, some patients may experience treatment-related fluctuations (TRF) and a relapse rate of 2–5% [6].

The pathophysiology of GBS involves hyperreactive immune responses, including the release of antiganglioside antibodies, formation of antibody-dependent immune complexes, and enhanced macrophage engulfment, leading to demyelination and/or axonal degeneration. Based on these pathogenic mechanisms, GBS is categorized into two subtypes: acute inflammatory demyelinating polyneuropathy (AIDP) and axonal variants, such as acute motor axonal neuropathy (AMAN) and acute motor-sensory axonal neuropathy (AMSAN) [7-9]. The diagnosis of GBS is typically based on clinical history and physical examination, supported by cerebrospinal fluid analysis and electrodiagnostic studies [6].

Approximately 50% of GBS patients require intensive care, particularly due to respiratory failure (17-30%) and autonomic dysfunction (20%) [10-11]. Respiratory muscle weakness in patients with GBS leads to loss of airway protection, ineffective coughing, and pulmonary complications, which increase the risk of pneumonia and respiratory failure. Furthermore, bulbar palsy and dysautonomia can impair secretion clearance, further increasing the risk of pneumonia [1]. Swallowing difficulties occur in 80% of ICU-admitted patients with GBS and are linked to an increased risk of acute respiratory failure and the need for endotracheal intubation and mechanical ventilation [2,6].

Patients with GBS are admitted to the ICU when one of the following criteria is met: (a) rapid progression of respiratory muscle weakness, (b) development of respiratory distress, (c) severe dysautonomia or dysphagia, and (d) an Erasmus GBS respiratory insufficiency score (EGRIS) > 4 [1,6]. Decisions regarding intubation, mechanical ventilation, and other interventions require a multidisciplinary approach to optimize the patient outcomes. Mechanical ventilation should be considered if any of the following are present: (a) vital capacity < 7.5 kPa, (b) hypercapnia ($\text{PaCO}_2 > 6.4 \text{ kPa}$), (c) hypoxia ($\text{PaO}_2 < 7.5 \text{ kPa}$), and (d) intolerable respiratory distress [1].

Therapeutic Plasma Exchange (TPE) and intravenous immunoglobulin (IVIg) are standard treatments for GBS, with TPE showing better outcomes when administered within 4 weeks of symptom onset, with optimal effects when initiated within 2 weeks [12-14]. TPE involves the removal of pathogenic antibodies from the blood, which can significantly improve respiratory function, shorten ventilator dependency, and reduce disability [14]. IVIg, derived from pooled plasma, is another treatment option that has been shown to be equally effective as TPE in terms of reducing hospitalization and ventilator dependency, although IVIg is

easier to administer [13,15]. This patient received TPE for 3 consecutive days, which resulted in significant improvement, as demonstrated by successful extubation after the third cycle of plasmapheresis.

In terms of nutritional support, early enteral feeding is critical for patients with GBS to prevent muscle wasting and facilitate recovery. Recommendations suggest 40-45 kcal per kilogram of body weight with high protein intake (2-2.5 g/kg) to prevent muscle loss and accelerate weaning from the ventilator [8]. This patient, with a predicted body weight of 66 kg, required approximately 1,800 kcal/day and 79.2-132 g of protein daily, which was provided via enteral nutrition starting on day 5 of ICU care. Feeding was gradually increased, and by the 7th day, the patient was receiving 1,800 kcal/day.

Community-Acquired Pneumonia (CAP) remains a significant cause of morbidity and mortality in critically ill patients. The incidence of CAP is high, affecting 3-40 cases per 1,000 people per year, with 40-60% of cases requiring hospitalization and 10% requiring ICU care [16-18]. In patients with GBS, early onset pneumonia, often due to aspiration, is common and can lead to rapid deterioration if not addressed promptly [12]. In this patient, the diagnosis of severe CAP was confirmed through clinical signs, chest X-ray showing bilateral infiltrates, and sputum culture revealing *Acinetobacter baumannii*. Appropriate empiric antibiotic therapy with ceftriaxone and levofloxacin was administered, consistent with the ATS/IDSA guidelines for CAP [18-20]. Prompt initiation of antibiotics is crucial for reducing mortality in severe CAP cases, as failure to treat early can lead to multiorgan failure [21,22].

The management of GBS complicated by CAP requires a coordinated approach that includes early recognition, mechanical ventilation, plasmapheresis or IVIg therapy, and appropriate antibiotic therapy. Early enteral feeding and careful monitoring of respiratory function and nutritional status are vital components of care. This case underscores the importance of a multidisciplinary approach in managing patients with complex conditions, such as GBS and CAP, in the ICU.

CONCLUSION

Guillain-Barré Syndrome (GBS) is a peripheral polyneuropathy characterized by acute limb weakness following infection, which can lead to respiratory muscle dysfunction, airway obstruction, and ineffective coughing, thereby increasing the risk of pneumonia. Community-Acquired Pneumonia (CAP) in patients with GBS is associated with higher mortality, requiring timely and appropriate management. Management in this case included mechanical ventilation, adequate empiric antibiotic therapy to prevent CAP progression, followed by definitive treatment and Plasmapheresis for GBS.

DECLARATIONS

None

CONSENT FOR PUBLICATION

The Authors agree to be published in the Journal of the Society of Medicine.

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COMPETING INTERESTS

The authors declare no conflicts of interest in this case report.

AUTHORS' CONTRIBUTIONS

All authors contributed to the study, including data analysis, drafting, and reviewing the article. They approved the final version and were accountable for all the aspects.

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