Original Article

Comparative Analysis of Outcome of Respiratory Failure Associated with Myasthenia Gravis Versus Guillain – Barre Syndrome Among Patients Admitted in Intensive Care Unit Tertiary Hospital

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ABSTRACT

Objective: To compare the clinical outcomes of respiratory failure among patients with MG and GBS admitted to the intensive care unit (ICU).
Study Design: Analytical cross-sectional study
Place and Duration of Study: This study was conducted at the Pak Emirates Military Hospital, Rawalpindi, from December 2025 to February 2026.
Methods: A total of 40 patients with respiratory failure requiring invasive mechanical ventilation for at least 24 hours were included, comprising 20 patients with MG and 20 patients with GBS. Data regarding clinical history, treatment details, ICU parameters, complications, and outcomes were collected using a structured proforma.
Results: Patients with GBS had a longer mean duration of mechanical ventilation than those with MG (14.6 vs. 8.5 days) and a prolonged ICU stay (22.1 vs. 14.3 days). Mortality was higher among GBS patients compared with MG patients (45% vs. 15%). Sepsis occurred in 40% of GBS patients and 15% of MG patients, while acute kidney injury was observed in 35% and 10% of patients, respectively. At discharge, mild disability was more frequent among MG patients than GBS patients (60% vs. 25%).
Conclusion: Patients with GBS-associated respiratory failure had poorer ICU outcomes than those with MG, including longer ventilator dependence, prolonged ICU stay, higher complication rates, and greater mortality. MG patients demonstrated comparatively better functional recovery at discharge.
Key Words: Myasthenia gravis, Guillain-Barré syndrome, respiratory failure, mechanical ventilation, intensive care unit, prognosis.

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INTRODUCTION

Respiratory failure is a life-threatening complication, commonly encountered in neuromuscular disorders and necessitates admission to an intensive care unit (ICU) to be treated and ventilated appropriately[1].

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Two of the most common disorders that lead to respiratory compromise are Myasthenia Gravis (MG) and Guillain Barré Syndrome (GBS) with the different underlying pathophysiology, clinical presentation, and prognosis[2]. These variations should be learned to ensure that management in the ICU is optimized and patient outcomes are better and that ventilator dependence is minimized[3]. This paper presents the pathophysiology, progression, treatment, and prognosis of respiratory failure related to MG and GBS, in particular, recent research findings, which present the topic of ICU management and outcomes[4].

In the case of Myasthenia Gravis, an autoimmune disease, the neuromuscular junction is targeted by the immune system of the body that targets the acetylcholine receptors present in the neuromuscular junction[5]. This results in the weakening of the muscles and which is most obvious in the muscles of the eyes, the bulbar and the respiratory muscles[6].

A myasthenic crisis typically causes respiratory failure in MG, in which the muscle weakness increases, resulting in hypoventilation, poor cough, and ultimate loss of the ability to sustain reasonable ventilation[7]. The major respiratory muscles in this case include diaphragm and intercostal muscles which are weak and thus they fail to help in breathing[8]. Respiratory failure in MG is usually progressive and prevention of intubation and mechanical ventilation can be achieved by early intervention using non-invasive ventilation (NIV)[9]. Nevertheless, in extreme patients with respiratory failure in MG, intubation is required, and this may be provoked by any infection, surgical intervention, or change of medication[10]. Plasma exchange (PLEX) and infusion of intravenous immunoglobulin (IVIG) are frequently applied in MG crises to enhance neuromuscular transmission, as well as accelerate recovery[11].

Conversely, Guillain-Barré Syndrome is an acute non-progressive autoimmune disease which causes demyelination of peripheral nerves, which causes the onset of ascending paralysis[12]. In contrast to MG, respiratory muscle weakness occurs more gradually, whereas in GBS the weakness tends to progress at very high rates, sometimes escalating to hours and days[13]. Acute ventilatory failure is often caused due to the throat breathing muscles, such as the phrenic nerve, which innervates the diaphragm. In severe cases, the development of paralysis may very fast impair the breathing capacity, which requires early intubation and mechanical ventilation[14]. It is also true that GBS patients tend to have a long ICU stay because the peripheral nerves take a long period to regain their functions[15].

The aim of performing such assessments was to identify the variations in the ICU resource consumption, patient recovery patterns, and survival rates of MG and GBS patients who suffered respiratory failure. This was essential to provide treatment plans that are tailored, ICU management strategies that are optimization, and better patient outcomes in the two conditions.

METHODS

This cross-sectional analytical study was conducted at Pak Emirates Military Hospital, Rawalpindi, to compare respiratory failure outcomes in patients with Myasthenia Gravis (MG) and Guillain-Barré Syndrome (GBS). The study was carried out in the intensive care unit over a three-month period from Dec 2025- Feb 2026. A sample size of 40 patients (20 MG and 20 GBS) was calculated using a two-proportion formula with 80% power and a 5% significance level. Consecutive non-probability sampling was used to recruit eligible patients. Adults aged 18 years or older with MG or GBS requiring mechanical ventilation for at least 24 hours were included. Patients with other causes of respiratory failure, central nervous system disorders, pregnancy, incomplete records, or inability to provide consent were excluded.

Inclusion Criteria:

- Adults aged 18 years or older.
- Patients with Myasthenia Gravis (MG) or Guillain-Barre Syndrome (GBS). Based on the MGFA criteria, MG diagnosis was conducted, and GBS diagnosis was conducted based on Brighton criteria.
- Patients who were admitted to the ICU with respiratory failure necessitating mechanical ventilation of not less than 24 hours.

Exclusion Criteria:

- Patients whose respiratory failure is associated with other factors than MG or GBS, e.g. chronic obstructive pulmonary disease (COPD) or amyotrophic lateral sclerosis
- Patients with central nervous system disorders that can confound the study outcome.
- Pregnant women because the pregnancy may introduce confounding factors that may affect respiratory functionality and ICU care.

Data collection and analysis: Complications such as sepsis, ventilator-associated pneumonia, dysautonomia, and acute kidney injury were recorded using standard diagnostic criteria. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Data analysis was performed using SPSS version 26.0. The Shapiro-Wilk test assessed data normality, and appropriate statistical tests, including independent t-test, Mann-Whitney U test, Chi-square test, and Fisher's exact test, were applied. Multivariate logistic regression was used to identify factors associated with outcomes, with statistical significance set at $p < 0.05$.

RESULTS

The results of the study have indicated that significant differences between the outcome of respiratory failure patients with Myasthenia Gravis (MG) and Guillain-Barré Syndrome (GBS) confined to Intensive Care Unit (ICU) were observed.

Table No. 1: Descriptive Statistics for Continuous variables

Variable	MG Group (n=20)	GBS Group (n=20)
Age (Mean ± SD)	53.4 ± 9.8	58.2 ± 11.1
Ventilation Duration (Days)	8.5 ± 3.2	14.6 ± 5.1
ICU Stay (Days)	14.3 ± 5.5	22.1 ± 8.2

A total of 40 patients (20 MG and 20 GBS) formed the sample population. The information gathered indicated that there are some important areas of comparisons such as the time of mechanical ventilation, the time spent in the ICU, mortality rates, complications, and functional outcomes upon discharge. Statistical results showed that GBS patients experienced longer ventilation periods and ICU hospitalizations than the MG ones.

Table 2 represents the categorical data of the MG and GBS groups. The gender distribution in the groups was not significant. Nevertheless, GBS patients exhibited much greater levels of hypertension (50%) and diabetes (50%) than MG patients (25% and 20% respectively). The mortality rate among GBS group (45%) was also much greater than among the MG group (15%), which implies worse results among the GBS group.

Table 3 represents the result of the Modified Rankin Scale (mRS) of discharge disability. The proportion of mild disability (mRS 0-2) was also much greater in patients with MG (60%) compared to the patients with GBS (25%): p = 0.01. The percentage of moderate disability (mRS 3) was also more in GBS patients (40) compared to MG patients (20) (p = 0.05). This translates to the fact that GBS patients would have greater effects of severe disability than MG patients, however, there was no significant difference in severe disability (mRS 4- 5) (p = 0.12).

Table No. 2: Descriptive Statistics for Categorical Variables

Variable	MG Group (n=20)	GBS Group (n=20)
Gender (Male)	10 (50%)	8 (40%)
Gender (Female)	10 (50%)	12 (60%)
Hypertension (Yes)	5 (25%)	10 (50%)
Diabetes (Yes)	4 (20%)	10 (50%)
Mortality (Death)	3 (15%)	9 (45%)
Sepsis (Yes)	3 (15%)	8 (40%)
VAP (Yes)	2 (10%)	6 (30%)
Dysautonomia (Yes)	1 (5%)	5 (25%)
AKI (Yes)	2 (10%)	7 (35%)

Table No. 3: Disability Assessment Using the Modified Rankin Scale (mRS)

mRS Score	MG Group (n=20)	GBS Group (n=20)	Chi-square p-value
mRS 0-2 (Mild)	12 (60%)	5 (25%)	0.01
mRS 3 (Moderate)	4 (20%)	8 (40%)	0.05
mRS 4-5 (Severe)	3 (15%)	6 (30%)	0.12
mRS 6 (Death)	1 (5%)	1 (5%)	1.00

Table No. 4: Normality Test (Shapiro-Wilk Test)

Variable	MG Group (n=20)	GBS Group (n=20)	Shapiro-Wilk p-value (MG)	Shapiro-Wilk p-value (GBS)
Age	0.89	0.73	0.21	0.30
Ventilation Duration	0.95	0.91	0.56	0.50
ICU Stay	0.96	0.90	0.60	0.62

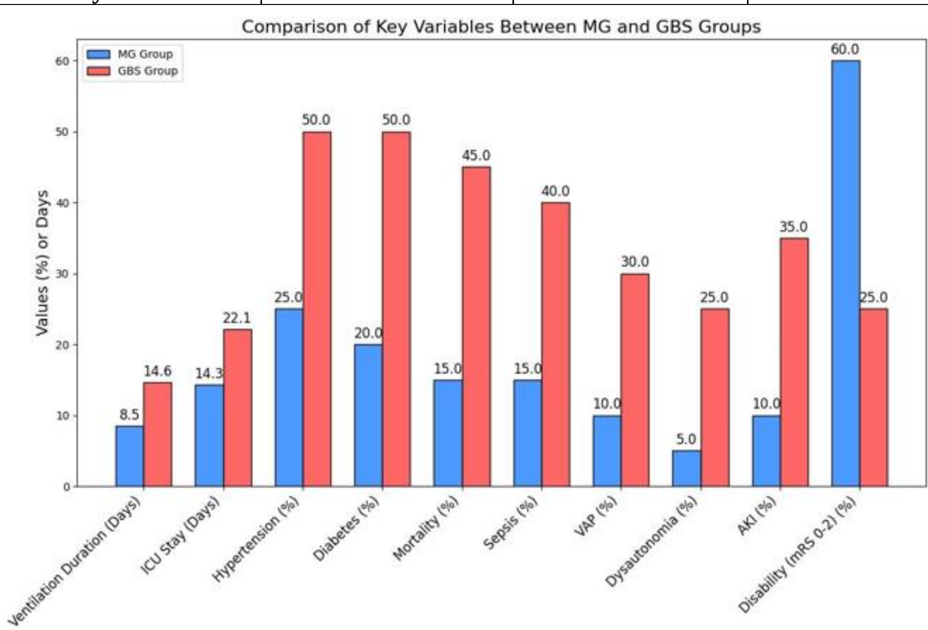

Figure No.1: Comparison of Key Variables between MG and GBS Groups

Table 4 demonstrates the results of the Shapiro-Wilk test of normality. Age, ventilation duration and ICU stay had normal distribution in both the MG and GBS group (p > 0.05 to all variables). It is a confirmation that parametric tests like independent t-test can be used in the comparison of these continuous variables between the two groups. The statistics indicate that there are no problems with the normality assumption of these variables.

DISCUSSION

This paper showed that the clinical outcomes of GBS patients were much worse than of MG patients, especially in the cases of the mechanical ventilation, ICU stay, mortality, and complications. The GBS was characterized by a much longer ventilation length (14.6 days) and an ICU stay (22.1 days) as opposed to that of the MG (8.5 days and 14.3 days, respectively) (p = 0.001 and p = 0.002). A study established that GBS patients are likely to experience acute respiratory failure that takes more time in the ICU than MG patients. The ascending paralysis is the main factor that leads to the prolonged ventilation of the GBS patients because it frequently results in the respiratory muscle weakness during the initial period [16]. The study also established that complications, including VAP, AKI and dysautonomia were more frequent in GBS patients than in MG patients. GSB patients showed a very high sepsis (40%) or AKI (35%) rate in comparison to MG patients (15% and 10%) [17]. On disability outcome, we also established that MG patients had better results with 60% of the MG patients being categorized as having mild disability (mRS 0-2) versus 25% in the GBS cohort (p = 0.01). This is in line with research carried out by Kumar et al., (2025) [18] which revealed that MG patients, particularly those well treated are expected to recover successfully and have less long term disability than GBS patients who experience more chronic impairments. Huang et al. [19] also proved that long-term disability especially in motor functions are more likely to result among GBS patients even after the recovery of the acute phase. In our study, MG patients were found to have a much better prognosis and recovery profile than GBS patients, with a higher percentage of patients attaining mild disability or full recovery upon discharge. It aligns with Cao et al, that points out the responsiveness of MG to acetylcholinesterase inhibitor and immunosuppressive treatment that is very effective in improving respiratory functioning and minimizing long-term disability [20]. There are a number of limitations in the study that need to be taken into account when inferring the findings. To begin with, the size of the sample was rather low, as there were only 20 patients per group, which can compromise the statistical strength and extrapolation of the results, and moreover it is single centre study.

CONCLUSION

Respiratory failure in Myasthenia Gravis (MG) and Guillain-Barré Syndrome (GBS) presents significant ICU management challenges, although outcomes differ between the two conditions. MG patients generally experience slower disease progression and better outcomes, allowing effective use of non-invasive ventilation, shorter ICU stays, and improved recovery. In contrast, GBS progresses rapidly, often requiring early intubation and prolonged mechanical ventilation, increasing the risk of complications such as sepsis, ventilator-associated pneumonia, and acute kidney injury.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Umer Farooq, Asif Hashmat, Amber Gul
Drafting or Revising Critically:	Aida Younis, Fawad Ahmad, Qaisar Khan
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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