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Clinical Course and Short-Term Outcome of Mild Guillain-Barré Syndrome: A Retrospective Observational Study from Western India

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ABSTRACT

Background: Guillain-Barré Syndrome (GBS) has a variable clinical course. Limited data are available on therapeutic decisions in patients with mild disease severity. **Methods:** We conducted a retrospective, record-based observational study of 32 patients with mild GBS (defined as Hughes disability grade $\leq$ 2) admitted to SVP Institute of Medical Sciences & Research (Ahmedabad) from August 2016 to July 2019. Patients who worsened clinically during hospitalization (i.e., an increase by $\geq$1 Hughes grade) were treated with intravenous immunoglobulin (IVIG) or plasmapheresis (PLEX). Demographic, clinical, cerebrospinal fluid (CSF), and electrodiagnostic parameters were analyzed. Outcomes were assessed at 1-month post-discharge. Statistical tests included Fisher's exact test and logistic regression. **Results:** Among 32 patients (mean age 31.3 years; M: F ratio 3.6:1), nine experienced clinical worsening and required treatment. Early presentation (<7 days from symptom onset) was significantly associated with deterioration ($p < 0.001$). Bulbar and bifacial weakness were more common among treated patients. Regression analysis showed symptom onset-to-hospitalization duration was the only independent predictor of worsening (OR 3.74, $p = 0.032$). At 1 month, 66.7% of treated patients and 34.8% of untreated patients had a good outcome (Hughes $\leq$1). **Conclusion:** Mild GBS patients presenting within 7 days were more likely to deteriorate during admission in this retrospective cohort. Prospective studies that account for time-at-risk and use validated risk scores are needed to guide treatment decisions.

KEYWORDS: Mild GBS, Outcome, Hughes scale, MRC sum score, Retrospective study

INTRODUCTION

Guillain-Barré Syndrome (GBS), also known as acute inflammatory polyradiculopathy, is one of the most common causes of acute flaccid paralysis. It has a highly variable clinical course, with most patients developing significant morbidity and mortality. Hughes and colleagues (1978) introduced a scale to measure disability in GBS patients based on locomotor function, which is still used in clinical practice and remains relevant. [1]

Randomised Controlled trials in GBS patients with moderate to severe disability, i.e., inability to walk independently for 10 m or worse (Hughes grade $\geq$3) showed benefit from immunomodulatory therapy, with intravenous immunoglobulin (IVIG) or plasmapheresis (PLEX). [2]

Grade
0. Healthy
1. Minor symptoms, capable of running
2. Able to walk 10 meters unassisted but unable to run
3. Able to walk 10 meters across an open space with assistance
4. Bedridden or wheelchair-bound
5. Requiring Assisted ventilation for at least part of the day
6. Dead

Table 1: GBS Disability Scale (Hughes et al.) [1]

However, approximately one-third of GBS patients have mild disease (Hughes grade <2) and can walk unaided. [3, 4] A few mild GBS patients do not seek medical consultation as they can do their daily activities without additional support. Some patients who initially present with a low Hughes disability scale may worsen during the course and ultimately may require aid for ambulation.

No randomized controlled trials have been performed to evaluate the efficacy of immune-modulatory therapy in mild Guillain-Barré syndrome (GBS). The Cochrane reviews on plasmapheresis (PLEX) and intravenous immunoglobulin (IVIG) do not provide any recommendations for the treatment of mild GBS. [2, 5] Identifying clinically deteriorating patients who require treatment is challenging. Postponing treatment until after further deterioration might result in more severe and possibly irreversible nerve damage. [6]

At our centre, the SVP Institute of Medical Sciences & Research (SVPIMSR, Ahmedabad), we analysed the data of mild GBS patients retrospectively, evaluated their clinical and paraclinical profiles to identify risk factors for worsening during the course, and collated the outcomes.

METHODS

Patients' selection

This is a retrospective, record-based observational study conducted at SVP Institute of Medical Sciences and Research (SVPIMSR), Ahmedabad, using hospital records from August 2016 to July 2019. We reviewed all the medical records of patients with GBS, fulfilling the National Institute of Neurological and Communicative Disorders and Stroke criteria for GBS [7, 8], from the neurology department of our centre. Mild GBS was defined uniformly as Hughes disability grade $\leq$ 2 at presentation. Those with atypical forms (such as Miller-Fisher syndrome, bi-brachial variants, and pure cranial polyneuropathy), inadequate medical records, and deficient follow-up data were excluded from the cohort. Of 34 screened patients with mild GBS (Hughes grade $\leq$ 2), two with Miller-Fisher variant were excluded, resulting in 32 patients included in the final analysis.

Assessment

The following characteristics were noted for all patients at baseline: age, gender, duration of symptom-onset to hospitalization, preceding infection, cranial nerve involvement, onset to nadir time, sensory involvement, power grading according to Medical Research Council Scale (MRC), MRC sum score, deep tendon reflexes, and disability at the time of presentation. Routine investigations, including a complete blood count, serum creatinine, serum electrolytes, thyroid function test, Anti-Nuclear Antibodies (ANA) by Immunofluorescence Assay (IFA), and Creatine Phosphokinase (CPK) total, were performed for all patients to rule out misdiagnosis. The Cerebrospinal Fluid (CSF) exam, which included routine and microbiology tests, was also evaluated for protein and cell count. Nerve conduction test results were classified using specific criteria for demyelination and axonopathy in four groups: acute inflammatory demyelinating polyneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute motor sensory axonal neuropathy (AMSAN) and normal or unclassified group (when the electrodiagnostic data were insufficient to categorize). [9]

Outcome

Medical records for all patients were evaluated to determine whether there was clinical worsening or recovery. Patients who worsened on the Hughes scale by grade 1 or who lost ambulation were usually treated according to guidelines with IVIG or PLEX as per the patient's preference (and were included in the treatment group). The remaining patients were classified as the "conservative group" and were treated symptomatically and with physiotherapy. The primary outcome was measured using the GBS disability scale (Hughes) at one month for both the treatment and conservative groups and compared to the admission score. A Hughes score of one or less was considered a good outcome, while a Hughes score of 2 or more was considered a poor outcome. The secondary outcome was based on the MRC sum score and the patient's ability to walk unaided.

Statistical analysis

We used Fisher's exact test for categorical comparisons and Mann–Whitney U for non-normally distributed continuous/ordinal measures. Given the small number of events (n=9), we performed univariable analyses; multivariable modelling was considered exploratory and, where presented, used Firth-penalised logistic regression with $\leq$2 predictors.

RESULTS

Patient profile

During the study period, 34 consecutive admissions with mild GBS (Hughes $\leq$2 at presentation) were screened; two Miller–Fisher cases were excluded, leaving 32 patients for analysis. The mean age was 31.3 years (range 14–65); 25/32 (78.1%) were male. A history of antecedent infection was documented in 4/32 (12.5%). Cerebrospinal fluid (CSF) examination was available in 28/32 (87.5%), of whom 18/28 (64.3%) showed albumino-cytological dissociation. On nerve conduction studies (NCS), 12 fulfilled demyelinating (AIDP) criteria, 9 showed axonal changes (AMAN/AMSAN), and 11 were normal/unclassified (Table 2).

In-hospital course and predictors of deterioration

Nine of 32 (28.1%) patients experienced in-hospital deterioration ($\geq$1-point increase in Hughes score) and subsequently received immunotherapy (IVIG/PLEX); these constitute the treated group. The remaining 23/32 (71.9%)

did not deteriorate and were managed conservatively.

Presentation within 7 days of symptom onset was strongly associated with in-hospital deterioration (treated 9/9 vs conservative 4/23; Fisher's exact p < 0.001). Bulbar weakness was uncommon (2/32) but both cases deteriorated (Fisher's exact p = 0.07). Bifacial weakness was more frequent among treated patients (5/9 vs 5/23; p = 0.06). Albumino-cytological dissociation on CSF and NCS category did not differ significantly between groups (all p > 0.05) (Table 2).

Characteristics	Total (N = 32)	Treated (n = 9)	Conservative (n = 23)	p-value
Sex				
Male	25	9 (100.0%)	16 (69.6%)	0.07†
Female	7	0 (0.0%)	7 (30.4%)	
Onset → hospital < 7 days	13	9 (100.0%)	4 (17.4%)	< 0.001†
Bifacial weakness	10	5 (55.6%)	5 (21.7%)	0.06†
Bulbar weakness	2	2 (22.2%)	0 (0.0%)	0.07†
Albumino-cytological dissociation (of 28)	18/28 (64.3%)	4/8 (50.0%)	14/20 (70.0%)	0.40†
NCS category				
Normal / unclassified	11	5 (55.6%)	6 (26.1%)	0.28†
Demyelinating (AIDP)	12	2 (22.2%)	10 (43.5%)	
Axonal (AMAN/AMSAN)	9	2 (22.2%)	7 (30.4%)	

†Fisher's exact test (two-tailed).
Denominator for CSF analyses is 28 (treated n=8; conservative n=20).

Table 2: Baseline clinical and paraclinical features by in-hospital course (treated after deterioration vs conservative)

One-month outcomes

At 1-month, good outcome (Hughes ≤ 1) was achieved in 6/9 (66.7%) treated patients compared with 8/23 (34.8%) in the conservative group. Distribution of Hughes grades at follow-up is shown in Table 3. The MRC sum score increased from 45.3 $\rightarrow$ 52.0 (Δ=6.7) in the treated group and 46.8 $\rightarrow$ 52.7 (Δ=5.9) in the conservative group. Between-group differences in change were not statistically significant (Mann–Whitney U p = 0.60). The distribution of Hughes improvement likewise did not differ significantly (exact test p = 0.55).

Hughes grade	Treated (n = 9)	Conservative (n = 23)
0	2 (22.2%)	2 (8.7%)
1	4 (44.4%)	6 (26.1%)
2	3 (33.3%)	15 (65.2%)
Good outcome (≤ 1)	6 (66.7%)	8 (34.8%)

Hughes distribution, exact test p = 0.55.

Table 3: Hughes disability at 1 month

	Treated	Conservative
On admission, mean	45.3	46.8
At 1 month, mean	52.0	52.7
Mean change	+6.7	+5.9

Group comparisons: MRC change, Mann–Whitney U p = 0.60

Table 4: MRC sum score (You can add Standard Deviation if possible)

Summary of key findings

In this single-centre retrospective cohort of mild GBS, earlier presentation (<7 days) was associated with observed in-hospital deterioration; cranial involvement showed a suggestive pattern but without statistical significance in this small sample. At 1 month, a larger proportion of patients who deteriorated and then received immunotherapy achieved Hughes ≤ 1 compared with those managed conservatively; however, differences in continuous strength measures were not significant. Given the design and event count, these findings should be interpreted with caution.

DISCUSSION

Guillain-Barre Syndrome has a variable clinical course. The differentiation between mild and severe Guillain-Barré Syndrome (GBS) is based on the GBS disability scale, which primarily assesses the legs' motor function and overlooks the involvement of the arms, cranial nerves, sensory nerves, autonomic nerves, and non-motor functions. Those with mild disease at presentation may be left untreated with immunomodulatory therapy due to the absence of clear guidelines. This subset of patients may progress to more

severe disease later or remain in this phase for an extended period. In a 2002 study, up to 38% of patients with mild GBS reported problems in hand function and running after 6 months of follow-up, even though 22% had received treatment. [4] Data to identify risk factors for poor prognosis and the need for treatment in such patients are sparse.

We conducted a retrospective analysis of mild GBS patients from our institution to evaluate two fundamental questions: 1. Are there any clinical or other factors that may help predict prognosis? and 2. What is the short-term outcome (1 month) of these mild GBS patients? Those GBS patients with mild disease who later progressed to a severe category, i.e., requiring assistance for walking, were treated as per standard guidelines.

Predicting risk of severity

On comparative analysis, most of our patients who had worsening during hospitalization were less than 45 years of age. A Dutch epidemiological study has shown that men over 50 years of age are more likely to have a mild course. [3] We also noted a male-to-female ratio of 3.8:1 in our mild GBS cohort. Other similar studies did not find any age or sex predilection in mild GBS, in contrast to a more aggressive form of the disease. [10–12]

Only 12.5% of patients in our cohort have a history of preceding infection. Van Koningsveld et al. proposed that infection with Epstein-Barr virus and the absence of antiganglioside antibodies are more frequently associated with a mild form of GBS. [4] We do not have serological test results for infection and antibodies to compare.

Patients with GBS usually present within a few days of the onset of symptoms and may progress up to 4 weeks. In this cohort, patients who presented early (<7 days) were more likely to worsen during hospitalization and require therapy. The only statistically significant difference between the treatment and conservative group (69.2% vs 30.8%) was early presentation. This may indicate a group of patients with a more severe form, which needs to be treated, even if it was presented as mild GBS. Though progression of GBS is considered up to 4 weeks by the criteria, most patients usually worsen within the first 2 weeks. [13]

Half of the patients who developed facial weakness on presentation showed signs of worsening during hospitalization. Only 2 out of 32 patients had a bulbar weakness, and both needed treatment. C. Verboon et al. proposed treatment in mildly affected GBS patients with autonomic dysfunction and facial or bulbar weakness (level of evidence: based on >= 1 case report). [14] The presence of albumino-cytological dissociation did not help to distinguish between the treatment and conservative groups. A recent study noted that high CSF total protein in GBS patients is more common in the severe form, as compared to mild GBS patients. [15] There was no significant difference in electrophysiological parameters (normal, demyelination or axonal type of involvement) in patients who deteriorated for Hughes grade >1. Most of these studies were conducted during the first week of symptom onset, i.e., the early stage of the disease, which may explain the absence of a peak CSF protein level or the high degree of certainty associated with electrodiagnostic features. However, our study did not consider individual parameters of NCS (such as compound muscle action potential amplitude or conduction velocity).

Treatment dilemma

At one month's follow-up, only 8 out of 23 (34.7%) of mild GBS patients who were not treated could walk independently. For those who had worsened from mild to moderate grade and were treated, 66.7% were able to reach a Hughes grade of 1 or less. Untreated mild GBS patients were more likely to remain with a disability of Hughes grade 2 at the end of 4 weeks. A p-value of 0.55 was obtained as the difference in Hughes scale improvement between treated and untreated groups. However, these short-term outcome measure with both groups need validation and further research. No statistically significant difference in the MRC sum score was observed between the two groups (p-value 0.6).

Lacking the guidelines, treatment of mild GBS patients varies considerably across the world. (Americas 82%, Asia 75% and Europe 74%) [14] In a small group of children with mild GBS, IVIG has shown benefit in the form of early recovery and may lower disability scale at 4 weeks. [16] In a French Plasma exchange study, it was derived that treatment with two PLEX sessions shortened the time to onset of motor recovery (4 days) than supportive care (8 days) and shortened the time to hospital discharge (13 vs 18 days). [17] However, data from the Netherlands showed that mild GBS patients of the prospective observational International GBS Outcome Study (IGOS) did not significantly differ in the GBS disability scale at 1 year between the treated and untreated groups. [18]

This study's limitations include small cohort size, retrospective nature and uni-centric design. Hughes scale does not take bulbar weakness, respiratory insufficiency or autonomic dysfunction to gauge GBS disability. The association between early presentation and in-hospital deterioration may reflect time-at-risk bias rather than underlying biology; patients admitted earlier had a larger window to manifest worsening while under observation. Modified EGOS (Erasmus GBS Outcome Score) and EGRIS (Erasmus GBS Respiratory Insufficiency Score) help to predict long-term prognosis and risk for respiratory failure, respectively and are more useful for severe GBS patients. [10, 11]

To summarize, Mild GBS patients groups, whether deteriorated in clinical severity or not, did not differ concerning age, gender, cranial nerve dysfunction, CSF and electrodiagnostic features. However, those who presented to medical care within 7 days were at more risk of deterioration and required therapy. At one-month follow-up, the majority of

mild, untreated GBS patients had persistent disability. We could not identify clinical or paraclinical markers of mild GBS patients with certainty; however, further clinical research should be continued to investigate both clinical and paraclinical markers for predicting the severity of GBS prospectively and for the long-term. It will help a subset of mild GBS patients by offering immunomodulatory treatment, leading to better long-term functional outcomes.

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