Predictors and Risk Factors of Severity of GBS, the Requirement for Mechanical Ventilation and Poor Short-Term Prognosis of Severe GBS

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Research article

Abstract

Background/Objective: It is still an extraordiarily exigent thing to early recognize the severity, therapeutic method and prognisis of Guillain-Barré syndrome (GBS). Our research's goal is to investigate the clinical predictive factors indicating severity of GBS and the requirement for mechanical ventilation(MV) in severe patients with GBS, and to explore the identification of modifiable risk factors for predicting poor short-run outcome of severe GBS.

Methods: A total of 155 patients were included in a cohort of GBS patients admitted to the Affiliated Yantai Yuhuangding Hospital of Qingdao University between 2014 and 2020. Demographic, clinical, therapeutical and evolutionary data were collected. Neurological testing which used standardized data collection were carried out by the same investigators on the whole study period. Comparion of the results were implemented by single and multiple regression analysis.

Result: Of 155 patients, 66 patients were severe GBS, of which twenty-nine patients (18.7%) needed MV. Significant clinical predictors for severe GBS were recent history of surgery, time from onset to admission, Medical Research Council(MRC) sum score on admission, autonomic dysfunction, cranial nerve impairment(glossopharyngeal, facial, Oculomotor and/or abducent nerve deficits) and elevated liver enzyme levels were significantly bound up with severity scores($p<0.05$). With regard to risk factors of MV in severe GBS, univariate logistic analysis indicated presence of cranial nerve involvement, autonomic dysfunction, MRC score at nadir, elevated liver enzymes and pneumonia were significantly different($p<0.05$); Multivariate analysis determined that MRC score at nadir and autonomic dysfunction were also considered to be predictors for MV in severe GBS($p<0.05$).As to prognostic of factors, recent history of surgery, MRC score at nadir, the requirement for MV, MRC score at admission and pneumonia during hospitalization were predictors of poor short-run outcome in severe patients with GBS by univariate logistic analysis, and that the nadir MRC score and the requirement for MV were identically proved as clinic parameters of unfavourable prognosis by multivariate logistic analysis ($p<0.05$) .

Conclusions: Clinical risk factors of severity in GBS, the requirement of MV and unfavourable short-run prognosis in severe GBS were evident. Recent history of surgery is also a predictor for severity in GBS patients.

Introduction

Guillain-Barré syndrome (GBS) is a inflammatory demyelinative polyradiculoneuropathy[1], and its acute phase is characterised by generalised paralysis, bulbar muscle weakness, autonomic dysfunction, respiratory failure, and with or without sensory associated with hyporeflexia or arflexia, and in absence of cerebrospinal fluid pleocytosis.

Approximately 30% of patients with GBS present with respiratory failure, so that they require endotracheal intubation and MV support[1,2]. Thus, respiratory failure is a life-threatening manifestation, which is the leading cause of death for GBS patients[3]. Furthermore, severe GBS patients need to be closely

monitored in intensive care unit(ICU) and even artificial ventilation to save live. These emphasize the necessity of judging severity early and proper guidelines of allocating patients with GBS to the suitble department(common ward or ICU) to decrease the incidence of respiratory distress and mortality.

It has been reported that the requirement for MV was a prominent prognostic predictor of poor result in GBS[4]. Therefore, identificating patients who may need to be intubated and MV at an earliar stage of hospitalization is of great improtance. The clinical features and prognosis of severe GBS are many and variable. As severe GBS patients are often complicated with severe complications such as pneumonia and sepsis, these patients usually have poor prognosis. Early identification of prognostic predictors of poor prognosis in severe GBS patients and early clinical intervention for these interventional factors are expected to improve the prognosis of GBS patients with respiratory failure.

Additionally, due to the prevalence of GBS, the sample size of severe GBS，especially in respiratory failure is usually small. Therefore, through a retrospective study, our study analyzed and studied on the clinical risk factors of severity of GBS, respiratory failure and poor prognosis in severe GBS patients, aims to ameliorate the prognosis of severe GBS and have clinical, therapeutic, and financial implementions in our setup to a great extent.

Methods

Study design and setting

The research was confirmed by the ethics committee of the Affiliated Yantai Yuhuangding Hospital of Qingdao University, Yantai, China. Because of its retrospective nature of our study, informed consent was waived. Subjects were selected from patients who comformed to the diagnostic criteria of GBS[5] and accepted sequential therapy during hospitalization in the Department of Neurology of Yuhuangding Hospital Affiliated to Qingdao University, during January 2014 to July 2020. Subjects were excluded from the study if they were: aged<18 years; refused the treatment or diagnosed as either bickerstaff encephalitis, critical illness polyneuropathy/mypathy(CIP/CIM), or chronic inflammatory demyelinating polyradiculoneuropathy[6] or Miller Fisher syndrome. Also subjects has been excluded from the patients who were out of hospital within 3 days, because their illness might not reach the worst condition when discharged and they might lose the data. Clinical data from all subjects were analyzed retrospectively including age, gender, place of residence(urban community or countryside), season of disease occurrence, history of antecedent infections (mainly include diarrhea and upper respiratory tract infection), recent history of surgery(GBS symptom onset within 6 weeks), time from onset to admission, hospital stays, clinical severity evaluated by the Hughes Functional Grading Scale (HFGS) score at nadir/admission, muscle strength assessed by MRC sum score at nadir/admission, tendon reflex, sensory disturbances, cranial nerve damage(including glossopharyngeal and vagus nerves, facial nerve, oculomotor and/or abducent nerve), sensory disturbance, whether requiring mechanical ventilation, autonomic nerve dysfunctions(including blood pressure fluctuation, tachycardia, bradycardia, and abnormal sweating), abnormal hepatic enzyme, therapeutic method and complication during

hospitalization such as pneumonia. Abnormal hepatic enzyme was defined as abnormal aspartate aminotransferase and/or alanine aminotransferase which were/was 1.5 times higher than the normal value in the 2nd day after admission. In our department, in the treatment of GBS patients, we chose intravenous immunoglobulin (IVIg) as the preferred treatment method, while some of severe patients were prescribed intravenous corticosteroids which was decided by the neurologists. What's more, the patients who refused using IVIg were administrated intravenous corticosteroids or supporting therapy.

Assessment of neurological functional deficit and clinical severity

All 155 patients were assessed the neurological functional impairment and clinical severity. The HFGS was applied to evaluated functional impairment which has 6 degrees[7]: 0, normal; 1, mild symptoms and able to run; 2, capable of walking more than five meters without help with others but can not run; 3, capable of walking more than five meters with assistance; 4, chairbound or bedridden; 5, requiring mechanical ventilation for breathing; 6, dead. Additionally, MRC score whose total score rangs from 0 to 60 was used to evaluate muscle strength, its score was calculated according to six bilateral muscles in four limbs[8]. The lowest MRC score or the highest HFGS score was defined as the nadir of GBS.

Assessment of short-run outcome and grouping

All 155 patients were gotten into groups of two on the basis of HFGS, severe GBS group (HFGS ≥4) [9] and non-severe GBS group(HFGS <4). For severe GBS group, 66 patients were further divided into subgroups of two based on the requirement for MV or not for MV, Group MV including the GBS patients requiring MV and Group NV including the patients not requiring MV at the nadir of illness. Generally, the patient was allowed to discharged from the hospital when his condition was improved or stable in our department. Thus, in this study, patients who could walk with help when discharged (HFGS ≥3) were judeged to receive a favourable short-run outcome, and on the contrary, the patients who could not walk even with assistence(HFGS<3) were considered to have a poor short-run outcome. In view of the above, the severe GBS patients were separated into two other groups: Subgroup 1, patients with good short-run outcome; Subgroup 2, patients with poor short-run outcome.

Statistical analysis

In present study, SPSS version 17.0 software and GraphPad prism 8 were use for statistical analysis. Categorical data were expressed as proportions and tested by *Chi*-square test; All continuous data accordde with normal distribution and were expressed as means±standard deviations and tested by independent *t*-tests. Multivariate logistic regression analysis was used to evaluated the independent predictors of severity in GBS patients, the requirement of MV and unfavorable short-run outcome in severe GBS. For all statistical tests, *p-values* < 0.05 was deemed to be significantly different in statistics.

Results

Demographic features of GBS patients

All 155 patients were registered. The average age of onset was 56.2 years, and the majority were males(57.4%). 65(42.6%) patients with HFGS score ≥4 points at nadir were placed into severe GBS group, and the rest of 89 patients were in non-severe GBS group. Difference between severe GBS group and non-severe GBS group are shown in Table 1.We demonstrated that cranial nerve impairment and autonomic dysfunction were both more common in severe GBS group (56% versus 28.1% and 43.9% versus 4.5%，both p<0.05), and so was a longer hospitalization time (Fig.1A 20.5 days versus 12.1days, p<0.01). In severe GBS group,recent history of surgery was higher than non-severe GBS group (25.8% versus 5.6%, p<0.05). As indicated in Fig.1B, Muscle strength was evaluated by MRC score at admission and at nadir indicated more severe disease in severe GBS group(31.8 versus 49.7 and 20.6 versus 48.3, both p<0.05). Time from onset to admission of non-severe GBS group was longer than that of severe GBS group(Fig.1C 9.6 daysversus 5.4 days, p<0.05). Severe GBS group has higher abnormal liver enzymes than non-severe GBS group(Fig.1D 65.5% versus 13.5%, p<0.05) . In addition, age, sex, the season of morbidity and the place of residence had not significant difference(p>0.05), and the same as tendon reflex, sensory dysfunction, pain.

Clinical risk factors of severity

In the study, recent history of surgery, time from onset to admission, MRC sum score on admission, autonomic dysfunction, cranial nerve impairment (glossopharyngeal and vagal nerve deficits, facial), elevated liver enzyme level had significant correlation with severity scores by univariate analysis(p<0.05). In addition, there was no clinically characteristic variable associated with severity scores by mutivariate logistic regression analysis.

Clinical predictors of MV

In severe GBS patients, the mean onset age was 60.5±15.4 years with a male preponderance(65.5% vs 38.5%, p<0.05). Thereinto, Group MV included 29 GBS patients requiring MV and Group NV had 36 severe patients not requiring MV. Comparisons between the two groups above are proved in Table 3. We found that sex, the season of morbidity and the place of residence, surgery, MRC at admission, HFGS at nadir had no statistically significant difference(p>0.05), and the same as tendon reflex, sensory dysfunction, pain. However, MRC score at nadir of patients in Group MV was significantly lower than that of patients in Group NV(11.9 versus 27.1, p<0.05, as shown in Fig.2A). Moreover, the Group MV was measured higher liver enzyme values than the Group NV(Fig.2C, 65.5% versus 16.7%, p<0.05). Cranial nerve involvement(82.8% versus 36.1%, p< 0.05) and autonomic dysfunction(93.1% versus 5.6%, p< 0.05, Fig.2D) were both more common in Group MV which also had a longer hospitalization time (Fig.2B 30.1 days versus 13.1days, p<0.05).

Through univariate logistic analysis, we found that male, cranial nerve impairment, glossopharyngeal and vagal nerve deficits, autonomic dysfunction, MRC score at nadir and elevated liver enzyme were significantly different(p < 0.05), as shown in Table 2. By multivariate logistic analysis, we determined that the nadir MRC score and autonomic dysfunction were identically proved as the risk factors for MV (p<0.05) (Table 3).

Clinical predictors of poor short-run outcome in severe GBS group

In the 65 severe patients, 20 patients who had good prognosis were placed into Subgroup 1, the remaining 45 patients with poor outcome were assigned to Subgroup 2. The differences between the two groups are indicated in Table 4. From it we can see that recent history of recent history of surgery were more common in Subgroup 2 than Subgroup 1(33.3% versus 5%, p<0.05). The time from onset to admission and seasonal distribution was not different (p>0.05). Nevertheless, the MRC score at nadir and on admission were both significantly higher in Subgroup 1 compared with Subgroup 2 (32.5 versus 15.1, 41.1 versus 27.6, both p<0.05). In addition, the requirement of mechanical ventilation was significant lower in Subgroup1 than Subgroup 2(25% versus 53.3%, p<0.05).Because pneumonia during hospitalization period could influence the outcome of severe GBS patients, we make a comparison between the two groups of the occur of pneumonia, from which we found that pneumonia occured comparably in Subgroup 1 and Subgroup 2 (57.8% versus 30%, p<0.05). Furthermore, By multivariate logistic analysis, the nadir MRC score and the requirement of MV were proved as the independent poor outcome predictors(p<0.05) ,as indicated in Table 5.

Discussion

In our study, we investigated predictors for severity in GBS patients at early stages, for the requirement of MV and short-run outcome in severe GBS. The risk factors for severe GBS included recent history of surgery, time from onset to admission, MRC sum score at admission, autonomic dysfunction, cranial nerve impairment and elevated liver enzyme levels, which were also the predictors for MV, except recent history of surgery and interval time from onset to admission. As to prognostic factors in severe GBS patients, we proved that a lower MRC score at admission and at nadir , the requirement of MV and complicated with pneumonia had led to poor short-term prognosis. We think these results may help clinicians to allocate GBS patients to the appropriate unit, decide whether or not tracheotomy and ventilator assisted ventilation should be performed, assess the prognosis and develop a clinical prediction model.

Although GBS is a potential acute self-limited disease and amost of patients either have recovery fully or retain minor sequelae. However, severe GBS often leads to unfavorable residual sequelae or mortality; at the same time, many hospitals has limited medical resources, especially intensive care facilities. Thus, identification of modifiable risk factors for severe GBS in early stage of illness is of great important to help clinician to allocate appropriate unite and develop individualized treatment, which can make intensive care facilities use rationally and may decline the occur of residual sequelae and mortality. We found that recent history of surgery was most significant risk factor for severe GBS, it was in accordance with the result of Lei Bao et al. [10,11] which demonstrated that GBS patients induced by surgery presented severe movement disorder and respiratory failure. The possible potential pathophysiological mechanisms of post-surgical GBS are not clearly known yet. It has been reported that clinical and/or subclinical infections secondary to post-surgical short-term immunosuppressive conditions induce GBS[12]. In addition, the breakdown of its innate protective barrier make antigens in blood entry into

nervous system intraoperatively, so that the antigens trigger followed autoimmune responses[13].Nonetheless, to clearly clarify the pathogenesis need further research. Notwithstanding, in our study recent history of surgery was not statistically different between MV group and NV group, it was contradictory to the results of Lei Bao et al [10] which reported that acute respiratory failure and the requiement of MV in post-surgical GBS patients was meaningfully more common than non-surgical GBS patients, and came to the conclusion of higher respiratory depression of GBS induced by surgery.This difference might be due to the smaller sample size that was used in the present study.Next, we will enlarge the sample size to further clarify the relationship between surgery and respiratory failure.

It is of prime importance to predict the need of MV early, by reason of 60% of GBS patients with MV occured plenty of complications which increase the mortality, early recognition and intervention of GBS may decrease the occurrence of complications and ameliorate its prognosis[14,15,16]. Heterogeneous studies had been conducted to researched the predictive factors of requiring MV in GBS patients. The present study demonstrated that shorter interval time from onset to admission, elevated liver enzyme levels, bulbar nerve involvement, autonomic dysfunction and lower MRC score at admission were predictors of MV, this was in accord with the result of previous studies[17,18,19,20] and could explain why they are the predictors of severe GBS. The scoring system "The Erasmus GBS Respriatory Insufficiency Score(EGOS)" was developed by Walgaard et.al on the basis of three respiratory insufficiency predictors: facial and/or bulbar weakness at admission, MRC sum score at admission and the time onset to admission[18].This finding was further proved by the multivariate regression analysis, which identified lower MRC at admission and autonomic dysfunction were independent predictors for MV in severe GBS. Islam et.al found that severe muscle weakness(MRC sum scores ranging 0 from 20) at study entry was more likely to progress to MV[21]. Autonomic dysfunction was thirteen time more common in MV patients than NV patients in the present study.It was in accordance with result of a cohort study that reported dysautonomia as an independent predictor of respiratory insufficiency[22,23]. In contract, age, facial paresis, antecedent infection, sensory, pain, place of residence and treatment option showed no association with the need for mechanical ventilation. The result of male more statistically significant preponderance in present study than female was different from other study[24] because of the smaller simple.

As classically described, poor prognosis is unfavourable in our study; Recent history of surgery, MRC at admission, MRC at nadir, the requirement of MV and pneumonia in hospitalization period are the risk factors which have been reported for poor outcome. Lei Bao et al[10] indicated patients with post-surgical GBS had poorer prognosis compaired with the patients with non-surgical GBS. Walgaard et al[18]. have eatablished a modified EGOS (mEGOS) whose primary dissimilitude is the MRC sum score at admission and in the 7th day in place of the GBS disability score [25], they demonstrated that the MRC sum score at hospital entry is more precise to guide the choice of treatment method. Pneumonia was associated with poor short-term prognosis, which is consistent with the result of a previous study that pneumonia was related to duration of mechanical ventilation for severe GBS patients[26].Severe GBS patients requiring MV occur more likely complication, such as pneumona, sepsis, lung collapse, pneumothorax, urinary tract infection. It may explain that the severity of illness prolonged the time of hospitalization, and longer

duration of hospitalization might be related to poor short-term outcome with severe GBS. This result was further proved by the multivariate regression analysis, which identified MRC at admission and the requirement of MV were independent predictors for unfavourable short-run prognosis in severe GBS patients.

The present study has following limitations. At first, it was a retrospective analysis and has the monocentric design, especially the prognosis was done mainly on the patients of the hospital, lacking of follow-up observations to study the long term prognosis. Secondly, because of the retrospective nature of our research, a certain of clinical indexes which have been advocated to be risk factors of MV could not obtained including various IgG antiganglioside antibody species,vital capacity, electrophysiological data, and so on. Thirdly, the detail data about autonomic nervous system involvement and complication expect pneumonia for MV patients was not recorded in this study. In addition, the sample size of our study for stratified analysis is so small that we can not come to a conclusion with strong statistic significance. Further prospective study is required to prove these observations.

Conclusion

We conclude from our results that recent history of surgery, time from onset to admission, MRC sum score at admission, autonomic dysfunction, cranial nerve impairment and elevated liver enzyme levels are the risk factors for severity of GBS, which were also the predictors for MV in severe GBS, except recent history of surgery and interval time from onset to admission. And lower MRC score at admission and at nadir, the requirement of MV and complicated with pneumonia are the poor short-term prognostic factors of severe GBS patients. These results should be confirmed by a prospective study or a comparable multicenter retrospective study.

Abbreviations

GBS: Guillain-Barré syndrome, MV: mechanical ventilation, MRC: Medical Research Council (sum score), ICU: intensive care unit, HFGS: Hughes Functional Grading Scale, EGOS: The Erasmus GBS Outcome Score, mEGOS: modified Erasmus GBS Outcome Score, CI: confidence interval

Declarations

Acknowledgments

No applicable

Author contributions

Wen PY, Wu HL and Chu WZ conceived and designed the study. Zhang M,Feng QC and Ji H contributed in collecting the data. Wen PY and Wu HL performed data analyses, Wen PY interpreted data and drafted

the manuscript, which was critically reviewed by all other authors. All authors read the manuscript for intellectual content and commented on the final version of the manuscript before submission.

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the ethics committee of Yuhuangding Hospital Affiliated to Qing University, because of its retrospective nature, all participants did not provide written informed consent.

Consent for publication

No applicable

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1.

Comparisons of clinical characteristics, presentations of GBS between severe GBS group and non-severe GBS group

Varible	Severe GBS group (n=66)	Non-severe GBS group(n=89)	P value
Age(years)	59.7±16.3	53.0±16.2	P=0.12
Male	33(50)	56(62.9)	P=0.108
Place of Residence			P=0.109
Urban community	27(40.9)	48(53.9)	
Countryside	39(59.1)	41(46.1)	
Incidence of GBS in different seasons			P=0.311
Spring	16(24.2)	15(16.9)	
Summer	21(31.8)	28(31.5)	
Autumn	12(18.2)	27(30.3)	
Winter	17(25.8)	19(21.3)	
Antecedent infections			P=0.278
Recent history of surgery	17(25.8)	5(5.6)	P<0.0001
Granial nerve involvement	37(56)	25(28.1)	P=0.007
Facial nerve	16(24.2)	15(16.9)	P=0.255
Glossopharyngeal and vagus nerves	19(28.8)	14(15.7)	P=0.05
Oculomotor and/or abducent nerve	10(15.2)	12(13.5)	P=0.15
Sensory disturbance	17(25.8)	34(32.9)	P=0.103
Autonomic dysfunction	29(43.9)	4(4.5)	P<0.0001
Pain	7(10.6)	12(13.5)	P=0.589
Hyporeflexia or areflexia	62(93.9)	83(93.3)	P=0.86

Table 2.
Comparisons of clinical characteristics, presentations of GBS between Group MV and Group NV

Varible	Group MV(n=29)	Group NV(n=36)	P value
Age(years)	61.55±15.2	59.56±15.7	P=0.607
Male	19(65.5)	14(38.9)	P=0.033
Place of Residence			P=0.839
Urban community	12(41.4)	14(38.9)	
Countryside	17(58.6)	22(61.1)	
Incidence of GBS in different seasons			P=0.967
Spring	8(27.6)	8(22.2)	
Summer	9(31)	12(33.3)	
Autumn	5(17.2)	7(19.4)	
Winter	7(24.1)	9(25.0)	
Antecedent infections			P=0.384
Recent history of surgery	7(24.1)	9(25)	P=0.936
Granial nerve involvement			P<0.0001
Facial nerve	10(34.5)	6(16.7)	P=0.097
Glossopharyngeal and vagus nerves	12(41.4)	7(19.4)	P=0.053
Oculomotor and/or abducent nerve	7(24.1)	4(11.1)	P=0.164
Sensory disturbance	6(20.7)	10(27.8)	P=0.51
Pain	1(3.4)	6(16.7)	P=0.087
Hyporeflexia or areflexia	27(93.1)	35(97.2)	P=0.694
Time from onset to admission	4.1±4.5	6.4±10.36	P=0.27
MRC on admission	29.9±23.6	33.2±14.3	P=0.486

Table 3
Possible independent predictors for MV in severe GBS by multivariate logistic regression

Varible	Regression coefficient(95%)CI	P value	Exp(B)
MRC at nadir	0.123(0.02-9.22)	<0.05	1.13
Autonomic dysfunction	-6.429(4.777-326.6)	<0.05	0.002

Table 4
Comparisons of clinical characteristics, presentations of GBS between Subgroup 1 and Subgroup 2

Varible	Subgroup 1(n=20)	Subgroup 2(n=45)	P value
Age(years)	59.95±15.8	60.7±15.4	P=0.864
Male	10(50)	23(51.1)	
Place of Residence			P=0.583
Urban community	11(55)	28(62.2)	
Countryside	9(45)	22(37.8)	
Incidence of GBS in different seasons			P=0.077
Spring	5(25)	11(24.4)	
Summer	6(30)	15(33.3)	
Autumn	7(35)	5(11.1)	
Winter	2(10)	14(31.1)	
Antecedent infections	9(45)	12(26.7)	P=0.927
Recent history of surgery	1(5)	15(33.3)	P=0.014
Granial nerve involvement			P=0.697
Facial nerve	5(25)	11(24.4)	P=0.962
Glossopharyngeal and vagus nerves	5(25)	14(31.1)	P=0.617
Oculomotor and/or abducent nerve	3(15)	8(17.8)	P=0.783
Sensory disturbance	5(25)	11(24.4)	P=0.962
Autonomic dysfunction	7(35)	22(48.9)	P=0.298
Pain	3(15)	4(8.9)	P=0.463
Hyporeflexia or areflexia	17(85)	39(86.7)	P=0.304
Elevated liver enzymes	7(35)	18(40)	P=0.702
Hospital stays	17.15±8.9	22.2±19.7	P=0.157
Time from onset to admission	6.5±6.4	4.9±8.9	P=0.497
MRC at nadir	32.5±9.7	15.1±14.7	P<0.0001
MRC on admission	41.1±12.5	27.6±19.9	P=0.007
MRC at discharge	46.8±7.7	21.8±15.6	P<0.0001

MV	5(25)	24(53.3)	P=0.034
Complicated by pneumonia	6(30)	26(57.8)	P=0.039
Treatment modality			P=0.362
IVIg	16(80)	38(84.5)	
IVIg+intravenous corticosteroids	3(12.5)	4(8.9)	
Intravenous corticosteroids	1(5)	0	
Supportive treatment	0	3(6.7)	

Table 5
Possible independent predictors for poor outcome in severe GBS patients by multivariate logistic regression

| Varible	Regression coefficient(95%)CI	P value	Exp(B)
MRC on admission	0.054(0.021-0.116)	<0.05	1.055
MV	-1.461(0.225-3.279)	<0.05	0.232

Figures
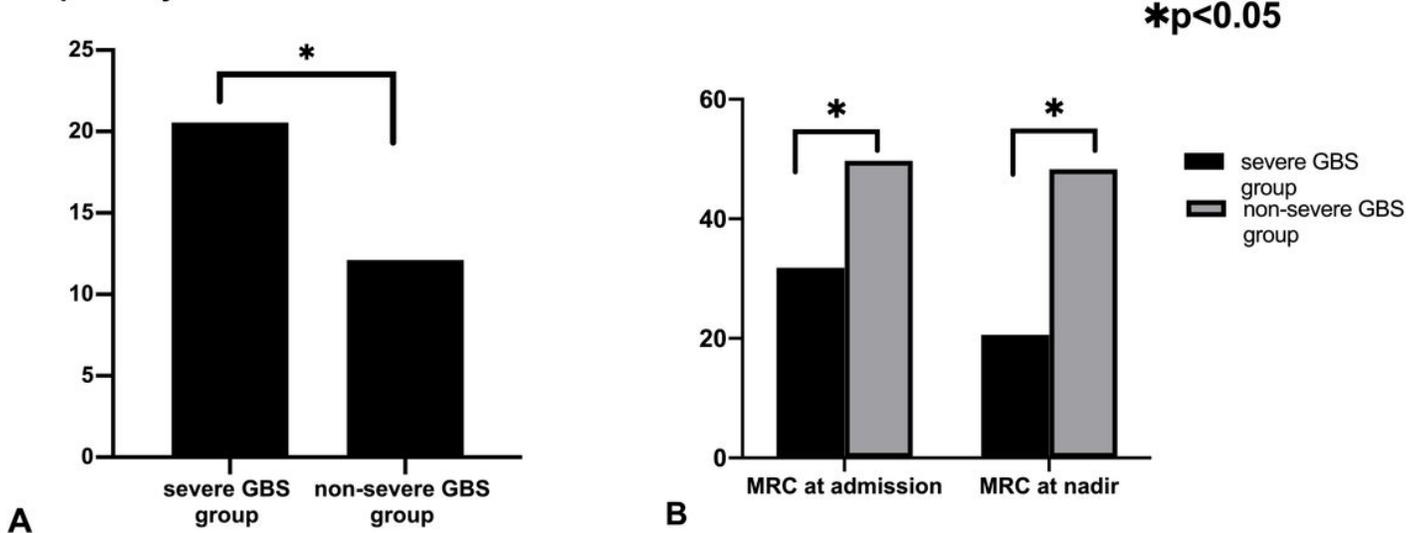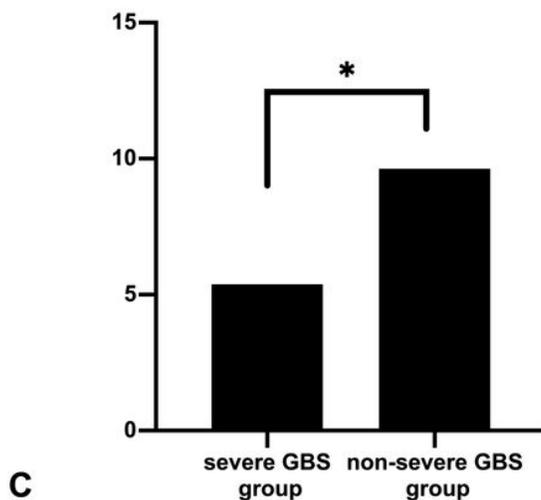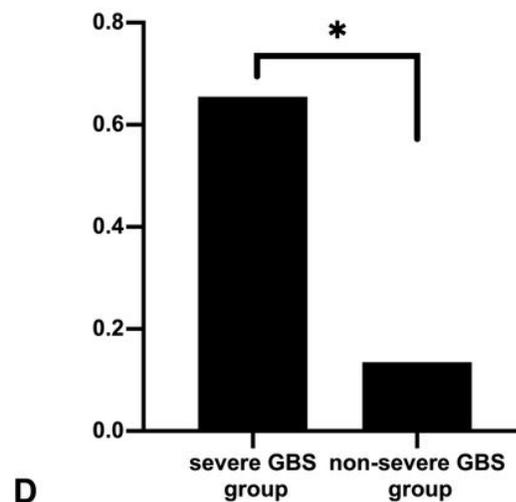
Figure 1

Comparisons of hospital stays, MRC at admission, MRC at nadir, time from onset to admission and liver enzyme level between severe GBS group and non-severe GBS group. A Hospital stays was longer in severe GBS group than non-severe GBS group(20.5 versus 12.1, p<0.05). B MRC at admission (31.8 versus 49.7, p<0.05) and MRC at nadir (20.6 versus 48.3, p<0.05) were both lower in severe GBS group. C Time from onset to admission was significantly shorter in severe GBS group compared with non-severe GBS group (5.4 versus 9.6, p<0.05). D Liver enzymes was higher n severe GBS group than non-severe GBS group(65.5%versus 13.5%, p<0.05).
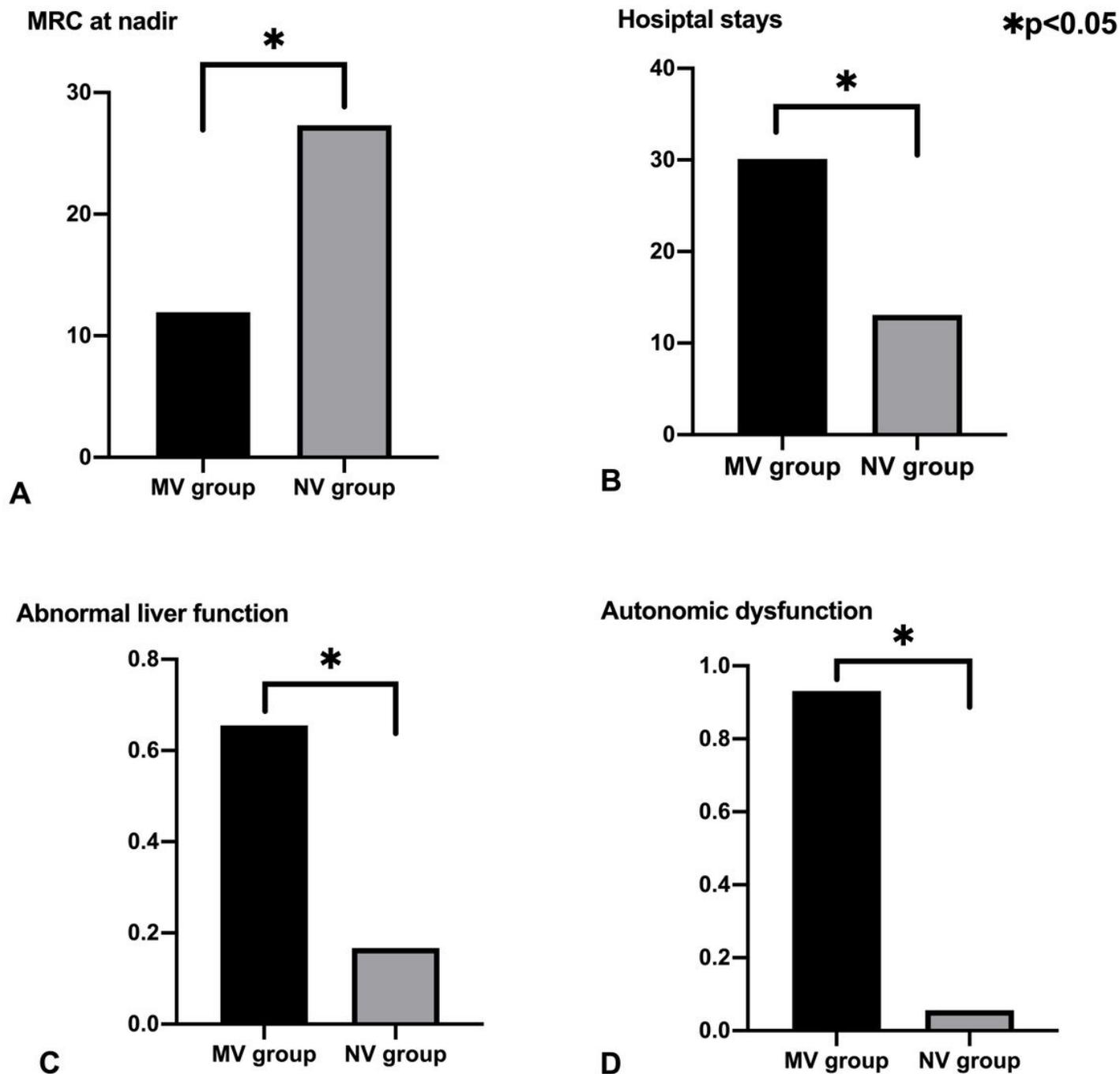
Figure 2

Comparisons between MV group and NV group. A MRC at nadir was lower in MV group than NV GBS group(11.9 versus 27.1, p<0.05). B Hospital stays was significantly longer in MV group compared with NV group (30.1 versus 13.1, p<0.05). C the liver enzymes and D autonomic dysfunction were both higher in MV group than NV group(65.5%versus 16.7%, p<0.05 and 93.1%versus 5.6%, p<0.05).