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Early Electrophysiological findings in Guillain Barre Syndrome:

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ABSTRACT:

Early electrophysiological testing is more important as early abnormalities can be obtained even in the first week. However the electrical abnormalities may not be that prominently evident for definitive diagnosis in the first 2 weeks.
However at times the decision of treatment has to be taken early. Research is required to look at different electrophysiological parameter which could give clue for an earlier diagnosis. The aim of our study is to determine early electrophysiological parameters with in first week to identify GBS at earliest.

KEY WORDS:

Electrophysiological testing, GBS, Cerebrospinal fluid protein

INTRODUCTION

GBS is an acquired autoimmune polyradiculoneuropathy. As polio is being eradicated from the world it is the most common cause of acute flaccid paralysis worldwide[1]. It affects equally males and females with an annual incidence rate of 1-2/100000[2]. Clinically it presents with progressive symmetrical ascending muscle weakness of more than two limbs, areflexia with or without sensory, autonomic and brainstem abnormalities lasting less than four weeks[3,4]. Due to involvement of cranial and phrenic nerve approximately 1/3 of hospitalized patients require mechanical ventilation because of diaphragmatic and oropharangeal muscle weakness[2]. Early detection and appropriate treatment can save the patient from the need of mechanical ventilation and enhances early recovery.[5,6,7] Electro diagnostic studies play very vital role for the diagnosis of GBS[5-8]. It is also useful to differentiate between different subtypes of GBS to assess the prognosis as axonal As compare to Electro diagnostic studies the other vital tool for detection is CSF. It usually has elevated proteins. But cerebrospinal fluid protein is frequently normal in the earlier course of the disease (although this can vary in some patients during the course of illness or even characteristic abnormality may not evolve for several days or week).[14] Early electrophysiological testing is more important as early abnormalities can be obtained even in the first week. However the electrical abnormalities may not be that prominently evident for definite diagnosis in the first 2 weeks,[15] Literature search shows various studies regarding the earliest signs seen electro diagnostically .These studies included patients up to 7 days. However at times the decision of treatment has to be taken early. Research is required to look at different electrophysiological parameters which could give clue for an earlier diagnosis. The aim of our study is to determine early electrophysiological parameters with in first week to identify GBS at earliest.

METHODOLOGY

The study was analytical cross sectional. The data was collected from the records of all patients with the clinical diagnosis of GBS presenting in the neurophysiology lab at Liaquat National Hospital

Karachi from Jan 2016 to Dec 2017. The diagnostic criteria were in accordance with the electrophysiological findings using Dutch Guillain Barre Electro Diagnostic criteria[16]. The data was analyzed on SPSS version 19. As the aim of study was to highlight the earliest electrophysiological findings the data was divided in to three sub categories according to durations of less that is less than 3days, 3 to 5 days and 5-7 days were studied. The results were than compared with each other.

ELECTROPHYSIOLOGICAL CRITERIA FOR DIAGNOSIS OF GBS

According to the Dutch Guillain Barre study group criteria only one of the following abnormalities in at least two nerves should be considered[16].

1. Increased distal motor latency>150% of upper limit of normal
2. Decreased conduction velocity<70% of lower limit of normal
3. Increased F wave latency>150 of upper limit of normal
4. Decreased CMAP (compound muscle action potential) amplitude > upper limit of normal.

INCLUSION CRITERIA:

- Patients with provisional clinical diagnosis of GBS referred for NCS
- Duration of symptoms is up to one week.

EXCLUSION CRITERIA:

- Patients with duration of symptoms for more than one week
- Patients with history of any other illness which may cause motor weakness other than GBS such as Diabetes, Alcoholism, Renal failure, inherited disease of peripheral nerves, anterior horn cells disease, myopathy, and other systemic diseases that may affect nerves.

NCS PARAMETERS

For the motor nerves, we obtained the latency and amplitude by stimulating at both the proximal sites (elbow for the median and ulnar nerves, popliteal fossa for the tibial nerve, and fibular head for the peroneal nerve) and distal sites (wrist for the median and ulnar nerves, and ankle for the tibial and peroneal nerves). The conduction velocity was calculated for the segment between the proximal and distal stimulation sites. The CMAP amplitude was measured from baseline to the negative peak. We also obtained F-wave latencies from these motor nerves. For Sensory nerves we obtained peak latencyconduction velocity and sensory nerve action potential (SNAP) amplitude by stimulating at distal sites (wrist for median and ulnar sensory nerves and ankle for sural nerves). We also measured the H-reflex.

RESULTS

Total of 60 patient records were reviewed. Only 31 patients were found to be within the duration of 7 days. Out of these 31 patients, 7 patients lie in the group of less than 3 days, 12 in 5 days group and 12 in 1 week group. Out of 31, 21 were males and 10 were females' patients. Age range was 6 years to 62 years, mean age was 36.58 years. Type of GBS was inconclusive (only absent H reflex) in 8 patients while 13 patients found to have AMAN and 10 patients had AIDP. The data was stratified into three categories, depending upon time of arrival from onset of symptoms. The following results were obtained:

Table 01:

Showing electrophysiological findings with the duration of GBS symptoms

Parameters		Duration of symptoms			Total	p-value
		less than 3days	5days	1week		
NCS	Normal	2 28.6%	3 25%	1 8.34%	6 19.35%	0.42
	Abnormal	5 71.4%	9 75%	11 91.67%	25 80.64%	
M F waves	Normal	2 28.57%	5 16.67%	3 25%	10 32.25%	0.66
	Abnormal	5 71.42	7 58.34%	9 75%	21 67.74%	
latencyM	Normal	3 42.85%	7 58.34%	3 25%	13 41.94%	0.246
	Abnormal	4 57.14%	5 41.67%	9 75%	18 58.06%	
Motor CV	Normal	3 42.85%	5 41.67%	2 16.67%	10 32.25%	0.31
	Abnormal	4 57.14%	7 58.34%	10 83.34%	21 67.74%	
amplitudeM	Normal	2 28.6%	5 41.67%	1 8.34%	8 25.81%	0.146
	Abnormal	5 71.4%	7 58.34%	11 91.67%	23 74.19%	
H-reflex	Normal	1 14.28%	1 8.34%	0 0.00%	2 6.45%	0.33
	Abnormal	6 85.71%	11 91.67%	12 100%	29 93.55%	
H-reflex value	Normal	1 14.28%	2 16.67%	0 00.00%	3 9.68%	
	Poorly modulated	2 28.57%	6 50%	3 25%	11 35.48%	0.19
	Absent	4 57.14%	4 33.34%	9 75%	17 54.84%	

Table 02:

Showing type of GBS and of symptoms of GBS.

typeofGBS * durationofsymptoms Crosstabulation

		Duration of symptoms			Total	p-value
		less than 3days	5days	1week		
Type of GBS	Not known	2 28.57%	5 41.67%	1 8.34%	8 25.81%	0.42
	axonal	3 42.86%	4 33.34%	6 50%	13 41.64%	
	demyelinating	2 28.57%	3 25%	5 41.67%	10 32.36%	
Total		07 100%	12 100%	12 100%	31 100%	

Table 03:

Showing sural nerve involvement with the duration of GBS symptoms:
suralnerve * durationofsymptoms Crosstabulation

		Duration of symptoms			Total	p-value
		less than 3days	5days	1week		
suralnerve	normal	6 85.71%	7 58.34%	5 41.67%	18 58.06%	0.209
	abnormal	1 14.29%	4 33.34%	7 58.34%	12 38.71%	
	not done	0 00.00%	1 8.34%	0 00.00%	1 3.23%	
Total		7 100%	12 100%	12 100%	31 100%	

Table 04:
Sural nerve involvement with type of GBS
Sural nerve * type of GBS Cross tabulation

		Type of GBS			Total	p-value
		Not known	axonal	demyelinating		
Sural nerve	normal	7 87.5%	8 61.54%	3 30%	18 58.06%	0.95
	abnormal	1 12.5%	5 38.46%	6 60%	12 38.71%	
	not done	0 00.00%	0 00.00%	1 10%	01 3.23%	
Total		8 100%	13 100%	10 100%	31 100%	

DISCUSSION

There have been various studies on early electro diagnostic findings in patients with GBS. According to the study of Geetanjali on Early Electro Diagnostic Findings of GuillainBarre Syndrome[3], hallmarks of early demyelinating polyneuropathy are slow motor conduction velocities (MCV) prolonged distal motor latency (MDL), prolonged/absent F wave latencies mainly in the lower limbs, and conduction block with absent F wave.

For early diagnosis of AIDP variant of GBS, ChansonJB[17] study proposed new diagnostic criteria with sensitivity of 81% within 7 days. According to the study, if electro diagnostic parameters like H-reflex, CV (conduction velocity) and DML (distal motor latency) were abnormal, patient can be diagnosed with AIDP. Their study showed abnormalities in the H-reflexes (97%), motor conduction velocity (78%), and prolonged distal latency in motor nerves (78%).

Comparing this with our study H reflex was abnormal in 93.55% of cases (p value0.33), F wave was prolonged in 67.74% (p value 0.66), motor latency were abnormal in 58.06% (p value 0.246) and slowing of motor conduction velocity were abnormal in 67.74% (p value 0.31) .

As the main aim of the study was that which parameters could be further indicative of the disease earlier than 7 days. Although the stratified data did not show significance on statistical analysis the percentile results were indicative of certain considerable potential parameters.

Considering about these parameters, as we had stratified our data in to earliest by 3days, 5 days and 7 days from onset to see most early electrophysiological changes. We found abnormal H-reflex to be earliest involved in 85.71% of patients (within 3days) which increase up to 91.67% by 5 days and was abnormal in all cases by day 7. As compare to H reflex, MCV was abnormal in approximately 55% (details- 57.14% by day 3 and 58.34% by day 5, 83 % by day 7). While DML (latency) was 57.14% by day 3, 41.67% by day 5 and 75% by 7 days thus clearly indicating the H-reflex was the earliest abnormality to be noted.

F wave is most sensitive diagnostic test for early GBS it shows early predilection for involvement of proximal spinal roots, According to Gordon PH[19] study, f-wave latency is abnormal in 84% by 7 days. In our study, it was 75% by 7 days as with rest of world literature. However, in earliest group (3 days) it was 71.42%, 58.34% in 5days and 75% by 7 days. When comparing with H-reflex it was noted that F wave were abnormal by 71.42% in 3 days (H reflex 85.71 %), 58.34% by day 5 (H reflex 91.67%) and 75% by 7 day (H reflex 100%). Again indicating that H reflex is the relatively more sensitive earliest indicator of GBS.

Our study was limited by the smallness of the sample, which hindered the ability to draw definitive conclusions. However the potential considerable parameters like H reflex and f waves are consistent with world literature.

CONCLUSION

The electro diagnostic parameters are sensitive indicators of early GBS, H reflex followed by F reflex can be abnormal as earliest by 3days.

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Hazim Brohi; concept, data collection, data analysis, manuscript writing, manuscript review
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