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Original Article

Prognostic Implications of Early Albuminocytological Dissociation in Guillain–Barré Syndrome

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ABSTRACT: ***Background:*** Half of Guillain–Barré syndrome (GBS) present elevated cerebrospinal fluid (CSF) protein levels within 1 week since symptom onset and 80% within 2 weeks. Our objective was to determine the clinical and prognostic implication of albuminocytological dissociation in early GBS. ***Methods:*** An ambispective cohort study was conducted. Good outcome was considered if the patient was able to walk unaided (Guillain-Barré disability score [GDS] ≤ 2 points) at 3-month follow-up. Patients were classified into two groups: with and without albuminocytological dissociation; we compared clinical and paraclinic characteristics between the groups. We analyzed clinical and electrophysiological factors related to presenting early dissociation through a multivariate model. ***Results:*** We included 240 patients who fulfilled Asbury criteria for GBS. On further selection, only 94 patients fulfilled inclusion. Mean age was 45.94 ± 17.1 years and 67% were male. Median time from symptom onset to admission was 5 days (IQR 3–6). Regarding albuminocytological dissociation and electrophysiological variants, we found a significant difference: acute inflammatory demyelinating polyneuropathy (AIDP) [60.6% vs 26.2%, $p = 0.002$], acute motor axonal neuropathy (AMAN) [21.2% vs 49.1%, $p = 0.009$] and acute motor sensory axonal neuropathy (AMSAN) [12.1% vs 1.6%, $p = 0.05$]. We did not observe significant differences in recovery of independent walking in short term between both groups. The presence of conduction block in any variant (OR 3.21, 95% CI 1.12–9.16, $p = 0.02$) and absence of sural registration (OR 5.69, 95% CI 1.48–21.83, $p = 0.011$) were independent factors related to early dissociation. ***Conclusions:*** Early dissociation (<7 days) is not associated with any particular clinical feature or unfavorable outcome. It is more common to see in AIDP rather than axonal variants.

RÉSUMÉ : Implications pronostiques de la dissociation albumino-cytologique précoce dans le cas du syndrome de Guillain-Barré. ***Contexte :*** La moitié des cas de syndrome de Guillain-Barré (SGB) présentent des taux élevés de protéines dans le liquide céphalo-rachidien (LCR) dans la semaine suivant l'apparition des symptômes et 80 % d'entre eux dans les deux semaines. Notre objectif est ici de déterminer l'implication clinique et pronostique de la dissociation albumino-cytologique à un stade précoce du SGB. ***Méthodes :*** Une étude de cohorte ambispective a ainsi été effectuée. Un résultat a été considéré « bon » dans la mesure où un patient était capable de marcher sans aide (GDS ≤ 2 points) lors d'un suivi effectué au bout de 3 mois. Les patients à l'étude ont été classés en deux groupes : avec et sans dissociation albumino-cytologique. Nous avons ensuite comparé entre elles les caractéristiques cliniques et paracliniques des deux groupes. Au moyen d'un modèle multivarié, nous avons en outre analysé les facteurs cliniques et électro-physiologiques liés à la présentation d'une dissociation précoce. ***Résultats :*** Nous avons inclus 240 patients qui remplissaient les critères d'Asbury pour le SGB. Après une nouvelle sélection, seuls 94 patients ont été inclus. L'âge moyen de ces derniers était de 45,94 ± 17,1 ans tandis que 67 % étaient des hommes. Le délai médian entre l'apparition des symptômes et l'admission était de 5 jours (EI 3-6). En ce qui concerne la dissociation albumino-cytologique et les variantes électro-physiologiques, nous avons constaté une différence notable : PDIA [60,6 % contre 26,2 %, $p = 0{,}002$], NAMA [21,2 % contre 49,1 %, $p = 0{,}009$] et NAAMS [12,1 % contre 1,6 %, $p = 0{,}05$]. Précisons que nous n'avons pas observé entre les deux groupes de différences significatives dans la récupération autonome à court terme de la marche. La présence d'un bloc de conduction nerveux dans n'importe quelle variante (RC 3,21 ; IC 95 % 1,12-9,16; $p = 0{,}02$) et l'absence d'enregistrement des triceps suraux (RC 5,69 ; IC 95 % 1,48-21,83 ; $p = 0{,}011$) étaient des facteurs indépendants liés à une dissociation précoce. ***Conclusions :*** La dissociation précoce (< 7 jours) n'est associée à aucune caractéristique clinique particulière ni à une issue défavorable. Elle est plus fréquente dans le cas de la PDIA que dans les autres variantes axonales.

Keywords: CSF; Albuminocytological dissociation; Guillain barre; Neuropathy; Prognosis; Electrophysiological variants; AIDP; AMAN; Early lumbar puncture

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Introduction

Guillain–Barré syndrome (GBS) is the most common cause of acute flaccid paralysis worldwide. GBS is essentially a clinical diagnosis; however, cerebrospinal fluid (CSF) analysis is recommended to exclude other diseases and lessen the possibility of misdiagnosis.[1] A common CSF finding in GBS is albuminocytological dissociation, defined as elevated protein levels (>45 mg/dl) and ≤5 cells.[1,2] Half of GBS present elevated CSF protein levels within 1 week since symptom onset and 80% within 2 weeks.[3]

GBS is exclusively a disease of the peripheral nervous system.[4] Pathophysiologically, there is inflammation of the nerve root, causing venular congestion of small root veins and plasma proteins leak from the nerve root blood vessels into the subarachnoid space.[3] When nerve roots are compromised, proximal limb weakness and radicular pain occur.[3,5]

Rapid progression of symptoms in GBS causes patients to seek early medical attention (≤7 days). This subset of patients has increased risk of invasive mechanical ventilation (IMV), which is also a risk factor for prolonged hospital stay, and consequently poor outcomes at 3 and 6 months.[6]

Early Guillain–Barré syndrome is considered in patients in which weakness occurs within 7 days of symptom onset.[7] In this subset of patients, neurophysiological findings have been described in previous articles. Various CSF biomarkers have been proposed to assess prognosis and response to therapy, including tau, antigangliosides, hypocretin-1, neurofilament, eleveated protein levels and basic myelin protein.[8] However, the clinical and prognostic implication of albuminocytological dissociation has not been described.

Materials and Methods

An ambispective cohort study of patients with GBS defined by Asbury criteria during the period from January 1, 2017, to June 30, 2021, in a single reference neurological center in Mexico was conducted. Patient's data from the years 2017 and 2018 was collected retrospectively and data from the years 2019–2021 prospectively. Selection included patients >18 years, arrived at our institution within 7 days since symptom onset, had CSF analysis within 7 days since symptom onset and had nerve conduction studies performed. Albuminocytological dissociation was considered in patients having elevated protein levels (>45 mg/dl) and ≤5 cells in CSF analysis.[9] We excluded patients with fever, immunosuppression, seizures, or clinical suspicion of a central nervous system infection, as it may alter CSF analysis.

Baseline characteristics were obtained to describe our population. We considered: age, gender, history of infection, assessment of muscle strength through the Medical Research Council (MRC) scale and the GBS disability scale at the time of diagnosis,[10] cranial nerve involvement, IMV, and length of hospital stay. We also considered cardiovascular autonomic dysfunction as changes in heart rate (bradycardia and/or tachycardia) or blood pressure (hypotension and/or hypertension) not explained by any other medical condition (example: infection or secondary to medications) on admission or during hospitalization at the discretion of the treating physician.

We obtained the following information from nerve conduction studies: compound muscle action potential (CMAP) (mV), distal latency (ms) and nerve conduction velocities (m/s) of the median, ulnar, fibular, and tibial motor nerves, and sensitive action potential (SNAP) (μV) of the median and sural sensory nerves. Uncini's criteria were applied to classify patients into electrophysiological variants; we also considered any variant with conduction block: the presence of pCMAP/dCMAP amplitude ratio <0.7 (excluding tibial nerve) in at least one of the motor nerves explored in any electrophysiological variant (acute inflammatory demyelinating polyneuropathy (AIDP) or axonal).[11]

Good outcome was considered if the patient was able to walk unaided (Guillain-Barré disability score [GDS] ≤2 points) at 3-month follow-up.

Statistical Analysis

Quantitative variables were described as mean (SD) or median (IQR) depending on their distribution. Categorical variables are

Table 1: Baseline characteristics of our patients

Characteristic	$N = 94$
Age, mean (SD)	45.94 ± 17.1
Gender (male), *n* (%)	63 (67)
Previous diarrhea, *n* (%)	36 (38.3)
Previous respiratory infection, *n* (%)	27 (28.7)
Time from symptom onset to admission (days), median (IQR)	5 (3–6)
Admission GDS, median (IQR)	4 (3–4)
MRC score, mean (SD)	32.4 ± 15.7
IMV requirement, *n* (%)	32 (34)
Cranial nerve compromise, *n* (%).	51 (54.3)
Unilateral facial compromise, *n* (%)	9 (9.6)
Facial diparesis, *n* (%)	33 (35.1)
Bulbar cranial nerve compromise, *n* (%)	33 (33.1)
Cardiovascular autonomic dysfunction, *n* (%)	27 (28.7)
Clinical variants:	
Sensorimotor, *n* (%)	50 (53.2)
Pure motor, *n* (%)	31 (33)
Miller–Fisher/Overlap, *n* (%)	11 (11.7)
Lumbar puncture:	
Time to CSF analysis (days), median (IQR)	5(3–6)
Protein levels (mg/dl), median (IQR).	36(27–54)
Cells count, median (min–max)	1(0–49)
Electrophysiological variants:	
AIDP, *n* (%)	36 (38.3)
AMAN, *n* (%)	37 (39.4)
AMSAN, *n* (%)	5 (5.3)
Inexitable, *n* (%)	6 (6.4)
Equivocal, *n* (%)	10 (10.6)
Treatment	
IVIG, *n* (%)	51 (54.3)
Plasma exchange, *n* (%)	30 (32)
Observation, *n* (%)	13 (13.8)
GDS score ≤2 at 3-month follow-up, *n* (%)	42/86 (48.8)

SD: standard deviation, IQR: interquartile range, MRC: medical research council, IMV: invasive mechanical ventilation, GDS: Guillain-Barré disability score, AIDP: acute inflammatory demyelinating polyneuropathy, AMAN: acute motor axonal neuropathy, AMSAN: acute motor sensory axonal neuropathy.

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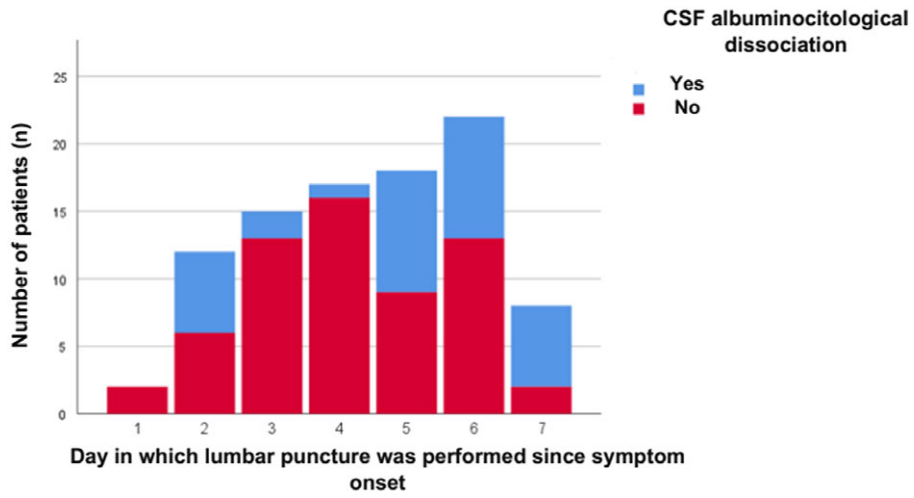

Figure 1: Number of patients with vs without albuminocytological dissociation according to the day cerebrospinal fluid was obtained.

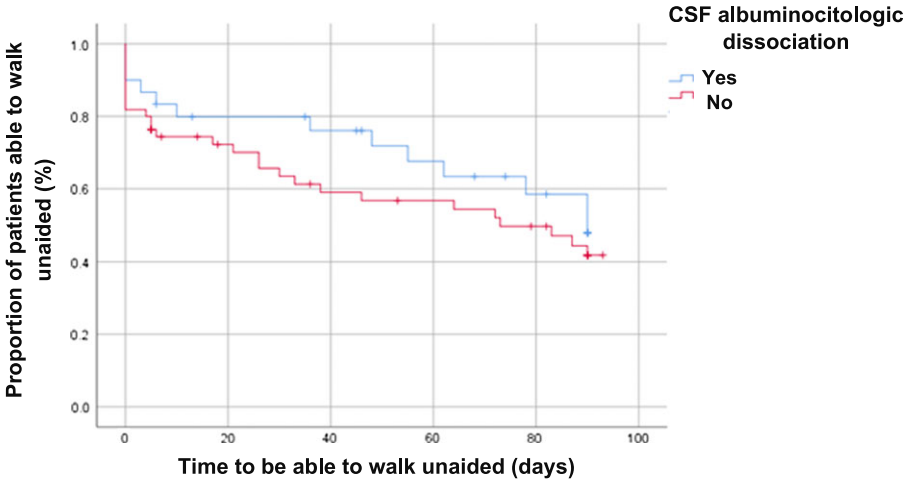

Figure 2: Proportion of patients able to walk unaided with vs without early albuminocytological dissociation.

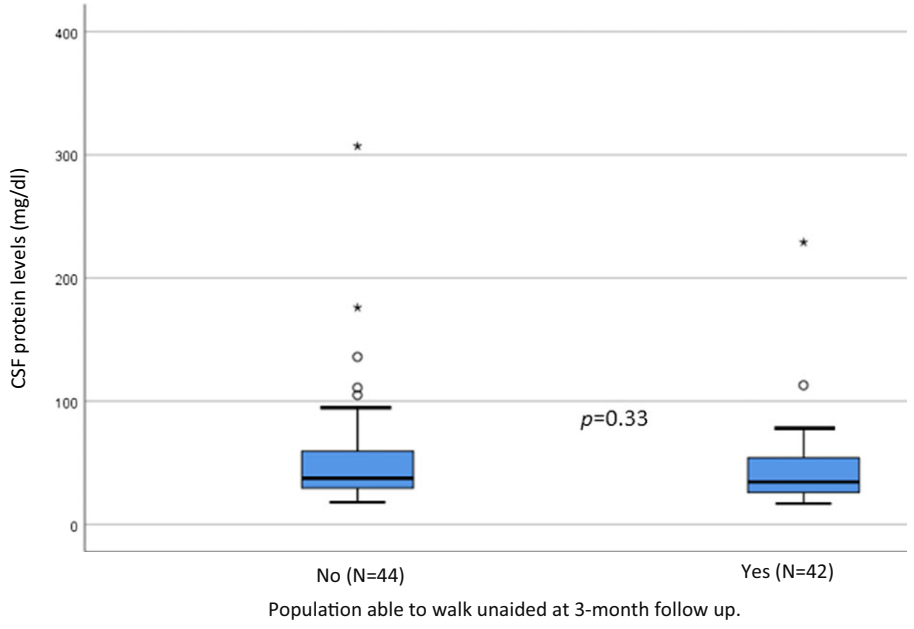

Figure 3: CSF protein levels at admission in patients with and without recovery of independent walking at three months of follow-up.

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Table 2: Comparison between patients with versus without albuminocytological dissociation

	Albuminocytological dissociation $N = 33$	No albuminocytological dissociation $N = 61$	*P* value
Age, mean (SD)	48.2 ± 17.8	44.6 ± 16.7	0.46
Gender (male), *n* (%)	21 (63.6)	42 (68.8)	0.65
Time from symptom onset to admission (days), median (IQR)	5 (3.5–6)	4 (3–5.5)	0.02
Previous diarrhea, *n* (%)	15 (45.4)	21 (34.4)	0.37
MRC score, mean (SD)	32.8 ± 15.0	32.0 ± 16.0	0.62
GDS ≥3 at admission, *n* (%)	28 (84.8)	46 (75.4)	0.42
IMV requirement, *n* (%)	10 (30.3)	22 (36)	0.65
Cranial nerve involvement, *n* (%)	17 (51.5)	34 (55.7)	0.82
Facial diparesis, *n* (%)	9 (27.2)	24 (39.3)	0.26
Bulbar nerves compromise, *n* (%)	9 (27.2)	24 (39.3)	0.26
Cardiovascular autonomic dysfunction, *n* (%)	8 (24.2)	19 (31.1)	0.63
GDS score at 3-month follow-up, *n* (%)	14/31 (45.1)	28/55 (51)	0.65
Electrophysiological variant			
AIDP, *n* (%)	20 (60.6)	16 (26.2)	0.002
AMAN, *n* (%)	7 (21.2)	30 (49.1)	0.009
AMSAN, *n* (%)	4 (12.1)	1 (1.6)	0.05
Inexitable, *n* (%)	1 (3)	5 (8.2)	0.66
Equivoco, *n* (%)	1 (3)	9 (14.8)	0.09
Any variant with presence of conduction block, *n* (%)	18 (54.5)	19 (31.1)	0.043
Absence of sural registry, *n* (%)	12 (36.3)	6 (9.8)	0.005
Sural SNAPs (μV), median (IQR)	9.85 (0.0–25.2)	26.8 (17.0–38.3)	<0.001
Median SNAPs (μV), median (IQR)	11.8 (0.0–20-2)	20.0 (9.8–23.8)	0.002

SD: standard deviation, IQR: interquartile range, MRC: medical research council, IMV: invasive mechanical ventilation, GDS: Guillain-Barré disability score, AIDP: acute inflammatory demyelinating polyneuropathy, AMAN: acute motor axonal neuropathy, AMSAN: acute motor sensory axonal neuropathy, CMAPs: compound muscle action potential, SNAPs: sensory nerve action potential.

Table 3: Uni- and multivariate analysis

	Univariate analysis				Multivariate analysis	
	With ACD $N = 33$	Without ACD $N = 61$	*P* value	OR, CI 95%	OR, CI 95%	*P* value
Days since symptom onset, median (IQR)	5 (3.5–6)	4 (3–5.5)	0.02	1.37 (1.0–1.83)	1.57 (1.12–2.21)	0.009
AIDP, *n* (%)	20 (60.6)	16 (26.2)	0.002	4.32 (1.75–10.6)	3.56 (0.95–13.3)	0.058
AMAN, *n* (%)	7 (21.2)	30 (49.1)	0.009	0.27 (0.1–0.7)	0.85 (0.19–3.66)	0.83
Any variant with presence of conduction block, *n* (%)	18 (54.5)	19 (31.1)	0.043	2.5 (1.0–6.0)	3.21 (1.12–9.16)	0.02
Absence of sural nerve registry, *n* (%)	12 (36.3)	6 (9.8)	0.005	5.2 (1.7–15.7)	5.69 (1.48–21.83)	0.011

General model: Chi-square 28.94, GL 5, $p = 0.001$.
Hosmer-Lemshow: Chi-square 4.30, GL 8, $p = 0.82$.
Model accuracy AUC 0.81 CI 95% (0.72–0.90), $p = <0.001$.
ACD: albuminocytological dissociation, CI: confidence interval, OR: odds ratio, IQR: interquartile range, AIDP: acute inflammatory demyelinating polyneuropathy, AMAN: acute motor axonal neuropathy. NCS: nerve conduction studies.

described in frequencies and percentages. To search for differences between groups, we used x^2 and Fisher's exact test for categorical variables. Student's t-test was considered to compare means, and Mann-Whitney U test to compare medians. A p value <0.05 was considered statistically significant. Through multivariable binary logistic regression, risk factors associated with early cerebrospinal fluid albuminocytological dissociation were sought. The results were expressed as odds ratio (OR) with 95% confidence intervals. To validate the multivariable model, the Hosmer-Lemshow goodness-of-fit test was used and the performance of the model was evaluated through area under the curve.

Results

We included 240 patients who fulfilled Asbury criteria for GBS. One hundred fourteen patients had a lumbar puncture performed

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within 7 days within symptom onset. Twenty patients were further excluded because they were diagnosed with a central nervous system infection, leaving 94 patients for analysis.

Baseline Characteristics of Our Population

Mean age was 45.94 ± 17.1 years and 67% were male. Thirty-eight percent had a history of diarrhea and median time from symptom onset to admission was 5 days (IQR 3–6). Mean GDS at admission was 4 (IQR 3–4), MRC score at admission 32.4 ± 15.7 points, and 34% required IMV. Fifty-four percent had cranial nerve involvement, and 28.7% had autonomic dysfunction. The median time from symptom onset to CSF analysis was 5 days (IQR 3–6), and median protein levels were 36 mg/dl (27–54). Figure 1 depicts the presence or absence of albuminocytological dissociation grouped by days since symptom onset. The most frequent electrophysiological variant was acute motor axonal neuropathy (AMAN) (39.4%) followed by AIDP (38.3%). The rest of the baseline characteristics are summarized in Table 1.

Comparative Analysis

When comparing the group with versus without albuminocytological dissociation only the time since symptom onset to diagnosis was significant: (median) 5 (3.5–6) days vs 4 (3–5.5) days, $p = 0.02$ (Table 2). Regarding electrophysiological characteristics, we found significant differences in the frequency of the different electrophysiological variants: AIDP [60.6% vs 26.2%, $p = 0.002$], AMAN [21.2% vs 49.1%, $p = 0.009$] and acute motor sensory axonal neuropathy (AMSAN) [12.1% vs 1.6%, $p = 0.05$]. In addition, we observed significant differences in the frequency of any variant (AIDP or axonal) with the presence of at least one complete nerve conduction block (54.5% vs 31.1%, $p = 0.043$). The SNAPs of the median and sural nerves were lower in the group with early dissociation. In addition, 18 (19.7%) of our population presented absence of sural nerve recording: 11 patients with AIDP, 5 with AMSAN and 2 patients with the Inexcitable variant. This finding was observed more frequently in the early albuminocytological dissociation group (36.3% vs 9.8%, $p = 0.005$). There were no significant differences in the distal CMAPs of the motor nerves (median, ulnar, fibular and tibial) between groups.

Analyzing clinical and paraclinical factors related to presenting early albuminocytological dissociation, interestingly we observed that the presence of conduction block in any variant (OR 3.21, CI95% 1.12–9.16, $p = 0.002$), the absence of sural nerve registry (OR 5.69, CI95% 1.48–21.83, $p = 0.011$) and the greater number of days from the onset of symptoms upon admission (OR 1.57, CI95% 1.12–2.21, $p = 0.009$) are independent risk factors. Model performance through ROC curves is 0.81, CI 95% (0.72–0.90), $p = < 0.001$ (Table 3).

Follow-up and Prognosis

We did not observe significant differences in recovery of independent walking in short term between both groups (with vs without albuminocytological dissociation) in the comparative frequencies (Table 2) and Kaplan–Meyer analysis (Figure 2). We did not observe significant differences in protein levels between the population with vs. without recovery of independent walking at three months of follow-up (Figure 3).

Discussion

Albuminocytological dissociation is a common finding in GBS and directly related to nerve root inflammation. It has also been associated with increased deposition of antibodies, complements, and products of active myelin breakdown. It is present in half patients within 1 week of symptom onset and 80% within 2 weeks.[12] It is considered a supportive criterion for Asbury GBS criteria, as well as definer to a greater level of certainty in Brighton group criteria.[2,13]

Albuminocytological dissociation is classically defined in GBS as protein levels >0.45mg/L in CSF with normal cells.[2,9] Recently, several authors consider that the upper limit range (URL) of total protein levels in CSF should be adjusted to the patient's age to increase diagnostic sensitivity.[14] A systemic review considers that protein upper limit level in CSF for patients older than 50 years should be >0.60 mg/L.[15] A limitation of our study is that all patients were classified according to the classic definition of albuminocytological dissociation. A study by Sahin et al concluded that elevated CSF protein levels were associated with poor 6-month outcome.[16] Other study concluded that albuminocytological dissociation does not correlate with clinical severity in GBS.[17] Nonetheless, this last study was underpowered, and elevated CSF protein levels seemed to be potentially associated with the need for mechanical ventilation, but studies with a greater number of patients are required. To date, there is no clear evidence regarding patients with early dissociation (<7 days). We did not find any difference in motor recovery in patients with early dissociation vs. those with normal CSF.

Requirement for IMV occurs in 30% of cases in GBS. Patients who present to medical services early (≤7 days of evolution) tend to be severe, due to a higher frequency of involvement of lower cranial nerves and lower MRC scores, which imply a risk of requiring mechanical ventilation.[18] In our population, 34% of patients required mechanical ventilation. Interestingly, we did not observe clinical differences in the frequency of mechanical ventilation, lower cranial nerve involvement, and MRC score, between patients with early albuminocytological dissociation and those without it. In patients in which lumbar puncture is performed within 7 days, there was no clear association between protein elevation and poor outcome.

We found in our patients that elevated protein levels were more common in AIDP than in axonal variants in early CSF analysis. We hypothesize that the demyelinating variant might have also increased production of antibodies, early root inflammation, and early active myelin breakdown.[16] In our population with GBS with early admission, the most frequent electrophysiological variant was AMAN 39.4%. Although it is controversial in the literature if albuminocytological dissociation is more frequent in some variant than in others, we clearly observed in this population the most frequent association is AIDP (60.6%).

Only half of patients with proximal weakness or radicular pain, which are related to root compromise had elevated CSF protein levels. This explains that root inflammation is not the only mechanism to produce CSF protein elevation, as mentioned before, or that root inflammation should be severely compromised to increase protein levels.[7]

A marker of clinical severity in GBS is the presence of autonomic dysfunction, which occurs in 20–32% of cases, regardless of the electrophysiological variant (axonal or demyelinating).[19,20] The main are heart rate or blood pressure variability. Autonomic dysfunction generally occurs in severe clinical forms

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of GBS (GDS ≥ 3).[19] Anatomically the sympathetic autonomic fibers leave the spinal cord towards the paravertebral ganglion chains, close to the nerve roots. However, patients with early albuminocytological dissociation did not present a higher frequency of autonomic dysfunction.

The attack on the peripheral nerve by inflammatory cells or through complement is directed against molecules found at different levels, such as gangliosides at the nodal or paranodal level.[21] The inflammatory attack can affect some nerves more, translating clinically into some clinical variants (sensory motor, pure motor, pharyngocervicobrachial, paraparetic, etc).[4] Likewise, some nerves may be more electrophysiologically affected. In this study, we did not observe differences in axonal damage through the distal CMAPs of both motor nerves in the upper and lower extremities.

As previously mentioned, early dissociation in GBS is not related to any clinical characteristic or unfavorable outcome in our population, as in other studies.[17] However, little is known about electrophysiological characteristics in early dissociation. When analyzing factors related to early dissociation in our population, we observed that no electrophysiological variant was statistically significant. Interestingly, we observed that the presence of a conduction block in any variant represents an OR 3.2 risk factor. This finding could be explained by the fact that the presence of conduction blocks represents an active inflammation through antibodies directed towards the proximal portions of the nerves.[16] We already know that one of the typical electrophysiological characteristics in GBS is the preservation of the sural nerve, however, 11% of patients have an affected sural nerve (absence of electrophysiological recording of the sural nerve).[22] In our multivariate model, we observed that sural absence is a risk factor. The involvement of the sural nerve (in this case, absence of electrophysiological recording of the sural nerve) occurs more frequently in the AIDP variant, especially in severe clinical presentation.[22] Another point is that sural nerve compromise is more frequent at older ages due to previous damage to the nerve over the years. In our population, the population with early dissociation is slightly older, although this result is not statistically significant.[23]

Conclusion

Albuminocytological dissociation is a common finding in patients with GBS, especially in those within 2 weeks of symptom onset. Early dissociation is not associated with any severe clinical characteristic or unfavorable outcome. It is more common to see in AIDP rather than axonal variants.

Conflicts of Interest. VCES, GOJA, LVF, GGM, GA, and LHJC declare no conflicts of interest.

Author Roles. VCES: writing, reviewing, and editing.
GOJA: writing, reviewing, and editing.
LVF: writing, reviewing, design, and editing.
GGM: writing and reviewing.
LHJC: writing, reviewing, design, and editing.

References

1. Sejvar JJ, Kohl KS, Gidudu J, et al. Guillain-Barré syndrome and Fisher syndrome: case definitions and guidelines for collection, analysis, and presentation of immunization safety data. Vaccine. 2011;29:599–612. DOI 10.1016/j.vaccine.2010.06.003.
2. Fokke C, van den Berg B, Drenthen J, Walgaard C, van Doorn PA, Jacobs BC. Diagnosis of Guillain-Barré syndrome and validation of Brighton criteria. Brain. 2014;137:33–43. DOI 10.1093/brain/awt285.
3. Brettschneider J, Petzold A, Süssmuth S, Tumani H. Cerebrospinal fluid biomarkers in Guillain-Barré syndrome–where do we stand? J Neurol. 2009;256:3–12. DOI 10.1007/s00415-009-0097-x.
4. Wakerley BR, Uncini A, Yuki N, GBS Classification Group, GBS Classification Group. Guillain-Barré and Miller Fisher syndromes–new diagnostic classification. Nat Rev Neurol. 2014;10:537–44. DOI 10.1038/nrneurol.2014.138 Epub 2014 Jul 29. Erratum in: Nat Rev Neurol. 2014;10:612. PMID: 25072194.
5. Berciano J, Sedano MJ, Pelayo-Negro AL, et al. Proximal nerve lesions in early Guillain-Barré syndrome: implications for pathogenesis and disease classification. J Neurol. 2017;264:221–36. DOI 10.1007/s00415-016-8204-2.
6. Walgaard C, Lingsma HF, Ruts L, et al. Prediction of respiratory insufficiency in Guillain-Barré syndrome. Ann Neurol. 2010;67:781–7. DOI 10.1002/ana.21976.
7. Berciano J, Orizaola P, Gallardo E, et al. Very early Guillain-Barré syndrome: a clinical-electrophysiological and ultrasonographic study. Clin Neurophysiol Pract. 2019;5:1–9. DOI 10.1016/j.cnp.2019.11.003.
8. Illes Z, Blaabjerg M. Cerebrospinal fluid findings in Guillain-Barré syndrome and chronic inflammatory demyelinating polyneuropathies. Handb Clin Neurol. 2017;146:125–138. DOI 10.1016/B978-0-12-804279-3.00009-5.
9. Doets AY, Verboon C, van den Berg B, et al. Regional variation of Guillain-Barré syndrome. Brain. 2018;141:2866–2877. DOI 10.1093/brain/awy232.
10. Hughes RA, Newsom-Davis JM, Perkin GD, Pierce JM. Controlled trial prednisolone in acute polyneuropathy. Lancet 1978;2:750-3.
11. Uncini A, Kuwabara S. The electrodiagnosis of Guillain-Barré syndrome subtypes: Where do we stand? Clin Neurophysiol. 2018;129:2586-2593. DOI 10.1016/j.clinph.2018.09.025.
12. Wakerley BR, Yuki N. Mimics and chameleons in Guillain-Barré and Miller Fisher syndromes. Pract Neurol. 2015;15:90–9. DOI 10.1136/practneurol-2014-000937.
13. Asbury AK, Cornblath DR. Assessment of current diagnostic criteria for Guillain-Barré syndrome. Ann Neurol. 1990;27:S21–4.
14. Bourque PR, Brooks J, McCudden CR, Warman-Chardon J, Breiner A. Age matters: Impact of data-driven CSF protein upper reference limits in Guillain-Barré syndrome. Neurol Neuroimmunol Neuroinflamm. 2019;6:e576. DOI 10.1212/NXI.0000000000000576.
15. Breiner A, Moher D, Brooks J, Cheng W, Hegen H, Deisenhammer F, McCudden CR, Bourque PR. Adult CSF total protein upper reference limits should be age-partitioned and significantly higher than 0.45 g/L: a systematic review. J Neurol. 2019;266:616–624. DOI 10.1007/s00415-018-09174-z.
16. Sahin S, Cinar N, Karsidag S. Are cerebrospinal fluid protein levels and plasma neutrophil/lymphocyte ratio associated with prognosis of Guillain Barré syndrome? Neurol Int. 2017;9:7032.
17. Saba K, Hossieny ZS, Arnold WD, et al. CSF protein level and short-term prognosis in Guillain-Barré syndrome. J Clin Neuromuscul Dis. 2019;21:118–9. DOI 10.1097/CND.0000000000000259.
18. López-Hernández JC, Colunga-Lozano LE, Galnares-Olalde JA, Vargas-Cañas ES. Electrophysiological subtypes and associated prognosis factors of Mexican adults diagnosed with Guillain-Barré syndrome, a single center experience. J Clin Neurosci. 2021;86:85–6.
19. Zaeem Z, Siddiqi ZA, Zochodne DW. Autonomic involvement in Guillain-Barré syndrome: an update. Clin Auton Res. 2019;29:289–99.
20. Michel-Chávez A, Chiquete E, Gulías-Herrero A, Carrillo-Pérez DL, Olivas-Martínez A, Macías-Gallardo J, Aceves-Buendía J, Ruiz-Ruiz E, Bliskunova T, Portillo-Valle J, Cobilt-Catana R, Ortiz-Quezada JA, Durán-Coyote S, Rodríguez-Perea E, Aguilar-Salas E, Cantú-Brito C, García-Ramos G, Estañol B. Predictors of mechanical ventilation in Guillain-Barré syndrome with axonal subtypes. Can J Neurol Sci. 2022:1–25. DOI 10.1017/cjn.2022.19. Epub ahead of print.
21. Fehmi J, Scherer SS, Willison HJ, Rinaldi S. Nodes, paranodes and neuropathies. J Neurol Neurosurg Psychiatry. 2018;89:61–71.
22. Bromberg MB, Albers JW. Patterns of sensory nerve conduction abnormalities in demyelinating and axonal peripheral nerve disorders. Muscle Nerve. 1993;16:262–6. DOI 10.1002/mus.880160304.
23. Umapathi T, Koh JS, Cheng YJ, Goh EJH, Lim CSJ. The utility of sural-sparing pattern in the electrodiagnosis of regional subtypes of Guillain-Barré Syndrome. Clin Neurophysiol Pract. 2020;5:43–5. DOI 10.1016/j.cnp.2019.12.002.