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MedEst|2026 | Vol.6: e534 | ISSN: 2789-7567 |RNPS: 2524| LETTER TO THE EDITOR

Clinical-imaging complementarity in traumatic brain injury: beyond the Glasgow scale

Complementariedad clínico-imagenológica en el traumatismo craneoencefálico: más allá de la escala de Glasgow

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Dear Director:

Regarding the article "Glasgow Coma Scale in traumatic brain injury: universality and limitations" by Castell-Martínez et al. [(1)], published in MedEst in 2026, it is considered appropriate to expand the debate on an inherent methodological limitation of the Glasgow Coma Scale (GCS): its inability to characterize the anatomical extent of intracranial injury. This limitation does not invalidate the utility of the GCS, but it does require recognizing that its prognostic value achieves greater precision when correlated with objective imaging criteria.

The heterogeneity of traumatic brain injuries poses a challenge for the establishment of diagnostic and therapeutic strategies. In this context, cranial computed tomography (CT), the GCS, and the Marshall classification constitute the main tools for assessing severity and predicting outcomes [(2, 3)]. However, the GCS presents situations in which its validity is compromised: intubated, sedated, or intoxicated patients, in whom neurological evaluation is biased [(1, 4)].

The Marshall classification for traumatic brain injury, derived from tomographic findings, categorizes the injury into six types based on the status of the basal cisterns, midline shift, and the presence of space-occupying lesions [(5)]. Previous studies have shown that higher Marshall categories are associated with greater six-month mortality [(6, 7)]. Crucially, evidence indicates an inverse correlation between the GCS and the Marshall classification: the lower the GCS score, the higher the severity of the Marshall category [(3, 8)]. This relationship is neither linear nor deterministic, which is precisely the central argument of our letter.

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Chuquillanqui-Inga et al. [3] found this inverse correlation to be statistically significant, and Fiallos-Duque et al. [9] demonstrated that patients with moderate neurotrauma (GCS 9-12) can present diffuse type II lesions and non-evacuated masses (Marshall VI), with midline shift greater than 5 mm and lesions larger than 25 mL as determining prognostic factors. These findings show that the GCS assessed in isolation may underestimate or overestimate the actual structural damage.

However, the mere observation of an inverse correlation does not alone justify a combined stratification. Brown et al. [10], in an analysis of 4,895 patients from the Traumatic Brain Injury Model System, found that the adapted Marshall classification (categories I-IV) provided predictive value only for the need for craniotomy or craniectomy during acute hospitalization, but not for one-year functional outcomes. This finding calls for critical reflection: Marshall, like the GCS, has defined prognostic limits and should not be overinterpreted.

It is therefore considered that the contribution of the article by Castell-Martínez et al. [1] could be enriched if it were made explicit that the GCS-Marshall complementarity does not consist of an arithmetic sum of scales but rather a clinical decision matrix where both variables operate as independent axes. The GCS provides immediate functional information; Marshall provides objective structural information. Their discordance —rather than their concordance— is what generates relevant clinical alerts.

By way of illustration, we present a matrix of clinical scenarios (Table 1) where discordance between GCS and Marshall modifies therapeutic management relative to what each scale would suggest in isolation.

Table 1. Scenarios of GCS-Marshall discordance with prognostic and therapeutic implications

Scenario	GCS	Expected Marshall (by GCS)	Actual Marshall	Clinical implication	Suggested management
Closed trauma with mild focal deficit	14 (mild)	I-II	IV (shift >5 mm)	GCS underestimates structural severity	Urgent CT; immediate neurosurgical

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					evaluation
Intoxicated patient	12 (moderate)	II	III-IV (cistern compression)	GCS biased by toxic factor	Do not delay surgical decision due to clinical "moderate"
Post-traumatic with amnesia, no focal signs	15 (mild)	I	II (diffuse injury)	Risk of underestimating diffuse injury	Systematic CT despite normal GCS
Severe trauma without lateralization, normal CT	7 (severe)	III-IV	I (normal CT)	Better structural prognosis than expected	Rule out extracerebral causes of coma before aggressive invasive management
Decompensated chronic subdural hematoma	11 (moderate)	II	VI (non-evacuated mass >25 mL)	Risk of sudden deterioration due to intracranial hypertension	Early surgical evaluation; do not rely on "moderate"

Source: Authors' own elaboration.

This matrix does not aim to establish a combined ordinal classification but rather to illustrate that joint assessment allows detection of risk situations that a single scale would miss. In agreement with Castell-Martínez et al. [1], the GCS maintains its functional universality, but its topographic limitation requires imaging complementation.

Finally, it is necessary to recognize the limitations of this approach. The Marshall classification does not consider the specific location of hemorrhage nor does it assess diffuse axonal injury [5]; furthermore, its predictive power for long-term functional outcomes is limited [10]. In resource-constrained settings —such as ours— CT availability is

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not always immediate, forcing clinical decisions initially based on the GCS. However, when CT is available, its critical correlation with the GCS enriches decision-making.

In conclusion, it is proposed that the management of traumatic brain injury benefits from a two-dimensional approach: the GCS as a functional urgency indicator and the Marshall classification as a structural correlate of severity. Their integration should not seek a single scale but rather a decision framework where discordance between the two constitutes the most relevant warning signal.

BIBLIOGRAPHICAL REFERENCES

1. Castell-Martínez LM, Fleitas-Almirall AA, Lorente-Espronceda Y. Escala de coma de Glasgow en traumatismo craneoencefálico: universalidad y limitaciones. MedEst [Internet]. 2026 [cited 10/03/2026];6:e463. Available in: https://revmedest.sld.cu/index.php/medest/article/view/463

2. Rivera-Ordóñez AC, Jojoa-Cultid AI, Mora-Benitez DA. Trauma craneoencefálico moderado y severo en un hospital del suroccidente de Colombia: factores clínico-radiológicos relacionados con la mortalidad. Acta Neurol Colomb [Internet]. 2024;40(2):e1771. DOI: 10.22379/anc.v40i2.1771

3. Chuquillanqui-Inga ME, Peralta-Navarro MG. Relación escala de Glasgow y Marshall en traumatismo encefalocraneano detectado por tomografía en el Hospital Ramiro Prialé Prialé Huancayo 2018 [Tesis en línea]. Perú: Universidad Peruana Los Andes; 2023 [cited 10/03/2026]. Available in: https://hdl.handle.net/20.500.12848/7477

4. Fernández-Reverón F, Núñez-Whong-Shue JS, Verdecia-Sánchez LI, Guzmán-Rubín E. Trauma craneoencefálico. En: Rodríguez-Castillo O, Duarte-Pérez MC, Laffita-Gámez Y, Pozo-Alonso AJ, Hernández-Mollings AO, Sevilla-Tirado AL, et al. Pediatría. 2.ª ed. La Habana: Editorial Ciencias Médicas; 2024. Tomo 2. p. 166-176.

5. Radiopaedia. Marshall classification of traumatic brain injury [Internet]. 2025 [cited 10/03/2026]. Available in: https://radiopaedia.org/articles/marshall-classification-of-traumatic-brain-injury

6. Tjokorda Gde BM, Golden N, Saputra A, Ryalino C. Modified Revised Trauma-Marshall score as a proposed tool in predicting the outcome of moderate and severe traumatic brain injury. OAEM [Internet]. 2018;10:135-139. DOI: 10.2147/OAEM.S179090

MedEst. 2026| Vol. 6: e534
ISSN: 2789-7567 | RNPS: 2524

7. Coronel-Coronel M, Vaca-Maridueña R, Vásquez-Cedeño D, Valverde-M A. Correlación entre variables clínicas sugestivas de hipertensión intracraneal y alteraciones en la neuroimagen en trauma craneoencefálico. Rev Ecuat Neurol [Internet]. 2022;31(2):27-30. DOI: 10.46997/revecuatneurol31200027

8. Chang M. Correlación entre la escala de Glasgow y los hallazgos tomográficos con la mortalidad intrahospitalaria en pacientes con diagnóstico de traumatismo craneoencefálico [Internet]. 2011. [cited 10/03/2026]. Available in: https://clinmedjournals.org/articles/ijccem/international-journal-of-critical-care-and-emergency-medicine-ijccem-7-116.php

9. Fiallos-Duque JA, Mónica-Eulalia AT. Hallazgos tomográficos según Escala de Marshall en pacientes con traumatismos cráneo encefálicos moderados y severos atendidos en el Hospital Vicente Corral Moscoso. CEUS [Internet]. 2023 [cited 10/03/2026]; 5(1):e168. Available in: https://ceus.ucacue.edu.ec/index.php/ceus/article/view/168

10. Brown AW, Leibson CL, Malec JF, Perkins PK, Diehl NN, Larson DR. Predictive utility of an adapted Marshall head CT classification scheme after traumatic brain injury. Brain Inj [Internet]. 2019;33(4):487-496. DOI: 10.1080/02699052.2019.1566970

CONFLICTS OF INTEREST

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