Commentary

The FOUR Score: A Reliable Instrument to Assess the Comatose Stroke Patient

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The Glasgow Coma Scale (GCS) is a widely known tool for the evaluation of patients with impaired consciousness and coma [1]. The scale has been translated into many languages and is commonly used in clinical research and practice. Nevertheless, some criticism was raised on its enforcement [2–4]. Shortcomings of the GCS included the impossibility of testing the verbal component in intubated patients, the lack of items to graduate the severity of coma (abnormal brainstem reflexes, changing breathing patterns, and the need for mechanical ventilation), and therefore the impossibility to follow subtle changes of the neurological status in comatose patients. Consequently, there have been several attempts to develop new and improved scales over time [5, 6]. In our opinion, the FOUR (Full Outline of UnResponsiveness) score represents an important step forward [7]. The FOUR, as disclosed by the acronym, tests eye response, motor response, brainstem reflexes, and respiration with a score from 0 to 4, where 4 is the best performance, in each category. Inter-observer reliability for the FOUR was good to excellent and was similar to that for the GCS, also in the first study where raters had only little experience with the scale [7–9]. The strengths of the scale are based upon its simplicity to use and to overcome the inadequacy of the CGS for the evaluation of intubated patients since the FOUR score does not include a verbal response. With the inclusion of brainstem reflexes and respiration the scale allows an accurate evaluation of the comatose patient, enabling to track subtle changes in the neurological status that cannot be recognized by the CGS. Moreover, it gives some hints to identify patients with the locked-in syndrome through the capability, at the eye response item, of tracking and blinking on command as well as patients in the vegetative state since they open their eyes but are unable of tracking or blinking on command. However, since the scale was not developed to evaluate permanently unconscious or severely disabled patients, it is unable to distinguish patients with vegetative state from those in the minimally conscious state [9–12].

So far, the scale has already been translated into French [13] and we welcome in this issue of European Neurology the Spanish version [14]. Authors from the University of Madrid and from the Mayo Clinic compared the Spanish version of the FOUR score with the GCS in 60 patients with acute stroke or transient ischemic attack [14]. They found a good correlation with the GCS and a high inter-observer agreement giving proper validation to the Spanish version for its use in clinical research and practice. Availability of a validated Spanish version of the scale is important since Spanish is the second most diffuse language worldwide.

The primacy of the GCS for almost four decades is now challenged by the FOUR score that, in our opinion, will also contribute to fill up some of the grey areas of the National Institutes of Health Stroke Scale (NIHSS). Actually, in the same paper, authors also compared the FOUR score with the standardized NIHSS in the evaluation of...
neurological deficits in patients with acute stroke [15]. The NIHSS has been translated and validated in many languages. To date it is still the most widely diffused tool for assessing stroke patients who are candidates for intravenous and intra-arterial thrombolysis and/or mechanical thrombectomy. The scale has 11 items to evaluate level of consciousness, best gaze, visual field, facial and limbs strength, limb ataxia, sensory function, best language, dysarthria, and extinction and inattention.

Only item 1 assesses the level of consciousness and consequently, a patient with a score of 3 at item 1a is evaluated as comatous. However, one of the major concerns with the NIHSS is that where a patient is scored 3 on item 1a, the assessment of most of the remaining items is challenging. In fact, while items 1b and 1c can easily and reliably be scored as 2, items evaluating facial and limbs strength, sensory function, language, and extinction and inattention are conventionally scored as if the patient had the maximum degree of severity in the corresponding item; limb ataxia is conventionally considered absent while items referring to best gaze and visual field are scored according to patient’s performance. To test the best gaze in the unconscious patient the oculocephalic maneuver (doll’s eyes phenomenon) can be performed. However, testing the visual field is particularly challenging because the eyes of the patient are normally closed and when passively opened by the examiner, blinking is impaired. In a comatose patient the NIHSS score ranges from 35 to 40, where 42 is the maximum global score of the scale (for details, see online supplementary table, www.karger.com/doi/10.1159/000313952). Moreover, the NIHSS lacks items to grade the severity of coma and is worthless in stroke patients with impaired consciousness. Despite not having been formally evaluated, its reliability and usefulness in the comatose patients is poor. On the contrary, the FOUR score, intended to be applied to patients with disturbances of consciousness, is able to recognize and grade their severity.

Accordingly, the validation of the FOUR score in acute stroke patients [14] is important since it provides a further tool that can be applied per se and mostly in those patients in whom a full evaluation by means of the NIHSS is hindered by its grey zone. In conclusion, to date, the more itemized FOUR score may not only integrate and eventually replace the GCS from or after the first evaluation of the unconscious patient in the acute phase but in patients who score 2 or 3 at item 1a of the NIHSS may allow a more comprehensive evaluation.

References

12 Wijdicks EFM, Bamlet WR, Marmatton BV, Manno EM, McClelland RL: Does the JFK Revised Coma Recovery Scale complement the FOUR score? Ann Neurol 2006;60:745.