

AUG 26 1980

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Journal of Neurology, Neurosurgery, and Psychiatry, 1980, 43, 377-379

Measuring the duration of post traumatic amnesia

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SUMMARY A simple quantitative test is described for measuring the duration of post-traumatic amnesia. It was used in a study of 336 patients with closed head injury; and the results matched closely the independent estimates of experienced neurosurgeons. A systematic procedure of this kind is clinically useful in its sensitivity to fluctuations or deterioration in the patient's mental state. It could also be used with advantage in multi-centre research by providing a standard criterion for the assessment of post-traumatic amnesia.

Post-traumatic amnesia, defined as a failure of continuous memory, was proposed by Russell¹ as a useful index of the severity of brain damage. His suggestion has been substantiated by an impressive body of data.²⁻⁴

While there have been experimental⁵ and methodological⁶ doubts as to the efficacy of this criterion, it remains one of the best measures available for classifying severity of injury and for predicting outcome.⁷⁻¹² However, a lack of consistency in clinical definition and practice makes it difficult to evaluate and compare studies in this field. Considerable progress has now been made in obtaining reliable and consistent predictions of outcome in relation to coma¹³⁻¹⁵ through the use of simple quantitative scales. A similar approach is required for the measurement of post-traumatic amnesia in order to obtain a sharper and more consistent diagnostic and predictive tool. Accordingly, a simple memory task was included in the protocol for a survey of head-injured patients admitted to the Radcliffe Infirmary, Oxford between February and August, 1976.

Method

Background A survey was carried out of all patients admitted to the Radcliffe Infirmary, Oxford between February 1 and August 31 in 1976. Patients were included if they had a history of loss of consciousness or amnesia or any exter-

nal head laceration requiring radiological investigation to eliminate the possibility of a skull fracture. Data concerning age, sex, type of accident and length of stay in hospital were registered by the investigators. Of the 944 patients admitted during this period, only 21 (2%) were referred from other hospitals for special treatment. Thus there are grounds for assuming that this was a good representative sample of acute admissions for head injury in the region.

Subjects The group chosen for scrutiny were males between the ages of 16 and 56 years. 336 patients satisfying these criteria were admitted during the six-month period, comprising one third of the total head-injured population. 63% of these patients were in hospital for only one night. 57% were aged between 16 and 25 years. The main causes of injury were, in order of frequency, road traffic accident (automobile (28%) or motor cycle (18%)), falls (16%), and assault (13%).

Procedure The accident wards were visited early in the morning, seven days a week, for the six-month period. Estimates of orientation and of the length of post-traumatic amnesia were made in the following manner by the neuropsychologists concerned:

1. A simple questionnaire was used to ask the patient for personal details (for example, age, marital status, number of children, occupation) and to test his orientation in time and space. If the patient was unable to respond spontaneously, he was presented with a multiple choice (thus, if he did not respond to the question "where are you now?" he was asked "are you at home, in a hotel, or in a hospital?")

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Accepted 3 January 1980

2. The patient was asked about his memories of events before the accident, for example, time, location, manner; and he was specifically questioned about his *last* memories before the accident and his *first* memories after the accident.

3. The patient was then shown three coloured pictures of common objects (a dog, a coat, and an armchair) and was asked to name them. He was then asked to remember them and the examiner stressed this point, showing the photographs again and pronouncing their name at the same time. The examiner then said that he or she would return the following day to check whether the pictures had been recalled. The patient was also asked to remember the examiner's face and first name.

The following day the examiner returned to give the same questionnaire and to check the recall of face, name, and pictures. If the patient failed to respond spontaneously, recognition memory for names and pictures was tested as follows:

He was given a choice of three names (of which two were either phonologically similar or had the same number of syllables as the examiner's name) from which to choose. In the case of the object-pictures, he was shown eight pictures including the three stimuli and five new distractor items (in shuffled order with the constraint that the three target items did not appear in succession) and he was asked to respond "yes" or "no" according to whether he had been shown the same picture the previous day. Perfect recall was scored if the patient responded "yes" to the three positive stimuli and "no" to the five distractor items. The procedure was repeated until the patient's recall was perfect for three successive days, using the recognition measure. Post-traumatic amnesia (PTA) was judged to have ended on the first of three successive days of correct recall. Among cases with a PTA of less than one day, those with an amnesia of minutes only, were identified by clinical examination. Different distractor items were used every day for the picture recognition test for three weeks. After that period, for the very small number of cases who were still amnesic, the distractor series was used again in the same sequence, that is, the distractor items for Day 1 were used for Day 22 and so on. When there was a change of examiner from one day to the other, the new examiner carried a colour photograph of the previous examiner and asked the patients whether they had seen the person on the photograph before and, if so, what was his or her first name.

Results

The data thus obtained were used to group patients into PTA categories similar to those used by Russell and Smith²: less than 10 minutes; 10 minutes–1 hour; 1 hour–24 hours; 1–7 days; 1–4 weeks; and more than four weeks. The results of these estimations of duration of post-traumatic amnesia are shown in table 1. The distribution is not dissimilar to that of a similar population sample described by Lidvall, Linderöth, and Norlin.¹⁶

Table 1 *Estimated duration of PTA*

PTA Estimates	Number of patients	
	Total	Per cent
Less than 10 minutes	157	46.7
10 minutes–1 hour	58	17.3
1 hour–24 hours	70	20.8
1–7 days	14	4.2
1–4 weeks	6	1.8
More than 4 weeks	2	0.6
*Not available	29	8.6
	336	100.0

*This group mainly comprised patients with minimal injuries who were discharged before testing was completed.

While this study was being carried out, neurosurgical colleagues were also conducting a survey of the effects of head injury in the course of which they interviewed separately, on the ward, 80 of our patient sample. This provided an independent clinical estimate of duration of post-traumatic amnesia with which the test results could be compared. Table 2 summarises the neuropsychological and neurosurgical estimates of post-traumatic amnesia on the 80 patients interviewed by both departments: they matched well. The relationship between measures of PTA and of orientation was close; it will be presented in detail in a subsequent report.

Table 2 *Comparison of estimates of neuropsychologists and neurosurgeons*

Duration of PTA	Neuropsychologists	Neurosurgeons
Less than 10 minutes	39	41
10 minutes–1 hour	14	15
1 hour–24 hours	22	20
1–7 days	5	3
1–4 weeks	0	1
	—	—
Total	80	80

Discussion

It was reassuring to see that there was good agreement between estimates of experienced neurosurgeons and neuropsychologists. This suggests that the phenomenon of post-traumatic amnesia is a measurable clinical entity on which independent observers can agree. We suggest, therefore, that for research purposes—particularly when multicentre trials are involved—a systematic and quantitative method of estimating the duration of post-traumatic amnesia is valuable, to compare populations and to relate this measure to valid measures of outcome. An additional advantage of this technique is that it enables the daily observer to detect, at an early stage, a slight deterioration in the patient's condition that may require urgent clinical or surgical treatment.

FN and GR were supported by Grant No G 973/144 from the Medical Research Council.

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