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**Head Injury Prognosis: Calculations From Clinical Data**

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With 2 Figures

In order to establish a more accurate clinical prognosis in head injuries, a series of 600 consecutive cases without previous history or associated lesions (secondary intracranial or general) were analysed.

**Material and Method**

All cases were seen within an hour of accident. Four hundred and ninety-four cases had initial loss of consciousness, and 145 were in coma at arrival, while 349 were in different levels of consciousness. A total of 156 were in coma at some time (109 caudo-cranial evolution; and 47 cranio-caudal).

Daily clinical assessment, complementary studies, and a three year follow-up on survivors were done, as well as postmortem studies in deceased patients.

The following parameters were used: a) *The brain stem specific reflex activity*, b) *The patients basic general reactions* (motor, arousal, and mimic), and c) *the degree of integrity of higher mental functions*. The evolution of these cases could be displayed in graphic form and plotted against time, the appearance and disappearance of clinical signs compared in upwards and downwards evolving cases; signs appearing always in the same relative order of succession could be taken as evolutive landmarks. Thus, a clinical picture appearing constantly in a similar position on the graph, associated with a given landmark, can be taken also, as a *Functional Level of neurological integration* (FL) and used to indicate evolutive stages of a dynamic process without implying, a priori, any anatomical significance. Thus, neurological grading as a necessary step for devising a Head Injury Prognostic Scale could be done by using those levels.
In this way, we have been able to draw the following levels from our evolutive charts and compare them with postmortem and complementary studies:

I. Apnoea and total arreflexia, corresponding to a Medullary level.

II. Vegetative reflexes only (Ponto-Medullary level).

III. Extensor motor reaction (E); some deglutition (2. component); spontaneous respiration can be present. Irregularly dilated pupils (Mid-Pontine level).

All patients from these levels (more than one hour) died.

IV. Extensor response; corneal and deglutition reflex. Mid-dilated and fixed pupil. Spontaneous breathing (seems to correspond to Upper-Pontine level). Recovery was possible.

V. Extensor (E) or Flexor (F) response, mostly downwards corneomandibular reflexes. Fixed and mid-dilated or small pupils. Postmortem and radiological studies point to Mesencephalic level.

From here onwards, in upward (ascending) comas, the cases may follow one of three evolutive lines: a) Still presenting a extensor motor reaction at the end of the first week and remaining so in the following levels. We did not find recovery. b) Those showing a non-specific (flexor) reaction at the end of the first week and entering such condition in the next stages. On reaching arousal, they can proceed in one of two ways: either they regain menace or normal motor reaction during the second week (with good prognosis) or, failing to do so, the prognosis is poor (remaining demented in our series). c) Those showing normal (N) motor reaction within the first week made a good recovery.

VI. Positive vestibular reaction and oculo-cephalio reflexes, seem to correlate, in progressing comas, with recovery or integrity of Mesencephalic level.

VII. Reappearance of arousal and Blink reflex (2. component), seems to indicate recovery of Mesencephalic-Diencephalic reticular formation.

VIII. Reappearance of menace reflex (and the disappearance, shortly before, of the oculo-cephalic), seems to mark the beginning of corticalization.

IX. Full cortical level is represented by this level, comprising a series of transitional syndromes: obnubilation, confabulation, severe amnesia, mutism etc.

X. This level corresponds to normal condition.

I. Prognosis/Neurological Condition/Evolutive Time Relationship

We found in our series that probability of recovery, on the whole, increased with recovery of neurological function and the speed of its recovery (Fig. 1).