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THE OUTCOME OF HEAD INJURIES: THE SAUDI EXPERIENCE

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ABSTRACT

One analysis of the outcome of 159 cases of head injuries was based on patients' admission Glasgow Coma Scale (GCS), score, age, CT scan findings and uniform protocol of management. Fifty-three percent of the patients were children below the age of 10 years and 70 % of all patients were Saudis. Eighty-point-five percent (80.5 %) of the patients had a GCS score of 8 or more and their outcome was favorable. By contract, the 19.5 % who had an initial GCS score of 7 or less tended to be older and had a worse prognosis (mortality 68 %). A high initial GCS score, old age, associated multiple injuries and a shift of more than 4 mm of the midline structures on CT scan of the brain are useful prognostic indices in predicting the outcome of head injury.

Key Words: Head injury, Glasgow Coma Scale

INTRODUCTION

Injuries to the head often result in death or irreversible motor and/or sensory defect.[13] The medical, social, psychological and economical problems of the disabled patients who survive such injuries can be considerable. Moreover, the impact on society because of the high cost and use of medical facilities for these patients is enormous.[1] The scientific medical literature on the subject is vast. In the Kingdom, comprehensive national epidemiological statistics on head injuries and road traffic accidents are, so far, incomplete despite the well-observed high incidence and mortality mainly among young people.[1,2,3,4)] The authorities in Saudi Arabia have long recognized this problem and have taken active steps to correct it, Several neurosurgical units were established throughout the Kingdom over the past three to four years. Part of the function of such units is the specialized management of head injuries in an attempt to raise the standard of treatment and to improve the outcome.

During the last 20 years the management of head injuries has evolved favorably as a result of a) better understanding of intracranial dynamics, b) the introduction of CT scanning, and c) organization of treatment in specialized neurosurgical centers. In this paper we present our experience in the management of head injuries and their outcome during the first 18 months of our unit in King Fahd Hospital of the University, Al Khobar. During this period we adopted the policy of admitting all referred cases, but in the subsequent year we became more selective because of both the limitation of beds and of manpower.

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MATERIALS AND METHODS

This is a retrospective review of head injury patients admitted to King Fahd Hospital of the University in the period from August 1981 to January 1983 with the following types of injuries: blunt head trauma, penetrating head injuries, intracranial hematoma and depressed skull fractures causing major focal neurological defects or unconsciousness for at least six hours.

The patients analyzed in this study included 140 males and 19 females. The average patient age was 15.9 ±2 years with a range from 4 months to 67 years. Although the severity of brain injury varied, all patients required either surgical treatment or management in the intensive care unit (ICU) initially. The Glasgow Coma Scale (GCS) was used to grade each patient's level of consciousness. The initial GCS score was obtained on admission and before treatment at this hospital although some patients had been given osmotic diuretics or steroids in the primary referring hospital.

A CT scan was obtained on admission for 64 patients. For those with positive CT scan findings, the presence of midline shift was measured using the septum pellucidum and the inner table of the skull as markers. The shift was divided into two goups: 1) 4 mm or less and 2) more than 4 mm.

Following diagnosis on admission, the decision to undertake operative decompression of a mass lesion or not to operate was indicated by the nature of the patient's intracranial injury. A regime of hyperventilation, low-dose steroids and mannitol was used to treat cerebral edema in its severe form. Intracranial pressure (ICP) monitoring was not employed.

Because a large number of patients did not comply with follow-up visits, the outcome at discharge was categorized according to the Glasgow Outcome Scale[6] into favorable (good recovery and moderate disability) or unfavorable outcome (severe disability, vegetative state and death).

RESULTS

Table 1 shows the age distribution of the patients. Thirty percent of head injuries occurred in children under the age of 10 years; 53 % occurred in the group aged 20 to 49 years. Seventy percent of patients were Saudi. The male to female ratio was 7:1. On admission, 80.5 % of the patients fell into the GCS category of 8 to 15. Thirty-one patients (19.5 %) had severe head injuries and their GCS score was 7 or less. Almost all fatalities occurred in this latter group (Table 2). Motor vehicle accidents (MVA) were the leading cause of injury and accounted for 72.9 % of head injuries and 78 % of the fatalities (Table 3).

Table 1. Age Distribution Of The Sample

Age	Male	Female	No.	%	Saudi	Non-Saudi
0–9	39	9	48	30	38	10
10–19	10	1	11	6.9	9	2
20–29	18	3	21	13.2	13	8
30–39	32	4	36	22.6	21	15
40–49	26	2	28	17.6	17	11
50–59	19	—	10	6.2	7	3
≥60	5	—	5	3.1	5	—
TOTAL	140	19	159		110	49

Table 2. Neurological State On Admission

Initial GCS score	No.	%
8–15	128	80.5
5–7	27	16.9
3–4	4	2.5

Table 3. Cause Of Head Injuries

Source of Injury	No. of Cases	%	Death	%
Motor vehicle accidents	116	72.9	17	14.6
Other	43	27	5	11.6

Table 4. Radiological Investigations

Type	No.	%
Skull X-ray	152	95.5
CT scan	64	40.2
Angiography	1	0.6

Table 5. Relationship Between Outcome And CT Scan Findings

CT Scan	No. of Cases	Outcome	
		Favorable	Unfavorable
Extradural Hematoma	8	6	2
Subdural Hematoma	16	2	14
Intracerebral Hematoma	7	3	4
Diffuse Injury	9	4	5
Normal	24	22	2*
TOTAL	64	37	27

* One patient died from respiration arrest and the second from multiple injuries.

The quality of skull X-ray films from the referring hospitals was often poor; however, these films remained the leading first-line investigative tool (Table 4). CT scans performed on 64 patients (Table 5) revealed a definitive traumatic pathology in 40 patients (62.5 %). Patients with acute subdural or intracerebral hematomas had the worst prognosis and 78.2 % of this group had a fatal outcome. The delay in their transfer to our unit accounted, in part, for their high mortality. Correlation of the outcome to the midline shift on the admission CT scan was striking. Sixteen of 18 patients whose midline had shifted 4 mm or more were dead or in persistent vegetative state (PVS) on discharge (Table 6).

Table 6. Relationship Between Midline Shift And Outcome

Midline Shift	No.	Outcome Favorable	Unfavorable
>4 mm	18	92	16
<4 mm	27	14	13

The outcome on discharge correlated closely with the initial GCS score as shown in Table 7. The total mortality was 14.5 %. Two fatalities occurred in the mild to moderate head injury group with GCS scores of 8–15: one died from respiratory arrest in the ward and the other from multiple injuries. The outcome also correlated with the age of the patient. While 10 % of the children aged 9 or less had an unfavorable outcome, all the elderly patients aged 60 or more died or were in PVS. The reverse is true in the good recovery (GR) to moderate disability (MD) groups (Table 8). The average stay in the ICU of patients requiring intensive care was 21 days.

Table 7. Outcome In Relation To Intial GCS Score

Initial GCS Score	No.	Favorable GR	MD	Unfavorable SD	PVS	D
8–15	128	108	13	4	1	2
5–7	27	1	3	1	5	17
3–4	4	—	—	—	—	4
TOTAL	159	109	16	5	6	23 (14.5%)

GR: = Good recovery
MD: = Moderate disability
SD: = Severely disabled
PVS: = Presistent vegetative state
D: = Dead

Table 8. Relationship Of Age To Outcome

Age	No.	D/PVS	%	SD	MD/GR	%
0–9	48	5	10.4	0	43	98
10–19	11	2	—	0	9	—
20–29	21	5 23.8	0	16	76	
30–39	36	5		1	30	—
40–49	28	3	—	1	24	—
50–59	10	4	40	3	3	30
≥60	5	5	100	0	0	—
TOTAL	159	29		5	125	

GR: = Good recovery
MD: = Moderate disability
SD: = Severely disabled
PVS: = Presistent vegetative state

DISCUSSION

Head injuries constitute a major part of the work of a newly established neurosurgical unit in Saudi Arabia, reflecting the magnitude of road traffic accidents in the Kingdom. The alarming statistics for the year 1979 form the Road Traffic Control Department, Ministry of Interior, and Riyadh Central Hospital give an indication of the extent of the problem of road traffic accidents and their tragic consequences in Riyadh. In 1979, 28 thousand cars were involved in more than 17 thousand accidents leading to the death of 2871 (17 %) people and the hospitalization of 16832 patients suffering from serious injuries.[1]

In an earlier study, similarly alarming statistics for Asir Province were found during the years 1975 to 1977 with a total of 2694 admissions and 167 fatalities (6.2 %). Besides the human loss, the economic waste is also enormous, estimated as being more than 4.5 Million SR/day due to road traffic accidents and the management of their victims.[1] In all the reported series, head injuries were the leading cause of death and morbidity.[2,3,4)]

In the first 18 months after the establishment of our unit, referred head injuries constituted almost one half of our admissions from the catchment area of the Eastern Province. This by no means reflects the total number of head injuries in the province, as most patients are admitted to the district hospitals of Dammam, Qatif, Dhahran, and Hofuf. Similar to other reports, the majority of the victims were young Saudi males with a mortality of 14.5 % (23 cases) and a morbidity 16.9 % (27 cases) on discharge; but this high rate may be due to the high initial GCS score and the lack of prolonged follow up. The GCS is of value not only as an objective and reproducible means of quantifying the degree of neurological impairment, but also as a basis for making early, accurate predictions of the likely outcome of head-injured patients.[5]

Our data show that the initial GCS score and be used to reliably predict the outcome in patients with an initial score of more than 7 or of less than 5. Ninety-four percent (n=121) of our sample with an initial GCS score greater than 7 had a favorable outcome, and 100 % of those with an initial score of less than 5 had an unfavorable outcome. For the intermediate group with a score of 5 to 7, the outcome was worse than expected: 85 % had an unfavorable outcome, as most of them did not improve or move up the scale at 24 hours.[7] The delay in their transfer to our unit and the distances involved may have accounted for these results.

Age can affect the outcome independently of response score, pupil reaction or eye movement. The worst outcome is predictable for patients aged 60 years and older.[8] None of the patients in that age group in this study survived.

Miller et. al. looked at other factors that can help predict the outcome, including ICP, and found that all patients in whom ICP could not be brought under control, died.[9] The value of ICP monitoring in influencing the outcome of head injuries, however, remains uncertain.[10] We have not employed this technique but a prospective study is planned to investigate its influence on the outcome in patients with a GCS score of 8 or less. In a prospective randomized study of the efficacy of steroid therapy in patients with severe head injury, Thomas Gaul and colleagues[11] found no statistically significant difference in the outcome of the steroid and non-steroid groups at six months. Furtheremore, Copper et. al. failed to show any difference between high-does steroids and placebo in a large number of patients.[12]

Despite the above results, most neurosurgeons elect to include steroids in their protocol for management of patients with severe head injuries. We, in agreement with Becker and Tindall[13], instituted therapy with dexamethasone, though in low doses. However, as there was no control group in the present study, no useful conclusion of the efficacy of these steroids could be made.

We believe that the criteria we have used in addition to intracranial pressure (ICP) measurement could serve as early indicators to the likely outcome of head injury. This will help the treating surgeon to formulate an early estimate of the prognosis and hence concentrate his effort and

resources on salvaging those cases which require the utmost care.

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