The Outcome of Head Injury: The Saudi Experience

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Abstract

The outcome in 159 cases of head injury was evaluated in terms of the Glasgow Coma Scale (GCS) score, age, and computed tomographic (CT) findings. Children below the age of 10 accounted for 30% of the head-injured patients, and 69% were Saudis. 81% of the patients had a GCS score of 8 or higher, and in this group the outcomes were favorable. In contrast, 19% had an initial GCS score of 7 or less, tended to be older, and had worse outcomes, with a mortality rate of 68%. The initial GCS score, age, presence or absence of associated injuries, and the degree of midline shift according to CT were useful prognostic indices in patients with head injury.

Key words: head injuries, Glasgow Coma Scale, Saudi Arabia, subdural hematoma, intracranial pressure

Introduction

Head injuries often result in death or irreversible motor and/or sensory deficit. The medical, social, psychological, and economic problems of disabled patients who survive such injuries are considerable. In addition, the impact on every nation of the high cost of medical care for these patients is enormous. The medical literature on the subject is vast. In Saudi Arabia, comprehensive national epidemiological statistics on head injuries and traffic accidents are so far incomplete, despite the well documented high incidence and mortality, which affects mainly young people. The authorities in Saudi Arabia have long recognized this problem and have actively attempted to correct it. Several neurosurgical units have been established during the past 4 years. One function of such units is the specialized management of head injuries, the objective being to raise the standard of treatment and reduce the morbidity and mortality.

Over the last 20 years, the management of head injuries has improved as a result of better understanding of intracranial dynamics, the introduction of computed tomography (CT), and the construction of specialized neurosurgical centers. We present our experience in the management and outcome of head injuries in the neurosurgery unit of King Fahd Hospital of the University, Al-Khobar, during its first 18 months of operation. During this 18-month period, we admitted all referred cases. Subsequently, however, it became necessary to be more selective because of limitations of both beds and manpower.

Patients and Methods

We conducted a retrospective review of 159 head trauma patients admitted to our unit from August, 1981 through January, 1983 with the following types of injuries: blunt head trauma, penetrating head injuries, intracranial hematoma, and depressed skull fractures causing major focal neurological deficits or unconsciousness for at least 6 hours.

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

A skull x-ray was obtained in 152 cases (96%) at the referring hospital. Although these films were often of poor quality, skull x-rays were nonetheless the main source of initial information. A CT scan was obtained on admission in 64 cases (40%), including all of those with the GCS scores of 11 or less. On CT scans, the position of the midline structures was evaluated, and any shift was measured, the septum pellucidum and the inner table of the skull serving as markers. Patients with midline shift were divided into two groups according to whether the displacement was ≤ 4 mm or > 4 mm. Angiography was performed in a single patient (0.6%) because of a suspected isodense, bilateral subdural hematoma.

After the initial diagnosis had been made, whether to undertake operative decompression of a mass lesion or treat the patient conservatively was decided, based on the patient's intracranial status. A regimen of hyperventilation, low-dose steroids, and mannitol was used to treat severe cerebral edema. Intracranial pressure (ICP) was not monitored.

Because a large number of patients did not comply with the follow-up protocol, we analyzed only the outcome at discharge. According to the score on the Glasgow Outcome Scale,6) outcome was rated as favorable (good recovery or moderate disability) or unfavorable (severe disability, persistent vegetative state, or death).

Results

Table 1 shows the age distribution of the patients, 30% of whom were under 10 years of age. Those in the 20- to 49-year age group accounted for 53% of the head injuries. 69% were Saudi nationals. The male to female ratio of 7:1 is explained by the fact that Saudi females are prohibited by law from driving. On admission, 128 patients (8.1%) had mild to moderate head injuries with GCS scores of 8-15. Thirty-one patients (19%) had severe head injuries with GCS scores of 7 or less, and almost all of the fatalities occurred in this group. Motor vehicle accidents were the leading cause, accounting for 73% of the head injuries and 78% of deaths (Table 2). Among these, the great majority of victims (82%) were automobile occupants and the remainder were pedestrians, very few were motorcyclists; since the climate of Saudi Arabia discourages the use of motorcycles and walking outdoors.

The outcome at discharge was closely correlated with the initial GCS score, as shown in Table 3. The total mortality was 14%. Two fatalities occurred in the mild to moderate head injury group, one resulting from respiratory arrest and the other from multiple injuries. Outcome was also related to age: whereas only 10% of children 9 years old or younger had an unfavorable outcome, all of the patients aged 60 or older died or were persistently vegetative (Table 4).

CT scans, obtained in 64 cases, demonstrated
definite trauma-induced pathology in 40 (63%) (Table 5). Patients with acute subdural or intracerebral hematomas had the worst outcomes, and 78% of this group died. The correlation between outcome and the degree of a midline shift on admission was striking. Sixteen of the 18 patients with a shift of > 4 mm either died or were persistently vegetative at discharge (Table 6).

The average stay in the intensive care unit was 21 days.

Table 4 Relationship between age and outcome

<table>
<thead>
<tr>
<th>Age</th>
<th>GR or MD</th>
<th>SD</th>
<th>PVS or D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>43 (89.6%)</td>
<td>0</td>
<td>5 (10.4%)</td>
<td>48</td>
</tr>
<tr>
<td>10-19</td>
<td>9 (81.8%)</td>
<td>0</td>
<td>2 (18.2%)</td>
<td>11</td>
</tr>
<tr>
<td>20-29</td>
<td>16 (76.2%)</td>
<td>0</td>
<td>5 (23.8%)</td>
<td>21</td>
</tr>
<tr>
<td>30-39</td>
<td>30 (83.3%)</td>
<td>1</td>
<td>5 (13.9%)</td>
<td>36</td>
</tr>
<tr>
<td>40-49</td>
<td>24 (85.7%)</td>
<td>1</td>
<td>3 (10.7%)</td>
<td>28</td>
</tr>
<tr>
<td>50-59</td>
<td>3 (30.0%)</td>
<td>3</td>
<td>4 (40.0%)</td>
<td>10</td>
</tr>
<tr>
<td>60≤</td>
<td>0</td>
<td>0</td>
<td>5 (100.0%)</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 5 Relationship between CT findings and outcome

<table>
<thead>
<tr>
<th>CT findings</th>
<th>No. of cases</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extradural hematoma</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Subdural hematoma</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Intracerebral hematoma</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Diffuse injury</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Normal</td>
<td>24</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 6 Relationship between midline shift and outcome

<table>
<thead>
<tr>
<th>Midline shift</th>
<th>No. of cases</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;4 mm</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>≤4 mm</td>
<td>27</td>
<td>14</td>
</tr>
</tbody>
</table>

The correlation between outcome and the degree of a midline shift on admission was striking. Sixteen of the 18 patients with a shift of > 4 mm either died or were persistently vegetative at discharge (Table 6).

The average stay in the intensive care unit was 21 days.

Discussion

Head injuries constitute a major part of the caseload in the newly established neurosurgical units in Saudi Arabia, which reflects the high rate of traffic accidents in this country. The alarming statistics for the year 1979 compiled by the Road Traffic Control Department, Ministry of the Interior, and Riyadh Central Hospital indicate the magnitude of the problem and its tragic consequences in Riyadh. In 1979, 28,000 cars were involved in more than 17,000 accidents, resulting in 2871 deaths (17%) and 16,832 serious injuries requiring hospitalization.

An earlier study disclosed similarly alarming statistics for Asir Province from 1975 to 1977. Among a total of 2694 patients admitted because of traffic accidents, 167 died (6.2%). Apart from the loss of human life, the economic cost is enormous: it is estimated that more than 4.5 million Saudi riyals (U.S. $5,400,000) are lost each day because of traffic accidents, including the cost of medical care of the victims. In all reported series, head injuries are listed as the leading cause of death and morbidity. 4,8,12

In the first 18 months after our unit was established, head injury referrals constituted almost one half of our admissions from the Eastern Province. However, this by no means reflects the total number of head injuries in this province, as the majority are admitted to the district hospitals of Dammam, Qatif, Dhahran, and Hofuf. Our own statistics are similar to those of other reports. The majority of our head-injured patients were young Saudi males. On discharge, their mortality rate was 14% (23 cases) and their morbidity rate was 17% (27 cases).

The GCS is valuable as an objective, reproducible means of quantifying the degree of neurological impairment and of making early, accurate prognoses for head-injured patients. In our series, the initial GCS score reliably predicted the outcome when it was higher than 7 or lower than 5. Among those with scores of 5-7, the outcome was worse than expected; most patients showed neither clinical improvement nor higher scores within 24 hours of admission,7 and 85% had a poor outcome. Delays in their transfer, particularly in cases of acute subdural or intracerebral hematomas, attributable mainly to the distances involved, may have been responsible for the high rate of poor outcome.

Age can affect the outcome independently of the GCS score, pupillary responsiveness, or eye movement. The worst prognosis is for patients 60 years of age or older. In this study, all patients in that age group died or were persistently vegetative.

Miller et al.9 examined other factors that can influence the outcome, including ICP and found that all patients whose ICP could not be brought under control died. However, the value of ICP monitoring
in improving the prognosis in head injury remains uncertain.\textsuperscript{10} We have not utilized this technique, but a prospective study is planned to investigate its impact on the outcome of patients with GCS scores of 8 or less.

In a prospective, randomized study of the efficacy of steroid therapy in patients with severe head injury, Saul and colleagues\textsuperscript{10} found no statistically significant difference in outcome at 6 months between those treated and those not treated with steroids. Furthermore, Cooper et al.\textsuperscript{3} observed no difference in outcome in a large patient population treated with either high-dose steroids or placebo. Despite the controversy, most neurosurgeons elect to include steroids in their management of severely head-injured patients. In agreement with Becker\textsuperscript{2} and Tindall,\textsuperscript{10} we instituted therapy with low doses of dexamethasone. There was, however, no control group in our study, so we can draw no conclusions regarding the efficacy of the steroid therapy.

References


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