

## Head Injuries\*

### Review of 150 Cases

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A retrospective review of head injured patients seen at Freedmen's Hospital over a five-year period was undertaken as a part of a plan to develop a neurosurgical profile for this urban hospital which handles predominantly black patients. This information, so derived, may be utilized to evaluate delivery systems and quality of care received, to direct future prospective studies, and to direct the nature and content of the medical school curriculum in this teaching hospital. Such information is necessary to add a black perspective to the curricula of medical schools whose primary goal is the health problems of the black community and to avoid the "Miseducation of the American Negro"<sup>1</sup> as related to these medical students.

The study of head injured patients on a comparative basis is especially difficult because of the large number of variables involved. Such variable factors as the location of the hospitals and their proximity to high speed highways; the characteristics of the patient populations utilizing the hospitals; the hospitals admission policies and their treatment philosophies; and many others must be taken into consideration.

#### METHOD

The records of the Neurosurgical Division of Freedmen's Hospital were reviewed and the charts of all patients with a diagnosis of head injury were abstracted using a prepared standard form. The period covered was from January 1, 1966 through May 30, 1972. One hundred ninety-two patients were identified and the records were avail-

able on 150. Of these 147 were recorded as black and three as white.

#### AGE & SEX

In these series, 119 of the patients were male (79.3%). This represents a similar male predominance as noted in all types of accidents and is similar to the male preponderance in the subdural hematoma series of DeJesus<sup>2</sup> (77%) and McKissock (68%)<sup>3</sup>.

The age of the patients in this series was somewhat lower than is often reported. Twenty-one (14%) of our patients were over 60 while 42% of McKissock's series were over 60. Twenty-nine of our patients (19.5%) were under 20 and the largest number of patients were in the 4th decade of life. In the Kansas City series of DeJesus, more patients were in the 5th decade of life.

#### SOCIO-ECONOMIC STATUS

Thirty-nine (32.2%) of 121 patients over 20 were married and living with their spouses, while 36 (29.7%) were single and 44 (36.3%) were widowed, separated or divorced.

Forty-nine (42%) of 116 patients, between 18 and 65 were employed; 60 (52%) were unemployed, and no information concerning the occupational status of seven patients was available.

The marital and occupational status of patients in other series was unavailable, but the high incidence of the absence of "marital bliss" and lack of a steady job noted in our series, appears to be significant.

The majority of patients in this series had no hospitalization insurance and were unable to pay

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their hospital bills. For the year 1971, figures from Freedmen's Hospital were available for method of payment for patient days. Comparing the Freedmen's Hospital head injured patients with all Freedmen's Hospital admissions in 1971, 65% of patient days of head injured patients were in the "no pay" category while 12.2% of all patients were in a similar category (Table 1).

TABLE 1.—INSURANCE STATUS  
FREEDMEN'S HOSPITAL 1971  
(Patient Days)

	Head Injured Patients %	All Patients %
Medicare	6.1	11.0
Medicaid	12.7	50.0
Blue Cross and Other	11.0	23.9
Private Pay	5.2	1.4
Non-Pay	65.0	12.4
Other		1.3

Comparable figures concerning marital, employment and insurance status were unavailable in other series. The results in our series bear out the general concept<sup>2, 4</sup> that head injured patients, in large city hospitals, particularly those with subdural, come largely from the lowest socio-economic strata of urban society.

#### PREDISPOSING AND COMPLICATING FACTORS

It is well documented that alcoholics and epileptics are particularly prone to receive head injuries—especially subdural hematomas. Sixty-six of our patients were chronic alcoholics and 42 of these were acutely intoxicated on admission to the hospital. Historically, all of these patients were intoxicated at the time of their injury; the 12 other patients were intoxicated at the time of their injuries but were not thought to be chronic alcoholics. In 78 patients (52%), however, alcohol played a significant role in causing the head injury. The incidence of chronic alcoholism in the Kansas City series<sup>2</sup> was found to be 60% while Ransohoff, et al<sup>4</sup> state that "many" of the head injured patients in a large New York City hospital are chronic alcoholics. There does not appear to be any significant difference in the incidence of chronic alcoholism in our series.

Seizures are well known to bear a significant causative relationship to head injuries, especially subdural hematomas. Four patients in the non-

alcoholic group were known to have seizures antedating their head injuries and 15 of the alcoholic group were similarly affected. The head injury in each instance occurred in relationship to a seizure. Four non-alcoholic and 11 alcoholic patients developed their first seizures in relationship to their head injuries. The 19 patients (12.6%), whose seizures "caused" their head injuries and the 15 patients (10%) whose seizures were "caused by" their head injuries may be compared to the 3.4% and 13% of Kristiansen,<sup>5</sup> respectively. Other authors have described the incidence of "new" seizures in subdural hematomas, 42% of Cole and Spatz<sup>6</sup> and 71% of McKissock.<sup>3</sup>

Five of the patients in this series were heroin addicts and were under its influence when they sustained their head injuries. Two patients sustained their injuries, when they fell while under the influence of barbiturates.

Eighty-nine patients (59.3%) had significant predisposing factors associated with their head injuries—alcoholism, 78 (52%) seizures, four (2.6%); and drugs, seven (4.7%).

Pre-existing hypertension, determined by history, was noted in 19 (12.6%) patients. Hypertension, not previously diagnosed, but persisting during hospital convalescence until treated, was observed in 32 (21.3%) patients.

Pre-existing diabetes was recorded in 10 (6.7%) patients while abnormally elevated fasting and two-hour post-prandial blood sugars were observed during the convalescence of eight (5.2%) head injured patients.

Although, "new" abnormal elevations in blood pressure and blood sugar may have been related to central nervous system trauma, their persistence during the convalescence period would appear to indicate a pre-existing tendency for these abnormalities to occur. Patients with transient increases in blood pressure or blood sugar levels were not included. Moreover, hypertension and diabetes are felt to increase morbidity and mortality from stressful conditions—including head injuries. Comparable figures in other series were not found, and the figures in our study were not "age adjusted".

A positive serologic test for syphilis (VDRL) was obtained in 10 out of 101 instances in which it was studied. No comparable figures for the general hospital are available, but in our group of stroke and brain tumor patients, the VDRL was positive in less than 2% of cases. None of the pa-

tients, with a positive serology, had symptoms or signs which were compatible with luetic involvement of the central nervous system or heart. The increased incidence of positive VDRL's was apparently an index of the socio-economic strata of the group. This seems to be unrelated, in the absence of central nervous system involvement, to altered response to their head injuries. Comparable figures from other studies are not available.

#### ADMISSION CONSCIOUS LEVEL

Forty-seven patients (31.4%) were classified as being in semicoma or coma on admission. The conscious level of the head injured patient remains the most important prognostic index available. Thirty-one (66%) of the patients died, while 6.9% of those admitted alert and 4.6% of those admitted in a drowsy state, died. The relatively high percentage of those admitted in semicoma or coma is related to a relatively high mortality. McKissock's<sup>3</sup> subdural series showed that only 10% were admitted in coma, while 54% of our patients with subdurals were admitted in coma. Comparable figures from large city hospitals in the United States were not found.

#### MECHANISM OF INJURY

The injuries sustained by the persons in this series occurred primarily from blows (36.8%) and falls (32.6%). Fourteen percent were related to vehicular accidents, either as occupants or as pedestrians. In this series, 15.4% had no history or evidence of head injury on physical examination or on x-ray. These patients had subdural hematomas, however.

The most frequent mechanism, in the Formosan series of Yao Chang Chien,<sup>7</sup> was traffic accidents (59.6%). Jamieson states<sup>8</sup> that "the major portions of our head injuries come from collisions and other undesired eventualities on our roads. . . ." The relatively low frequency of head injuries due to vehicular accidents may be related to the inner city location of our hospital, where there are no nearby high speed roads, to ambulance emergency patient transportation patterns, and possibly to the fact that few of these patients own vehicles. The nationwide percentage of injuries due to falls and blows is significantly greater in American blacks than in American whites.

#### PRIMARY DIAGNOSIS

The final diagnosis on the discharge note was tabulated. Patients, with more than one diagnosis relating to their head injury, were classified under the most serious of the two. Some could have been characterized as combination diagnosis, e.g. subdural hematoma and cerebral contusion. However, we avoided altering the records and did not utilize this technique. The large number of subdural hematomas, 56 (37.4%) was surprising. The incidence of subdurals in Echlin's New York series<sup>9</sup> was 1% of head injuries and 5% of all severe head injuries. The incidence of subdural hematomas might be significantly reduced if all unavailable records did not include any subdurals. Assuming that only 56 of 192 head injuries were subdurals, the percentage of 29.1% would remain significantly elevated. The explanation for the apparent increased incidence of subdural hematomas in our series is not clear.

#### SUBDURAL HEMATOMAS

The incidence of subdural hematomas (56 of 150 or 37.4%) was significantly higher than those reported in Echlin's 1948 series of 7916<sup>9</sup> head injuries, from a large metropolitan New York hospital, where only 70 subdurals (approximately 1%) were reported in all head injured patients. Kalyaraman et al.<sup>10</sup> in 1970, reported that 1.4% of head injuries at Medical College General Hospital in Madras, India, had subdural hematomas. The high incidence in our series may be invalid because some information was unavailable. The ratio of extradural hematomas to subdural hematomas in our group is 1:28. This ratio is similar to that of Jamieson<sup>8</sup> who reported a ratio of 1:30 from his Australian series.

The mortality rate of 50% from all of our subdural hematomas is somewhat higher than Rosenbluth et al.<sup>11</sup> who reported 42 deaths in 100 subdural hematomas, from a Chicago hospital; Echlin,<sup>9</sup> who reported 25 deaths in 70 subdurals (35%), from a New York hospital; and DeJesus et al.,<sup>2</sup> who reported 32 deaths in 100 subdurals (70 operated), from a Kansas City hospital.

McKissock<sup>3</sup> reported 85 deaths in 389 patients with subdural hematomas. The higher mortality rate in our series possibly relates to a higher incidence of complicating and predisposing factors, but is unacceptable and should be improved.

## TREATMENT AND MORTALITY

Eighty-nine patients (59.3%) were treated without intracranial operations. Airway control, monitoring of blood gases, maintenance of fluid and electrolyte balance and caloric requirements, prevention of pulmonary stasis, and treatment with steroids and anticonvulsants were used in most of the patients with alteration in conscious levels for more than a few hours. Intravenous mannitol was used in some of the profoundly comatose patients. Fourteen (15.7%) of these patients died.

In addition to the above measures, 61 (40.6%) had intracranial procedures consisting primarily of burr hole craniotomies or occasionally, small bone flap craniotomies or sub-temporal craniectomies for removal of hematomas. Twenty-three (39.3%) of these patients died. Thirty-seven deaths were reviewed in regards to the admission level of consciousness and the presence of irreversible brain stem signs. These signs included fixed, dilated pupils, absent oculocephalic or cold caloric responses, irregular respiratory response and decorticate or decerebrate motor responses. In 15 of the 37 deaths, signs of brain stem dysfunction developed in the hospital and the patient was felt to have died of a cerebral death related to increased intracranial pressure. These 15 patients were felt to be possible candidates for "heroic surgery"—e.g. hemicraniectomy by the Ransohoff<sup>4</sup> technique.

The mortality rate for this series was felt to be too high and was related to a high percentage of patients in coma on admission and a high incidence of complicating factors.

## CONCLUSIONS

The retrospective nature of the study, missing data and the lack of similar data does not permit firm conclusions. The general impressions are, however, that this series of head injured black patients is similar, in most respects, to other series. However, some differences exist. The similarities show that the majority of those in this series were unemployed, unmarried, uninsured black males who were very often alcoholic or epileptic. The suggested differences are that more of the patients in the series are under 65 years; more have sustained their injuries from blows or falls; fewer have been injured in vehicular accidents; more are admitted in semicoma or coma; and more have a subdural hematoma; and more are likely to die.

The sum of the similarities and differences in head injured patients makes one surmise whether traumatic injury to the brain, skull and scalp, which are embraced under head injuries may be a psycho-socio-economic product of our confused, industrialized, aggressive, racist world.

## SUMMARY

1. Records of 150 head injured patients, hospitalized at F. H. from 1/1/66-5/30/72, have been reviewed. Of these, 97.5% were black.

2. There were more males than females (3:1); fewer married than "unmarried" (1:4); and more than 1/2 were unemployed and had no type of hospitalization insurance. Alcohol played a significant role in their injury or its effects.

3. More than 1/3 of the patients sustained their injuries as a result of a blow to the head.

4. Approximately 1/3 of the patients were semi-comatose on admission, despite a low incidence of vehicular injuries (14%).

5. The mortality rate was unfavorably influenced by alteration in conscious level, age and possibly by alcohol. It was higher in unmarried persons.

6. More than 1/3 of the patients had subdural hematomas.

7. This series showed that 40.6% of the patients had intracranial operations, with a mortality rate of 39.3%. The overall mortality rate was 24.7%.

8. Slightly less than 1/2 of the deceased patients may have been helped by newer, more extensive surgical procedures.

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on individual values and past experience rather than on well collected and assembled facts. State health planning agencies too have faltered because adequate information was lacking when they attempted to wrestle with questions of "certificate of need." Clearly, the issue of how these policies and priorities are established is one in which health centers have a great deal of interest. How will they fare *under revenue sharing* if political muscle is required? Probably not well! Another example is the regularity with which health education priorities are lowered by policy guidelines and implementation. It is the opinion of many that health education should have the highest priority because it yields the highest cost benefit or pay-off. The possible benefits of cultural and social change, behavior modification, as well as the improvement in the health care delivery system, are obvious. Since there is little information available to guide the policy makers in their decision-making, this high priority item will usually receive a lower ranking than delivery systems or direct health care services. Another example concerns the dilution of priorities and policies related to *minorities* as well as those *related to health care manpower*. I am convinced that HEW, which controls the largest single portion of the health care service dollar, is making the attempt to make policy analysis a more scientific part of their operation. In fact, I hope that they will find the information system that permits them to make the setting of policies and priorities a more deliberate process.

#### COMMENT

After all the anguish and fighting has subsided, who pays for the services of the comprehensive ambulatory community health centers? Basically these are federal dollars in the form

of grants, contracts, and government insurance in the form of Medicaid and Medicare. There is a trickle of "private" insurance money and out-of-pocket dollars. Who receives the service? By most accounts, the underserved populations use the programs according to their own taste, though not in impressive numbers. What is the pay off for the time and effort spent? The pay off has been great in terms of training many communities to awaken and involve themselves in meaningful self-determination and social change. The community health center programs have been like the space program in producing innovation, inertia, trials and failures, and serendipitous outpouring of knowledge. There has been considerable progress in health manpower innovation, especially in administration and allied health services. In the technology area, management information systems were designed, developed, refined, and equipment tested. Systems of patient handling were revolutionized, especially social services, health education and other disciplines which were permitted to break the mold and try new, exciting and effective methods.

It has been said that anything which benefits "the poor people of America" will also benefit the rest of America. We will find no finer example of this than the benefits from the on-going neighborhood health center movement.

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(Barber & Webster, from p. 204)