GUIDELINES FOR MANAGING MINOR HEAD INJURIES

Amin Tabish, N.A. Lone, M.A. Wani, Abdus Salam

Departments of Accident & Emergency Service, Neourosurgery and Internal Medicine
Sher-e-Kashmir Institute of Medical Sciences, Srinagar (J&K) India

Abstract: *Globally, thousands of people sustain head injury everyday. Early diagnosis and appropriate management improves outcome but is sometimes more difficult to achieve than might be imagined,injury to the brain is most likely to result in death or permanent disability. Estimates of traumatic brain injury (TB1) incidence, severity, and cost reflect enormous losses to individuals, their families, and society. Authors prospectively studied 485 consecutive patients of traumatic brain injury, out of which 280 with GCS of 1 3, 4, and 1 5 were subjected to routine early CT scan of head after 4 hours of reporting to Emergency Patients with penetrating head injury were excluded. 15 % of patients had abnormal CT scans and only 4% needed surgical intervention Though a small number of patients harbour potentially lethal intracranial lesions yet. most of these cases are salvageable if diagnosed and treated early.There is a strong need for improved methods of initial assessment including early CT scan and are treatment subsequently lead to reduction in the number of unnecessary admissions and a more focussed head injury care.*

INTRODUCTION

Traumatic brain injury (TBI) is a non-degenerative, non-congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairments of cognitive, physical, and psychosocial functions with an associated diminished or altered state of consciousness. Mild head injury refers to a traumatically induced physiologic disruption of brain function as manifested by one of the following: a) Loss of consciousness; b) Recent loss of memory for recent events; c) Immediately before or after the accident alteration in mental state at the time of the accident; d) Focal neurologic deficits, which may or may not be transient.

The other criteria for defining ***mild TBI*** include GCS score greater than 12, no abnormalities on CT scan, no operative lesions and length of hospital stay less than 48 hours. The criteria to define ***moderate TBI*** include length of stay of at least 48 hours. GCS score of 9-12 or higher, operative intracranial lesion and abnormal CT scan findings. ***Severe TBI*** is indicated when the GCS score is below 9 within 48 hours of the injury[1-14].

According to the Center for Disease Control (CDC), approximately 1.5 million people sustain traumatic brain injuries throughout the United States each year; of those approximately 1.1 million or 75 percent sustain a mild TBI Each year 1.4 million oeople attend hospitals in England and Wales after suffering a head injury, of whom 150,000 are admitted to hospital[15]. The annual estimated incidence of TBI in the United States and European countries is 200 to 300 patients per 100,000 population[16,17] TBI accounts for approximately 52000 deaths (40%) of all deaths) from acute injuries in the United States. Incidence of mild TBI is about I3 cases per 100,000 people, of moderate TBI-15 and severe TBI-14. Inclusion of prehospital deaths increases that figure to 21 cases per 100,000 people[1-14]. It is estimated that 350,000 patients require hospital treatment for mild head injury each year in the United States, representing 80% of all patients admitted to hospital for head injury[18-19]. Similarly, about I million head-injury patients hospitalised each year in the United Kingdom, one-fiftieth of the population [20]). Head injury causes 10% of new Accident & Emergency admissions in the UK and accounts for about 25% of all emergency observation ward admissions, with 97% of patients admitted for less than 24 hours. Thus mild head injury causes a significant number of visits to emergency departments and a substantial number of hospital admissions in both the United States and Europe.

The decision regarding when to use CT imaging for patients with minor head injury carries significant clinical as well as economic implications. To help physicians identify patients who are at risk of intracranial damage following minor head injury, two sets of guidelines have been proposed: the NOC (the New Orleans Criteria) and CCHR (The Canadian computed tomography head rule). While the NOC applies only to patients with a GCS score of I 5, the CCHR may be used for patients with a GCS score from 1 3 to 1 5

Thc CCE-IR and the NOC are clinical decision rules promulgated to identify which head Injury patients should undergo CT imaging The NOC recommends head CT for patients with minor head injury and any of the findings including headache, vomiting, age, older than 60 years, drug or alcohol intoxication, persistent anterograde amnesia, visible trauma superior to the clavicle, seizure.

Findings that should prompt CT evaluation by the standards of the CCRR include GC score less than 15 at two hours or more after the injury, suspected open or depressed skull fracture, any sign of basal skull fracture, two or more episodes of vomiting, age, 65 years or older, more than 30 minutes of amnesia of events prior to the injury, automobile vs pedestrian crash, ejection from a motor vehicle, fall from more than three feet, or fall from five or more stairs. The CCHR does not apply to persons younger than 1 6 years old or those with a hypocoagulable state. The NOC and CCHR can Jentify patients at high risk of intracranial trauma following minor head injury. The NOC is designed to apply only to patients with a GCS score of 15, whereas the CCHR may be used for patients with a GCS score from 13 to 15. The NOC and CCHR appear equally sensitive in predicting the need for neurosurgical intervention following minor head injury.

MATERIALS & METHODS

We carried out this prospective cohort study in the Emergency Departments of Sher-eKashmir Institute of Medical Sciences (SKIMS), Srinagar (India). SKIMS is a 600- bedded University hospital (with 100 beds for Accident & Emergency Department including 20 beds for the Disaster Management) catering to approximately seven million out of 1, 11, 82,000 population of Jammu

Correspondence: **Dr. S.A. Tabish,** *Head, Accident & Emergency Department, Sher-e-Kashmir Institute of Medical Sciences, Post Box: 826, GPO, Srinagar- 190001, India*

& Kashmir State. SKIMS is the only referral centre in Kashmir for the treatment of head injury. During November 2004 to January 2005. we included consecutive adults who presented with head injury we did standardized clinical assessments before the CT scan. A total of 280 Patients with GCS of' 13,14 and 1 5 were subjected to routine early CT scan (Spiral) of head after 4 hors of reporting to Emergency Department Patients with penetrating head injury ere excluded. No patient with a focal neurodeficit was included in the study Patients with normal CT Scans were discharged from Accident & Emergence\ Department while patients \\ho had abnormal CT Scans were admitted in the hospital further management under Neurosurgery department None of the discharged patients was re-admitted during the study for initial head injury. The main outcome measures include need for neurological intervention and clinically important brain injury on CT.

RESULTS

A total of 1085 head injury patients have been admitted during 2004 that comprise about 3.05% of 35505 total admissions. The study included 280(57.7%) of TBI patients, out of which 180 had GCS of 15, 72 had GCS of 14 and 48 had GCS of 13.44 (15%) had abnormal CT scans (Table1). Patients with GCS of 15 had 11% abnormal CT scans in contrast to 29 per cent in patients with GCS of 13.

Table 1. *Abnormal CT scan in relation to GCS*

GCS	Number of patients	Number of abnormal CT scans
15	160	17(11%)
14	72	13(18%)
13	48	14(29%)

Mild head injury refers to a patient with head trauma who has GCS of 13-15 (20,22). Any other clinical, radiological or surgical finding has been an additional risk. Kraus etal have reported that 80% of head injury admissions in hospital are of mold brain injuries[23-25]. Although these patients comprise the majority of head injury admissions. The consensus on the treatment policy of these patients is still lacking. In a busy trauma centre these patients occupy the majority of beds and utilize the hospital resources 17-18% of these patients have abnormal CT scans[26-27] and only 5-6% need surgical intervention (Table2). Though a small number of patients harbour potentially lethal intracranial lesions yet most of these cases are salvageable with early diagnosis and proper treatment.

Table2: *Category-wise percentage of patients with CT findings and need for surgical intervention*

Mode of injury	No patients	No. of positive scans	Patients requiring surgical intervention
Motor Vehicle Accidents	158(56%)	17(38%)	2(11%)
Fall	78(28%)	13(29%)	1(8%)
Assault	36(13%)	8(18%)	3(37%)
Flying objects	8(3%)	5(11%)	2(40%)

Early CT scanning can detect potentially lethal intracranial lesions and will reduce unnecessary hospital admissions.

Majority of patients were victims of motor vehicle accidents comprising 56 percent followed by falls 28 percent, assault 36 percent, flying objects like cricket ball etc 11 percent.

The abnormal CT scans when correlated with mode of injury that the highest number of abnormal scans (38%) patients hit by flying objects - assault and motor vehicle accidents. This may be directly related to the impact of force hitting the head. A total of 72 scans were abnormal *(Figure)*. Most common was single contusion around 4% patients needed surgical intervention (4 patients with depressed fracture, 3

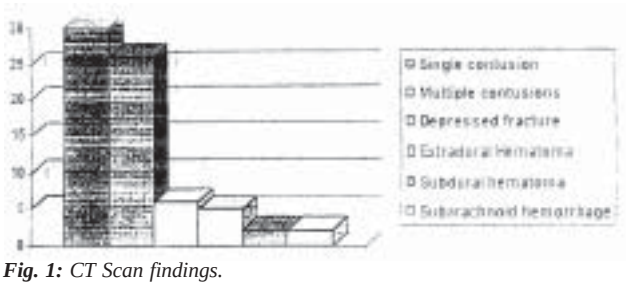


Fig. 1: *CT Scan findings.*

cases with extradural hematoma and, I case with contusion)

Forty-four (44) patients admitted after positive CT scan finding, accounted for 197 bed days. If all patients with brain trauma (including 236 with normal CT findings) had to be admitted for observation it would require additional 415 bed days; it saved 236 bed days for the hospital leading to availability of beds for new emergency admission

DISCUSSION

Minor injuries include patients having loss of consciousness, post traumatic amnesia with a GCS or more than13 in the United States, incidence of mild TBI is about 131 cases per 1,00000 people incidence of moderate TBI is about 10 cases per 100000 people. Incidence of severe TBI is about 14 cases per 100000 people more than 80 percent of TBI admission are mild and the average length of hospital stay was 265 days.

Recommendations for management of these patients vary from routine admission and observations without CT scan to mandatory CT scanning and admission to CT scanning without admission, The timing of the intant CT scan is important it has been shown that 14 to 20 percent of patients admitted with a diffuse brain injury may develop a mass resion within 12 to 24 hours after injury. Thus the danger is particularly evident when patient s with mild head injuries under go every year.

Difficulties encountered in the management of these patients include large number of such patients presenting as brain injuries and a high number of abnormal intracranial lesions which can be missed it routine CT scan is not done. Moreover, in appropriate admission of all patients withy head injury will need additional bed days in the presence of limited resources.

There is wide variation in the indications for obtaining a CTScan. One approach recommends scanning the vast majority of mildly TBI patients withy the only indication being loss of consciousness (LOC) or a period only in the presence of clinical deterioration[26,27,35] and a local neurological deficit. Some have suggested a combinationh of clinicoradiographic parameters, such as CT for all patients with a GCS score of 13 or 14 or a skull fracture. In patients with a GCS score of 15, the decision is left to the discreation of the treating neurosurgeon[38]. Some authors recommends CT on the presence of a skull fracture, persistent headache or vomiting or clinical deterioration [20,30] Purely clinical indications for CT are mild TBI with PTA or LOC, local neurological deficit, vomiting, headache, a serious injury mechanism[36,38] of Master criteria[38].

This SKIMS hospital adopted the policy of routine CT scanning of mild brain injury patients and selective admission of patients with abnormal CT scans. The authors observed that around 15 percent patients had abnormal CT scans. Similar results (1-18%) have been reported elsewhere[33,39,40]. Some authors have recommended routine admission and observation without CT scanning on the basis that it resulted in more efficient use of CT scanning. The authors behave that it results in large number of unnecessary admission that leads to over utilization of scarce resources that could otherwise be directed

to genuine admission.

Patients with admission GCS score of 13,14, or 15 have, minor or mild head injuries. A patient with mild head injury compolicated by an intracranial lesion has more severe sequalae and disability compared with a patient with anuncomplicated injury. In patients with a GCS score of 15 but LOC or PTA, diffuse headache, or vomiting a CT scan of the head must be obtained as soon as possible. In patients with admission GCS score of 14 or 15 but with skull fractures or neurological deficit CT Scan must be obtained immediately. The risk of missing delayed hematomas is overwhelming by the benefits of early hematomas detection. A CT scan should be obtained preferably with 4 hours of injury. Klauber et al[42] have reported a high mortality among very low risk patients in at least one hospital due to inadequate staffing which is a serious concern. One most question the reluctance to employ routinely early CT scanning in all cases of mind brain in jury because the policy of routine hospital admission for all patients of mild head injury results in more hospital charges[43]. Routine admission does not guarantee neurological observations, and the cost difference of CT scanning and X-ray films as screening devices are relatively less than cost of prolonged hospitalization lost wages, medical complication and expenses resulting from man practice.

Current use of cranial computed tomography (CT) for minor head injury nis increasing rapidly, highly variable and inefficient. The Canadian CT Head Rule (CCPR) and New Orleans Criteria (NOC) are previously developed clinical decision rules to guide CT use for p0atients with minor head injury and with Glassow Coma Scale (GCS) scores of 1500 15 for the CCHR and a score of 15 for the NOC. Howe3ver, uncertainty about the ethical performance of these rules exists. For patient with minor head injury and GCS score or 15, the CCHR and the NOC have equivalent high sensitivities for need for neurosurgical intervention and clinically important brain injury, but the CCHR has higher specimen for important clinical outcomes than does not the NOC, and its use may result in reduced maging rates Then adopted NOC decision rule appears valid for use in all patients with minor head inbjury whon are 16 years or older and have a GCS score of 13 to 15, irrespective of loss or consciousness. However, further research is needed to identify patients with neurocraman injury who do not require neuro surgical intervention but may benefit from emergency CT scanning and to determine the optimal trade off between sensitivity and specincityn not

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