

## FREQUENCY OF POSITIVE CT SCAN FINDINGS IN MINOR HEAD TRAUMA BASED ON NICE GUIDELINES

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### ABSTRACT

**Objective:** To determine the frequency of positive CT scan findings in cases of minor head injury with GCS score of 13-15 at presentation based on NICE guideline.

**Study Design:** Cross sectional study

**Place and Duration of Study:** Study was conducted in departments of Radiology CMH Rawalpindi and MH Rawalpindi from 10<sup>th</sup> Feb 2010 to 10<sup>th</sup> Aug 2010.

**Subjects and Methods:** One hundred and thirty five indoor and outdoor cases, fulfilling the inclusion criteria, reporting to the radiology department after head trauma, were included in the study after seeking written informed consent. Computerized tomography (CT scan) of the brain was done. Positive CT scan findings i.e. fracture, extradural, subdural and intraparenchymal hemorrhage were noted.

**Results:** Total number of patients studied in this study was 135 and evaluated after taking written consent from them. Out of total 135 patients 104 (77%) were males and 31(23%) were females. Positive CT scan findings were found in 10(7.4%) patients while 125(95.6%) patients had negative CT findings. Among patients having positive CT scan findings epidural hemorrhage was found in 2 (1.5%), intraparenchymal hemorrhage with fracture in 3 (2.2%), skull fracture in 3 (2.2%) and 1 (0.7%) patient had subdural hemorrhage.

**Conclusion:** CT scan is done in minor head trauma although results are often normal. NICE clinical guideline helps in identification and early management of head injury. The goal of implementing such guideline is to do CT scan only in those who are at risk of developing complications, thus minimizing the cost of CT scanning as well as strain on emergency neurology and radiology departments.

**Keywords:** Minor head trauma, NICE guideline, Plain CT scans brain.

### INTRODUCTION

The CT scan is gold standard imaging modality for head trauma whereas the Glasgow Coma Scale or GCS is a neurological scale that aims to give a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment. NICE (National Institute for Clinical Excellence) guideline is used in head trauma patients to address the triage, assessment, investigation and early management of head injury<sup>1</sup>.

The CT scan has been the preferred diagnostic modality in evaluating minor head injury. The advent of CT scan has had huge impact for traumatic head injury because it has a rapid acquisition, is non invasive, universally

accepted, reliable and is easy to interpret<sup>1</sup>. An intracranial complication of minor head injury occurs rarely<sup>2</sup>.

Minor head injury is the blunt trauma to head after which the patient briefly loses consciousness, may have short post traumatic amnesia or both and may have normally and minimally altered mental status at the presentation (GCS score of 13-15). GCS is used to classify level of consciousness in the patient with head trauma. It is divided into three categories, eye opening (E), motor response (M) and verbal response (V). The score is determined by sum of score of three categories. The patients with GCS score of 13-15 have mild, 9-12 has moderate and < 8 has severe head injury. It indicates neurocranial traumatic lesions are present on CT scan. The lesions are skull fracture, epidural/subdural hemorrhage and intra parenchymal hemorrhage.

Several clinical guideline have been developed to help identify patients, whether CT

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scan should be employed at the time of presentation of minor head injury. An important goal of implementing such guideline is to do CT scan only in those who are at risk of developing complications, thus reducing the cost of CT scanning as well as strain on emergency Neurology and Radiology departments. CT scan is widely used in mild head injury patients although results are often normal<sup>3</sup>. 6% of population proportion has positive CT scan finding in minor head trauma<sup>2</sup>.

National Institute for Clinical Excellence (NICE Guideline) now recommends selection of adults for CT scan in minor head trauma, when within 1 hour, having GCS <13 when assessed or GCS < 15, 2 hours after injury, suspected open/depressed or skull base fracture, post traumatic seizure, focal neurological deficit, persistent vomiting or loss of consciousness since injury. CT scan is also indicated (within 8 hours of injury) if amnesia of more than 30 minutes in patients of age > 65 years, on warfarin or road traffic accident (RTA) as pedestrian or ejected from car or fall > 1 m<sup>4</sup>.

Potential risks of unnecessary exposure to ionizing radiation warrant cautious patient selection for CT scanning as well as radiation dose management. There is now general consensus that patients identified as moderate risk or high risk for intracranial injury should undergo early non contrast CT<sup>5</sup>. Cranio cerebral injury patterns in developing countries are not different from developed countries and knowledge of its causative factors, management and potential complications will help to plan active interventions that may improve outcome<sup>6</sup>.

### **SUBJECTS AND METHODS**

This cross sectional descriptive study was carried out at department of radiology CMH Rawalpindi and MH Rawalpindi from 10<sup>th</sup> Feb 2010 to 10<sup>th</sup> Aug 2010 where computerized tomography scan machines are available.

Inclusion criteria and exclusion criteria based on NICE Guideline was followed.

Total 135 patients were included in this study through non probability convenience

sampling. Data collection was carried out by CT

**Table-: Frequency of types of head trauma (n=135).**

Types	Frequency	Percentage
Epidural	2	1.5
Epidural/Fracture	1	0.7
Fracture	3	2.2
Intraparenchymal Hemorrhage	3	2.2
Subdural Hemorrhage	1	0.7
Nil	125	93.3

scan done on Toshiba Asterion Multislice CT scan machine. The imaging protocol consisted of acquisition of contiguous section with a maximum thickness of 3 mm infratentorially and 6 mm supratentorially without I/V contrast administration. Images were evaluated with brain and bone window. 3-D construction was done for skull fractures only at CMH Rawalpindi as only this machine has this feature. All patients were evaluated clinically by detailed history and neurological examination based on Glassgow Coma scale. CT scan non contrast was done by trained CT technicians and reporting of CT scan brain was done by classified radiologist on CT work station as well as on film.

Statistical analysis showed that out of total 135 patients, 104 (77%) were males and 31(23%) were females. Data was analyzed using SPSS version 15. Descriptive statistics were used to describe the results.

### **RESULTS**

A total of 135 patients were included in our study of these 104 (77%) were males and 31(23%) were females. Minimum age was 18 yrs, maximum 65 yrs with average age of 38 years. All these patients had undergone Non CE CT scan of brain.

Positive CT scan findings were found in 10 (7.4%) patients while 125 (92.6%) patients had negative CT findings. Among patients having positive CT scan findings epidural hemorrhage was found in 2 (1.5%), intraparenchymal hemorrhage in 3 (2.2%), skull fracture in 3 (2.2%)

and 1 (0.7%) patient had subdural hemorrhage (table and fig). Patients were not advised follow up later on as in this study only those patients were studied who presented to radiology and neurology department within 24 hrs of minor head injury. None of patient included in this study had unrecognized intracranial injury.

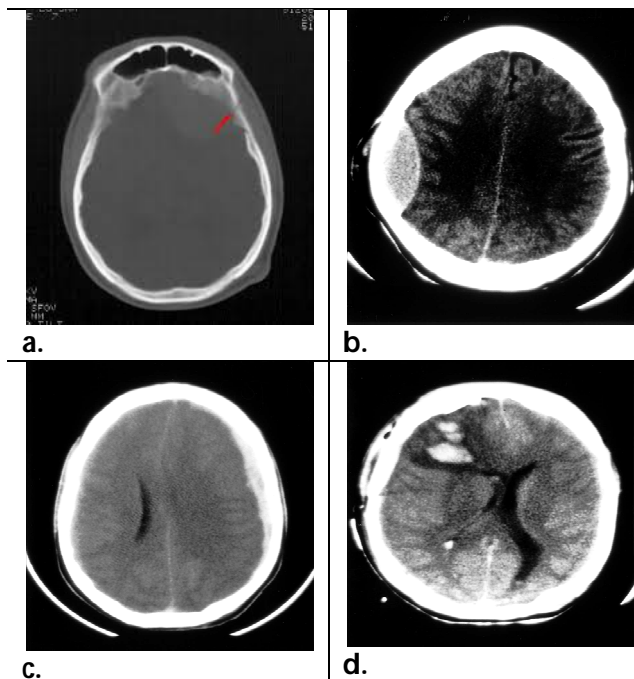
### DISCUSSION

Head injury is a major public health problem both logistically and clinically. Many patients seek healthcare advice for this, although relatively few will need care in a neuroscience centre<sup>8</sup>. A "head injury" is best defined as an injury that is clinically evident on physical examination and is recognized by the presence of ecchymoses, lacerations, deformities, or cerebrospinal fluid (CSF) leakage. A traumatic brain injury (TBI) refers specifically to an injury to the brain itself and is not always clinically evident, if unrecognized, it may result in an adverse outcome. Traditionally, minor head trauma has been defined as blunt head trauma in a patient with a Glasgow Coma Scale (GCS) score of 13 to 15<sup>9</sup>.

CT scan is the preferred diagnostic modality in evaluating minor head injury. The advent of CT scan has had huge impact for traumatic head injury because it has a rapid acquisition, is non invasive, is universally accepted, reliable and is easy to interpret<sup>1</sup>. An intracranial complication of minor head injury occurs rarely<sup>2</sup>.

Although implementation of NICE guideline is clearly intended to improve patient care, the sheer number of patients with head injury means that any change in policy may have important effects on the ambulance service, neuroscience centre's, and the other work of emergency, intensive care, and radiology departments. Reassuringly, though, the major change advocated in the first NICE head injury guideline from a policy of admission (with plain skull radiographs being used as a triage tool), to diagnosis through computed tomography was not as disruptive as many had anticipated and led to improvements with safe early discharge, evidence of a reduction in the numbers of

admitted patients and cost savings in some centres<sup>7</sup>. In army NICE guideline can help to reduce the cost of the CT scan as well as strain on



**Figure-: Showing CT features of positive CT scan (a. Skull fracture b. Extradural hematoma, c. Subdural hematoma d. Intraparenchymal hemorrhage).**

emergency neurology and radiology departments.

Most patients (80–90%) who sustain a minor head trauma (MHT) do not need admission to the hospital and almost all are sent home with appropriate instructions.

Considering the large number of people affected, the routine use of computerized tomography (CT) scan is rather expensive and not always practical. Although the vast majority of patients with MHT go on to make an uneventful recovery, a few patients with unrecognized intracranial injury ( haemorrhage, contusion, edema, or laceration to the brain substance or meninges) deteriorate and become neurologically devastated, severely disabled or die<sup>10,11</sup>.

Positive CT scan findings were found in 10 (7.4%) patients while 125 patients had negative CT findings reported by classified radiologists

consistent with the study done by Smits et al<sup>2</sup>. Minor head injury: Guideline for the use of CT- A multicentre validation study showed 6% population proportion with positive CT scan<sup>2</sup>. Among patients having positive CT scan findings epidural hemorrhage was found in 2 (1.5%), intraparenchymal hemorrhage in 3 (2.2%), skull fracture in 3 (2.2%) and 1 (0.7%) patient had subdural hemorrhage.

Potential risks of unnecessary exposure to ionizing radiation warrants cautious patient selection for CT scanning as well as radiation dose management. There is now general consensus that patients identified as moderate risk or high risk for intracranial injury should undergo early non contrast CT<sup>5</sup>.

In brief, CT scan is widely used in mild head injury although results are often normal. This study would help in prompt detection of significant intracranial pathology, avoidance of unnecessary hospitalization and cost saving which is the important consideration in minor head injury if we assess patient on NICE guideline.

### CONCLUSION

CT scan of brain is the cornerstone test in the evaluation of traumatic brain injury. CT scan is done in minor head trauma although results are often normal. NICE clinical guideline help in identification and early management of head

injury. NICE guideline on the basis of Glasgow coma scale can identify patients who have no need for head CT imaging. NICE guideline methodologically sound, clinically useful and addresses assessment, investigation and early management of head injury. This has the advantage of being cost effective and prevents unjustifiable exposure of patients to radiations as well as reducing the strain on hospitals.

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