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Role of Non-Contrast Computed Tomography in Evaluation of Traumatic Brain Injury

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ABSTRACT

Head trauma is a major public health concern throughout the world, and is the most serious of all health problems facing developed countries. [1] In this new era of radiology, computed tomography scan has become the basic primary modality of choice for the initial assessment of head injury patients. It is also easily available, faster and highly accurate in detecting skull fractures and acute intracranial hemorrhage. [2] A prospective study was conducted based on convenience sampling at Department of Radiology, Ankur Matrika Hospital, Jammu, among 50 patients who were all referred for NCCT head investigation. The study was performed to determine the clinical findings, type of fracture and site of fracture. The study concluded that NCCT head investigation is the best primarily modality for patients with history of traumatic brain injury.

Keywords: NCCT Head, MDCT, tomography, reconstruction.

INTRODUCTION

CT scan stands for computed tomography scan. It is a special form of tomography in which a computer is used to make mathematical reconstruction of a tomographic plane or a slice. The first clinical computed tomography scan (CT) scan on a patient, suspected for frontal lobe tumor, took place on 1st October 1971 on a prototype scanner developed by Sir Godfrey N. Hounsfield. The scanner produced an image with an 80 x 80 matrix. [3] In 1974, Dr Robert Steven Ledley gave the whole-body CT scanner. [4] Nowadays skull radiographs are no longer systematically recommended in the assessment of head trauma. Indeed, some series reported that management or outcome is not significantly affected by skull film findings, because a skull fracture alone does not indicate a serious internal head injury. Computed tomography is now widely recognized as the first-choice imaging for the initial evaluation of patients with head injury. [5, 6] The aim of the study is to know the exact extent of head injury, evaluate type of injury by CT scan & to locate the site of fracture and type of fracture by using computed tomography scan. A prospective study was conducted based on convenience sampling at Department of Radiology, Ankur Matrika Hospital, Jammu, among 50 patients who were all referred for NCCT head investigation. NCCT head protocol was used and the raw data was acquired with 5mm slice thickness, 5mm increments and reconstructed with standard filter.

MATERIALS & METHODS

The source of data for this study are patients referred to Department of Radiology, Ankur Matrika Hospital, Jammu from OPD/IPD for a period of one year, from 15 July 2022 to 15 April 2023.

INCLUSION CRITERIA: All the patients with head injury.

EXCLUSION CRITERIA: Patients in whom CT could not be performed, pregnancy, & patients who cannot be shifted for CT Scanning. After obtaining clinical history relevant clinical examination was done. CT examinations were done on MDCT GE 16 slice. The protocol for Adult NCCT Head was chosen and axial images were acquired using the following protocol and technique. The acquired 5 mm axial images are then reconstructed by using IRS in 1.5 mm slice thickness. The CT head images were evaluated in axial, coronal and sagittal views and are used to know the exact extent of head injury, evaluate type of injury by CT scan & to locate the site of fracture and type of fracture. The data obtained was statistically analyzed using SPSS version 19 software.

RESULT

A prospective study was conducted to evaluate traumatic brain injury using non-contrast computed tomography for head (NCCT Head), the study was carried out on 50 patients referred from Ankur Matrika Hospital, Jammu. The results are shown below:

Table 1: Descriptive table represent the CT findings

CT Findings	Yes	No	Total
Fracture	28	32	50
Hemorrhage	25	25	50

Table 2: Descriptive table represent the type of fracture

Types of fracture	Yes	No	Total
Linear	14	36	50
Depressed	7	43	50
Basilar	1	49	50
Elevated	4	46	50
Penetrating	1	49	50

Table 3: Descriptive table represent the site of fracture

Site of fracture	Yes	No	Total
Frontal	2	48	50
Temporal	6	44	50
Parietal	11	39	50
Occipital	8	42	50

DISCUSSION

A prospective study was conducted to evaluate traumatic brain injury using non-contrast computed tomography for head (NCCT Head), the study was carried out on 50 patients referred from Ankur Matrika Hospital, Jammu. The age of the referred patients was from 11 to 80 years, and the mean was found to be 41.2. History of trauma (100.0%) was the most common complaints followed by the headache (76.0%) and seizure (38%). The study showed that findings of fracture and hemorrhage were 50.0%. Linear fracture (28%) was the most common followed by the depressed fracture (14%). The most common site of fracture was parietal bone (22%) followed by the occipital bone (16%). Out of 50 patients 20.0% patients are normal and 60.0% patients are abnormal and statistics result shows non-significant.

Fig.1: Linear Fracture

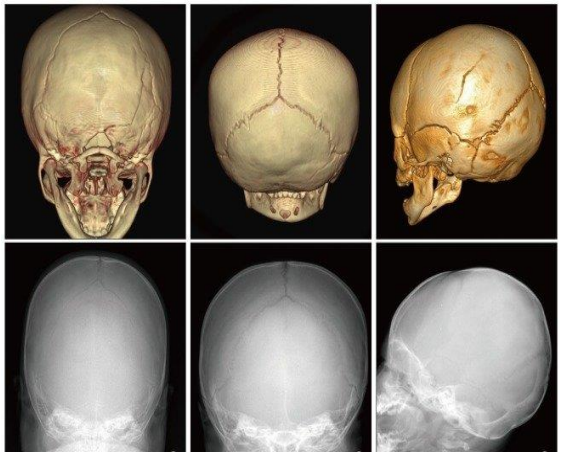

Fig.2: Three-dimensional (3D) view of linear fracture

CONCLUSION

Non-contrast Computed Tomography head scans are very sensitive for detecting traumatic brain injury. Helical CT is more sensitive than Axial CT in detecting fractures, site and type of fracture. This study comprises of total no. of 50 cases, out

of which 40.0% patients are normal and 60.0% patients are abnormal. The most common site of fracture was in parietal bone and linear fracture was the most common. The most common type of fracture was linear fracture.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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