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# "Study of Head Injury in Emergency Department Using Conventional X-ray and Computed Tomography"

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### Abstract:

This was a descriptive and analysis study, the main objective of this study to give simple overview of head trauma in emergency department using conventional x-ray and computed tomography CT. This study included random sample of 50 patients (29male and 21 female) with age between (1-60) years old . The study was carried out at the Al Ribat University Hospital in Khartoum Sudan, during the period of February 2018, and the data were collected from this hospital for CT machine (Siemence 16slices)and conventional x-ray machine (TOSHIBA). The result including that the head trauma was higher in male (58%) than in female(42%), the most effected age group were the age between (30-40) years , the Road Traffic Accident RTA type was most common (60%), and the fall down and head by stick was same percent (20%). The result also showed that using CT technique was highly accurate in the head trauma because some cases were normal in x-ray (44%) but CT showed fracture (14%) and hemorrhage (30%), and the other cases were fracture only in x-ray (56%) but CT showed fracture and hemorrhage (24%). It concluded that the CT scan is best modality in diagnosis of head trauma because it has high accuracy in detect of fracture and hemorrhage but x-ray can detect the fracture only.

Key words: Head trauma, Conventional x-ray, CT

### **1.1 Introduction:**

Head injury is the main cause of morbidity and mortality in emergency department, any injury that results in trauma to the skull or brain can be classified as a Head injury. The terms traumatic brain injury and head injury are often used Interchangeably in the medical literature. This broad classification includes neuronal injuries, hemorrhages, vascular injuries, cranial nerve injuries, and subdural hemorrhage SDH, Extradural hematoma EDH, among many others. These classifications can be further categorized as open (penetrating) or closed head injuries. This depends on if the skull was broken or not. Because head injuries cover such a broad scope of injuries, there are many causes—including accidents, falls, physical assault, or traffic. Adults suffer head injuries more frequently than any age group. Their injuries tend to be due to falls, motor vehicle crashes, colliding or being struck by an object, and assaults. Children, however, tend to experience head injuries due to accidental falls and intentional causes.

Presence of fracture skull on X-ray is indicative of more serious intracranial injury for this why skull radiographs are routinely done [6]The conventional x-ray sometimes is not enough to diagnose all cases that come to the emergency department such as head trauma which may cause small cranial fractures, cerebral hemorrhage and edema .All of these mentioned cases of trauma need accurate diagnosis to plan for urgent treatment .computed tomography became well established in diagnosis of diseases of the central nervous system, and in some cases, and reduced the frequency of cerebral angiography. Seidenwurm. (2007).

### 2. Materials and Methods

### 2.1 Materials

**2.1.1 Sample of the study:** The study was performed in emergency department in AL Ribat University Hospital. Data were collected on February 2018. This study includes 50 pts male and female with different ages from 1 year to 60 years, all patients came to the radiology department had head trauma, Excluded all normal cases and cases with history of brain pathology.

2.1.2 Machine used: For conventional X-ray used TOSHIPA. For CT machine used Siemence 16 slices.

#### 2.2 Methods

### 2.2.1Technique used:

**2,2,1.1 Conventional x-ray technique:** The sagittal midline of the patient's head is parallel to the image detector Sella turcica in profile. <u>Temporomandibular joints</u> are superimposed. the beam travels laterally, with 0° of angulation, through a point ~4 cm above the <u>external auditory meatus</u>. source-to-image distance: 40" (100 cm). IR size & orientation 24\*30cm landscape. Center ray directed to5cm superior to EAM. Collimation was outer skin margins of the skull. kVp70-75. mAs20 FFD 100cm. grid is used. . William.E. (2007)

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**2.2.1.2 CT technique :** The patient is placed supine on the CT table without rotation or tilt of head for good image quality, Head is rest on the head holder, axial scan started from the base of skull to vertex, Slice thickness 10 mm, spacing 10mm,KVP 120 ,MAS 320 ,Slice thickness 5 mm and gantry tilt zero degree. CT images are viewed with two sets of window settings. One set allows optimal visualization of the brain (brain windows) with lower contrast, the other set display optimal bony detail (Bone windows) with higher contrast. William.E. (2007)

**2.3 Interpretation and getting results:** A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send assigned report to primary care or referring physician, Data is collected from images reports.

**2.4 Data analysis:** Data were first summarized into master data sheet, then analyzed by SPSS program and Microsoft excel for data presentation.



### **3-Results**

### Fig 3.1: Type of trauma

#### Table 3.1: Shows x-ray finding:

| x-ray finding | Percentage |
|---------------|------------|
| Normal        | 44%        |
| Fracture      | 56%        |
| Total         | 100%       |



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### Fig 3.2: Illustrated CT finding





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Typeoftrauma



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Fig3.4: +llustrated correlation between CT finding and type of traumaFig 3.5: Illustrated correlation between X-ray



### finding and CT finding

### 4. Discussion

The objective of this simple descriptive study was to study the head trauma in emergency department by using x-ray and CT scan. In our study, 50 patients were had head trauma with different gender 29 male and 21 females, the sample was classified according to age starting from (3-60) years and the most age group effected was 30-40 years that means the age had no effect. The most common type of trauma was RTA (60%) then fall down and head by stick trauma was same percent (20%) and this result agree with previous study. E. Abd Elrahim (2014) Figure (3.1). For X-ray finding in this study, fracture finding was higher (56%) than normal finding (44%) Table (3.1). CT finding in this study, fracture (46%), fracture +EDH (16%), intracerebral hematoma (12%), subdural hematoma (10%), epidural hematoma (8%), fracture + SDH (4%), fracture + EDH+SDH (2%) and fracture + intracerebral hematoma (2%) Figure (3.2). In correlation between xray finding and type of trauma, result that in RTA type the fracture was 16 pts and normal was 15 pts, fall down type the fracture was 5 pts and normal was 4pts and in head by stick trauma type fracture there was 7 patients (pts) and the normal was 3 pts, and this result agree with previous study E.Abd Elrahim (2014) Figure( 3.3). In correlation between CT finding and type of trauma, the study found that in RTA head trauma type the fracture was in 9pts, subdural hematoma 5pts,fracture with 7pts,epidural hematoma 3pts,intracerebral hematoma 5pts,fracture +EDH +SDH 1pt and fracture +intracerebral hematoma 1 pt., and fall down type the fracture was 7pts, epidural hematoma1pt and intracerebral hematoma 1pt, Finally in head by stick type the fracture was in 7pts, fracture with EDH 1pt and fracture with SDH 2pts Figure(3.4). In correlation between X-ray finding and CT finding, result that in normal x-ray finding the CT finding fracture was 7pts, epidural hematoma 4pts, subdural hematoma 5pts, intracerebral hematoma 6pts, and in comparing fractured x-ray finding with CT finding fracture it was 16 pts had fractures in CT, fracture with EDH found in 8pts, fracture with SDH 2pts,fracture with EDH and SDH 1pt and fracture with intracerebral hematoma 1pt. Figure (3.5) CT is the must indicative in head trauma agree with study done by Broder (2010) that showed Non contrast computed tomography (CT) provides important diagnostic information for patients with traumatic brain injury, this agree with study of Chawla, H.(2015) which found that radiograph is of little benefit when a CT scan is obtained. It has no added advantage over CT scan. 5. Conclusion As conclusions the study found that the head trauma was higher in males than females, the most effected age group were the ages between 30-40 y, the RTA was the most common type of trauma and the fracture was the most

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common finding in x-ray and CT .The CT scan is best modality in diagnosis of head trauma because it has high accuracy in detect of fracture and hemorrhage but x-ray can detect the fracture only. Future study with large sample size recommended.

## **References:**

Vinay Kumar, Vinay Kumar Abul Abbas Jon Aster. (2017) Basic Pathology: 10th edition, ISBN: 978032348054.

William E. Brant, Clyde A. Helms. (2007). Fundamentals of diagnostic radiology. 3rd ed Philadelphia: Lippincott, Williams & Wilkins

Paul Butler, Adam Mitchell, Harold Ellis (2007), Applied Radiological Anatomy for Medical Students 1st Edition, ISBN-10: 0521819393 2007.

Lorrie L. Kelley, Connie (2007) Sectional Anatomy for Imaging Professionals: 2nd Edition8555 M. Petersen by Mosby Library of Congress. ISBN-13: 978-0323020039

James R. Booth, Douglas D. Burman, Joel R. Meyer, Darren R. Gitelman, Todd B. Parrish, M. Marsel Mesulam. (2002) Functional Anatomy of Intra- and Cross-Modal Lexical Tasks, Neuro Image, Volume 16, Issue 1,Pages 7-22,

Elrahim E.A, Elzaki A, Abd Elgyoum AM, Osman H. (2014) Computerized tomography imaging value in diagnosing head injuries, compared with conventional skull X-rays. Sch J App Med Sci. 2(5D):1760

Chawla, H., Malhotra, R., Yadav, R. K., Griwan, M. S., Paliwal, P. K., & Aggarwal, A. D. (2015). Diagnostic Utility of Conventional Radiography in Head Injury. Journal of clinical and diagnostic research: JCDR, 9(6), TC13–TC15. https://doi.org/10.7860/JCDR/2015/13842.6133

Broder J. S. (2010). Head computed tomography interpretation in trauma: a primer. The Psychiatric clinics of North America, 33(4), 821–854. https://doi.org/10.1016/j.psc.2010.08.006



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الملخص هذه الدراسة الوصفية والتحليلية، والهدف الرئيسي من هذه الدراسة هو إعطاء لمحة عامة بسيطة عن إصابات الرأس في قسم الطوارئ باستخدام الأشعة التقليدية والتصوير المقطعي المحوسب. تضمنت هذه الدراسة عينة عشوائية من 50 مريضا (29 ذكر و 12 أنثى) تتراوح أعمار هم بين (1-60) سنة. أجريت الدراسة في مستشفى الرباط الجامعي في مدينة الخرطوم السودان. خلال فترة فبراير 2018، وتم جمع البيانات من هذا المستشفى لجهاز التصوير المقطعي المحوسب (شريحة سيمنس 16) وجهاز الأشعة السينية التقليدية (توشيبا). تضمنت النتيجة أن إصابة الرأس كانت أعلى لدى الذكور (58٪) منها عند الإناث (24٪)، وكانت الفئة العمرية الأكثر تأثراً هي الفئة العمرية بين (1-60) سنة، وكان النوع الأكثر شيوعاً لحوادث المرور على الطرق، وكانت الفئة العمرية نتيجة السقوط و اصابة الرأس بعصا متساوية (20٪). كما أظهرت النتيجة أن استخدام تقنية التصوير المقطعي المرور على الطرق، وكانت الماراس نتيجة السقوط و اصابة الرأس بعصا متساوية (20٪). كما أظهرت النتيجة أن استخدام تقنية التصوير المقطعي المحوسب كانت عالية ونزيف (30٪)، والحالات الأخرى كانت طبيعية في الأشعة السينية (44٪) ولكن التصوير المقطعي المدوسب كانت عالية ونزيف (30٪)، والحالات الأخرى كانت كسور فقط. في الأشعة السينية (66٪) لكن التصوير المقطعي أظهر كسر ونزيف (26٪)، ونزيف الدقة في إصابات الرأس لأن بعض الحالات كانت طبيعية في الأشعة السينية و66٪) لكن التصوير المقطعي أظهر كسر ونزيف (26٪). ونزيف الدراسة إلى أن الأشعة المقطعية هي أفضل طريقة في تشخيص إصابات الرأس لأنها تتميز بدقة عالية في الكش ونزيف الكر».