

Study of Skull X-Ray and physical examination in head trauma with GCS=15

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Abstract: Head trauma is a frequent and important problem from the view of emergency physician. Estimates of mortality following head injury vary from 10 to 36 per 100000 populations. Estimates of combine medical costs from trauma places of over 6 billion dollars. One of the diagnostic procedures in these cases is use of radiologic imaging. Nevertheless, visible fractures are found less than 5% in skull X-Ray films. Therefore, it is better to use this procedure when risk of detecting visible fracture is high. In a cross-sectional analytic study that performed in Emergency Medicine Department of Tabriz University of Medical Sciences from September 2010 to July 2013 on patients with head trauma, we evaluated fractures visible on plain radiographies and the clinical manifestations in patients with head traumas with GCS=15. This study besides determination of relative frequency of age, sex, etiology, visible fracture in skull X-ray and clinical manifestations in these cases tries to determine the relationship between clinical manifestations and visible fracture in skull X-ray. The most common cause of head trauma was falling down 42.7%. Male to female ratio was 2.2 to 1 and most of cases were in 2-17 years age group(40.2%). 346 of cases discharged without admission who had not clinical manifestation or had only slight swelling, mild pain in traumatized area, vomiting(maximally 2 times), scalp wound, cephalohematoma or mind subgaleal hematoma. 150 caese were admitted and 11 of whom had visible fracture in skull X-Ray. Clinical manifestation in these cases are as below. On the basis of this findings and clinical statistical finding in inpatients and usage of Chi-squre with $p < 0.05$ it is proved that there is relationship between clinical manifestations and visible fracture in skull X-Ray. Clinical manifestations include otorrhagia, recurrent vomiting, Raccon sign, and all of the cases who had severe tenderness and subgaleal hematoma had fracture in skull X-Ray. As a conclusion besides these problems, if scalp wound presents, it is preferred to take skull X- Ray to detect foreign body or fracture that have a high risk for meningitis. When cases had no clinical manifestations or had only slight swelling, mild pain, vomiting (maximallt two times) cephalohematoma, or mild subgaleal hematoma, they have had a low risk to find visible fracture and skull X-Ray does not help to determine fracture. Therefore, we can with attending above mentioned notes decrease accomplish side effects and cost of radiology. Other clinical manifestations such as otorrhea and rhinorrhea in studied cases were not found so it demands more study on these line.

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1. Introduction

Head traumas is one of the most important and most common cases in the emergency departments, every year about 8 millions of cases of head traumas occurs in united states and a minimum of 2 million of this number refers to physician(Wilkinsons, 1985). After the primary assessment and primary examinations, diagnostic tools like plain radiography or CT- scan is used for further evaluations and the upcoming proceedings

will be based on the findings of these diagnostic tools (Ahlskog, 1991). In the studies regarding to the topic, the rate of the fracture in the severe head traumas with neurologic disorders had been reported as 40% in plain radiographies and in mild head traumas without neurologic disorders with best radiologic tools have been reported as less than 5 % (Johl, 1998). Brain traumas had been known as fetal injuries from the past, and there is still a horror in people in such an injuries despite the recent improves

in the diagnostic and treatment tools (Ballinger, 2011). So, in most of such cases the patients or the relatives insists on taking radiographs in order to achieve the peace of the mind if the radiograph reveals the natural findings. The physician should assure the patient in cases in which there is no indications for the modality. If there is a lack of trust in the physician's remarks, the patients try different ways to convincing the physician to the desired radiography. Since radiologic beams has numerous complications for the patient and the staff of radiology (Fauci, 2012), as was said, this study can determine the over the 2 years with GCS with head traumas who have less need to radiologic studies and be effective in much more alerting the physicians and medical students and reducing the use of radiologic studies (Bates, 1991).

The aim of this study is the evaluation of the relative frequency of fractures visible on plain radiographs in head trauma patients over two years with GCS=15.

2. Material and Methods

In a cross-sectional analytic study that performed in Emergency Medicine Department of Tabriz University of Medical Sciences from September 2010 to July 2013 on patients with head trauma, we evaluated fractures visible on plain radiographies and the clinical manifestations in patients with head traumas with GCS=15.

In this study, we selected the patients with head traumas and then we evaluated the existence of fractures in plain radiograph and the demographic and clinical parameters were studied.

The variables include age, gender, and the trauma etiology, the site of the trauma, clinical presentations and the radiographic findings. The study population was 469 patients who were randomly selected among the patients older than 2 years and the GCS of more than 15.

From 496 patients, 346 were discharged as outpatients and 150 were admitted because of existence of the clinical manifestations or the fractures, among these patients, 11 patients had the fracture visible on plain radiographs.

3. Results

Among the 496 patients, 341 were male and 155 were female, the male to female ratio was 2.2. The age distribution of the patients is shown on figure 1.

In 139 patients which there was no fracture line in their radiography, 99(71.2%) was male and 40 (28.8%) was female, with a male to female ratio was 2.2 to 1 and in 11 patients who had fracture line, 9 (18.8%) was male and 2(18.2%) were female.

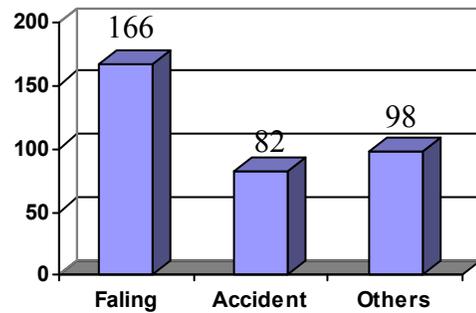


Figure 1: Causes of trauma in discharged patients

The falling from the heights was the most common cause of the head trauma with 212(42.7%) cases and the vehicle accidents with 171(34.4%) and Miscellaneous cases 113(22.7%) were on the other steps.

The cause of the head traumas in patients with fracture was falling in 6(54.6%) and vehicle accidents in 5(45.5%). The age distribution of patients with head traumas is shown in figure 2 and admitted patients were shown in figure 3.

In patients who were managed as outpatients, there was no symptoms in 259(74.8%) or there were a slight swelling or a dull ache in the hit areas or they had a maximum of times of vomiting. 55(15.8%) had open wounds and 32(9.2%) had slight sub cranial hematomas.

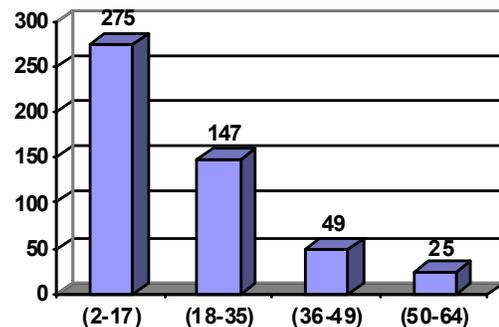


Figure 2: Age distribution of all patients with head trauma

In the admitted patients, who had not any fractures, 16 patients(10.6%) had 1-2 times of vomiting, 54 patients(36%) had more than 2 times of the vomiting, 31 patients(20.5%) had open wounds, 22 patients(14.6%) had slight reduction consciousness, 18 (12%) had severe loss of consciousness, in 17 cases (11.2%) there were large subgaleal hematoma, 9 patients (6%) had minimal subgaleal hematoma, 2

patients (1.2%), had bleeding from the nose and one (0.66%) had bleeding from the ears.

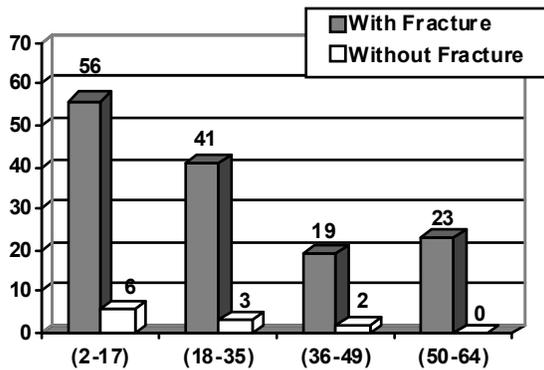


Figure 3: Age distribution of admitted patients

Clinical symptoms in patients with fracture lines in radiography, included large subgaleal hematoma in 7 patients (63.6%), frequent vomiting in 5 patients (45.5%), loss of consciousness, in 4 patients (63.3%), Racon eye in 2 patients (18%), and each of the open wound and ear bleeding was seen in 1 patient (9%) was observed in one patient there was no positive clinical symptom in 1 patient.

4. Discussion and conclusions

Most of studies regarding to the head traumas is conducted in the United States of America and fewer studies have been conducted in developing countries (Gray, 2009; Henry, 2010). As a result, there is limited information about the traumas in the developing countries. Unfortunately, In our country due to the lack of a efficient and independent organization for the purpose of health statistics, the statistics are very incomplete and unusable and since there is no other study in this topic in recent years in the Hamadan University of medical sciences, so we studied the patients with head traumas from the point of the existence of fracture in plain radiography.

Men had 3 to 4 times higher rate of head trauma comparing to women which can be caused by the more social activities, more usage of the vehicles and more violence in this gender (Youmans, 2011), in the present study the male: female ratio was 2.2 that is as same as previous studies.

According to the reference books listed, young men are the population who have the most head traumas (Youmans, 2011) and in our study the young men at the age of the 2-17 years was the most common persons diagnosed with head traumas.

In most of the emergency departments, the skull radiographies is requested from all patients with head trauma despite having a GCS of 15(Netter, 1986; Oski, 1990; Palmer, 1985). With regard to the complications of each graph and the direct and

indirect costs imposed to the health services, we studied the necessity of graph in all patients with head trauma and GCS of 15 and with regard to the fact that there a small percent of patients who underwent skull radiography, have fractures of the radiography, Can we define a criteria to screen the patients with higher risk for fractures and require the graphics of the head for them? And also can we use the "Some clinical symptoms" for defining the necessity of radiography request without imposing a risk for other patient?

The present study was designed for this purpose. The study included 496 patients over two years with a history of head injury with a GCS of 15 who were referred to the emergency department of Emrgency medicine of Tabriz Univercity of medical Sciences, Only 11 cases were diagnosed with visible fracture lines.

236 patients had 1 or more positive symptoms and there were no symptoms in 260 patients. In patients with fractures, it seemed 1 or more positive symptoms in 10 cases and there seemed no symptoms in 1 case.

The sensitivity and specificity of the diagnostic criteria of "having some clinical symptoms" in screening skull fracture was 90.9% and 53.29% respectively.

Since the detecting of the skull fractures is very important to the patient. Diagnostic criteria should be considered to have high sensitivity and low false negative percentage and since there is usually an inverse relationship between sensitivity and specificity(Romanes, 1989; Rowlaand, 2009; Schwartz, 1999; Simpson, 1991). Thus, using the diagnostic criteria of "having some important clinical symptoms" with a high sensitivity (90.9%) would be acceptable.

Seeing the fracture in the plain radiography of the head of the patients older than 2 years with a GCS of 15 is related to the clinical manifestations and the probability of the seeing the fracture in cases with no symptoms is very poor and the plain radiography have almost no benefits in such cases. Therefore, the necessity of the graphies is questionable. Upon a study conducted by Yearly, Hogan in 1996, results revealed that there is no need for radiological studies in the patients with any neurological signs and at a low risks and CT- scan can be used in cases of signs and symptoms occurrence, if reports indicate suspicious bone lesions, the simple radiographies will be helpful(Slein, 1991).

However, clinical symptoms such as severe tenderness, hematoma, subarachnoid Galyal, repeated vomiting, loss of consciousness following traumatic has significant association with fractures seen in the

plain radiographs so taking the plain radiography will be helpful in such patients(Sutton, 1998).

In the patients with clinical symptoms or the neurological disorders (Johl, 1998) we can use the plain radiographies of the skull at its highest efficacy and minimize the additional usage of the radiology to reduce its complications.

Suggestions:

Its recommended not to request the plain radiographies of the head in patients with low probability of seeing the fracture in their skull plain radiographies such as patients with no clinical symptoms, dull pain, slight swelling of hit area, maximum 2 times of vomiting, subgaleal hematoma ,as far as possible. CT scan can be helpful in cases of occurrence of neurologic symptoms so the complications and costs of plain radiographies can be reduced.

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