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Der Pharmacia Lettre, 2016, 8 (20):140-144
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN 0975-5071
USA CODEN: DPLEB4

The Relationship between CT scan Findings, Level of Consciousness and Outcome Score in Patients with Traumatic Brain Hemorrhage

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ABSTRACT

Traumatic brain injury(TBI) can lead to pathological damage many of the most important of which can be fractured skull, Brain contusion as well as various hemorrhage and hematoma (epidural, subdural, subarachnoid, interparenchymal and intrvantericular). This research aims to study the relationship between CT scan findings, level of consciousness and outcome score in patients with traumatic brain hemorrhage. During a 6-month period 100 patients with traumatic intra-craniumhematoma referred to emergency department were studied. They were then transferred CT. Scan department for brain CT. Scan in order to determine type of hematoma, location of hematoma, change of midline shift and volume of hematoma. Patients with clear and visible hemorrhage were excluded out of the study. The level of consciousness was measured and recorded based on Glasgow Coma Scale in time interval of entrance time and 24 hours after patients' hospitalization. Patient's outcome was determined based on Glasgow Coma Scale. The collected finding were, data was analyzed using SPSS 20 software. Based on CT. Scan findings the most current type of hematoma is subdural. Hematoma location in 30 people was epidural, in 44 people subdural and in 26 people inter-parenchyma. Also outcome of 13 patients was death, 3 people with vegetative state, 17 people with brain sever injury, 20 people in low state and 47 people in normal state. According to obtained results there was a significant relationship between level of consciousness and voloume of hematoma. Also it was determined that there is a significant relationship between patients' outcome and level of consciousness while releasing. ($P<0.05$) Our study shows that outcome of patients involving intra-brain traumatic hemorrhage depends on CT. Scan findings and level of consciousness. Among CT. Scan findings there is a significant reverse relationship between hematoma volume and mildline shift with level of consciousness.

Key words: CT findings,GCS,GOS, head Trauma

INTRODUCTION

Traumatic brain injury (TBI) is a broad and inclusive term designating a wide range of pathology that results from an external force to the cranium and underlying brain (1).Serious Traumatic injuries that can reduce quality of life (2-8). Have a significant financial impact, and result in emotional, psychological (9) and physical complications in the all individuals (7).

According to a study conducted in 2015 in the United States have shown that about 1.3 million annual emergency department (ED) visits for TBI severity of all ages and from all there (10). Traumatic brain injury can lead to pathological damage many of the most important of which can be fractured skull, Brain contusions well as various hemorrhage and hematoma (epidural, subdural, subarachnoid, inter traparanshymal and introvantericular) (11). There are several predictors of outcome in patient with brain injury (TBI) among them. Computerized tomography (CT) scan is found very useful for prognosis the invidual imaging feature like basal cistern compression, traumatic subarachnoid hemorrhage, midline shift, or presents of any abnormally have been found (12). Patient who sustain head trauma are often assessed clinically using the Glascow coma scale(13).TheGCS score provide a shorthand assessment of the patient's neurological functioning (14, 15). The author are always of only one study evaluating the correlation of the Glascow coma score (GCS) and abnormal ct finding, which showed that allow GCS associated with a higher incidence of abnormal ctfindings (16).In cerebral hemorrhage, emergency imaging and determine the appropriate treatment early, two important measures are the outcome of this disease remain (17).By weighting Glascow coma scale (GCS) score age hematoma size origin of ICH and ventricular Involvement, the ICH score has been raise as simple method in predicting mortality (18).This study aimed to investigate the relationship between CT findings, level of consciousness and outcome in patients with hemorrhage in the brain caused by head trauma.

MATERIALS AND METHODS

This study was conducted on 100 patients with intra-cranium traumatic hemorrhage referred to emergency department, from December 2015 to May 2016 among which 64 people were male with average age of 35.97 year and 36 people were female with average age of 44.88 year and level of consciousness was between 3 and 15. The inclusion criteria for the study were as follow:

1. Patient with penetrating head trauma
2. Patient with Glascow Coma Scale (GCS) below 15
3. Patient with CT scanning
4. Patient with intracranial hemorrhage

The level of consciousness was recorded in entrance time and 24 hours after patients' hospitalization. Level of consciousness in patient was recorded and measured based on Glasgow Coma Scale (GCS). The level of consciousness was assessed by the convention: Mildly impaired consciousness was defined as GCS>12, moderate impaired consciousness as 8<GCS<12, severely impaired consciousness as GCS<8 (19). Patients were transferred to the radiology department for brain CT scan by necessary equipments. Patients with clear and visible hemorrhage were excluded out of the study. The interpreted of ct scan finding to determine the midline shift, intra- cranium hemorrhage, type of hematoma, volume of hematoma and hematoma location by radiologist. All CT scan were done in on center with a Toshiba CT scan spiral single slice. Patients were controlled from entrance to releasing or death. Patient’s outcome was determined using Glasgow outcome Scale. Patients outcome scale that is a global scale for performance result divides patients' status proper active condition was evaluated with GOS and classified as death (score 5),persistent vegetative state (score 4), severe disability (score3), mild disability (score 2) and good recovery (score 1) (16**,** 20). Favorable and unfavorable outcomes were defined as GOS scores 1-2 and 3-5, respectively (16).

Statistical Analysis

The collected finding were analyzed using SPSS 20 software. Chi square and Fisher test were used to analyze and study relationship between findings present in CT. Scan pictures (midline shift, intra-cranium hemorrhage, type of hematoma, volume of hematoma and hematoma location) with level of consciousness and outcome score in patient. Correlation coefficient test was used to analyze and study CT. Scan findings and level of consciousness. Correctness of data analysis was measured by ($P<0.05$).

RESULTS

In this research 100 patients involving intracranial hemorrhage visible in CT. Scan stereotype were studied among which there were 36 females and 64 males with average age of 18/67±37/58. According to obtained results the most current hematoma is subdural with 48% abundance. Based on CT. Scan results hematoma location for 30 people was epidural, for 44 people was subdural and for 26 people was inter-parenchymal. Also there was hematoma in temporoparital area for 22 people, in temporal area for 15 people, in frontal area for 16 people, in frontoparital for 13 people and in ventricle area for 8 people. Based on results obtained from outcome in patient based on GOS scale death was reported for 13 people, vegetative state for 3 people, sever brain injury for 17 people, mild brain injury for 20 people and normal state for 47 people.

Regarding abundance obtained from outcome in patient shown in table (1), patients with more sever level of consciousness were in better conditions than patients with lower level of consciousness and it was determined that there is a significant relationship between level of consciousness in patients while releasing and their outcome. According to table (2) relationship between hematoma location and outcome in patient was determined and to study this relationship chi square test was used. Results show that there is a relationship between hematoma location and outcome in patient ($P<0.05$).

Type of hematoma is measured regarding primary level of consciousness by Glasgow coma Scale that increasingly affects severity of injury. According to table 3 one of findings from CT. Scan pictures relates to volume of hematoma in entrance and the other is midline shift. Both parameters relate to patients' level of consciousness significantly and reversely. Increasing hematoma volume causes to fall level of consciousness more ($p=0.04$, $r=-0.62$). Also increasing midline shift is followed by less level of consciousness ($p=0.02$, $r=-0.53$). Results show that there is no relationship between type and location of hematoma with level of consciousness.

Table 1: patients' outcome abundance regarding their level of consciousness

GOS	GCS		Total
	Mild/moderate 9 – 15	*Sever 3 - 8*	
Death	5	8	13
Persistent vegetative	1	2	3
Sever	10	7	17
Moderate	15	5	20
Normal	32	15	47
Total	71	29	100

Table 2: relationship between hematoma location in CT. Scan and outcome patient

CT GOS	EDH	SDH	IPH	Total
Death	2	8	3	13
Persistent vegetative	0	1	2	3
Sever	2	7	8	17
Moderate	6	8	6	20
Normal	24	18	5	47
Total	30	44	26	100

Table 3: relationship between CT. Scan findings and patients' level of consciousness

CT Finding	p-value	correlation coefficient
Midline shift	0/02	-0/53
Hematoma location	0/238	0/068
Type of hematoma	0/443	- 0/510
Volume of hematoma	0/04	-0/62

DISCUSSION

Traumatic Brain injuries (TBI) have been an important problem of public health for a long time (21). Correct and exact diagnosis of head trauma brain hemorrhage patients is necessary. It should be done correctly but fast. For this purpose CT. Scan is used as an important and non-aggressive method to diagnose and treat patients. Relationship between abnormal findings in CT. Scan pictures and level of consciousness with patients' outcome wasn't studied in this research. Abundances of hematomas obtained from the research results were divided in three groups of epidural, subdural and inter-parenchyma respectively equal to 30%, 44% and 26%. In a similar study subdural hematoma was reported equal to 43.9%, epidural hematoma equal to 26.8% and inter-parenchymal hematoma equal to 29.3%. Also in other study subdural hematoma was reported equal to 24%, epidural hematoma equal to 20% (22).Mortality rate was 13 people in this study. In Barbless ETall's study mortality rate was reported equal to 29 cases (23). In study by Jahanbakhshi et al mortality rate was 14.3% (17). In Kyu-Hong study (2009) mortality rate resulted of subdural hematoma was reported equal to 42% (24). One of research results that is a very important measure on patients' primary therapies is patient' primary level of consciousness that is measured based on Glasgow Coma Scale. There is a relationship between patient's primary level of consciousness and produced hematoma's volume and it is a prominent matter in many studies performed in the field of brain hemorrhage and in this regard it is important. There is a significant reverse relationship between patient's level of consciousness on entrance time and 24 hours after patients' hospitalization with hematoma volume that was obtained from CT Scan pictures; this is similar results of study conducted in this field (23, 25).Also in other study it was explained that decreasing level of consciousness relates to pathologic findings in CT. Scan pictures (26). Therefore increasing hematomavolume decreases level of

consciousness. There is a reverse relationship between midline shift in CT. Scan and patients' level of consciousness. Larger midline shift leads to less level of consciousness. These findings are similar to the results of conducted researches (17). To determine patients' fate Glasgow outcome Scale was used. There is a significant relationship between patients out come and hematoma location in CT scan pictures. The most cases of injury and mortality were related to subdural hematoma and less injured patients were related to epidural hematoma; these were similar to results of conducted study (27, 28). It is worth to note that hematoma volume relates to patient's outcome significantly. Results showed that hematoma volume less than 30 mm leads to less mortality. In a research Juanet al explained that observing in 68% of patients hematoma volume more than 30 mm leads to more mortality (18). So increasing patient's hematoma volume leads to this is more probable that patient will be in worse position. It is also advised that hematoma volume and midline shift can be used as two important parameters on predicting this group of patients out come.

Restriction

Our study had some limitations. First, we couldn't use findings of patients' surgery in our study and it was for noncooperation of neurosurgeon. Because having surgeon information and CT scan findings is useful to predict patient's status. Second, number of gathered samples was low and it is advised to repeat study by more volume because more information will be obtained in the field of recognizing and treating brain traumatic hemorrhage.

CONCLUSION

Our study showed that outcome of patients involving intra-brain traumatic hemorrhage depends on CT. Scan findings level of consciousness. Among CT. Scan findings there is a significant reverse relationship between hematoma volume and shift of midline with level of consciousness. Using these findings by other parameters is advised to predict patients out come.

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