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Research Article

A study on correlation of degree of midline shift on CT scan and Glasgow coma scale in patients of acute traumatic head injury

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ABSTRACT

Background: The present study is undertaken to analyses the patients of craniocerebral injury with special reference to correlation between Glasgow coma scale score and CT scan findings at the time of admission.
Methods: A study was conducted on patients with acute traumatic head injury. Most common and important complication of traumatic head injury is the development of an increased intracranial pressure resulting in midline shift. The larger the amount of the midline shift on CT scan the poorer will be the outcome of traumatic head injury. Other variables such as Glasgow coma scale have been subsequently introduced to build more complex and accurate prognostic model. In Glasgow coma scale it was found that confident prediction could be made only after 24 hours.
Results: Cerebral contusion was the most common CT scan finding followed by depressed fracture), subdural hematoma (15.3%) than extradural hematoma. Hemorrhagic contusion was the most common CT scan finding irrespective of GCS score. In patients with GCS 3-5 other outcome findings are extradural hematoma, subdural hematoma, & depressed fracture. In patients with GCS 6-8 other common findings are extradural hematoma, depressed fracture & hemorrhagic contusion. In patients with GCS 9-12 other common findings were hemorrhagic contusion, depressed fracture & intra cerebral hematoma. In patients with GCS 13-15 other common findings were depressed fracture, hemorrhagic contusion.
Conclusion: The increased degree of midline shift in patients with head injuries by CT scan was related to the severity of head injury (GCS= 3-12) and was significantly related to poor final clinical outcome.

Keywords: CT scan, Glasgow coma scale, Acute traumatic head injury, Midline shift

INTRODUCTION

Traumatic head injury affects up to 2% of population per year, constitute the major cause of death.

Most common and important complication of traumatic head injury is the development of an increased intracranial pressure resulting in midline shift.

The larger the amount of the midline shift on CT scan the poorer will be the outcome of traumatic head injury. Other variables such as Glasgow coma scale have been subsequently introduced to build more complex and accurate prognostic model. In Glasgow coma scale it was found that confident prediction could be made only after 24 hours.

The present study is undertaken to analyses the patients of craniocerebral injury with special reference to correlation between Glasgow coma scale score and CT scan findings at the time of admission.

METHODS

This study was conducted in department of surgery and pediatric surgery Hamidia hospital Bhopal during May 2010 to April 2011.

The criteria for inclusion of patients in the present study were

1) All traumatic head injury patients.

2) All patients who had initial cranial Computed Tomography (CT) scan after head injury.

In all the patients CT scan was reviewed separately from clinical information. The degree of midline shifting was divided into three categories; no shifting, midline shifting up to 10 mm & midline shifting greater than 10 mm. Clinical information such as age, gender, mechanism of head injury, Glasgow coma scale & clinical outcome were collected.

Score in the Glasgow coma scale was calculated according to table number 1.

Severity of head injury is classified into 3 subgroups; mild degree (GCS=15), moderate degree (GCS=13-14), severe degree (GCS=3-12).

On admission patients were examined carefully and quickly, ABCDEF i.e., airway, breathing, circulation, disability and neurological deficit, expose and examine and fluid resuscitation were done.

Complete general & local examination was done. Head is inspected for any laceration or fracture.

Patients were reviewed at regular intervals and their progress was recorded after stabilization of patient, repair of wounds, securing of bleeding points and immobilization of fracture sites. Patients were subjected to X ray of skull and other parts as required.

If patient present with black eye he is suspected for basal skull fracture of middle cranial fossa. A fracture of the petrous temporal bone was suspected either when patient had blood or CSF behind tympanic membrane or had Battle's sign (ecchymosis over mastoid process).

In conscious patient detailed neurological examination is performed. In uncooperative patients attention was given to evaluation of reflexes to detect focal abnormalities.

Special attention was given to respiratory pattern, papillary size, and light response, oculocephalic reflexes, motor response to painful stimulus & deep tendon reflexes. CT scan was indicated in unconsciousness or convulsions or presence of any neurological defect. CT scan findings were noted & patients were indicated for surgery when either intracranial hematoma was large and producing mass effect and intracranial pressure or scalpel laceration with comminuted fractures with or without CSF leak.

Operative findings were noted in all cases & patients treated conservatively were closely monitored and assessed periodically twice daily with GCS & papillary changes etc. Good outcome (GCS more than 12), fair outcome (GCS between 12-8), poor outcome (GCS below 8) & death.

RESULTS

Male:female ratio was 5:1 in our study. Mainly motor cycle accident account for 65.65% of head injury cases then fall from height 15.24% Assault is significantly reduced after 4th decade. External injury of scalpel is seen in 91.5% of cases, blackening of eye in 38.9% & vomiting in 29.8%.Mortality was significantly higher in patients with bradycardia and patients with low BP (Below 100/60). Low Glasgow coma scale at the time of presentation was associated with increase in morbidity and mortality. Cerebral contusion (28.7%) was the most common CT scan finding followed by depressed fracture (25.1%), subdural hematoma (15.3%) than extradural hematoma (9.7%). Hemorrhagic contusion was the most common CT scan finding irrespective of GCS score. In patients with GCS 3-5 other outcome findings are extradural hematoma, subdural hematoma, & depressed fracture. In patients with GCS 6-8 other common findings are extradural hematoma, depressed fracture & hemorrhagic contusion. In patients with GCS 9-12 other common findings were hemorrhagic contusion, depressed fracture & intra cerebral hematoma. In patients with GCS 13-15 other common findings were depressed fracture, hemorrhagic contusion.

Table 1: Showing Glasgow coma scale and score.

Feature	Scale responses	Score notation
Eye opening	Spontaneous	4
	To speech	3
	To pain	2
	None	1
Verbal response	Orientated	5
	Confused conversation	4
	Words (inappropriate)	3
	Sounds (incomprehensible)	2
	None	1
Best motor response	Obey commands	6
	Localize pain	5
	Flexion-normal	4
	Flexion-abnormal	3
	Extend	2
	None	1
Total coma 'score'		3/15-15/15

DISCUSSION

The present study found that causes of head injury were also related to age groups (P = 0.001): MCA was the highest (65.8%) in group 1 (21-30 years), hit or blunt objected assault was the highest (11.1%) in group 2 (20-40 years), car accident was the highest (7.1%) in group 3 (41-60 years) and fall was the highest (15.2%), in group 4 (0-20). The GCS score was well correlated with outcome in which higher mortality was associated with a lower with a lower GCS score (P = 0.0001) that over 95% of patients with a score of 4 or less are likely to have a poor outcome compared with those with a score of 8 or a more.

In the present study, 157 patients with GCS of 9-12, 8 had a poor outcome (2.7%) and 80 patients with GCS of 13-15, 1 case had a poor outcome (o.33%), while 58 patients GCS<9, 21 cases had a poor outcome (63.3). The present study showed the degree of midline shift. The presents brain injury was statistically significant as a determinant of outcome. It appeared that probability of poor outcome was higher when there is combination of midline shift with other type of intracranial hemorrhage, clinical factor such as sex, age, GCS score and associated injury. The degree of midline shift was found to be not significant in relation to GCS score in the present study. This meant that a larger midline shift tends to be not associated with a lower GCS score.

The present study found that the presence of midline shift especially with SDH was significant. This meant that the outcome would be poorest if the midline shift with SDH compared to other lesion in patients with brain injury.

Out of 295 cases in the present study 135 cases showed evidence of midline shift. Out of the 135 cases.30 patients (22.2%) died while the remaining 112 patients (82.8%) had a good outcome. The present study showed in contrast to other studies, which revealed that midline shift was a significant predictor of mortality.

CONCLUSION

The increased degree of midline shift in patients with head injuries by CT scan was related to the severity of head injury (GCS= 3-12) and was significantly related to poor final clinical outcome. Males outnumbered females in all age groups. Incidence of head injury is found to be maximum in 2nd, 3rd, 4th decade. Maximum number of patients presented with GCS>13 and have good prognosis. Prognosis of patients worsens with decrease in GCS score. Cerebral contusion is most common CT Scan finding (28.7%) followed by undisplaced fracture (25.1%) and SDH (15.3%). Children have better prognosis as compared to adult age group in head injury patients and mortality increases with increasing age. Mortality varies from 70%-100% in patients the presenting with GCS score<9 depending upon various CT scan lesions responsible for the score. Also survival varies from 50%-100% in the patients presenting with GCS score between 9-12 with respect to their CT scan finding indicating need of more accurate accessing scale. By correlating Glasgow coma scale score with CT scan finding we can predict the condition of patient and outcome of patient more precisely than considering both parameters separately.

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