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CT SCAN FINDINGS IN PATIENTS WITH MODERATE AND SEVERE HEAD INJURIES

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ABSRTACT

Objective: To determine the CT scan findings in patients with moderate and severe Head injury.

Material and Methods: It was a cross sectional descriptive study done in the Department of Neurosurgery Government Lady Reading Hospital, Peshawar, Pakistan from February 2012 to March 2012. All patients who were admitted with moderate and severe head injury were included in the study. CT scans were done for all these patients. Consecutive non probability sampling technique was applied. Record of the patients collected on a performa and then analyzed for results.

Results: Among 150 patients studied 77% were male and 23% were female. 50% of patients in the study were in the age range of less than 10 years. Road traffic accident was the most common cause of head injury. Fourty three percent were having severe head injury while 57% were having moderate head injury. Twenty nine percent patients were having unremarkable CT scan findings, Extradural hematoma in 10%, Subdural hematoma in 7%, Subarachnoid hemorrhage in 12%, Depressed skull fracture 7%, pneumocephalus 10%, linear skull fracture 17%, brain edema 14%, contusion 13%, burst lobe 2%, intracerebral bleed and intraventricular extension in 3% of patients and hydrocephalus in 1% patients.

Conclusion: Road Traffic accidents and falls are the common causes of head injury and the most common CT scan findings are linear skull farctures, brain edema, contusions, Extradual and subdural Hematomas.

Key Words: CT scan, Extradual, hematoma, Subdural, Road traffic, accidents.

INTRODUCTION

Head injury is one of the leading causes of death and disability in the modern era. Road traffic accidents and falls are the major causes of head injury[1] besides physical assault, building collapse, fire arm injuries and bomb blasts. The annual rate of head injuries in Pakistan is 81 per 100,000 with a mortality rate of 15%[2]. In the USA, monitoring by the Centers for Disease Control and Prevention shows the annual incidence of emergency department visits and hospital admissions for traumatic brain injuries (TBI) to be 403 per 100,000 and 85 per 100,000, respectively[3]. Epidemiological data on traumatic brain injuries from the European Union are scarce, but do indicate an annual aggregate incidence of hospitalized and fatal TBI of approximately 235 per 100,000[3].

Head injury is classified as mild moderate and severe according to the Glasgow coma scale of assessment. There are total of 15 points in this scale. Patients with GCS of 13 and above are classified as mild; GCS 9 to 12 as moderate and GCS 3 to 8 are classified as having severe head injury[3,4]. CT scan is the investigation modality of choice used in the evaluation of acute head injured patients[3,4,5]. It is cheap, readily available for most of our patients, non invasive and has been considered as gold standard in the investigation of acute head injury[6].

Patients suffering from head injury have got extradural haematoma, subdural haematoma, depressed skull fracture, subarachnoid hemorrhage, intracerebral hematoma or contusions that are visible on CT scan while many patients have got diffuse axonal injury with unremarkable CT scan findings[1,3-6].

The purpose of this study is to know the percentage amount of intracranial pathologies visible on CT scan in the events of head injuries. The significance will be, by timely diagnosis and treating the pathology, we will be able to limit secondary brain injuries as a sequel of primary head injury.

MATERIAL AND METHODS

The study was conducted at Department of Neurosurgery Lady Reading Hospital, Peshawar. It was

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cross sectional descriptive study of the patients admitted to this unit in the months of February and March 2012 using descriptive statistics software through SPSS version 17. The consecutive non probability sampling technique was applied and total number of patients included was 150. The data was recorded on preformed Proforma's and then analyzed.

Patients were selected purely on the basis of Glasgow coma scale and those of GCS 12 and below were included in the study. Patients having GCS of 13 and above were excluded from the study although some patients had got intracranial lesions as well. Patients were divided into several groups on the basis of age range, gender and geographic distribution but the data was interpreted as a whole for all these groups.

RESULTS

The total number of patients included in this study was 150, 76.66% of these were male while 23.33% were female patients. Most of the patients were in their first decade of life Table 1. The most common cause of head injury in our study was Road traffic accident (RTA) which was 48% (n=72) followed by falls 44% (n=66). Forty three percent of patients presented with severe head injury having GCS below 8/15 while 57% of patients presented with moderate head injury having GCS 9-12 out of 15. The CT scan findings are presented in Table 2 and one of the radiological image presented in Figure 1.

DISCUSSION

CT scan of head axial cuts from base to vertex without contrast administration is considered the preferred method of evaluating head injured patients. It has been rather called the gold standard for evaluation of head injury patients because of its greater sensitivity for detection of intracranial blood and bone disorders[4,7].

Majority of patients in our study (50%) were in the age range of 0-10 years which is in contrast to various studies in different countries[7]. This is followed by 11-20 years group (21%) and then 21-30 years (15%) and this is in consistence with various studies[2,3,4,6]. This was followed by 31-40 years group which included 8% of patients and more than 40 years patients were 6% accounting for least involved age group in head injuries. This is because in our society children less than 10 years of age are being less well protected from falls during playing on the rooftops of their houses or climbing up or downstairs. Along with this children aged more than 8 or 9 years going to schools hanging behind the buses and wagons sustains falls causing head injuries. The second most involved group in head injuries is the youngsters in 2nd and 3rd decade of life. This is because this age group is actively involved in daily life activities and sports. Youngsters have increased tendency towards motor bike use and that too without wearing helmets make them susceptible to head injuries. People above 40 years of age in our society remain at their workplaces or homes most of the times and are less involved in road traffic accidents and falls.

Table 1: Age wise distribution

Age (years)	No. of patients and %age
0–10	75(50%)
11–20	31(20.66%)
21–30	23(15.33%)
31–40	12(8%)
>40	9(6%)

Table 2: Percent CT scan findings (n=150)

Variables	Percentages
Unremarkable CT	29%
Linear skull fracture	17%
Brain edema	14%
Contusions	13%
SAH	12%
EDH	10%
Pneumocephalus	10%
SDH	7%
DSF	7%
Intra cerebral bleed+IVH	3%
Burst lobe	2%
hydrocephalus	1%

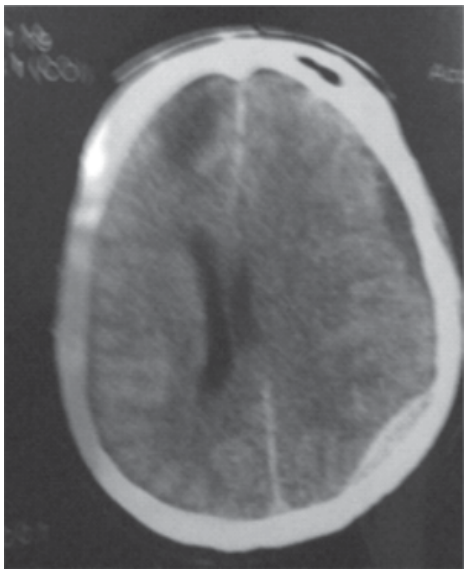

Fig. 1: Left occipital Extradural hematoma causing midline shift with Subarachnoid hemorrhage and frontal lobe infarct

In a study, percentage of patients in age range of 0-10 is 7%, 11-20 is 12.9%, 21-30 years is 19.3%, 31-40 years is 14.6% and above 40 years is 45% combined[7]. Another study conducted by Naseri et al[1] the peak age for head injury is 25 years and the major patients belong to age range of 16 to 30 years. According to the results of Asaleys et al[4] 75% of patients were below the age of 40 years and majority belong to the age group in 2nd and 3rd decade of life.

The male to female ratio in this study is 3.3:1 that is 77% male and 23% female patients. In a study conducted by Ghebrehiwet M et al[5] the male to female ratio is 3.5:1 the total number of male were 75.5% while number of female were 24.5% The female patients in this study were mostly in the pediatric age group who suffered falls from heights. This is because adult female population is less mobilized and less actively involved in daily life activities in the male dominated society of this region. The male to female ratio is 4:1 according to study conducted by Naseri et al[1] and study conducted by Andrew et al states the male to female ratio as 3:1 that is 75% male involvement in head injuries[3]. In another study conducted by male were 67% while female patients were 33%[7].

The leading cause of head injury in this series is Road traffic accidents and 48% of patients met RTAs which is followed by falls in 44% of patients. Head injury due to physical assault in this series was in 2% of patients, due to fall of objects over the head was in 3% and due to Fire arm injuries and bomb blasts were 3% as well. In a study conducted by Samuel et al[7] the percentage of patients with RTA is 59%, falls 19% and physical assault was 13%. According to the results of Naseri et al[1] RTA was leading cause of head injury in 60% patients followed by falls and physical assaults. In another study findings were (RTA) 90% falls (1.8%); assault (5.4%) and gunshot (1.8%)[4].

Among the patients analyzed 29% were having unremarkable findings in their CT scan of brain and were labeled as having unremarkable CT scans. According to Ohaegbulam SC et al the patients with unremarkable CT scans were about 19.9%[7] while another study conducted by Asaleye et all the percentage of patients with unremarkable CT Scan were 28%[4].

Extradural hematoma was found in 10% of the patients on CT scan in our study. Ayrak et al found in their study that 15.1% of patients have EDH[8] while in other studies the frequency of EDH is 16.5%[1] 8.0%[7] and 14%[4]. The reason for variation in these results is not clearly understood although they are all in close range in all these studies. Subdural hematoma was found in 7% of patients in our study. Ayrak et al conducted his study in turkey and found SDH to be in 10.7% of patients[8]. Naseri et al found in their studies the percentage of SDH to be 13.3%[1] while in another study SDH was found to be in 36% of cases[4]. Other studies showing percentages of SDH are 30%[7], 28.7%[9].

Twelve percent of patients in our study were having Sub arachnoid hemorrhage. This percentage was 16% in a study conducted by Ayrakl et al[8] and 11.4% by study of Naseri et al[1]. SAH was found isolated findings on CT but mostly in association with other intracranial pathologies like intracranial hematomas and linear or depressed skull fractures. Depressed skull fracture was found to be 7% in our study. A similar result of 7.3% was found by Mebrahtu et all in their study[5]. 9.4% by Samuel et al in their study and 16.1%[7] by Naseri et al.[1] These types of skull fractures in our study were mostly compound type which required elevation and debridement of bone fragments. Linear skull fractures were found in 17% of patients and most of them were the associated findings with other intracranial pathologies. According to some studies linear skull fractures are 27.6%[1] 7.3%[5], 13.4%[7], 33.8%[4].

Pneumocephalus was found in 10% cases which were mostly associates with frontal or ethmoidal air sinus fractures or basilar skull fractures. Pneumocephalus was reported to be 11.25%[1], 34%[8], and 8%[4]. Brain edema was found in 14% of our patients. All of these patients were treated conservatively with intravenous Mannitol administration, elevation of head end of the bed, fluid resuscitation and oxygen inhalation. Some patients with brain edema and who's GCS was less than 8 required tracheotomy to maintain their airway.

Contusions were found in 13% of patients in our study. In a similar study by Mabhatu the percentage of cerebral contusions in acute trauma settings were 16.4%[5]. Contusions were found to be 32.9% by Naseri et al in their study[1]. In another study contusion associated with cerebral edema was found to be 30.7%[7]. Cerebral contusions have poor outcome according to Glasgow outcome scale and Barthel Index[8]. In 3.3% of patients there were intracerebral bleed with some having intaventricular extension. Burst lobe was found in 2% of patients and these patients while being managed with lobectomy and decompressive craniotomy did very well recovery. In 1.33% of patients in our study there was hydrocephalus. These patients had got SAH as well on CT scan one because of RTA and other being victim of a Bomb blast injury. Hydrocephalus was treated with a VP shunt in these patients.

CONCLUSION

Unremarkable CT study, linear and depressed skull fractures with Subarachnoid hemorrhage, extradural hematoma, subdural hematoma, contusions and brain edema were the most common findings.

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