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ORIGINAL ARTICLE

The Utility of Brain CT in Highlighting the Etiological Patterns and Incidental Findings of Traumatic Brain Injury

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ABSTRACT

Aim: To find the utility of brain CT in highlighting the etiological patterns and incidental findings of traumatic brain injury.
Methods: From January 2022 to March 2022, 110 patients presenting to emergency department of Pakistan Institute of Neurosciences with brain traumatic injury was present in this study. Patients go through long clinical evaluation and computed tomography on every trauma criteria.
Results: The most affected age (group) was 30 to 42 years (37.05%) male (78.2%) to female (21.8%) ratio was 8:2. Injuries were predominantly caused by RTA (72.7%), less commonly caused by fall (11.8%), pedestrial (6.4%), assault (5.5%), and sports (3.6%). Among those with RTA less than 6% people was wearing helmet. The common CT scan evaluation was brain contusion (35%), fracture (13%), Edema (13%), SDH (10%), EDH (8%), SAH (4%), pneumocephalus (5%) and others (3%). Prediction of true prevalence of incidental findings is tough. In this study, we found that enlarged cisterna magna (3.6%) and calcification (3.6%) were the common incidental (findings), and brain tumor (0.9%) and hydrocephalus (0.9%).
Conclusion: Road traffic accidents (RTA) are a major cause of TBI. This can be avoided by wearing helmet, but it is less used. Moreover, there is a proper need to put strict system amongst hospitals citywide to lessen the effects of severe TBI. At last every person had to check up on themselves for any minor physical or mental change.
Keywords: Traumatic Brain Injury, CT scan, Etiological patterns, Incidental findings.

INTRODUCTION

A Computed Tomography scan is used in the medical field to obtain the detailed imaging of the internal body structures for the diagnostic purposes. It is the most used modality in radiology sciences. The three dimensional images can also be obtained by the CT by stacking up the sliced images so that we can easily diagnose any abnormality and proper visualization of the internal organs and structures[1]. Traumatic brain injury (TBI) is an acquired, non-degenerative trauma to the brain brought on by a mechanical force from outside the body. This may be accompanied by sensorium loss or change[2].

It is ideal for the frequently daily monitoring of evolving pathology and the investigation of sick neonates who are too unstable to be immediately transferred to the computed tomography (CT) or magnetic resonance imaging (MRI) scanner due to the lack of requirements for ionizing radiation, sedation, or transport of the neonate to the scanner[3].

TBI occurs when outside physical force destroy the brain; it can be caused by an accident, assault, fall or any other physical force. TBI can be defined as (non-degenerative), obtained to destroy the brain resulting from an outer force[4].

This line proves that potential workers to TBI diagnosis, and prove that (symptomatology), extensions of the accident and broad context should be considered to inform diagnosis[5]. Although we found a very small percentage (about 9%) of incidental findings from our sample of 110 subjects. Other findings also play a part in the treatment of the subject[6]. Standard, young males are way more effected than women to encounter injury. Traumatic mind injury is a growing concern among sure agencies. The biggest reason of TBI is road traffic accidents, assaults. Sports activities and undertaking sports also are a primary motive of TBI, which include concussions and this study concluded that the health groups and traumatic groups have to do collectively to avoid injuries and to make certain more valuable in future for men and women with head injuries[7].

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One study determined hundred and five youngsters with the GCS score of less than 12 with a mean 6.2 (±3.5) age of year. This study concluded that's their preliminary diagnostic at leaving patients (lifeless or active) have been looked, and both scores have been estimated. We test each rating was associated with the loss of life of infants sufferers[8]. Emerging factors probably to gain greater large work in the future but there application in analysis, emerging and concept of the herbal course of recuperation after injury, and ability for comparing remedy techniques[9].

The worldwide incidence of (TBI) which is called as the "silent epidemic" on 27 April 2018 contributes to global demise and incapacity extra than another traumatic damage. But, traumatic injuries prevalence and division in areas and socio economic distribute is not known[10].

Brain specificity or mind-greater expression is an essential function of blood-primarily based biomarkers for moderate TBI and associated conditions, as extracerebral resources for biomarker molecules can compromise the interpretability of the check consequences. So this concluded that in moderate TBI, fluid biomarkers for axonal injury suggest the greatest promise in the intervening time[11].

Structural neuroimaging findings in mild traumatic brain injury common neurological findings shows in this research are contusions, small subarachnoid or intra parenchymal hemorrhages as well as subdural and epidural collections, edema and skull fractures. Also shows with Glasgow coma scale of greater than 13 considered as mild injury such as falls or like sport injuries. CT also exposes the ionization radiation[12].

The MRI technique which diffuses axonal organization further technique, so in this study they concluded that the DTI with corpus callosum is more common in patients with normal TBI as Contrast to moderate TBI also occurs 6 months post injury[13].

Neuroimaging includes many strategies, and (DTI) is most important. Presently it is used for reading mild, slight and extreme TBI in people (kids, adolescents and adults) the principle consciousness of DTI is the white depend tracts. Current patents in manipulating obtained TBI pix are reviewed with unique emphasis being located on the innovation of latest magnetic resonance imaging (MRI) apparatus[14].

Children With Mild Head TBI Computed tomography is frequently used modality in pediatric patients with mild head TBI because its gold standard it gives internal structure scans in slices for accessing incidental findings[15].

This study will help in the treatment of the subject more efficiently and keenly. When we thoroughly examine the subject and point out what is necessary and what is not, this makes the treatment easier. The etiological patterns examined in the utility of brain CT play a major role, while scoring the GCS score and mode of injury and will let further treatment required for the subject. Also the incidental findings, if there is any will let us treat the subject more efficiently.

MATERIALS AND METHODS

This was a sample based observational study. Data collected was from Pakistan Institute of Neurosciences. Study concluded in a time duration of two months Sampling technique that is used convenience sampling. Patients of traumatic brain injury with incidental findings and etiological patterns. The population size for this research was 110, and we used SPSS software for the data sampling. We collected data by using Computed tomography modality.

Inclusion criteria

1. Patients of both genders (male and female)
2. Patient of head trauma of any cause
3. Patient of all age group
4. Emergency cases
5. GCS scale 5 - 15

Exclusion criteria

1. Pregnant females
2. Patients presenting with complains other than head trauma
3. Nonemergency case

RESULTS

Table 1 depicts the demographic data. Age was 37.05±16.84 while 86 participants were male and 24 were females. Figure 1 shows the mode of injury. Figure shows the different methods of injury. RTA is the (most common) mode of TBI in 80 subjects out of 110 with 72.7% and the second common is fall in 13 patients only with 11.8%.Assult, pedestrian and sports are least common among them. The figure (Figure 3) below gives its graphical representation. Figure 2 depicts location of impact.It shows the most common location of impact is frontal lobe in 51 patients with 46.4 % and second common is temporal lobe followed by parietal, occipital and front occipital.

Table 1: Demographic data (n=110)

Age	37.05±16.84
Gender	86(M)/24(F)

Figure 1: Mode of injury

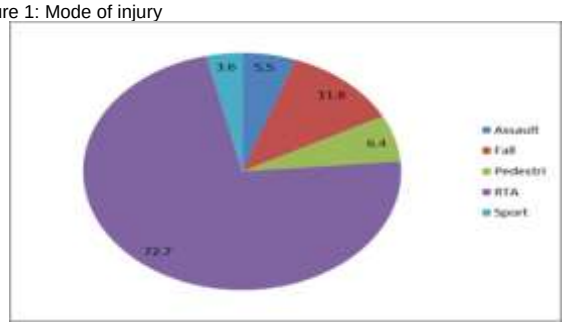

Table 2 depicts the etiological patterns and positive CT scan findings which are known as etiological patterns. Figure 1 gives its graphical representation. Most common etiological pattern we found was contusion among traumatic brain injury patient and the second most was edema. Furthermore, patient was affected by SAD, EDH, Fractures, Pnemocephalus and others. Table 3 depicts theCT scan finding with Glasgow coma scale. From this cross comparison of etiological pattern and GCS, we found that mostly Patient with moderate GCS have contusions and fractures. Epidural hemorrhage was also found in patient with moderate GCS.

Figure 2: Location of impact

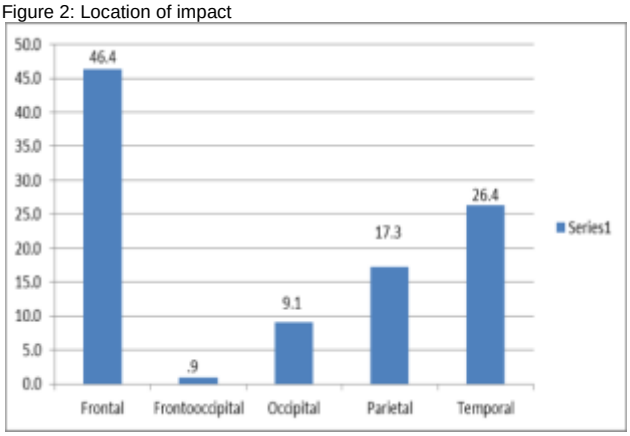

Table 2 : Etiological patterns

Contusions	34.80%	92.7
SAD	4.40 %	11.8
EDH	8.18%	21.8
SDH	9.92%	26.4
Fractures	13%	34.5
Edema	22.50%	60
Pnemocephalus	4.70%	12.7
Others	2.50%	6.4
Total	100.00 %	266.3

Table 3: Cross Tabulation between ETIOLOGICAL PATTERNS & GCS

Etiologicalpattern * GCS Crosstabulation

Count

		GCS			
		mild	moderate	severe	Total
Etiologicalpattern	0	0	2	2	4
	contusion	19	21	7	47
	subarachnoid hemorrhage	1	3	2	6
	epidural hemorrhage	2	8	0	10
	subdural hemorrhage	2	6	0	8
	edema	0	1	1	2
	contusion+fracture	8	20	5	33
Total		32	61	17	110

DISCUSSION

TBI is damage to brain caused by outer mechanical factor (force) like due to RTA (road traffic accident), assault, fall, pedestrians and others. They can be divided in mild, moderate and severe. There is very less obtained studies present in Pakistan in University of management and technology on the aspect of the utility of brain CT in highlighting the etiological patterns and incidental findings of traumatic brain injury, but a lot of researches are present globally.

In a review article find incidental findings in head CT scans of 300 traumatic injury patients. In this study of TBI patients, enlarged (cisterna magna) was the (most) common (incidental finding) among all with head tumour and cyst in arachnoid matter in next order. In 7 cases, arachnoid cyst was present and

(hydrocephaly) in 3 of the cases. Enlarged (cisterna magna) (>10cm•3) present in 11 of the cases[16]. As per our research, we see that enlarged (cisterna magna) and calcification were (most) common (incidental findings) with same percentage of (3.6%); tumour (0.9%) and hydrocephalus (0.9%) were next in frequency.

In another research concludes contusion progression after TBI. The purpose of this research was to show how the Progression of cerebral contusions following TBI is a common origin of neurologic decay, increasing death rate. Clinical factors are initial GCS, history of hypertension, decompressive craniectomy, continuous smoking, and coagulopathy. Other radiological factors from CT are basal cistern compression, midline shift, skull fracture correlating with presence of contusion progression with skull fracture and cisternal compression being independent predictors[17].

In our study, contusion was the most common etiological pattern in a patient of traumatic brain injury with a percentage of 35%. Most common patients with TBI have severe contusion with percentage of 54.5% and then moderate (20.9%) and then mild (17.3%). Another research topic concludes the traumatic brain injury and complications'. TBI diagnosis with GCS. A recent review of 811 patients in which 144 subjects from the (NTD) represents that GCS score >13 or 13 can differentiate in-hospital deaths, neurological new methods, severe TBI[18].

In our Research, the most founded GCS score in patients of traumatic brain injury is moderate (9-12) and contusion were mostly present in patients with GCS between 9 and12.

In another article emphasis 'practices from a TCC in Pakistan'**.** In this study, accidents from motorbike are a big origin and origin of severe TBI with percentage of 62.6%. And is avoided by wearing proper helmets[19].

As per our research, RTA are cause of TBI. This can also be lessen by using proper helmet which most people avoid Moreover, there is a proper need of wearing helmet.

In another review article determines the 'analysis of TBI in children and boys'**.** In this study, sample size was 342 of both genders. It is found that the falls were the most common cause of TBI.Boys achieves injuries with more energy transfer and more. Findings like extra Dural haematomas were mostly highly shown in boys with 14% and subdural haematomas in girls with 11%. Mortality rate varies in both male and female with ratio of 4:2[20].

Another study determines the `clinical characteristics of TBI from road traffic accidents**.** As per this research, sample size of 692. Whereas the mean age group was 31.8 years ranging from 1 to 91, the majority of the patients affected from motorcycle accident and passengers with 40.5%. Analysis showed the factor with poor recovery was age >38 and GCS<8 and subdural hematoma on CT[21].

As per our study, sample size was 110 of both genders. The (most) affected age was (30 to 42) mean 37.05. Male to female ratio was 8:2. Percentage of Injuries caused by road traffic accidents are (72.7%).

CONCLUSION

CT is the preferred imaging modality in the case of mild head TBI, which shows accurate diagnosis, thus treatment; extra and intra-axial bleeding, hydrocephalus, major outcome and vascular injury. (RTA) is a big cause of TBI. This can be reduced by wearing a suitable helmet, but it is not used much. In addition, there is an important need to refer a strict system between hospitals in the country to reduce the effects of severe TBI. We found that enlargement of cisterna magna and calcifications were the (most) common (incidental findings), and tumors in brain and hydrocephalus were next in order.

Recommendations: CT has an important role in the mild alteration of head trauma. CT is also helpful in diagnosing other injuries and is essential in further evaluation. Futures studies with large sample size and increasing of time may overcome these limitations.

Conflict of interest: Nil

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