INCIDENCE OF INTRA CRANIAL HAEMORRHAGES IN TRAUMA OF THE HEAD ON CT SCAN BRAIN

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SUMMARY

CT Scan has largely modified the diagnosis and plan of treatment in patients with head injury. It easily provides the direct visualization of the blood collection and allows one to detect even haematomas/contusion of few mm size. Thus the probability of poor outcome can be predicted with certainty. The study presented in this article is a study of 100 consecutive head injury patients who were treated in the Department of Neurosurgery Hayat Abad Medical Complex, Peshawar from 15th June 1998 to 15th December 1998. This study was conducted irrespective of age, sex and cause. All these 100 head injured patients were scanned in emergency and the CT findings of these patients were analysed. (The objective of this study were to find out the incidence of different types of intra cranial haemorrhages in head injured patients on CT Scan, the relation of intra cranial haemorrhages with the clinical condition of patients and to help the doctors in time while planing treatment.)

INTRODUCTION

Head injury remains an important cause of death and disability. Head injuries account for half of road traffic accidents death.[1] Improvement in resuscitation and a more aggressive attitude to treatment of head injured patients have resulted in lowering of mortality.[2] Careful monitoring of head injured patients is important and achieved by a combination of careful clinical evaluation, imaging, electrophysiological markers and a variety of biochemical measurements.[3]

In the pre CT era, traumatic intracerebral haemorrhage was rarely diagnosed in isolation.[4] Nowadays, computed tomography has largely modified the diagnosis of intracerebral haematomas because it easily provides the direct visualization of the blood collection and allows one to detect even small haematomas of a few mm in diameter.[5] The major killing factors following head injury are intracerebral haemorrhage, cerebral hypoxia and brain swelling.[6] This shows the significance of CT findings for the surgical intervention and prognostic evaluation.

The incidence of traumatic intracranial haematomas and their out come depend on age, cause, time since head injury and clinical condition of patient. The analysis of CT help in calculating, the volume, site, extent and the nature of haematoma. The objective of this study were to find out the incidence of different types of intra cranial haemorrhages in head injured patients on CT Scan, the relation of intra cranial haemorrhages with the clinical condition of patients and to help the doctors in time while planing treatment.

MATERIAL AND METHODS

This prospective study includes 100 head injured patients who were presented through the emergency department of

Neurosurgery Post Graduate Medical Institute, Hayat Abad Medical Complex, Peshawar with in six months duration from 15th June to 15th December 1998. These patients belonged to different areas of N.W.F.P including central and remote areas.

All these patients were scanned after receiving emergency treatment with in 24 hours of their arrival to the hospital. The patients with an increased duration of more than 24 hours were excluded from this study.

The study was conducted irrespective of age or sex. There were 80 male and 20 female with male to female ratio of 4:1. The age group ranges from 1-80 years with maximum incidence between 20-40 years. Ninety patients were from different areas of NWFP including southern and northern areas while 10 patients were referred from Afghanistan because our neurosurgical centre provides health facilities to the border line areas of this province as well.

TABLE – 1

STUDY SHOWING SEX WISE DISTRIBUTION OF 100 PATIENTS WITH HEAD INJURY

	Sex	No of patients	Percentage
1.	Male	80	80%
2.	Female	20	20%
	Total	100	100%

Male / Female ratio = 4:1

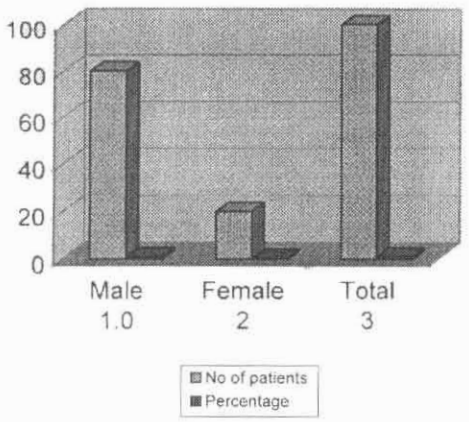
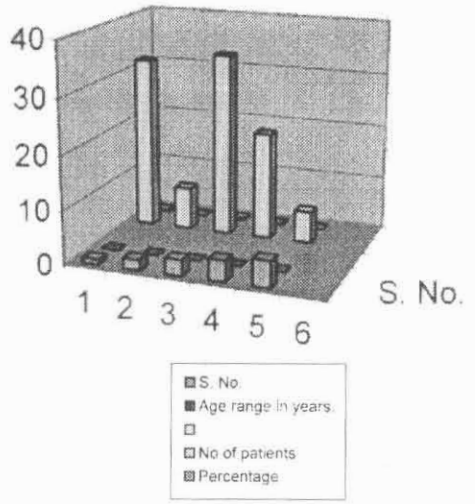


TABLE – 2

TABLE SHOWING AGE RANGE OF 100 PATIENT WITH HEAD INJURIES

	Age range in years	No of patients	Percentage
1.	1-10	32	32%
2.	11-20	8	8%
3.	21-40	34	34%
4.	41-60	20	20%
5.	61 – above	6	6%



All these 100 patients were clinically graded according to the Glasgow Coma Scale (GCS) and were divided into three groups mild, moderate and severe head injury.

The following points were recorded about each patient i.e. name, age, sex, address, mode of injury, clinical condition according to the Glasgow Coma Scale, associated injuries and CT findings.

The CT findings of these patients were divided into four groups.

1. Patients with skull fractures only.
2. Patients with focal haematomas in the form of extra dural/subdural, intra cerebral and intra ventricular haemorrhages. Those patient who were having contusion were also included in this group.
3. Patients with brain oedema only.
4. Patients with normal CT Scan.

RESULT

The results of CT findings of 100 patient with head injury is presented. There were 80 male & 20 female with male to female ratio of 4:1 (Table–I). The age group

TABLE – 3

TABLE SHOWING GEOGRAPHICAL DISTRIBUTION OF 100 PATIENTS WITH HEAD INJURIES

	Area	Percentage
1.	NWFP (Pakistan)	90%
	Southern area	8%
	Northern area	19%
	Central area	63%
2.	Afghanistan	10%
		100%

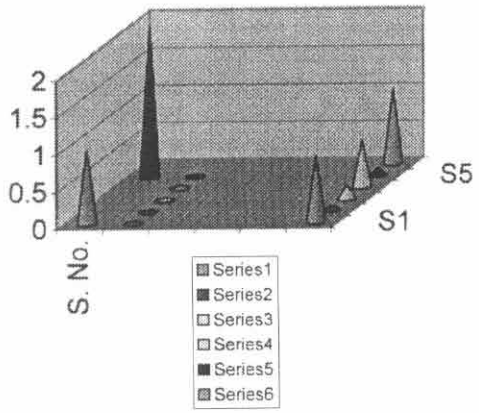
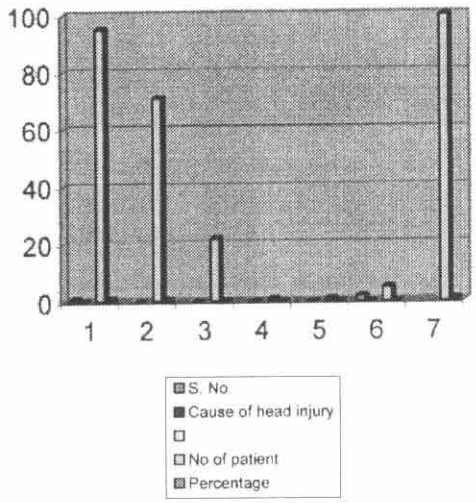


TABLE – 4

	Cause of head injury	No of patient	Percentage
1.	Blunt Trauma	95	95%
	• Road traffic accidents	71	71%
	• Falls	22	22%
	• Physical assaults	1	1%
	• Sport injuries	1	1%
2.	Fire arms injuries	5	5%
		100	100%



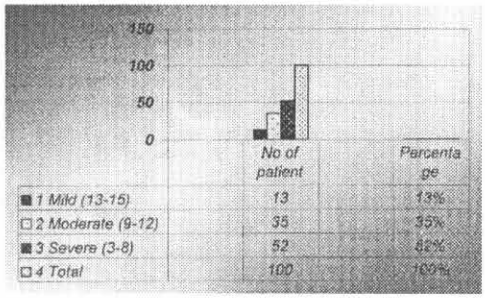
ranges from 1-80 years with maximum incidence between 20-40 years (Table–2). Ninety patients were from dif-ferent areas of NWFP including southern and northern areas while 10 patients were refer-red from Afghanistan because our neuro-surgical centre provides health facilities to the border line areas of this province as well. (Table–3)

The mechanism of injury was blunt trauma in 95 patient (95%) and fire arms in 5 patients (5%). Those with blunt trauma, were due to road traffic accident 71% fall from heights 22% physical assaults 1% and sports injury in 1%. (Table–4)

TABLE – 5

TABLE SHOWING SEVERITY OF HEAD INJURY ACCORDING TO GLASGOW COMA SCALE IN 100 PATIENTS

	Type of head injury (GCS)	No of patient	Percentage
1.	Mild (13-15)	13	13%
2.	Moderate (9-12)	35	35%
3.	Severe (3-8)	52	52%
	Total	100	100%



The clinical conditions were recorded according to the Glasgow Coma Scale. Those with mild head injury of Glasgow Coma Scale of 13-15 were 13(13% patients, with moderate head injury of Glasgow Coma Scale of 9-12 were 35 (35%) patients while with severe head injury of Glasgow Coma Scale of 3-8 were 52 (52%). Those with moderate and severe head injuries were of younger age group. (Table–5)

The CT findings included only fracture without intracranial pathology in 12 cases (12%) including both linear and depressed in 8 & 4 cases respectively. Focal pathology was seen in 56 (56%) while 32 (32%) were having diffuse brain edema or normal CT. The focal pathology included extra dural haematoma in 10(10%), subdural haematoma in 10(10%), sub-arachnoid haemorrhage in 3(3%), intracerebral haematoma including cortical contusions 32(32%) while only one case was having intra ventricular bleed (1%). (Table–6)

Thus the number of patients with intracranial lesion were 56 so the incidence of intracerebral bleed on CT scan was 56%. The CT findings of these patients were also co-related with mechanism of injury i.e. 35 patient with road traffic accident, 15 patients with falls, I patient with physical assaults while 5 patients with fire arm injury were having intracranial bleed.

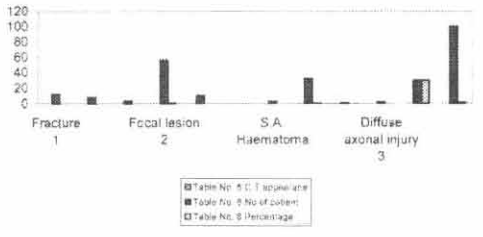
DISCUSSION

The incidence of serious neurosurgical complications after head injury is highly variable and depends upon the overall severity of injury. The intracranial hae-

TABLE – 6

TABLE SHOWING C.T APPEARANCE OF 100 PATIENTS WITH HEAD INJURIES

	C.T appearance	No of patient	Percentage
1.	Fracture	12	12%
	Linear	8	8%
	Depressed	4	4%
2.	Focal lesion	56	56%
	Extradural haematoma	10	10%
	Subdural Haematoma	10	10%
	S.A. Haemorrhage	3	3%
	Intracerebral bleed intra	32	32%
	Intraventricular bleed	1	1%
3.	Diffuse axonal injury	2	2%
4.	Normal CT	30	30%
	Total	100	100%



morrhages, which are amenable to surgical treatment can be predicated by scanning patients as early as possible.[7]

With the availability of CT Scan for emergency evaluation of head injured patients, intracranial haemorrhages have been shown to occur more than previously thought. Post traumatic intracerebral haemorrhage was thought to be an uncommon findings before the development of CT Scan.[8]

The incidence and outcome in different intracranial pathologies depends on age, cause, time since head injury and clinical condition of the patient. As a result of advances in surgical technique, anaesthesia and intensive care, an increasing amount of intracranial surgery is performed. The CT Scan also helps a lot and provides a surgical plan to neurosurgeon about surgical procedure.

Many variables have been found significant either positively or negatively in association with morbidity and mortality from head injury. These variables are age and sex of patients, injury mechanism, clinical condition and CT appearances. All these factors can potentially affect the recovery of patients.

Such random prospective study with wide range of age and mechanism is difficult to find in possible available literature because most of studies are confined to specific period or specific cause.

In 1990, Francesco et al[9] have reported a retrospective analysis of the CT scan of 50 consecutive patients in whom 33 male and 17 female ranging in age from 24-70 years (average 57 years) and Abdul Hakim Jamjoon et al[10] in 1992 have published a series of 66 elderly patients, with average of 72.5 years (61-85 years) with male to female ratio of 1:1. In 1990, Kwan Honchan[7] et al have published a series of 1178 consecutive adolescence over four years period with ranging age from 11-15 years. All these three series of study show outcome of head injury patients in comparison with age and sex in three different stages of life i.e. upto 15 years, upto 70 and upto 85 years.

The number of patients and period of study are also variable. As far as age and sex factors are concerned it becomes difficult to compare my random study of 100 patients of short period of three months. On important point is noted in our study that due to wide range of age from infancy to old age, different factors like anatomy of head, type and mechanism of injury, clinical status and CT appearances can be compared.

In my study of 100 patients the common mechanism of injury was blunt trauma in 95 patients out of which accident and fall were common, 71% and 22% of patients respectively. Fire arm injury was seen in 5% of cases which is not reported by any author in the concerned literature.

The road traffic accident and falls are the common caused of head injury in all parts of the world and particularly in third world countries including Pakistan. Road traffic accidents were seen commonly in urban area and falls in rural area predominately due to congestion and heavy traffic in cities. Road traffic accident was noted as cause of head injury in young and adolescent age group and falls in the extreme age of life. The factor of fall at the extreme age has also been given importance by Abdul Hakim Jamjoon et al in their study.[10] They have added alcohol in 14% of patient as an additional risk factor which is not so common in our society.

Fall during the sport and domestic activities and blunt trauma by following objects were common causes of head injuries in the study of Kwan Honchan et al.[7]

The clinical condition of patient with the head injury depends on age and over all severity of injury. These two factors are observed closely in our study as well. The incidence of intracerebral haemorrhages is higher in adolescents due to the factor that the adolescent skull bone is still undergoing puberty which has not achieved the thickness and hence the toughness of the adult skull.[11]

We noticed focal pathology in the from of intracerebral haemorrhage like extra dural in 10% subdural haematoma in 10% cortical contusion and intracerebral haematoma in 32%, sub-arachnoid haemorrhage in 3% and intra ventricular haemorrhages in 1%. The focal pathology in the form of intracranial haemorrhages have been probably due to the reason of focal impact type of injury during fall and road traffic accident.

Focal impact injury usually causes skull fractures with extra dural haematoma or subdural haematoma as its sequalae and intracerebral haemorrhage without skull fracture shows the phenomena of reverberation in cranial cavity.

Before the development of CT scan, intra ventricular haemorrhage was an unusual finding. The actual incidence of intra ventricular haemorrhage and prognostic implication have not been established and little attention has been given to the localization of blood in the ventricular system.[8]

We have noticed intra ventricular haemorrhage in 1% of patients in this study. This incidence is comparable with reported incidence of 2-9% of Melmed S 1990 study. Abroszbo, et al have recorded 22% incidence of post traumatic intra ventricular haemorrhage in 66 cases series of intra ventricular haemorrhages in which rest of cases were the result of spontaneous haemorrhage.

The appearance of blood in the ventricular system indicate the severity of head injury and poor prognosis.[12] Similarly subarachnoid blood on CT scan is single most useful method of predicting mortality.[13]

The value of pre-operative Glasgow Coma Scale as prognostic index is well known.[14] The combining score of Glasgow Coma Scale and CT findings of these patients help in deciding about the treatment schedule of the patients and thus the expected outcome could be explained. The urgency of surgical management like intracranial pressure measurement and evacuation of clot is planned early.[15] Levati et al have reported 100% mortality rate in head injured patients with Glasgow Coma[16] Scale of less than 5 above 40 years of age while Reuter and Warneke[17] reported a morality of 37% with pre operative Glasgow Coma Scale of 8. Though, the out come of patients was not out come objective of study but by combining the clinical status and CT findings one can explain the functional out come of such cases.

Keeping the CT picture in relationship between the type of intracranial pathology and out come, following severe head injury has been reported. Gennarelli et al[15] have reported poor prognosis with an over all mortality of 74% in patient with acute subdural haematoma with Glasgow Coma Scale of 3 to 5. Pentland B et al[18] have reported 53% mortality rate in patients with extra dural haematoma while worst prognosis has been reported by Becker et al[19] in patients with an intra cerebral mass lesion.

Though, the out come was not the objective of this study however, the presence of cerebral edema, intra ventricular blood and the degree of midline shift on CT scan predicts the out come of patient. Thus by predicting the out come of cases from clinical condition and CT findings, a clear advise may be given to the patients relatives and neurosurgeons.

CONCLUSION

1. Computed tomography was largely modified the diagnosis of intracranial haematomas because it easily provides the direct visualization of the blood collection and allows one to detect even haematomas/contusion of few mm size.
2. The tomodensitometric findings can suggest a prognostic evaluation and help to determine which patient is to be subjected for operation.
3. The main rational for early CT is to identify surgical mass lesion and signs of impending increased intracranial pressure and thus advantages can be gained by early therapeutic intervention for these patients who otherwise would have gone undetected.
4. Abnormal motor responses, loss of brain stem reflexes, mass lesion and midline shift on CT scan show poor outcome.
5. Fracture of the skull in adult age can be associated with intra-cranial haemorrhage.
6. The facility of CT should be made available in all large/divisional hospitals for early detection of intracranial bleed and thus the mortality and morbidity can be significantly reduced.

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