ORIGINAL ARTICLE

Extradural Hematoma: An Analysis of Surgical Management of 150 Selective Cases

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ABSTRACT:

Objectives: *1-To study the prevalence of extradural hematoma among the head injury patients.2-To study the morbidity and mortality in extradural haematoma and factors influencing them.3-To study the outcome in cases of extradural haematoma after one year follow-up.*

Patients & Methods: *It was a retrospective analysis of the data of 150 patients of Extradural hematoma among head injury patients presenting to the emergency of Neurosurgery Unit II in Lahore General Hospital Lahore from August 2002, to August 2003. Case selection was done according to an inclusion and exclusion criteria.*

Results: *The majority presentation was found between the age 1-12 years of age, closely followed by the 13-22 years and the23-32 year's age group. A strong male preponderance was noted. Male and females were almost in 5.8:1 ratio Falls from the home accounted for most in children, while traffic injury assumed prominence in the second and third decades. Fall from height was responsible for62 cases, Road side accident was responsible for 58 cases, assault resulted in 19 cases while 4 patients were injured during playing. The classical description of extradural hematoma was present in only22 patients. A linear fracture was seen on plain radiographs in 68 patients, depressed fracture was seen in twelve patients, compound fractures were seen in four patients and gaping fracture was seen in four patients. So in total, 62 had no visible fracture on the plain x-rays. Preoperative CT scan was done in all patients. Postoperative CT scan was done in 90 patients who failed to show a predictable recovery after evacuation of the hematoma. Three recurrent / residual hematoma was found and four patients had infarction. Most of the hematomas were seen to occur in the Temporoparietal region; eight were located in the frontal region, seven in the parietal and six in the post-parietal /occipital areas. Four hematomas confined themselves to the temporal fossa. Two were located in the fronto parietal region. While the Post. Fossa was the seat of one hematoma. Bilateral hematomas occurred in two patients. Regarding the side of extradural formation, in this study nearly equal on both sides, 75 patients have hematoma on left side, 72 patients have on right side and two have bilaterally, out of which two case have bifrontal across the superior saggital sinus. Surgery was performed in 150 patients. In 134 patients, an osteoplastic flap craniotomy was performed while in 16 patients evacuation of hematoma was done through a craniectomy of sufficient size to expose the clot and source of bleeding adequately. Craniectomy was done in emergent condition to save the life of the patient either patient deteriorated suddenly or anesthetist was not available. Dura was not opened in all cases, except where there is subdural hematoma on C.T. Scan or dura was bluish in colour per-operatively. If the recovery was slower than the expected, check C.T. Scan was done. There was recurrence in 3 patients. The source of bleeding was identified in 147 patients and in 3 patients there was no source, there was generalized oozing from the dura. In this study middle meningeal artery was the main bleeding source, responsible for bleeding in 53 (35.3%) patients and is followed by the fractured bone in 42 (28%) patients. The third source of bleeding was the dural venous sinuses (superior saggital sinus, sigmoid sinus, transverse sinus) in 36 (24%) patients. In 16 (10.7%) patients bleeding was from both the middle meningeal artery and fractured bone. Accompanying intradural lesions were seen in 65 patients seen on C.T.Scan / peroperatively. Seven patients had more than one intradural pathologies. There were 13 subdural hematomas, 10 intracerebral hematoma while 24 patients had contusions, eleven patients had subarachnoid haemorrhage. Significant Subdural hematomas and contusions were also evacuated in 10 and 13 patients respectively. In this study morbidity 36 (24%). Morbidity ranges from infection of wound to vegetative*

state. Ten patients were moderately disabled, 6 patients were severely disabled, 10 patients developed seizures postoperatively, out of which five had preoperatively fits, 6 in vegetative state, and four patients had wound infection postoperatively, which recovered later on. Our mortality of 12.7% seems quite high. One hundred and fifty patients were operated, out of which seventeen patients expired in hospital. Follow-up of 133 patients was performed, at one month, three months, six months and twelve months. At each visit the Glasgow out come scale was assessed and recorded. At the end of one month, when patients were examined, 107 patients recovered well, 9 patients were moderately disabled, 6 patients were severely disabled, and 11 patients were in vegetative state. Seventeen patients expired. At the end of three months, 107 patients were in good recovery, 9 patients were moderately disabled, seven patients were severely disabled and 10 patients were in vegetative state. No patients expired. At the end of six months, 115 patients recovered well, seven patients were moderately disabled, five patients were severely disabled and five patients were in vegetative state. One patient expired who was in vegetative state. At the end of twelve months, 122 (81.3%) patients were in good recovery, 5 (3.3%) were moderately disabled, 2 (1.3%) patients were severely disabled, 2 (1.3%) patients were vegetative and 19 (12.7%) patients expired.

Conclusion: *Zero mortality with acute extradural hematoma seems to be impossible. Even full neurosurgical and radiological facilities available around the clock in a tertiary care center may not prevent catastrophic deterioration in a minority of patients with rapidly developing extradural hematoma with associated intradural injuries.*

INTRODUCTION

Traumatic brain injury (TBI) affects up to 2% of the population per year, and constitutes the major cause of death and severe disability among young people. By far, the most important complication of TBI is the development of an intracranial hematoma, which complicates 25 to 45% of severe TBI cases, 3 to 12% of moderate TBI cases, and approximately 1 in 500 patients with mild TBI[1]. Without effective surgical management, an intracranial hematoma may transform an otherwise benign clinical course with the expectation of recovery to a situation in which death or permanent vegetative survival will occur. Moreover, prolonged delay in the diagnosis or evacuation of an intracranial hematoma may produce a similar result.

Since the introduction of CT scanning as the imaging study of choice to detect intracranial lesions after trauma, the incidence of surgical and nonsurgical EDH among traumatic brain injury (TBI) patients has been reported to be in the range of 2.7 to 4%.[2-5] Among patients in coma, up to 9% harbored an EDH requiring craniotomy[6]. The peak incidence of EDH is in the second decade, and the mean age of patients with EDH is between 20 and 30 years of age.[7-15] EDH are a rare entity in patients older than 50 to 60 years of age. In pediatric patients, the mean age of patients harboring EDH is between 6 and 10 years,[14,16] and EDH is less frequent in very young children and neonates.[17-18]

Head injury is of paramount interest to the neurosurgeon because quality care can make an important difference in outcome. Care of the head injured patient forms an important part of a neurosurgeon's work in all countries, and especially in developing countries, like ours, where widespread facilities for such care may be meager. With increasing industrialization, increase in road traffic accidents, the incidence and severity of head injury is increasing.

AIMS AND OBJECTIVES

1. To study the prevalence of extradural haematoma among the head injury patients treated from August 2002, to August 2003, presenting in emergency of Neurosurgery Unit II Lahore General Hospital Lahore.
2. To study the morbidity and mortality in extradural haematoma and factors influencing them. These factors are:
   i) Time interval between injury and operation.
   ii) Mode of injury.
   iii) Primary brain injury as assessed clinically or by C.T. scan.
3. To study the outcome in cases of extradural haematoma after one year follow-up.

PATIENTS AND METHODS

Study Design

It was a retrospective analysis of the data of 150 patients of Extradural hematoma among head injury patients presenting to the emergency of Neurosurgery Unit II in Lahore General Hospital Lahore from August 2002, to August 2003. Case selection was done

according to an inclusion and exclusion criteria.

Inclusion Criteria

1. All head injury patients presenting in the emergency directly or referred from any other hospital.
2. Irrespective of age and sex.
3. Extradural hematoma on CT scan with or without intradural lesion.
4. Patients with single long bone fracture will be included.

Exclusion Criteria

1. Polytrauma with massive abdominal, chest injuries and multiple long bones fracture.
2. Patients with gunshot injury.
3. Associated spinal injury patients.
4. Bleeding disorders and coagulopathies.
5. Known mentally retarded patients.

RESULTS

Age Incidence

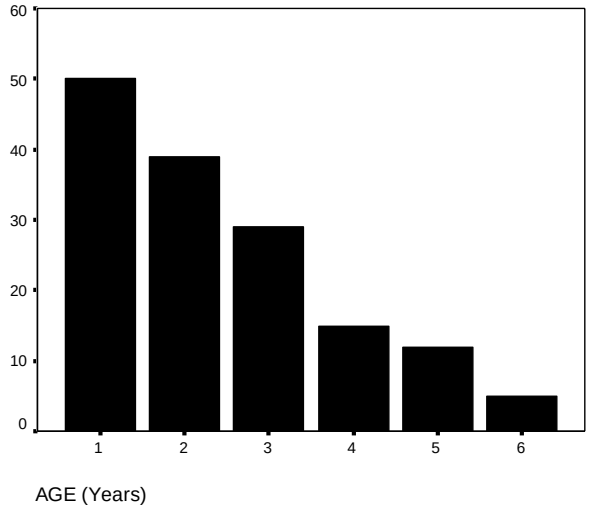
The greatest presentation was found between the age 1-12 years of age, closely followed by the 13-22 years and the23-32 year's age group. As evident, almost more than half were in the second and third decades of life. In older age group, a steady decline in the incidence was noted. In the fourth and fifth decades, the no. of patients was 12 and 5 respectively. The oldest patient was a man of 69 years (Table 1, Fig 1).

Table 1: *Age Distribution.*

Age (Years)	No. of patients	Percentage (%)
1 - 12	50	33.3
13 - 22	39	26
23 - 32	29	19.3
33 - 42	15	10
43 - 53	12	8
> 53	5	3.3
Total	150	100

Sex Incidence

A strong male preponderance was noted. Male and females were almost in 5.8:1 ratio (Table 2).



1. 1-12 years
2. 13-22 years
3. 23-32 years
4. 33-42 years
5. 43-52 years
6. >52 years

Fig. 1: *Incidence of Extradural Hematoma in Various Age Groups.*

Table 2: *Sex Distribution.*

Sex	No. of Patients	Percentage (%)
Male	122	81.7
Female	28	18.7
Total	150	100

Table 3: *Percentage of Mode of Injury.*

Mode of injury	No. of patients	Percentage (%)
Fall	62	41.3
Road traffic accidents	58	38.7
Assaults	19	12.7
Sports	4	2.7
Miscellaneous	7	4.7
Total	150	100

Mode of Injury

The cause of injury varied with age, as expected. Falls about the home accounted for most in children, while traffic injury assumed prominence in the second and third decades. Fall from height was responsible for62 cases, Road side accident was responsible for 58 cases, assault resulted in 19 cases while 4 patients were

injured during playing, seven patients were included in the miscellaneous group, like fall of a brick, fall of ceiling fan and fall of tree on head. No case due to fire arm injury was received (Table 3).

Classical Picture of Extradural Hematoma

The classical description of extradural hematoma was present in only 22 patients. The majority of the patients that is 41% displayed only two of these two features, while 23% had only one of these signs. The most important group however, was the one that did not demonstrate any of these signs and a substantial number i.e.22% belonged to this group.

Skull Radiography

X-ray skull was done in all the patients. Standard anteroposterior and lateral films were obtained and findings recorded. A linear fracture was seen on plain radiographs in 68 patients, depressed fracture was seen in twelve patients, compound fractures were seen in four patients and gaping fracture was seen in four patients. So in total, 62 had no visible fracture on the plain x-rays.

When the incidence of fracture skull was studied in relation to the age, no significant difference was seen in various age groups. The incidence of fracture was similar in the entire group (Table 4, Fig.2).

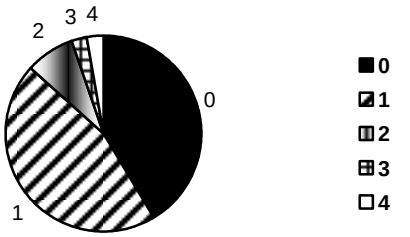
Table 4: *Findings of X-ray Skull.*

Radiographic findings	No. of patients	Percentage (%)
No. fracture (radiographically)	62	41.3
Linear fracture	68	45.3
Depressed fracture	12	8
Gapping fracture	4	2.7
Compound fracture	4	2.7

Computed Tomography (CT Scan)

Preoperative CT scan was done in all patients. The picture on the CT scan was typical of an extradural hematoma with the dense biconvex shadow in proximity to the bone.

Postoperative CT scan was done in 90 patients who failed to show a predictable recovery after evacuation of the hematoma. Three recurrent / residual hematoma was found and four patients had infarction, out of which two had infarction in the territory of posterior cerebral artery and two had under the site of hematoma.



0 - Normal, 1 - linear fracture, 2 - depressed fracture, 3 - compound fractures, 4-gapping fractures

Fig. 2: *Fracture of Skull on X-rays.*

Site of Extradural Hematoma

Most of the hematomas were seen to occur in the Temporoparietal region; eight were located in the frontal region, seven in the parietal and six in the post-parietal / occipital areas. Four hematomas confined themselves to the temporal fossa. Two were located in the fronto parietal region. While the Post. Fossa was the seat of one hematoma. Bilateral hematomas occurred in two patients (Table 5, Fig. 3).

Table 5: *Different Sites of Extradural Hematoma.*

Site of hematoma	No. of Patients	Percentage (%)
Frontal	25	16.7
Temporal	10	6.7
parietal	52	34.7
Frontoparietal	14	9.3
Temporoparietal	28	18.7
Post parietal	5	3.3
Post. Fossa	3	2
Occipital	6	4
Occipital and post fossa	7	4.7

Regarding the side of extradural formation, in this study nearly equal on both sides, 75 patients have hematoma on left side, 72 patients have on right side and two have bilaterally, out of which two case have bifrontal across the superior saggital sinus.

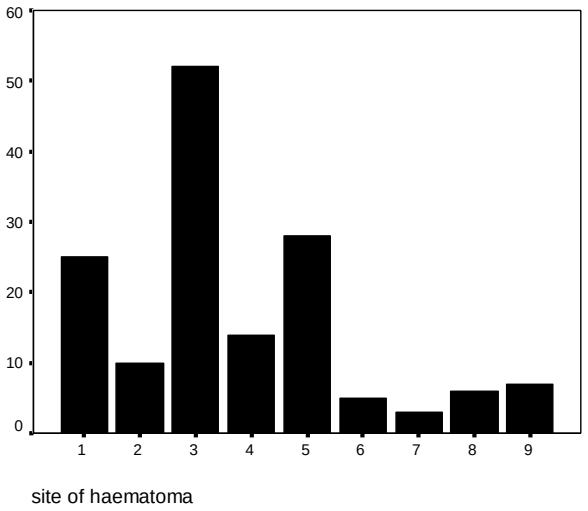


Fig. 3: *Site of Hematoma.*

1. Frontal extradural hematoma.
2. Temporal extradural hematoma.
3. Parietal extradural hematoma.
4. Fronto-temporal hematoma.
5. Temporo-parietal hematoma.
6. Postparietal hematoma.
7. Post. fossa extradural hematoma.
8. Occipital extradural hematoma.
9. Occipital and post.fossa hematoma.

Operative Findings

Surgery was performed in 150 patients. In 134 patients, an osteoplastic flap craniotomy was performed while in 16 patients evacuation of hematoma was done through a craniectomy of sufficient size to expose the clot and source of bleeding adequately. Craniectomy was done in emergent condition to save the life of the patient either patient deteriorated suddenly or anesthetist was not available.

However it was seen that exposure was better and surgery was easier when a craniotomy was performed, though of course, the time span in fashioning an osteoplastic flap was slightly more. The posterior fossa hematoma was removed through craniectomy of adequate size. In those patients, in whom, depressed fracture was to be elevated and osteoplastic flap was not possible, because there was a compound, comminuted fracture of bone overlying extradural hematoma craniectomy was done. Operative site was identified by doing C.T. scan. No exploratory burr holes were made.

Dura was not opened in all cases, except where there is subdural hematoma on C.T. Scan or dura was bluish in colour per-operatively, if the recovery was slower than the expected, check C.T. Scan was done. There was recurrence in 3 patients.

Source of Heamorrhage

The source of bleeding was identified in 147 patients and in 3 patients there was no source, there was generalized oozing from the dura. In this study middle meningeal artery was the main bleeding source, responsible for bleeding in 53 (35.3%) patients and is followed by the fractured bone in 42 (28%) patients. The third source of bleeding was the dural venous sinuses (superior saggital sinus, sigmoid sinus, transverse sinus) in 36 (24%) patients. In 16 (10.7%) patients bleeding was from both the middle meningeal artery and fractured bone (Table 6).

Table 6: *Source of Bleeding.*

Source of bleeding	No. of patients	Percentage (%)
Middle meningeal artery	53	35.5%
Fractured bone (diploic veins)	42	28%
Venous sinuses	36	24%
Middle meningeal artery and fractured bone	16	10.7%
Generalized oozing	3	2%

Accompanying Intradural Lesion

Accompanying intradural lesions were seen in 65 patients seen on C.T. Scan / peroperatively. Seven patients had more than one intradural pathologies.

Table 7: *Incidence of Intradural Lesions in Patients of Extradural Hematoma.*

Intradural lesions	No. of patients	Percentage (%)
Contusions	24	16
Subdural hematoma	13	8.7
Subarachnoid haemorrhage	11	7.3
Intracerebral hematoma	10	6.7
More than one pathology	7	4.7

There were 13 subdural hematomas, 10 intracerebral hematoma while 24 patients had contusions, eleven patients had subarachnoid haemorrhage. Significant Subdural hematomas and contusions were also evacuated in 10 and 13 patients respectively (Table 7, Fig. 4).

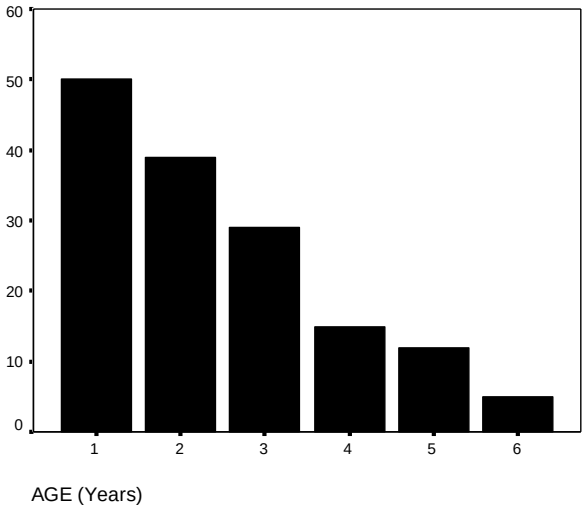


Fig. 4: *Incidence of Extradural Hematoma in Various Age Groups.*

1. 1 - 12 years
2. 13 - 22 years
3. 23 - 32 years
4. 33 - 42 years
5. 43 - 52 years
6. > 52 years

OUTCOME

Morbidity

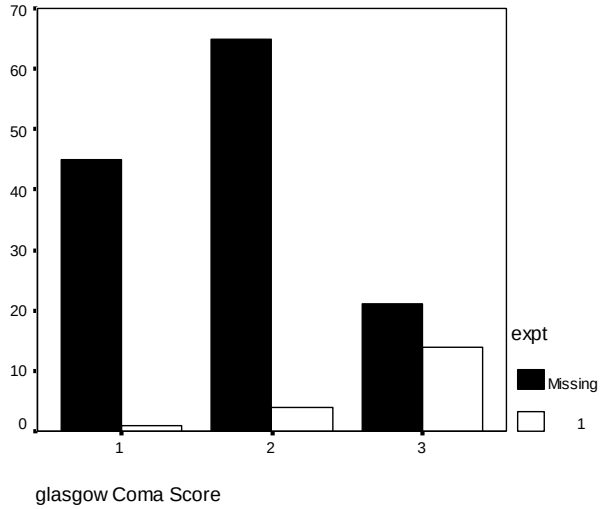
In this study morbidity 36 (24%). Morbidity ranges from infection of wound to vegetative state. Ten patients were moderately disabled, 6 patients were severely disabled, 10 patients developed seizures postoperatively, out of which five had preoperatively fits, 6 in vegetative state, and four patients had wound infection postoperatively, which recovered later on (Table 11).

Mortality

Our mortality of 12.7% seems quite high. (Table 8, Fig.5).

1. **Follow-up**

One hundred and fifty patients were operated, out of which seventeen patients expired in hospital. Follow-up of 133 patients was performed, at one month, three months, six months and twelve months. At each visit the Glasgow out come scale was assessed and recorded.



Glasgow coma score 13-15
Glasgow coma score 8-12
Glasgow coma score 3-7

Fig. 6: *Mortality In Relation To Preoperative Glasgow Coma Scale.*

0 No
1. Contusion/ICH
2. Subarachnoid haemorrhage
3. Diffuse axonal hiycry
4. Subdural hematoma
5. Double pathology

Glasgow Outcome Scale

0 - Good recovery
1 - Moderate disability patient can care himself.
2-Severe disability patient can't care himself.
3-Vegetative state higher mental functions are impaired
4- Dead
(Jennet B, Bond DM; 1975)

One Month

At the end of one month, when patients were examined, 107 patients recovered well, 9 patients were moderately disabled, 6 patients were severely disabled,

Table 8: *Morbidity, Outcome, Glasgow Coma Scale And Associated Brain Injuries.*

Morbidity/ Outcome	G.C.S	Associated brain injuries						Total
		No	Contusion	SAH	DAI	SDH	DP	
Good recovery	13 - 15	26	4	1	1	4	1	37
	8 - 12	33	10	1	5	2	2	53
	3 - 7	4	3					7
Total		63	17	2	6	6	3	97
MD	8 - 12	1		2				3
	3 - 7	3	1		1	1	1	7
Total		4	1	2	1	1	1	10
Epilepsy	13 - 15	4				1		5
	8 - 12		1			1		2
	3 - 7	1			1	1		3
Total		5	1		1	3		10
SD	8 - 12	2						2
	3 - 7	3	1					4
		5	1					6
Vegetative State	13 - 15			1				1
	8 - 12	1		1		1		3
	3 - 7		1	1				2
Total		1	1	3		1		6
Infection	13 - 15	1						1
	8 - 12	2						2
	3 - 7		1					1
Total		3	1					4
Death	13 - 15			1	1			2
	8 - 12	2				2		4
	3 - 7	2	2	3	1		3	11
Total		4	2	4	2	2	3	17

and 11 patients were in vegetative state. Seventeen patients expired.

Three Months

At the end of three months, 107 patients were in good recovery, 9 patients were moderately disabled, seven patients were severely disabled and 10 patients were in vegetative state. No patients expired.

Six Months

At the end of six months, 115 patients recovered well, seven patients were moderately disabled, five patients were severely disabled and five patients were in vegetative state. One patient expired who was in vegetative state.

Twelve Months

At the end of twelve months, 122 (81.3%) patients

were in good recovery, 5 (3.3%) were moderately disabled, 2 (1.3%) patients were severely disabled, 2 (1.3%) patients were vegetative and 19 (12.7%) patients expired.

Table 9: *Outcome, Associated Brain Injuries and Glasgow Coma Scale at the End of One Year.*

Morbidity/ Outcome	G.C.S	Associated Brain Injuries						Total
		0	1	2	3	4	5	
Good Recovery	13-15	31	4	2	2	5	1	45
	8-12	38	11	1	5	4	2	61
	3-7	9	5			1	1	16
Total		78	20	3	7	10	4	122
Vegetative state	8-12			1				1
	3-7	2		1	1			4
Total		2		2	1			5
Severe disability	8-12	1		1				2
Total		1		1				2
	8-12			1				1
Moderate disability	3-7				1			1
Total				1	1			2
Death	13-15			1				1
	8-12	2				2		4
	3-7	2	4	3	1	1	3	14
Total		4	4	4	1	3	3	19

DISCUSSION

The incidence of extradural hematoma in patients admitted with head injury in our department was 4.32%, maximum patients were below twelve years of age 39.6% followed by 29.3% in the age between 13-22 years. Our youngest patient was a boy of two years and oldest patient was of 6 8years.

A 5.8:1, male: female ratio was observed.

Fall was the commonest cause of extradural hematoma (41.3%). The next important cause encountered, mainly in young subjects, was injury due to road traffic accident (38.7%). The incidence of assaults is (12.7%). This study shows 42 (28%) patients were conscious, 47 (31.3%) patients were unconscious, 61 (40.7%) patients were in a drowsy / stuporous condition and lucid interval was in29 (19.3%), anisocoria in 32 (21.3%), dilated / fixed in 21 (14%) and isocoria in 97 (64.7%) patients. Bradycardia was in 72 (48%) patients and pulse was normal in 78 (52%) patients.

However, most cases were not seen to behave in the "classical way". Only twenty two patients (14.6%) presented with these three signs together.

The incidence of fracture skull in this series is 85.4% (58.8% were seen on routine X-rays, while 26.6% were seen per operatively). The present study revealed that fractures occurred with approximately the same frequency in most age groups. In fracture of skull 45.3% were linear, 8% were depressed, 2.7% were gapping, other 2.7% were compound and 26.6% were diagnosed peroperatively which were also linear.

CT scan was found to be an extremely useful diagnostic tool. It helped us to diagnose extradural hematoma and associated brain injuries and helped us in assessing our operation results. Its availability round the clock is a great asset. It is recommended that all patients with the slightest doubt of a traumatic mass lesion should be subjected to a CT scan examination. All unconscious patients, and all those who are not showing predictable recovery are good candidates for a C.T. Scan. Persistent headache and vomiting are indications as well. Three patients in this series presented with intractable headache after trauma as the sole complaint. In the series of Cook et al,[19] 40% patients presented with only nausea and vomiting. In the Present study, 33 patients had no localizing signs or a history of deterioration. However I do not think that every patient with a history of brief unconsciousness less than 5 minutes, without signs of increased intracranial pressure and a linear fracture skull should be subjected to CT. scan, as suggested by Servadei et al.[20] Such a policy is not practicable in Pakistan at the present moment, as scan facilities are limited only to the tertiary centers and the patients can not afford the cost of CT scan. Intradural lesions were found in 65 (43.3%) patients, out of which 24 16%), 11 (7.3%), 10 (6.7%), 13 (8.7%) and 7 (4.7%) patients had contusions, subarachnoid haemorrhage, diffuse axonal injury, subdural hematoma and more than one pathology respectively included brain lacerations and intra cerebral hematoma. In the series of Jamieson and Yelland,[21] incidence of intradural lesion was 47.3% and contusion in 21%, subarachnoid haemorrhage was in 18%.

S/NO	AGE	SEX	Mode Of Injury	G.C.S	CONCIOUS LEVEL	ASSOIATED BRAIN INJURIES	SITE OF HEMATOMA	TIME B/W INJURY and OPERATION	RECURRENCE	COMPLI-CATION
1	18 Y	Male	RSA	4/15	Since injury	Frontoparietal contusion	Rt.Temporal EDH	06 hours	Present	-
2	20Y	Male	RSA	9 /15	Drowsy	Subdural hematoma	Rt.Fronto temporal EDH	18 hours	_	_
3	32 Y	Male	Assault	4 /15	unconscious	Rt.Fronto temporal infarct	Rt.Fronto temporal EDH	11 hours	_	_
4	25 Y	Male	Assault	4 /15	unconscious	Subarachnoid haemorrhage	Rt.Fronto temporal EDH	5 hours	_	_
5	36 Y	Male	RSA	4 /15	unconscious	Intracerebral haemorrhage	Rt.parietal EDH	10 hours	present	_
6	32 Y	Male	Assault	6 / 15	Unconscious	Contusion + subarachnoid haemorrhage	Lt.frontotem poral EDH	18 hours	_	_
7	12 Y	Male	Fall	11 / 15	Unconscious	Deep seated contusion	Rt. frontal EDH	07 hours	_	_
8	25 Y	Male	Fall	4 / 15	Unconscious	Subarachnoid haemorrhage	Lt.parietal EDH	12 hours	_	_
9	04 Y	Male	Fall	8 / 15	Unconscious	Subarachnoid haemorrhage	Pos.fossa EDH	Five days	_	_
10	35 Y	Female	Fall	03 /15	Unconscious	Subarachnoid haemorrhage	Lt. Parietal EDH	Five days	_	_
11	30 Y	Male	RSA	3 / 15	Unconscious	Subarachnoid haemorrhage	Rt. Parietal EDH	28 Hours	_	_
12	50 Y	Male	Fall	11 /15	Drowsy	Bifrontal + Post.Fossa Contusion	Post.Fossa EDH	12 Hours	_	_
13	23 Y	Male	RSA	03 / 15 (AMBU Respirat ion)	Unconscious	Brain Stem Contusion	Rt. frontal EDH	03 Days	_	_
14	11 Y	Male	RSA	08 / 15	Unconscious	_	Rt. parietal EDH	15 hours	_	WI + DD
15	60 Y	Male	Fall	06 / 15	Unconscious	Rt.parietal Contusion	Rt. parietal EDH	12 Hours	_	_
16	12 Y	Male	Fall	5 / 15	Unconscious	Lt.parietal Contusion	Lt. parietal EDH	12 Hours	_	_
17	08 Y	Male	Fall	5 / 15	Unconscious	Bilat.occipital infarction	Rt. TP EDH	03 Hours	_	_
18	18 Y	Male	Fall	5 / 15	Unconscious	Rt.Temporal Contusion	Lt.Temporal EDH	24 Hours	_	_
19	10 Y	Male	RSA	06 / 15	Unconscious	Bifrontal Contusion	Lt.TP EDH	07 Hours	_	_

Table 18: *Mortality at the end of one year in relation to mode of injury, conscious level, associated brain injuries and time duration b/w trauma and operation.*

A craniotomy was found to be better in comparison to a craniectomy, as the exposure was more adequate, hemostasis easier, and the need for a future cranioplasty obviated. However, as osteoplastic flaps take about 10-15 minutes longer to fashion, in the rapidly deteriorating patient, a fast craniectomy is advocated. A cranioplasty can, of course be done at leisure six months later. Craniectomies are the obvious choice for posterior fossa hematomas.

Two cases (1.5%) of recurrence were recorded. In many large series such complications have been encountered in 1-2% of the patients, e.g. Hooper,[22] Phonprasert et al.[23] Our good surgical results are probably due to wide exposure, immaculate hemostasis and accurate anchorage of the dura to the pericranium in all cases.

It is recommended that whenever scan facilities are not immediately available, a suspected case should not be labeled negative until all the six standard burr holes (Temporal, parietal and frontal on both sides) and an exploration of the posterior fossa, where indicated, reveals no clot. In all these patients, where exploration does not reveal a clot despite a strong clinical suspicion, a postoperative scan should be done on priority basis to find out the cause of the deterioration / development of signs.

In post operative period 17 patients expired (11.3%) in this study and 33 patients (24%) have developed surgical morbidity i.e, moderate disability (6.6%), epilepsy (6.6%), severe disability (4%), vegetative state (4%) and infection in (2.6%).

Mortality was in 9 (6%) patients of falls out of which five patients were in G.C.S, ranging from 3-7/15, 3 (2%) patients were in G.C.S ranging from 8-12/15 and one patient presented with G.C.S ranging from 13-13/15. Seven (4.6%) patients expired who presented with road traffic accidents out of which five were in G.C.S 3-7/15 and two patients were in G.C.S ranging from 8-12/15 before operation. Three (2%) patients expired in whom mode of injury was assault (blunt weapons, dandas, bricks etc) ; all are in G.C.S 3-7/15. In an other study by Buzdar et al.[24] Mortality was 29.1% out of which 20.83%, 4.1%, 4.1%were presented with road side accidents, fall and assault respectively. In era of CT scan with optimal diagnosis and treatment with in a few hours, mortality was 12%.[25]

At the end of one year two patients expired during follow up, both were in moribund (vegetative state) in post operative period, so total mortality in this study was nineteen patients (12.7%).

Morbidity after serial follow up, at the end of one year was n 15 (10%) patients. Five (3.33%) patients were moderately disabled, two (1.33%) patients had severe disability, two (1.33%) patients were in vegetative state and six (4%) patients also had epileptic fits.

CONCLUSION

Zero mortality with acute extradural hematoma seems to be impossible. Even full neurosurgical and radiological facilities available around the clock in a tertiary care center may not prevent catastrophic deterioration in a minority of patients with rapidly developing extradural hematoma with associated intradural injuries.

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