Original Research Article

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Extra Dural Hematoma an Institutional Experience and Review with a New Insight in its Management

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Abstract

Background and Aim: Extra Dural hematomas are one of the common neurosurgical emergencies especially affecting young male in their 2nd and 3rd decade. Trauma to the head is the leading cause and occasionally non traumatic etiology like dural arterio venous fistula, sickle cell disease and patients on hemodialysis do develop spontaneous EDH. Usually presents with altered sensorium often preceded by headache with one third of patients shows classical lucid interval. Very often it presents with uncal herniation with anisocoria and rarely with end stage tonsillar herniation. CT scan is gold standard investigation for early diagnosis. Craniotomy and evacuation of hematoma is the most popular and worldwide procedure of choice and it successfully address the problem in majority of cases. Here we evaluated the important prognostic factors and outcome of 85 consecutive patients with extradural hematoma managed surgically.

Material and method: Data of 85 consecutive patients of extradural hematoma who were admitted and undergone surgical management in our neurosurgical unit between the period sepember2018 to September 2020 were analyzed. The analysis was mostly made with respect to etiology, and different prognostic factors affecting the surgical outcome.

Results: Standard craniotomy was done in 29 patients, trephination was carried out in 44 patients. extended burr hole was performed in 4 patients and 8 patients were subjected to craniectomy. Overall clinical outcome was good with total 5 deaths in the series.

Conclusion: Extra Dural hemorrhage is a problem of mainly the younger age group. Trauma is the leading cause and CT accurately detects it. Mostly presents with features of raised ICP and focal neurological deficits .Though it carries a mortality of 10%, patients who undergo early neurosurgical intervention typically have better outcomes than patients who have delayed interventions.

Keywords: Head injury; Extradural hematoma; Glasgow coma scale; Outcome.

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Introduction

Extradural hematoma is a neurosurgical emergency. Mostly seen in young adults of 2nd to 4th decade after low velocity trauma to the head and accounting 4 to 10% of head injury patients with a mortality rate of 10%.Though Road traffic accident is the leading cause behind occurrence of Extradural hematoma, there are very rare incidence of spontaneous non traumatic extradural hematoma like following rupture of Dural arterio-venous fistula and as a rare complication in patients of sickle cell disease. Whatever may be the cause, the rapidity of clinical progression depends upon the source of bleeding and the amount of blood that is collected in the epidural space and always it warrants prompt management. No doubt CT is the gold standard investigation modality for trauma victims and so far EDH is concerned, nobody will miss the diagnosis as the radiological appearance is very characteristic and eye catching. Though all EDH does not require surgery, large hematoma with deteriorating consciousness or

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focal neurological deficit needs prompt evacuation. Borderline hematoma needs neurosurvillance for any progression to cause neurological deterioration by doing serial CT scan at regular interval where as small size hematoma are of little concern for it's very remote possibility of expansion and sudden deterioration. Overall the decision and timing for treatment of EDH has to be made individually in each case depending on patient's age, hematoma size, degree of mass effect location and patient's neurological status. Prognosis in small to medium size hematoma is always satisfactory however in cases of large size hematoma it depends upon the promptness of surgical evacuation and other factors that independently affect the outcome. Isolated extradural hematoma after surgical evacuation before cerebral herniation shows immediate improvement and carries excellent prognosis.[5] whereas Patients who have already coned and those who are having associated parenchymal brain injury carries bad prognosis with delayed recovery and residual neurological deficit. This is a study encompassing different mechanism leading to development of EDH which was managed surgically in a tertiary care centre where neurosurgical service is available with a dedicated trauma team and it's surgical outcome.

Maerials and Mehodology

This is a retrospective study conducted at Veer Surendra Sai Institute of Medical Science and Research (VSSIMSAR), Burla, Sambalpur, Odisha between September 2018 to September 2020. Total 85 patients who were admitted to Department of Neurosurgery with the diagnosis of Extradural hematoma and undergone surgical evacuation were included in the study. Data were retrieved from the medical record section and critically analyzed. Hematoma of volume more than 30cc, presence of mass effect and midline shift of more than 5 mm, and patients having focal neurological deficit due to EDH were included in the study. Analysis was made with respect to patient profile, symptomatology, diagnostic method used and procedure performed along with treatment outcome. Since it is a retrospective study the treatment end point was time of discharge.

Results

There were total 85 cases of EDH operated. The peak age incidence was between 2nd and 3rd decade. The minimum age was 6 yr and the maximum age was 66 yr. Age distribution is shown in Table-1. There were 76 male (89.41 %) and 7 female (8.23%). Two were children. Among causes of EDH trauma contributed majority of cases of which RTA accounts 60% followed by assault, followed by fall from a height. Among non traumatic etiology Sickle cell disease (SCD) took the upper hand in our small series. Usually thrombotic strokes are common in sickle cell patients but two of our patients present with rare spontaneous hemorrhagic complication that is development of spontaneous EDH manifested with severe headache and associated with other features of sickle cell crisis. The most common location of hematoma was temporo- parietal (32.94%), parietal (27.05%), followed by frontal (25.88%). Association with underlying fracture was found in more than 90 % of cases and coexisting primary parenchymal injury was observed in 30 % of cases. At presentation 35% of patients had GCS 13-15, 28% had GCS of 9-12 and 20% had GCS 6-8 and rest 17 % had GCS less than 5.(Ref. to Table-2) Lucid interval was seen in approximately 1/3rd of patients in our series. Hemiparesis was the prominent neurological deficit among patients with parietal EDH and altered sensorium and irritability was the prominent feature of temporal EDH where as patients of posterior fossa EDH had remarkable headache and lower cranial nerve palsy as the predominant symptoms. Five Patients in our series had low GCS with bilateral fixed and unreactive pupil. So far surgical options are considered 44 patients (51.76%) underwent trephination and evacuation.29 patients (34.11%) were subjected to standard craniotomy. In 8 patients (9.41%) craniectomy was carried out and 4 patients (0.47%) were managed with extended burrhole with negative suction evacuation. (Ref. Table-3) So far surgical outcome is analyzed there was no death among patients with GCS 13-15 and one death among 9-12 GCS group. 4 patients of critical group (GCS< 8) were died. (Ref. Fig-1) Among the patients who were operated with bilateral fixed and un reactive pupil 3 were died (60%) post operatively. The overall mortality rate in our series was less than 12%, so far complication and residual deficit was considered few patients had persistent double vision due to 6th cranial nerve palsy due to raised ICP secondary to EDH. None had seizure.PCA infarction was noticed in patients with delayed presentation.

Table 1: Age Distribution of patients.

Age group	Frequency	Percentage
0-10	1	1.17
10-20	13	15.29

21-30	35	41.17
31-40	17	20.00
41-50	12	14.11
51-60	5	5.88
61-70	2	2.35
Total	85	100%

Table 2: Glasgow coma scale of patients at presentation.

GCS Score	Number	Percentage
3-5	14	17%
6-8	17	20%
9-12	24	28%
13-15	30	35%
Total	85	100%

Table 3: Types of Surgical Procedure.

Type of procedure	No. of patients	Percentage
Trephination	44	51.76
Standard Craniotomy	29	34.11
Extended Burrhole	4	0.47
Craniectomy	8	9.41

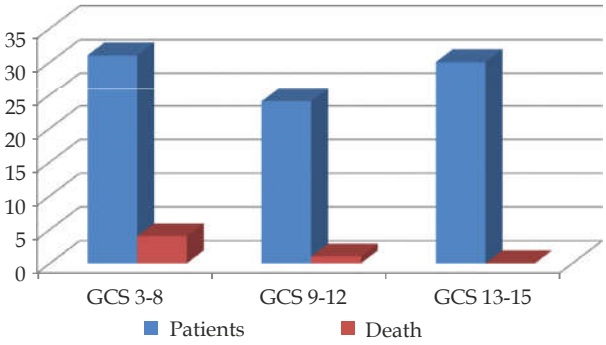

Fig. 1: Relationship between admission Glasgow Coma Scale and mortality.

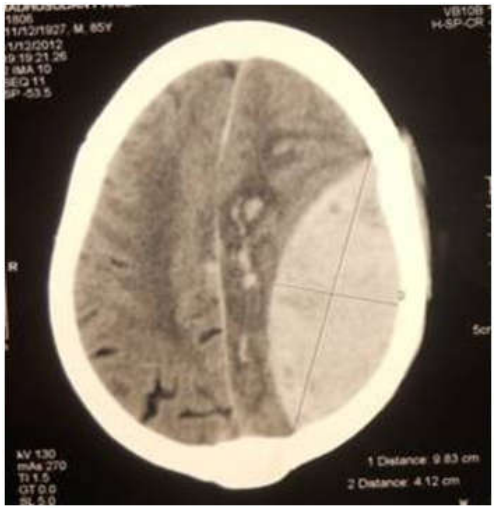

Image 1: Classical Large EDH limited to suture line.

Image 2: Hemispheric EDH.

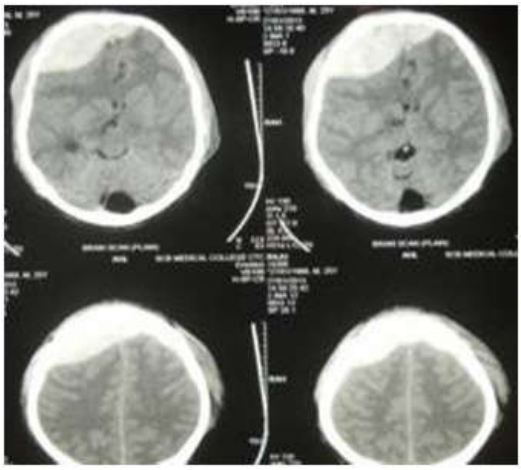

Image 3: Bilateral frontal EDH due to sinus injury.

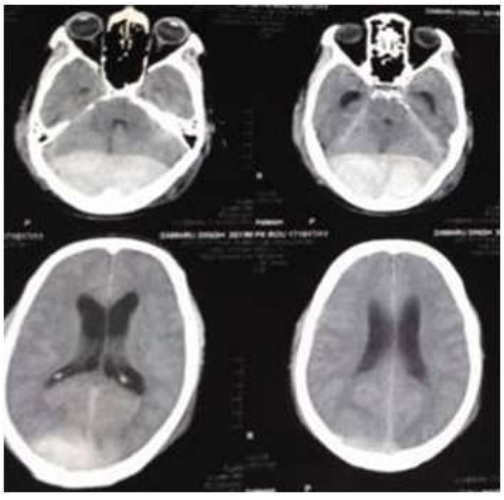

Image 4: Large posterior fossa EDH WIH POSSIBLE INJURY to transverse sinus.

Image 5: Standard craniotomy for evacuation.

Image 6: Technique of trephination.

Image 7: EDH in a child managed successfully.

Discussion

Extradural hematoma occurs after collection of blood in the epidural space stripping Dura from the bone. Usually the hematoma is limited within the suture line for which it gives a lenticular or

biconvex shape. (Image-1) However it may cross the suture line in cases where there is diastaic fracture causing stripping of the dura from its dense attachment at sutural margin. (Image-2) Sometimes it takes a shape of plano-covex, cofusing preoperatively with acute subdural hematoma. However presence of fracture and associated pneumocephalus and buggy swelling over the scalp raises strong suspicion of EDH. Though it is mostly unilateral, bilateral/bicompartmental involvement occurs when the venous sinuses are involved. (Image-3) involvement of transverse venous sinus leads to large EDH with both a supratentoreal and infratentoreal component. (Image-4) Crossing of fracture line across the venous sinuses always raises the suspicion of venous sinus involvement. The location of hematoma is mostly temporo-parietal followed by frontal location. The involved vessel usually decides the site of hematoma as tearing of anterior meningeal artery leads to frontal EDH and tearing of middle meningeal vessel lead to middle cranial fossa EDH. Study shows approximately 15 % of EDH are a result of venous bleeding.EDH often coexists with skull fracture. In 20 to 30 % of cases EDH is associated with other intracranial injury which contributes to overall prognosis after evacuation of EDH.[4]

EDH accounts 1% o 4% of trauma victims with a higher incidence in autopsy study. Uncommon in two extreme age group and mostly seen in 2nd to 3rd decade.[4] So far etiology is concerned trauma to the head is the underlying mechanism, mostly following RTA and assault but rarely do EDH occurs spontaneously as in our study we came across two such patients who were known to have sickle cell disease which predisposed spontaneous opening up of veins of the hypertrophied marrow into the epidural space and presenting with large extradural hematoma requiring surgery.[9]

Presentation varies depending upon the size and location of hematoma. History of lucid interval is usually seen in 1/3rd of patients and in our study 30% patients had history of lucid interval. Most of the patients usually present with altered sensorium and preceding headache is seen in almost all patients. It has been observed that EDH caused by arterial tearing rapidly deteriorates than when it is resultant from venous bleeding which presents with slower neurological deterioration.pre operative pupillary status is an important prognostic factor. Bilateral un reactive pupil carries poor prognosis, infact it is associated with 90% mortality. Rarely do patient survive if surgical intervention is as prompt as pupillary dilatation before sufficient time is elapsed between pupillary dilatation and surgical intervention. The role of CT scan cannot be over emphasized and practically MRI has little value in traumatic brain injury patients particularly EDH. However the typical CT finding i.e hyperdense biconvex lenticular opacity may not be evident in cases of anemia, shock and slow venous bleed. Angiography has a role in the pre CT scan era and now restricted to diagnose dural arterio-venous fistula and other vascular lesion. Complete blood count and routine coagulation profile is advocated in all patients.

So far treatment options are considered, craniotomy and evacuation of hematoma is the standard procedure for those who have absolute indication for surgery.[6] In certain situations the situation is so emergent that extended burr hole procedure is adopted along with negative suction to evacuate the hematoma.[8] The problem with extended burrhole is that it is difficult to identify and control the source of bleeding. Standard craniotomy is ideal. (Image-5)

But use of trephine gives a quick access to hematoma site along with adequate space for hematoma evacuation and control of bleeding. (Image-6) The importance of dural hitch stitches as devised by sir Harvey cushing cannot be over emphasized. so also the role of gelatin sponge which really play the magic in controlling bleeding where the source of bleeding is beyond the surgeon's vision.

Apart from surgical options a good majority of patient in fact can be managed conservatively. Patients having GCS 15 with no additional focal neurological deficit can be kept under observation with strict neuro-survillance. Temporal fosse EDH and posterior fossa EDH are very notorious for their un predictability and should not be taken lightly. Despite good GCS they may deteriorate suddenly and presence of persistent headache is an ominous sign in these patients. a volumes of 20 cc at these locations in a young tight brain is sufficient to cause the catastrophe. (Image-7)

There is an established relationship between outcome of patients and time lag between injury and surgical intervention. Royal college of surgeons recommend hat surgical decompression should be carried out within 4 hours of injury but practically hardly 3 to 4% of patients enjoy this golden hour benefit so far prognosis is considered.[2]

Delayed onset EDH is an established entity, the exact incidence of it cannot be determined with certainty.10 Literature shows that 1 out of 10 patients have their initial CT scan normal and later on EDH develops. In our experience these patients have poorer outcome which agrees with the finding by korinah et.al.[1]

No doubt admission GCS is one of the most important predictor of eventual prognosis. GCS above 8 carries overall good survival rate. Higher the admission GCS, better is the outcome. In contrast to other form of head injury, people with EDH and a GCS as low as 3 may still have good outcome if they receive surgery as quickly as possible. Associated brain injury, advanced age, presence of co morbidity, delayed presentation, other systemic injuries all adversely affects the outcome.[3,7]

Conclusion

Large intracranial EDH is a serious complication of head injury which requires immediate diagnosis and earliest intervention. Compared to other form of head injury the clinical deterioration is very fast unless managed promptly and timely management gives a satisfactory outcome with early recovery and early return to work. Temporal and posterior fossa EDH should be given extra attention for it's rapid and unpredictable course. Overall it carries a mortally of 10%. GCS score of 8 or more at admission and early surgical intervention predicts good outcome and low GCS, bilateral pupillary unreactivity, older age, elevated ICP after hematoma evacuation, midline shift more than 1 cm, associated intracranial injuries are all predictors of poor outcome. In our opinion unless brain dead all patients with EDH should be offered with surgery with hope of recovery.

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