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Manifestation and outcome analysis of chronic subdural haemorrhage patient in a tertiary care centre

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Abstract

Aim. To evaluate the results of surgical care in chronic subdural haemorrhage patients.

Design of the study. Prospective

Study location. Department of Neurosurgery, tertiary care centre

Methodology. The study comprised 65 individuals of both genders with chronic subdural haemorrhages who were above the age of 18. Patients' full medical histories, including age, gender, and place of residence, were documented. The Markwalder Grading System was used to classify patients. A CT scan was performed pre and post-surgery, as well as at the time of discharge. The Glasgow coma scale was used to record the outcomes.

Results. There were 57 (87.6%) male individuals and 8 (12.3%) female individuals. majority of them presented with headache (61.5%), followed by extremity weakness/paresis (52.3%). As Per, Markwalder's grade on admission, 33 (50.7%) people were in grade 1, and 30 (46.1%) people were in grade 2. The clinical picture at discharge was evaluated according to the Markwalder grade: 52 people (80%) were grade 0, 2 people (3%) were grade 1, 9 people (13.8%) were grade 2

Conclusion: The major risk factors for the development of CSDH in our set-up are male sex, mild head trauma, old age and alcohol intake. CSDH is more common on the left side. majority of patients had duration of trauma in between 4-12 weeks Majority of patients had grade 1 on Markwalder grading on admission. The majority of patients had a Thickness of CSDH is 10-20 mm MLS in CSDH is 5-10 mm on admission. The symptoms that present most frequently are headache and motor weakness, and the result is related to the person's pre-operative neurological condition, G.C.S., and concurrent systemic disorders. Surgical procedures should be individualised according to the radiological characteristics of chronic subdural haematoma.

Keywords
chronic subdural haemorrhage, markwalder, Glasgow coma scale

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Introduction

Chronic subdural haemorrhage (CSDH) is an encapsulated accumulation of old blood between the dura layer and arachnoid layer that is produced by bridging vein injuries. When the haemorrhage is more than 3 weeks old, it is called chronic subdural haemorrhage. It is a rather frequent illness, particularly among the elderly, had incidence ranging from 1.72 to 7.35 per 100,000 population with a male majority.[1,2,3]. Co-morbidities are common in the elderly population and

can have an influence on immediate postoperative prognosis and life expectancy. Although the majority of persons have a history of minor trauma, certain instances may be the result of a coagulation abnormality, cerebral hypotension, or the use of anticoagulants and antiplatelet drugs. Headaches, disorientation, sleepiness, vomiting, and seizures are frequent symptoms. On examination, the persons has a low G.C.S. hemiparesis/hemiplegia, ocular palsy, and other neurological abnormalities. The diagnosis is generally verified by an NCCT scan of the head; however, MRI is recommended for improved imaging of multiloculated membranes and septations.

This ailment is usually treated surgically; however, some people have been treated conservatively with steroids. Steroids have been used to treat mild headaches and individuals who are unable to undergo surgery [4].

Materials and methods

Study population

The study population consists of all > 18 year age group peoples who underwent surgery for chronic subdural haemorrhage in Department of Neurosurgery in tertiary care hospital.

Study design

The study design was prospective cohort study. Peoples who fullfiled inclusion criteria, post-operative outcomes were assessed at discharge, then at one month and three months afterwards in the neurosurgery OPD.

Sample size

Sample size (n) was calculated using the underlying formulae for prevalence.

$$n = \frac{Z^2 * (p) * (1-p)}{m^2}$$

Where:

Where n = sample size required

p = estimated prevalence found between 1.72 to 7.35/100,000 based on previous publication

m = Precision with which to measure the prevalence of the study (margin of error) (confidence interval), set at ± 5%

The Z value is 1.96 for 95% confidence interval.

Substituting in the above formula, the sample size ranged 26-104 and since the local incidence was unknown, we used the average sample size of (26+104)/2=65.

Inclusion criteria

Peoples with chronic subdural haemorrhages who were over the age of 18 based on radiological and clinical presentation and had undergone surgery.

Methodology

A comprehensive history, medical checkup, and CT/MRI scans were performed to confirm the diagnosis. Before enrolling Indi duals in the study, written informed consent was obtained in / English/ Hindi/ from the patient, or from a blood relative, preferably a first degree relative, in persons who were comatose or unable to give consent, after explaining both surgical options, i.e. BHC and mini craniotomy as required by CT scan or MRI findings. The ethical approval was obtained from the Institutional Ethics Committee.

A detailed history was gathered, including a history of head injury during the past 3 months or before, use of anticoagulants or antiplatelet medicines within the last 1 week, drinking, a history of high blood pressure, and hyperglycaemias. The persons had a thorough clinical and neurological evaluation, including the Glasgow Coma Scale (GCS) and Markwalder's Grading Scale (MGS).

Routine blood tests and coagulation tests were performed. Any coagulation disorders corrections and blood or blood product transfusion requirements were reported. CT information on the following parameters: maximal haemorrhages thickness, density, midline shift, and septation in the haematoma. When a CT brain scan revealed a possibility of septation, an MRI was performed.

All persons were placed under general anaesthesia (G.A) or monitored anaesthesia care (MAC) for surgical evacuation. At one month and three months following discharge, all persons were seen in the outpatient clinic. The Markwalder Neurological Grading System for CSDH was utilised to compare preoperative, postoperative, one-month, and three-month outcomes.

A total of 65 persons were hospitalised to the tertiary care centre's Neurosurgery Department. Every individual got surgery for chronic subdural haemorrhage.

Results

Demographic Characteristics

Out of 65 patients, the majority of them were in 8th decade, (71-80) (30.7%) followed by 7th decade (61-70) (23.0%) (Table-1, Figure- 1). There was male gender predominance with preponderance of the cases being men (87.6%), which shows to male to female ratio 9:1(Table -2).

Table 1. Age distribution.

Age (years)	No of Patients (%)
31-40	2 (3.0%)
41-50	8 (12.3%)
51-60	10 (15.3%)
61-70	15 (23.0%)
71-80	20 (30.7%)
81-90	10 (15.3%)
Total	65 (100%)

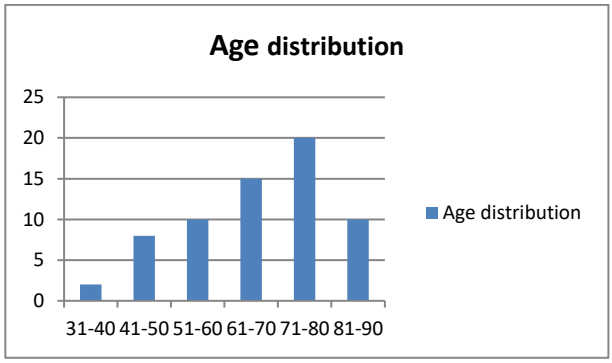

Figure 1. Bar chart showing age distribution.

Table 2. Gender distribution.

Sex	No of Patients (%)
Male	57 (87.6%)
Female	8 (12.3%)
Total	65 (100%)

Clinical presentation

Out of 65 patients, majority of them presented with headache (61.5%), followed by extremity weakness/paresis (52.3%). Other presenting symptoms were confusion (38.4%), nausea/vomiting (29.2%), speech disturbance (21.5%), convulsions (6.15%), blurring of vision (1.5%) respectively (Table-3, Figure- 2).

Table 3: Presenting complaints.

Presenting Complaints	No of Patients (%)
Headache	40 (61.5%)
Nausea/vomiting	19 (29.2%)
Monoparesis	4 (6.15%)
Hemiparesis	25 (38.4%)
Quadriparesis	5 (7.6%)
Speech disturbance	14 (21.5%)
Confusion	25 (38.4%)
Convulsions	4 (6.15%)
Loss of consciousness	10 (15.3%)
Blurring of vision	1 (1.5%)

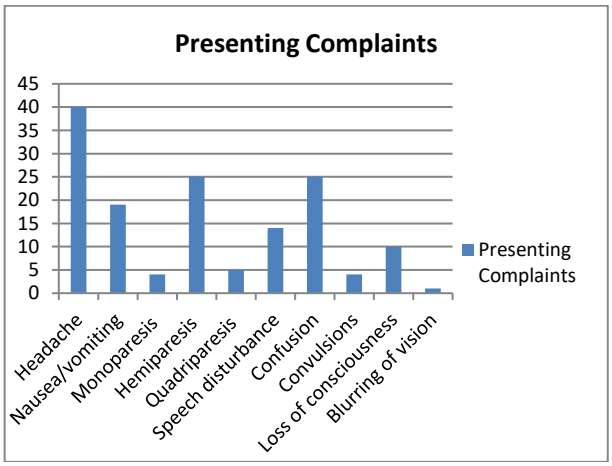

Figure 2. Bar chart showing incidence of symptoms.

Risk factors

Trauma was most common risk factors with (38.4%) history of trivial trauma in recent past, followed by, use of anti platelet agents (36.9 %) in which aspirin and clopidrogrel were mainly used, history of alcohol consumption (32.3%),anticoagulant use, mainly warfarin was found in (7.6%) range of INR from 2 to

5.5, history of CVA (7.6%), history of seizure disorder (4.6%), previous head surgery (4.6%), previous severe head injury (4.6%) and VP shunting (1.5%) respectively (Table- 4, Figure-3).

Table 4: Risk factors

Risk factors	No of patients (%)
Trivial trauma	25 (38.4%)
Anti-platelet agent	24 (36.9%)
Alcohol use	21 (32.3%)
Anticoagulant use	5 (7.6%)
CVA	5 (7.6%)
Seizure disorder	3 (4.6%)
Previous head surgery	3 (4.6%)
Previous head injury	3 (4.6%)
VP shunting	1 (1.5%)

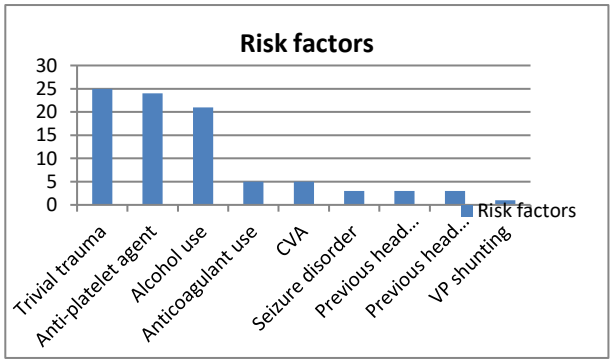

Figure 3. Bar chart risk factors for CSDH.

Duration of trauma

Duration of trauma in chronic subdural haematoma varied from the 4-20 weeks, majority of patients had duration of trauma in between 4-12 weeks (Table- 5, Figure- 4).

Table 5: Duration of trauma in chronic subdural haematoma (n= 26).

Duration (in weeks)	No of patients (%)
4-8	10 (38.4%)
8-12	10 (38.4%)
12-16	5 (19.2%)
16-20	1 (0.38%)

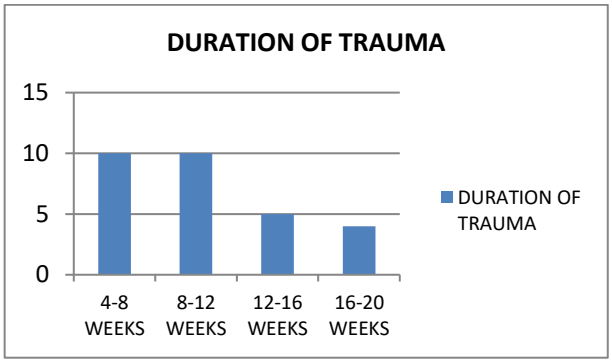

Figure 4. Bar chart duration of trauma in CSDH.

Comorbidities

In terms of comorbidities, hypertension was commonest at 46.1% followed by Diabetes was 38.4%, CAD was 12.3%, Renal disease was 6.1%, Chronic obstructive pulmonary disease was 4.6% and lastly Liver disease was 1.5% (Table-6, Figure 5).

Table 6: Comorbidities

Co-morbidities	No of patients (%)
Hypertension	30 (46.1%)
Diabetes	25 (38.4%)
Renal disease	4 (6.1%)
COPD	3 (4.6%)
Liver disease	1 (1.5%)
CAD	8 (12.3%)

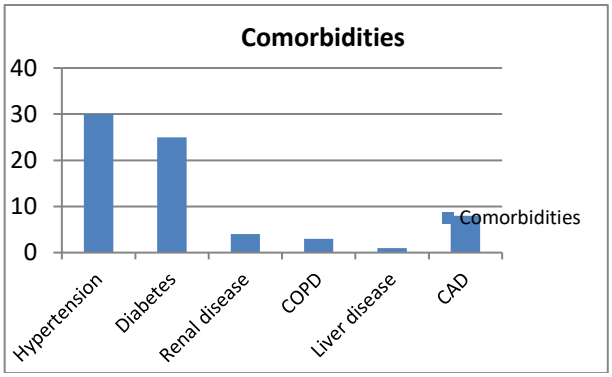

Figure 5. Bar chart showing co morbidities in CSDH.

On admission neurology

Mostly patients 54 (83.0%) had Glasgow Coma Scale of 15/15, 9 patients were in altered sensorium and 2 patients were in coma. (Table- 7)

Table 7: On admission GCS score.

Glasgow Coma Scale Score	No. of patients (%)
9	2 (3.0%)
10	0
11	0
12	0
13	3 (4.6%)
14	6 (9.2%)
15	54 (83.0%)

Markwalder grading on admission

As Per, Markwalder grade- no patient (0%) was grade 0, 33 (50.7%) patients were in grade 1, 30 (46.1%) patients were in grade 2, 1(1.5%) patient was in grade 3 and 1 (1.5%) patient was in grade 4 (Table- 8, Figure - 6).

Table 8: Markwalder grading on admission .

Grade	Markwalder grading	No. of patients (%)
0	Neurologically normal	0
1	Alert & oriented, mild symptoms such as headache or mild neurological deficit such as reflex asymmetry.	33 (50.7%)
2	Drowsy or disoriented or variable neurological deficit such as hemiparesis.	30 (46.1%)
3	Stuporous responding appropriately to noxious stimuli, several focal signs such as hemiplegia.	1 (1.5%)
4	Comatose with absent motor response to painful stimuli, decerebrate or decorticate posturing.	1 (1.5%)

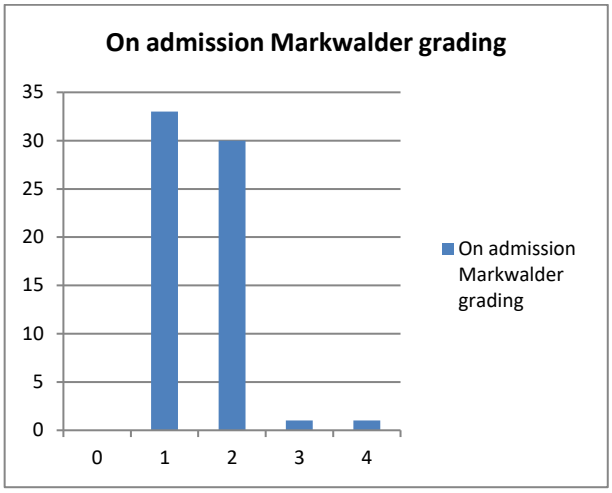

Figure 6. Bar diagram showing Markwalder grading on admission.

Radiological investigation

Out of 65 patients, pre-op investigation, only CT scan was done in 17 patients and only MRI was done in 24 patients. In rest 24 patients both CT and MRI were done. (Table 9)

Table 9. Radiological investigation done in CSDH patients.

Radiological investigation	No of patients (%)
CT scan only	17 (26.1%)
MRI only	24 (36.9%)
CT +MRI	24 (36.9%)

SITE: The haematoma was fronto-parietal in 35 patients, fronto-parietotemporal in 24 patients, fronto-parietotempocipital in 5 patients respectively. (Table 10).

Table 10. Site of CSDH.

Site	No. of patients (%)
Frontoparietal	36 (55.3%)
Frontoparietotemporal	24 (36.9%)
Frontoparietotempocipital	5 (7.6%)

Laterality of CSDH In 27 patients (41.5%), the haematoma was left sided, 20 patients (30.7%) it was right-sided, and 18 patients (27.6%) showed bilateral chronic haematomas. (Table 11).

Table 11: Laterality of CSDH

Side	No. of patients (%)
Right CSDH	20(30.7%)
Left CSDH	27(41.5%)
Bilateral CSDH	18(27.6%)

Type of anaesthesia

60 patients were operated under GA, but 5 patients were operated under MAC. All of them were burr hole evacuation surgery. (Table 12)

Table 12. Type of anaesthesia.

Type of anaesthesia	No. of patients (%)
GA	60 (92.3%)
MAC	5 (7.6%)
TOTAL	65 (100%)

Type of surgery

47 patients had unilateral CSDH, out of which 27 patients had burr hole evacuation surgery and 20 patients had minicraniotomy. In all patients of burr hole evacuation surgery double burr holes were made, none of the patient had single burr hole made. In 2 patients minicraniotomy with endoscopic membranectomy was done. 18 patients had bilateral CSDH out of which 15 patients had bilateral burr hole evacuation surgery and 3 patients had bilateral minicraniotomy, none of the patients had one side burr hole evacuation surgery and one side mincraniotmy. So, total numbers of procedures done were 83. Total number of Burr hole evacuations performed were 57 and Total number of mini craniotomies performed were 26. (Table-13)

In patients, preoperative CT scans showed membranes within the haematoma cavity, which made craniotomy the treatment of choice.MRI was done to confirm the membranes in CSDH. Burr hole was done in rest of the patients where there were no membranes.

Table 13. Type of surgery.

		Burr hole 27	Mini craniotomy 20
Right Unilateral		10	10
Left Unilateral		17	10
	Bilateral burr hole (no of procedure)	Bilateral mini craniotomy (no of procedure)	One side burr hole evacuation surgery and one side mincraniotomy
Bilateral CSDH	**15 (Total 30)**	**3 (Total 6)**	**0**

Thickness of CSDH

Total numbers of unilateral CSDH were 47 and bilateral CSDH were 18, so total numbers of thickness measured were 83. CSDH thickness were 5-10 mm were 2, 10-20 mm were 53, 20-30 mm were 27, and more than 30 mm was 1 respectively. (Table 14)

Table 14. Thickness of CSDH.

Thickness	No. of CSDH 83
5-10 mm	2
10-20 mm	53
20-30 mm	27
>30 mm	1

MLS of CSDH

MLS in CSDH patients were 0-5 mm in 13 patients ,5-10 mm in 36 patients, 10-15 mm in 14 patients, and more than 15 mm in 2 patients. (Table -15, Figure-21,22)

Table 15. MLS of CSDH

MLS	No. of patients (%)
0-5 mm	13 (20%)
5-10 mm	36 (55.3%)
10-15 mm	14 (21.5%)
>15 mm	2 (3.0%)

Post op scans

All patients underwent surgery in post op scan showed some pneumocephalus and residual extra-axial fluid. (Figure- 23, 24, 25) 20 patients got resolution of CSDH within 1 month, 29 patients got resolution of CSDH with in 2 month and 7 patients took up to 3 month to resolve. One of our patient took 150 days for resolution of hematoma (Figure-26).7 patients (10.7%) had recurrence and one patient expired. (Table -16)

Table 16. Time taken to resolve CSDH.

Time taken to resolve CSDH	No. of patients (%)
<1 month	20 (30.7%)
1-2 month	29 (44.6%)
2-3 month	07 (10.7%)
>3month	01 (1.5%)

Markwalder grading on discharge

The clinical picture at discharge was evaluated according to the Markwalder grade: 52 patients (80%) were grade 0, 2 patients (3%) grade 1, 9 patients (13.8%) grade 2, one patient (1.5%) grade 3 and no patient (0%) grade 4. (Table-7, Figure- 7)

Table 17. Markwalder grading on discharge.

Grade	Markwalder grade	No of Patients (%)
0	Neurologically normal	52 80%)
1.	Alert & oriented, mild symptoms such as headache or mild neurological deficit such as reflex asymmetry.	2 (3.0%)
2.	Drowsy or disoriented or variable neurological deficit such as hemiparesis.	9 (13.8%)
3.	Stuporous responding appropriately to noxious stimuli; several focal signs such as hemiplegia.	1 (1.5%)
4.	Comatose with absent motor response to painful stimuli, decerebrate or decorticate posturing.	0 (0%)

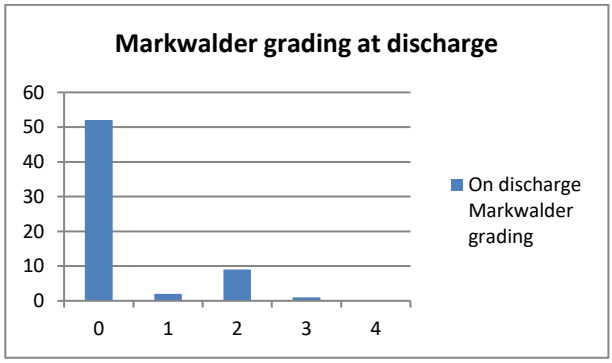

Figure 7. Bar diagram showing Markwalder grading at discharge.

In analysis of pre operative neurological condition , it was found that 54 (83.0%) of the patients, had G.C.S score of 15/15. 33 of our patients presented with the MGS 1 and 30 were MGS 2 at the time of admission and 1 patient was having MGS of 3 and 1 patient of MGS 4. On post operative outcome, we had 52 patients (80%) with favourable outcome of MGS 0 at discharge. Improvement up to MGS 0 in MGS progressed to 63(96.9%) patient at 3 months follow up. One patient expired and one had mild neurological deficit at 3 month follow up.

Discussion

Chronic subdural haemorrhage is a common condition in neurosurgical field . Because it mostly affects the elderly, its prevalence will continue to rise as the population ages.[2-4] The reason for its high prevalence in the elderly is due to growing brain atrophy and the corresponding higher baseline stretch on the bridging veins, which renders them more sensitive to minor head injury , which is one of the most common causes of CSDH. [5,6,7] Due to the advancing age of patients and their co-morbid conditions it is critical to find a surgical method which offers optimal efficiency in reducing possibly fatal haemorrhage -related mortality and morbidity while also demonstrating a lower recurrence rate and surgical complications. However, it as gentle and safe as feasible for the often comorbid individuals. [8]

The mean age of the research sample in our study was 66.73 years, which matches to other published research[9,10,11,12,13]. Male preponderance (87.6%) is seen in our study, which is consistent with prior studies. [9,11,14,15]

In our research, the majority of patients (61.5%) reported with headaches, followed by extremities weakness/paresis (52.3%). Other presenting symptoms included confusion (38.4%), nausea/vomiting (29.2%), speech disorder (21.5%), convulsions (6.15%), and blurring of vision (1.5%). The most common presenting symptoms, according to Santarius et al., [16] are abnormal gait (57%), impaired consciousness (35%), hemiparesis (35%), and headache (18%). The most common presentation in the elderly (50%-70%) according to the literature was disturbed mental condition.[17,18] In one series, hemiparesis was identified in 58% of the

patients.[19] The incidence of headache ranged from 14% to 50% in several series.[20,21] Epilepsy is an uncommon presentation and has been described as an early symptom in up to 6% of patients.[19] Our research is also consistent with this. The incidence of CSDH with transient neurologic impairments ranges from 1% to 12%.[22] Our patient population lacked transient neurologic impairments characteristics.

The most major risk factor (40%), trivial trauma, was generally minor and old . The average time from trauma to the start of manifestations was 7.9 weeks (4 to 20 weeks). Given the recall bias and the fact that major patients arrived with uncertainty, the history of trauma might be considerably greater; trauma was old and often minor, particularly in the elderly. Minor head injury has been proven as a common factor by several series [23,24,25,26,27.] Stroobandt [28] discovered it to be as high as 80% in his research of 100 patients, compared to aspirin (16%), coagulopathy (6%), and alcoholism (11%). Trauma is the most common cause of death in our research, accounting for 40%, followed by antiplatelet agents (35.3%) and alcohol intake (32%). Despite the fact that anticoagulant usage was 7.6% and antiplatelet agent use was 35.3% in our research. Because of the liver damage, chronic alcoholic consumption produces coagulation malfunction.[29] Other risk factors for CSDH include renal illness, dialysis therapy, liver failure, epilepsy, and chemotherapeutic drugs, as mentioned by Sim et al. [29].

INR was abnormal in 5 patients, which was resolved before surgery, however 1 patient (1.5%) had persistent coagulopathy, which recurred after surgery. Despite the fact that certain studies have found a significant incidence of coagulation disorder ranging from 10% to 42% [30,31]. Berwerts and Webster discovered [32] oral anticoagulant medications, raised blood pressure , INR >4.5, and anticoagulation duration to be significant risk factors in cerebral haemorrhage in a multivariate study.

Another observation in this study, was the correlation between the surgical procedure and required anaesthesia with data suggesting that BHC are more likely to be performed under MAC while craniotomies require more invasive and physically demanding general anaesthesia. Patients over 60 years of age, who usually have concomitant diseases and risk factors and may not be fit enough to undergo general anaesthesia. Though we did not find any such limitation but we preferred MAC if patient had multiple co morbidity and patient is going to be operated BHC if radiologically suitable for procedure.

The Markwalder grading was used to assess the neurological picture upon admission and at discharge. A comparison of our work with the series of Ernestus et al [33], Kotwica et al [34], Drapkin et al [35], and Richter et al [36], who all used the same technique of evaluation, shows that our study fits the results of Drapkin et al [35]. (Figures 8, 9)

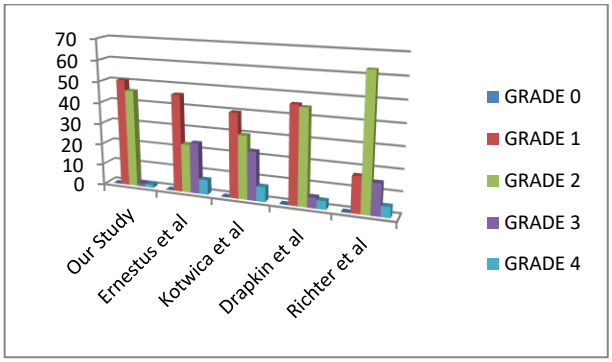

Figure 8. Markwalder grading on admission comparison of present research with other research.

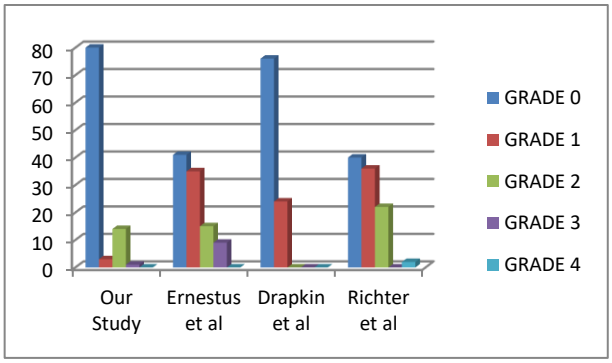

Figure 9. Markwalder grading at discharge comparison of present research with other research.

In summary, Considering increasing age and the often presence comorbidities of elderly neurosurgical patients who have to be treated for chronic subdural hematoma, the less invasive and physically demanding BHC should be the preferred if possible, but mini-craniotomy is required in patients in whom membranes are found within haematoma or there are solid blood clots , therefore there is need to individualize the surgical procedure on case to case basis depending on imaging study

characteristic of CSDH and to reduce recurrence and improve outcome.

Conclusion

- The major risk factors for development of CSDH in our set up are male sex, mild head trauma, old age and alcohol intake.
- CSDH is more common on left side and fronto parietal convexity.
- majority of patients had duration of trauma in between 4-12 weeks.
- Majority of patients had grade 1 on **Markwalder grading on admission.**
- Majority of patients had Thickness of CSDH is 10-20 mm MLS in CSDH is 5-10 mm on admission
- The most frequent presentation signs are headache and motor weakness.
- High blood pressure, diabetes, antiplatelet medication, and anticoagulants are all potential risk factors.
- The patient's pre-operative neurology condition, G.C .S, and related systemic disorders all have an impact on the end result.
- Surgical procedure should be individualised according to radiological characteristics of chronic subdural haematoma.

Recommendations

- Fall prevention in old age.
- Promotion of health and education helps in eradication of habits like alcohol consumption.
- Irrational use of antiplatelet agent should be relooked in view of high prevalence of CSDH in these patients.
- We should individualize the surgical procedure on case to case basis depending on imaging study characteristic to improve outcome reduce morbidity.

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