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Original Research Paper

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SPONTANEOUS INTRACEREBRAL HEMORRHAGE :AN INSTITUTINAL EXPERIENCES REGARDING CLINICAL FEATURES,OUTCOME AND MANAGEMENT

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ABSTRACT

Background Spontaneous intracerebral hemorrhage (ICH) is significantaly associated with mortality and morbidity throughout the world. To improve the devastating course of ICH, various clinical trials for medical and surgical interventions have been conducted in the last 10 years. Our article evaluate the clinical symptoms,associated factors and effect of conservative and surgical method on outcome following SICH .

Materials and Methods. We retrospectively reviewed records and online data of patients who admitted with ct scan proved SICH IN neurocare hospital jaipur between 1st January 2017 and 31st December 2019 . we analysed following indicator – demographic profile , associated comorbidities, Glasgow coma score (GCS) on admission, CT finding, ICH score ,treatment modality and outcome at six months. Modified Rankin score (mRS) was used to assess the outcome at discharge and six months.

Results. In our study group of 76 patients included 42 males and 34 females and the mean age at presentation was 63.20 years. In our study 58 patients (76.3%) were previously diagnosed hypertensive, of whom 32 (42.10%) were on hypertensive medication. the most common site of hematoma were capsuloganglionic thalamic region (61.84%,n = 47) followed by lobar (30.26% , n = 23), cerebellar (5.2%, n = 4), brainstem (2.63% ,n = 2). 21(27.63%) patients had intraventricular haemorrhage . 47 patients out of 76 were operated and remaining were managed conservatively In our study 34 (44.73 %) patients died during 6 month follow up periods. death ratio almost same in both mode of treatment .44.82% death occured in conservative and 44.68% death occured after surgery. Among 42 survivors at six months ,11 (14.47%) patients had poor outcome (mRS 4-5) and 31(40.78 %) patients had a favourable outcome (mRS <3).

Conclusions. SICH mainly affects a older population (>60 years). Age > 70 years, GCS < 8 on admission, clot volume above 30 ml, intraventricular extension and hydrocephalus predictors were associated with poor outcome and death . In case of moderate to large hematomas Mortality and morbidity can be reduced by surgical evacuation of the clot alone or combined with DC and small size hematoma can be managed conservatively.

KEYWORDS : Intracerebral Hematoma, Craniotomy, Decompressive Craniectomy

INTRODUCTION

Spontaneous intracerebral hemorrhage (SICH) defined by blood clot in the brain parenchyma without a history of a preceding trauma or surgery. Spontaneous (non-traumatic) intracerebral hemorrhage (ICH) is the second most cause of stroke and is associated with high mortality and morbidity throughout the world[1,2]. SICH affects 10–20 in 100,000 people every year and accounts for 20%–30% of all strokes.[3-6]]. Haemorrhagic stroke is associated with higher morbidity and mortality rates compare to ischemic stroke [7–9]. SICH is associated with a 30-day mortality rate of 32%–50% and only 10% become functionally independent at longterm followup.[4,6,10] SICH can be primary or secondary.primary SICH is without underlying etiology . secondary SICH associated with aneurysms, vascular malformations, vasculitis, etc. Management of secondary SICH is based on the correction of the underlying etiology.. Hypertensive arteriolosclerosis and amyloid angiopathy account for nearly 80% of primary SICHs.[4-6] The common sites for a primary ICH are basal ganglia and internal capsule (35%–70%), brainstem (5%–10%), and cerebellum (5%–10%). Lobar ICH accounts for the remaining one third of bleeds and is often related to amyloid angiopathy.[5,6,10,11}

Optimal management of SICH is controversial and debatable between conservative and surgical mode of treatment [12]. our goal of this single institution based study is to analyse the clinical profile, to assess the functional outcome , to identify the outcome prognosticators and to provide an option for management of SICH in a neuro care hospital located in jaipur rajasthan India.

PATHOGENESIS

ICH resulting from bursting of intracerebral arteries, a majority of cases occur in the first two days of the onset of symptoms[5,13]. nearly one-fifth of the patients with ICH experience neurological deterioration in the pre-hospitalization period [14] and one-fourth of the patients in the hospitalization period[15].

early diagnosis and treatment are crucial in the management of ICH. When a patient presents with sudden onset of severe headache, vomiting, focal neurological deficits, high systolic blood pressure (SBP) and altered sensorium , ICH should be the first condition considered in the diagnosis. In addition to clinical presentation, a brief medical history including hypertension, prior stroke, recent head trauma, and prior use of antithrombotic drugs including anticoagulants, should also be recorded. After assessment of the medical history and presentation, neuroimaging should be performed to confirm the diagnosis. Brain computed tomography (CT) is the gold standard for identifying acute hemorrhage. magnetic resonance imaging (MRI) can be an alternative with an advantage of being able to differentiate between the acute and chronic stages of hemorrhage[16,17].

After the initial diagnosis of ICH , acute management should be started at the same time. The main principle for the early management of ICH is the same as that for the management of ischemic stroke[18]. Airway management (if needed), cardiovascular support, urgent BP lowering treatment, and reversal of coagulation abnormalities should be initiated at the emergency room. Critical protocols developed for the management of ICH may allow more efficient, standardized, and integrated management of patients with ICH and reduce the length of stay at the emergency room by facilitating their prompt admission to a neuroscience intensive care unit[19].

Various grading scales are used for predicting the prognosis

in the early stages of ICH [13,20-24]. The ICH score is the mostly commonly used scale and can be easily calculated based on neurological examination and CT findings (Table 1)[13,22].

Table 1. Determination of the ICH score

Component	ICH Score Points
GCS score	
3–4	2
5–12	1
13–15	0
ICH volume (cm^3)	
≥30	1
<30	0
IVH	
Yes	1
No	0
Infratentorial origin of ICH	
Yes	1
No	0
Age (year)	
≥80	1
<80	0
Total ICH Score	0–6

MATERIALS AND METHODS

All patients above the age of 18 years who were presented to the neurocare hospital jaipur between 1st January 2017 and 31st December 2019 with computerised tomography (CT) evidence of SICH were included in the study. Patients with post-traumatic hematomas, intracranial space-occupying lesions with bleeds, haemorrhagic transformation of an ischemic stroke, vascular malformations, and aneurysms were excluded from our study.

Demographic data, comorbidities, clinical, radiological data, and information about surgical interventions were taken from register and online . Volume of hematoma was measured using the abc/2 method [25]. Hematoma expansion was determined WITH sequential brain imaging and defined if hematoma volume increase of more than 33% from initial to follow-up imaging within 3–72 hours [26]. All patients were admitted to neurosurgical intensive care unit and started on antihypertensives (Amlodipine, Labetalol) and antiedema measures (Mannitol 20% ,3% saline). Patients with lobar hematoma and patients planned for surgery were started on antiepileptics (Phenytoin sodium, sodium valproate and leviteracetam). All patients had a follow-up CT scan at 24 hours of admission or on clinical deterioration, Surgical evacuation was done with supratentorial hematoma volume >30 ml or midline shift of >1 cm. Posterior fossa cerebellar hematomas with maximum diameter >3 cm were offered surgical intervention. thalamic or Basal Ganglia bleeds with intraventricular extension and significant hydrocephalus with a GCS<8 were managed with an External Ventricular Drain (EVD). EVD was kept for a maximum of 7 days following its insertion. The outcome was measured using the modified Rankin Scale (mRS) at discharge, one months and 6 month. A mRS of 4 and 5 were considered as poor outcome and mRS of 0−3 as good outcome. 180 days mRS was recorded in the outpatient clinic. In cases where the patient failed to visit the clinic, a telephonic conversation was done .

RESULTS

In our study total 76 patients with spontaneous ICH were included .

PATIENT DEMOGRAPHICS.

The mean age of our study group was 63.20 years (18 years to 82 years). 42(55.26%) of them were males and 34(44.74%) were females. Nearly fourth-fifth of the patients (63 patients 82.89%) were above the age of 45 years.(table 3)

Table 3

Age in years	No of patients (n=76)(m=42,f=34)	Percentages
<15	0	0
16-30	6 (2,4)	7.89%
31-45	7 (6,1)	9.21%
46-60	26 (15,11)	34.21%
>60	37 (19,18)	48.68%

RISK FACTORS. History of arterial hypertension was present in 58 (76.31%) of patients. Of these 32 (42.10%) patients on antihypertensive treatment and their mean duration of hypertension was 5.2 years. the remaining 26(34.21%) patients were newly diagnosed hypertension on presentation.

A definitive history of diabetes was available for 11 (14.47%) patients with a mean duration of 6.1 years. At the time of the ICH, total of 3 (3.94%) patients were on antiplatelet medications

CLINICAL FEATURES. *The* most common presenting symptom was altered sensorium followed by contralateral weakness and headache. the others symptoms included slurring of speech ,seizures and vomiting. The median GCS on admission was 12 . 36 patients presented with a GCS of <8 and 40 patients presented with GCS > 8.

IMAGING CHARACTERISTICS. The most common location of the haemorrhage was capsuloganglionic and thalamic (61.84%,n = 47) followed by lobar (30.26% , n = 23), cerebellar (5.2%, *n* = 4), brainstem (2.63%, n = 2). 21(27.63%) patients had intraventricular haemorrhage .

Left side of brain is more commonly involved in case of lobar and capsuloganglionic –thalamic bleed. In case of lobar haemorrhage parietal lobe more commonly involved followed by temporal lobe. cerebellar hematomas were found in older age group in comparison to basal ganglia, lobar, and intraventricular haemorrhages. ICH with Intraventricular extension were more common with capsuloganglionic-thalamic bleeds. ICH score was calculated for all patients at the time of admission(table 2)

SURGERY. *47 patients out of 76 were operated.* craniotomy and suction evacuation of hematoma was done in 7 (9.2%) patients, only decompressive craniectomy plus lax duraplasty done in 16(21.05%) cases, decompressive craniectomy plus lax duraplasty and suction evacuation of hematoma was done in 14(18.42%) patients and External ventricular drainage for intraventricular haemorrhage was performed in 10 (13.15%) patients. in some cases EVD converted in to shunt surgery letter on.all details are mentioned in table 2.

OUTCOME. the overall mortality was 34 (44.73 % patients) during 6 month follow up periods.13(44.82%) patients died after conservative management and 21 (44.68%) patients died after surgery. Of these, 14 (18.41%) patients died before discharge and 20 (26.31%) patients died after discharge and within six months of follow up. Among 51 survivors at one months, 25 (32.89%) had a mRS 4-5 (poor outcome), and 26(34.21%) had a favourable outcome (mRS <3). Among 42 survivors at six months, 11 (14.47%) had a mRS 4-5 (poor outcome) and 31(40.78 %) had a favourable outcome (mRS <3). We observed that following discharge, many of the patients showed a gradual recovery with rehabilitative measures such as physiotherapy and speech therapy. The number of patients with favourable outcome (mRS<=3) increased from 26 to 31 at the end of 6 months. the number of patients with poor outcome (mRS 4-5) dropped from 25 to11 at the end of 6 months (Table 2).

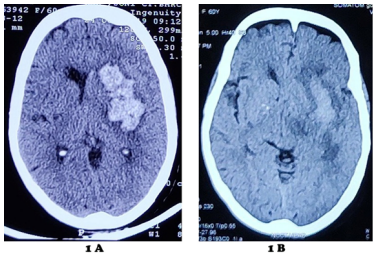
PROGNOSTIC FACTORS.

In our study ,34 (44.73 %) patients died during 6 month follow up periods most of patients who died were elderly age (Age > 70 years), GCS at the time of admission was < 8, Volume of hematoma > 30 ml and presence of hydrocephalus. So low GCS , elderly age ,volume of hematoma >30 ml ,brain stem ICH and intraventricular extension are poor prognostic factor .

Table: 2 Demographic ,clinical , Radiological Characteristics With Outcome & Mortality

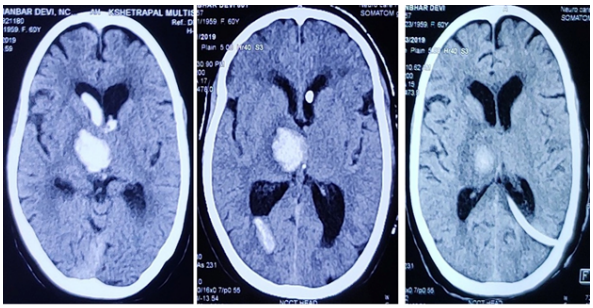
(N= number of patient, GCS= Glasgow coma Score, IVH= Intraventricular hemorrhage, HTN= Hypertension)

S. No	Parameter	Capsuloganglionic Thalamic Hematoma	Lobar Hematoma	Cerebellar Hematoma	Brainstem Hematoma
1	Total no of patient (N-76)	47	23	4	2
2	Mean Age (63.20 years)	62 year	58 year	64 year	52 year
3	M:F 42:34	21:20	16:13	3:1	2:0
4	GCS at the time of Admission				
	>8 (N-40)	22	16	2	0
	<8 (N-36)	25	7	2	2
5	ICH Score				
	0	3	1	-	-
	1	10	4	-	-
	2	15	10	-	-
	3	6	3	2	-
	4	6	4	-	2
	5	5	1	2	-
	6	2	-	-	-
6	IVH (N-21)	18	2	1	0
7	Hydrocephalus (N-14)	12	1	1	-
8	HTN (N-58)	38	18	1	1
9	Diabetes (N-11)	7	4	0	0
10	Volume of Hematoma (> 30 ml) N-35	19	16	-	
	Volume of Hematoma (< 30 ml) N-41	28	7	4	2
11	Side of Hematoma right side of brain N-26	16	8	2	2 brain stem hematoma are midline
	Side of Hematoma left side of brain N-48	31	15	2	
12	Surgery N-47				
	1. Craniotomy & suction evacuation of ICH (N-7)	3	4		
	2. Decompressive craniectomy & duroplasty (N- 16)	12	4		
	3. Decompressive craniectomy & duroplasty & suction evacuation of ICH (N-14)	3	9	2	
	4. CSF diversion Procedure (N- 10)	10			
13	Conservative management (N-29)	19	6	2	2
14	Mortality rate (After Surgery) (6 months Follow up) {N-21,44.68%}	10	9	2	
	Mortality rate (After Conservative) (6 months Follow up){ N-13,44.82%}	7	4	-	2
15	Deaths during treatment before discharge (N-14)	8	4	1	1
	Discharge after treatment (N-62)	39	19	3	1
	Death after discharge & with in 1 month (N-11)	4	6	-	1
	Death between 1 month & 6 months (N-9)	5	3	1	-
16	Outcome				
	At 1 months MRS (Modified ranking score) Good prognosis MRS< 3 (N-26)	17	7	2	-
	At 1 months MRS (Modified ranking score) Good prognosis MRS 4-5 (N-25)	18	6	1	-
	At 6 months MRS (Modified ranking score) Good prognosis MRS< 3 (N-31)	22	7	2	-
	At 6 months MRS (Modified ranking score) Good prognosis MRS 4-5 (N-11)	8	3	-	-
17	Survive at 6 months (N-42)	30	10	2	-



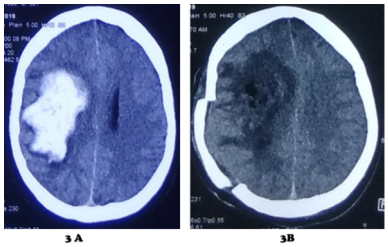
1A 1B

Fig 1 showed left Capsuloganglionic Hematoma (1A) at time of admission. Patient managed conservatively. Fig 1 B showed resolved hematoma and patient discharge 10 days after admission



2A 2B 2C

Fig 2 showed Right basal ganglia bleed with intraventricular extension with left hemiparesis (Fig 2A). Patient operated for Left frontal burr hole & EVD put (Fig 2B). Fig 2C showed Left VP shunt & discharged 15 days after admission.



3A 3B

Fig3 showed right parietal ICH (Fig 3A). Patient operated for Right parietal craniotomy and suction evacuation of ICH (Fig 3B). patient discharge 15 days after admission.

DISCUSSION

Hemorrhagic stroke has devastating consequences. The need to identify potential risk factors, initiate corrective measures, and customize treatment cannot be overemphasized, especially in resources limited setting as in India.

AGE AND SEX –

the mean age of patients in our study was 63.20 years which is slightly younger age compare to hemphill et al study was 66 years and slightly older age compare to ajay hedge et al study was 58.10 years. SICH mainly disease of the elderly person and also associated with high mortality rate in advancing age . Several authors have shown that older adults with acute ICH experienced the worse outcomes compared with their younger counterparts, including death, dependency, and overall quality of life [34, 27,28].sex has not been prognostic indicator. In our study ,almost same death ratio observed between male and female.

RISK FACTORS—

Hypertension –this is the most common risk factor in all the studies relating to SICH. Feldmann et al. have reported a relative risk of 3.9 for ICH in patients with hypertension [29]. A definite history of hypertension could be elicited in 76.31 % of our patients and Of these 42.10% patients on antihypertensive treatment and 34.21% patients were newly diagnosed hypertensive on presentation this observation is same to the preexisting hypertension (70−80%) observed in other Indian studies [35, 36, 30] We do follow guidelines of American Heart Association/American Stroke Association 2015 for the management of spontaneous ICH. According this guideline, patients with SBP >150 mmHg and ≤220 mmHg, early intensive BP-lowering treatment with a target of 140 mmHg can be a safe and effective method and patients with SBP >220 mmHg, aggressive BP reduction with a continuous intravenous infusion of BP lowering drugs, such as nicardipine, should be given.

Diabetes--.

It is another risk factor for woresening of ICH .IT IS proposed that high blood glucose at admission contributes to poor outcome, due to exacerbation of cerebral oedema and cerebral damage. A recent meta-analysis by Zheng et al. in 2018, concluded that hyperglycemia was associated with poor functional outcome in patients with ICH [31]. On the other side , tight glucose control with intensive insulin therapy is also reported to be associated with reduced cerebral extracellular glucose availability and increased mortality.32,33 Therefore, glucose level should be monitored regularly and both hyperglycemia and hypoglycemia should be avoided. In our series, 11 patients has history of diabetics but our study failed to demonstrate an association between blood glucose and poor outcome .

SITE OF HEMATOMA–

Infratentorial hematomas, especially brain stem hematomas, are known to carry a poor outcome compared to supratentorial hematoma. In our series of 70 patients have supratentorial hematoma (capsuloganglionic-thalamic and lobar hematomas)and 6 patients have infratentorial hematoma In our series, 2 of the 2 patients with brain stem hematoma expired Of the 4 patients with cerebellar hematoma 2 expired.

GLASGOW COMA SCORE.

One of the most consistent predictors of poor outcome is Glasgow Coma Score of less than 8. Indian studies to have reported similar findings with Bhatia et al. and Namani et al. reporting a fatality of 72.9% and 100% respectively with poor GCS on admission [30,35]. In our study, 36 patients admitted with GCS < 8 ,24 (66.67%) patients were died . so lower GCS was a statistically significant predictor of poor outcome .

Intraventricular Extension.

Intraventricular extension (IVE) is seen in around 40–60% of patients with spontaneous ICH and is known to be a significant predictor of 30-day mortality and long term outcome [13,35, 36]. Subgroup analysis from the STICH 1 Trial data concluded that the absence of IVH resulted in better outcomes. (31.4% vs. 15.1%;) and the presence of hydrocephalus lowered the likelihood of favourable outcome still further to 11.5% [37]. In our study , 21 patients (27.63%) had IVE of hematoma, and IVH was an independent predictor of the poor outcome. Hydrocephalus was observed in 12 patients (15.78%) in our group.

SURGERY.

Role of surgery in SICH remains controversial. A meta-analysis published by Prasad et al. after the STICH 1 trail concluded that surgery with medical management reduces the morbidity or mortality compared with medical management alone [38]. In Troberg's, study supposedly the most extensive study on long-term functional outcome with the longest follow-up (up to 10.8 years) of survival and functional status after surgery for ICH, 31% of all operated ICH patients were deceased after 1 year and only 24% of patients available for assessment of long term functional outcome were independent in activities of daily life [39]. Preictal heart disease and reduced level of consciousness before surgery were the most consistent predictors of mortality regardless of

follow-up time. Our study 47 patients under went for surgery (suction and evacuation of ich , decompressive craniotomy and csf diversion surgery) followed by medical treatment . in our study death ratio almost same in both mode of treatment .44.82% death occured in conservative and 44.68% death occured after surgery. patients without comorbidity ,patients with early surgery and patients without IVE were showed better response than patients with preexisting diseases, delayed surgery and with I'VE. early surgery with medical treatment showed better outcome.

ICH Scoring. Several scores for predicting functional outcome and mortality after ICH have been developed. We prefer to use the ICH score proposed by Hemophill due to its ease in application [40]. In our study for SICH scores of 0, 1, 2, 3, 4, and 5 our mortality rates were 0%, 14%, 36%, 55%, 75%,75% and 100% in comparison to Hemphill et al. 0%, 13%, 26%, 72%, 94%, and 100%. In an earlier publication, Hegde et al. attempted to validate the ICH score in an Indian setting and suggested reducing the age cut off from 80 years to 70 years in the original SICH score [41]. this was influenced by the fact that the mean age of the affected group in our study as well as in other Indian studies is much younger compared to the Western population. However, we do agree with Pinho et al. that even though the use of prognostic scores is recommended other factors must also be weigh when evaluating individual patients and an early subjective clinical judgment by experienced clinicians is not inferior to the application of formal prognostic scores in predicting outcome [27, 42].

OUTCOME . the overall mortality was 34 (44.73 % patients) during 6 month follow up periods. Of these, 14 (18.41%) patients died before discharge , and 20 (26.31%) patients died after discharge and within six months of follow up. In our study the outcome in the longer term is not obtained. Among 51 survivors at one months, 25 (32.89%) had a poor outcome (mRS 4-5) and 26 (34.21%) had a favourable outcome (mRS <3). Among 42 survivors at six months, 11 (14.47%) had poor outcome (mRS 4-5) and 31(40.78 %) had a favourable outcome (mRS <3). We observed that following discharge, many of the patients showed a gradual recovery with rehabilitative measures such as physiotherapy and speech therapy. Our mortality rate at the end of 6 months was 44.73%, With a median mRS score of 3 at 180 days follow up our overall outcome too appears to be comparable to other reported Indian studies.

LIMITATIONS

The major limitations of our study are less number of subject and short follow up (180 days) period. Beside these we were not performed minimal invasive surgery instead of using conventional surgery and not using thrombolytic drugs for IVH.

CONCLUSION –

base of the our study ,we concluded that

(1) SICH mainly affects a older population (>60 years).
(2) Age > 70 years, GCS < 8 on admission, clot volume above 30 ml, intraventricular extension and hydrocephalus remain the most consistent predictors for poor outcome and death
(3) in case of moderate to large hematomas, Mortality and morbidity can be reduced by surgical evacuation of the clot alone or combined with DC
(4) early surgery with medical treatment showed better outcome

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