

## ORIGINAL RESEARCH

# Study of Evaluation of Predisposing Factors for Chronic Subdural Hematoma Recurrence at a Tertiary Care Centre

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### ABSTRACT

**Background:** One of the frequently encountered neurosurgical conditions is chronic subdural hematoma (CSDH). Hence, this study was conducted to evaluate the predisposing factors for recurrence of chronic subdural hematoma.

**Materials & Methods:** Fifty participants were included in the study, with those undergoing surgery for bilateral hematomas being excluded. The patient cohort consisted of 35 men and 15 women, with an average age of 70.4 years (ranging from 30 to 85 years). Univariate analysis indicated a discernible trend in recurrence rates among different hematoma types. The data were processed using SPSS software, with a significance level set at  $p \leq 0.05$ .

**Results:** In the study involving 50 patients, univariate analysis suggested a potential association between different types of hematoma internal architecture and the recurrence rate of chronic subdural hematoma (CSDH) ( $p=0.06$ ).

**Conclusion:** The recurrence of chronic subdural hematoma (CSDH) was primarily linked to the specific hematoma type, especially the separated type.

**Keywords:** Chronic Subdural Hematoma, Recurrence, Internal Architecture.

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### INTRODUCTION

Chronic subdural hematoma (CSDH) is one of the most common neurosurgical conditions. The preferred surgical method continues to attract debate. There is lack of uniformity about the treatment strategies, such as the role of burr hole, twist drill, craniotomy, etc., in CSDH amongst various surgeons. There is also disagreement about the use of drain, irrigation, and steroid.<sup>1,2</sup> Chronic subdural hematoma constitutes a distinct type of intracranial hemorrhage, prevalent among elderly patients. In the last decade, the incidence of CSDH has progressively increased reaching around 8 to 18 cases per 100,000 people per year. In patients 80 years or older, incidence increases up to 36.6/100,000 patients per year.<sup>3-5</sup> Population aging not only is a driving force behind incidence but also contributes to a growing number of patients under antithrombotic medication and other comorbidities upon presentation.<sup>6,7</sup> The exact pathogenesis of cSDH remains debated although it has long been accepted that minor head injury causes

a small venous subdural bleed originating from a bridging vein. Alternatively, traumatic separation of the dura-arachnoid junction and development of subdural hygroma has been postulated as the initial stage.<sup>8,9</sup> The CSDHs are usually characterized by history of head trauma, which is usually a trivial trauma. Some cases could be secondary to defective coagulation, after lumbar puncture (LP), etc., CSDH should be suspected in a patient who presents with unusually persistent headache after spinal anesthesia or LP. CSDH should be taken into account as an important differential diagnosis in reversible dementia. The differentiation between CSDH and dementia could be difficult when it is associated with the hallucinations.<sup>10</sup> CSDH generally occurs in elderly although it may present in young patients. It may rarely be seen in infants. The presence of bilateral CSDH in an infant raises the suspicion of non-accidental trauma and presents a difficult diagnostic challenge because of the legal and social implications. Glutaric aciduria type 1 should be

considered in the differential diagnosis of bilateral CSDHs in infants. Some CSDHs of infancy may have a congenital etiology.<sup>11</sup> The CSDHs are usually on the most curved frontal or occipital convexity. Bilateral CSDH is common in patients with symmetrical frontal and occipital cranial vault. In asymmetrical cranium, CSDHs are usually on the side of the most curved frontal or occipital convexity which is more frequently on the left side.<sup>12</sup> Hence, this study was conducted to evaluate the predisposing factors for recurrence of chronic subdural hematoma.

**MATERIALS & METHODS**

Fifty participants were included in the study, with those undergoing surgery for bilateral hematomas being excluded. The patient cohort consisted of 35 men and 15 women, with an average age of 70.4 years (ranging from 30 to 85 years). The assessment included the examination of antiplatelet and anticoagulant usage for bleeding tendencies. Any ongoing anticoagulation was reversed before the surgery and reinstated within one-month post-surgery. Various factors were analyzed, encompassing age, gender, use of antiplatelet and anticoagulant medications, hematoma laterality, thickness of the hematoma, and internal architecture of the hematoma in preoperative CT films. Additionally, factors such as the use of irrigation, direction of the drainage tube,

width of the subdural space, and the presence of a massive subdural air collection in postoperative CT films were scrutinized. Univariate analysis indicated a discernible trend in recurrence rates among different hematoma types. The data were processed using SPSS software, with a significance level set at  $p \leq 0.05$ .

**RESULTS**

In the study involving 50 patients, univariate analysis suggested a potential association between different types of hematoma internal architecture and the recurrence rate of chronic subdural hematoma (CSDH) ( $p=0.03$ ). Furthermore, there was an observed tendency for the presence of a postoperative massive subdural air collection to be linked with hematoma recurrence ( $p=0.04$ ). Employing a logistic regression model in multivariate analysis revealed a significant association between the separated type of hematoma, in contrast to the trabecular type, and the recurrence of CSDH ( $p=0.02$ ). Consistent with univariate results, the presence of a postoperative massive subdural air collection exhibited a tendency to be associated with hematoma recurrence ( $p=0.07$ ). Importantly, neither univariate nor multivariate analysis established a correlation between the direction of the drainage tube and hematoma recurrence.

**Table 1: Factors associated with the recurrence of chronic subdural hematoma through univariate analysis**

Variable	Recurrence rate (%)	P value
Age	>70	14
	<70	4
Anticoagulation	Yes	4
	No	6
Antiplatelet	Yes	10
	No	6
Width of hematoma	>20	16
	<20	6
Internal architecture of the hematoma	Homogeneous	8
	Laminar	14
Massive air collection	Yes	22
	No	8

**Table 2: Multivariate logistic regression analysis of chronic subdural hematoma recurrence**

Variable	OR	P value
Age (>70)	1.8	0.512
Sex (M)	2.8	0.127
Anticoagulation	1.9	0.746
Antiplatelet	1.2	0.971
Width of hematoma	2.5	0.236
<b>Internal architecture of the hematoma</b>		
Homogenous	2.4	0.412
Laminar	3.5	0.221
Separate	7.6	0.020
Massive air collection	3.5	0.072

OR odds ratio

## DISCUSSION

CSDH could develop in the presence of potential hemorrhagic diathesis due to the deficiency of clotting factors. Factor XIII (FXIII) deficiency may play a pathophysiological role in spontaneous CSDH. FXIII activity should be investigated because it may predict rebleeding events after treatment. FXIII substitution may prevent recurrence in individuals with considerably low FXIII activity.<sup>13</sup> CSDH could develop in patients receiving antiplatelet and anticoagulation therapy.<sup>14</sup> Hence, this study was conducted to evaluate the predisposing factors for recurrence of chronic subdural hematoma. In the present study, involving 50 patients, univariate analysis suggested a potential association between different types of hematoma internal architecture and the recurrence rate of chronic subdural hematoma (CSDH) ( $p=0.06$ ). Furthermore, there was an observed tendency for the presence of a postoperative massive subdural air collection to be linked with hematoma recurrence ( $p=0.05$ ). Employing a logistic regression model in multivariate analysis revealed a significant association between the separated type of hematoma, in contrast to the trabecular type, and the recurrence of CSDH ( $p=0.02$ ). A study by Ohba S et al, performed a retrospective review of a number of CSDH cases and the potential factors associated with CSDH recurrence. The patient population comprised 112 men and 65 women with a mean age of 74.7 years. They analyzed the following factors: age, sex, antiplatelet and anticoagulant use, hematoma laterality, hematoma thickness, degree of midline shift and internal architecture of the hematoma in the preoperative CT films, use of irrigation, direction of the drainage tube, width of the subdural space, and degree of midline shift and the presence of a massive subdural air collection in the postoperative CT films. Univariate analysis revealed that there was a trend for different rates of recurrence among the different types of hematomas. The presence of a postoperative massive subdural air collection tended to be associated with the recurrence of hematoma. Multivariate analysis revealed that separated hematomas were significantly associated with CSDH recurrence, whereas the presence of postoperative massive subdural air collection tended to be associated with hematoma recurrence. Neither univariate nor multivariate analysis could demonstrate an association between the direction of the drainage tube and the recurrence of CSDH.<sup>15</sup> In the present study, consistent with univariate results, the presence of a postoperative massive subdural air collection exhibited a tendency to be associated with hematoma recurrence ( $p=0.07$ ). Importantly, neither univariate nor multivariate analysis established a correlation between the direction of the drainage tube and hematoma recurrence. Another study by Hamou H et al, study was to develop hematoma-specific characteristics associated with risk of recurrence. All consecutive patients treated for cSDH in a single

university hospital between 2015 and 2019 were retrospectively considered for inclusion. Size, volume, and midline shift were noted alongside relevant patient-specific factors. They applied an extended morphological classification system based on internal architecture in CT imaging consisting of eight hematoma subtypes. A logistic regression model was used to assess the classification's performance on predicting hematoma recurrence. Recurrence was observed in 122 (32.0%) of 381 included patients. Apart from postoperative depressed brain volume (OR 1.005; 95% CI 1.000 to 1.010;  $p=0.048$ ), neither demographic nor factors related to patient comorbidity affected recurrence. The extended hematoma classification was identified as a significant predictor of recurrence (OR 1.518; 95% CI 1.275 to 1.808;  $p<0.001$ ). The highest recurrence rates were observed in hematomas of the homogenous (isodense: 41.4%; hypodense: 45.0%) and sedimented (50.0%) types. The results support that internal architecture subtypes might represent stages in the natural history of chronic subdural hematoma. Detection and treatment at a later stage of spontaneous repair can result in a reduced risk of recurrence. Based on their high risk of recurrence, they advocate follow-up after treatment of sedimented and homogenous hematomas.<sup>16</sup> Altaf I et al, retrospective analysis of 113 patients diagnosed with chronic subdural hematoma who were surgically treated between August 2013 and December 2014 was performed. The radiological features were analyzed to clarify the correlation between these radiological factors and postoperative recurrence of chronic subdural hematoma. Twenty patients (17.7%) experienced recurrence. Chronic subdural hematoma recurrence was found to be significantly associated ( $p<0.05$ ) with preoperative hematoma thickness  $\geq 20$  mm. Midline shift, hematoma density and bilaterality were not significantly associated with recurrence. Post operative drainage also significantly ( $p<0.05$ ) reduced chronic subdural hematoma recurrence. Preoperative hematoma thickness  $\geq 20$  mm is an independent predictor of recurrence of chronic subdural hematoma. Postoperative drainage also significantly reduces chronic subdural hematoma recurrence.<sup>17</sup> CSDH is a common disease in neurosurgical practice and the incidence is increasing. The reported recurrence rate ranges from 3% to 30% where this study showed a recurrence rate of 17.7%. The etiology of CSDH recurrence has not been completely understood until now, but several radiological risk factors for CSDH recurrence have been reported, including: hematoma thickness, hematoma density, bilateral CSDHs and preoperative midline shift. However, results identifying consistent risk factors have been difficult to reproduce.<sup>18,19</sup> The etiologies of hematoma recurrence are not exactly known. Many factors seem to be responsible for the recurrence. Removal of outer membrane does not eliminate the risk of recurrence while partial removal

of hematoma could lead to total disappearance of membrane and hematoma.<sup>20</sup> Postoperative midline shift of 5 mm or more, diabetes mellitus, preoperative seizure, and preoperative width of 20 mm or more are the predictors of recurrence in CSDH. The rate of recurrence is lower in the homogeneous and the trabecular type, as compared to the laminar or multilayered type hematoma.<sup>21</sup> High- and mixed-density lesions are associated with a high incidence of recurrence.<sup>22</sup>

## CONCLUSION

The recurrence of chronic subdural hematoma (CSDH) was primarily linked to the specific hematoma type, especially the separated type.

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