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CLINICAL AND CT SCAN DIFFERENCES BETWEEN PATIENTS WITH AND WITHOUT PARALYSIS SYMPTOMS IN CHRONIC SUBDURAL HEMATOMA

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ABSTRACT

Objectives: *To investigate the clinical and CT imagining difference in patients with chronic subdural hematoma who present with or without paralysis symptoms.*

Subjects and methods: *A restrospective and prospective, comparison study was conducted on 142 patients with chronic subdural hematoma who underwent surgical treatment at Military Hospital 103 and Central Military Hospital 108 from January, 2022 to January, 2024.*

Results: *The average age of patients was 67.2 ± 11.5 years. Most patients were male (83.1%) and 64.8% had paralysis symptoms. Clinically, in the group without paralysis, the rate of headache was 98.0%, there were no cases of cognitive disorder (0%), the average age was 62.3 ± 11,9 years, and the average Glasgow Coma Scale score was 15 ± 1 points, statistically different compared to the group with paralysis (with rates of 86.9%; 13.0%; 69.8 ± 10.5 years; and 14 ± 1 points respective), with p < 0.05. On CT imaging, hematoma thickness, midline shift, and injury location in patients without paralysis symptoms were statistically different compared to those with paralysis, with p < 0.05.*

Keywords: Chronic subdural hematoma, CT scan, single hole trepanation.

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1. INTRODUCTIONS

Chronic subdural hematoma (CSDH) is a condition characterized by the accumulation of encapsulated blood and fluid in the subdural space. It is a relatively common neurological disorder. According to Bui Quang Tuyen, CSDH is the consequence of an acute or subacute subdural hematoma that persists for more than two weeks [1]. Unlike the acute or subacute forms, the clinical presentation of CSDH is often nonspecific; in most cases, it results from minor trauma, which patients may not notice or clearly recall. Surgical drainage remains the primary treatment for CSDH, yielding highly favorable outcomes. Among the surgical options, the burr-hole technique is considered the standard approach.

Currently, the incidence of CSDH is on the rise, due to both traumatic and pathological causes. Hemiparesis is a highly valuable symptom in the process of lesion localization-serving as an important factor in surgical indication and in prognostic evaluation of treatment outcomes in patients with chronic subdural hematoma. In patients with CSDH who do not present with paralysis, computed tomography (CT) is a valuable imaging modality-not only for detecting the condition but also for providing a solid scientific basis for timely surgical intervention. Clinical practice has shown that in many cases of CSDH, especially those without hemiparesis, there is often a discrepancy between the clinical presentation and the findings on cranial CT imaging.

Thus, we conducted this study to evaluate the differences in clinical features and computed tomography findings between two groups of CSDH patients: those with paralysis and those without.

2. SUBJECTS AND METHODS

2.1. Subjects

142 patients with CSDH who underwent surgical treatment at Military Hospital 103 and Military Central Hospital 108, from January, 2022 to January, 2024 were included in this study.

Patients were excluded if their medical records lacked sufficient information for research; had undergone prior CSDH surgery at another medical facility before being referred to Military Hospital 103 or Military Central Hospital 108; had a history of stroke; or did not consent to participate in the study.

2.2. Methods

- Study design: restrospective and prospective, comparison study.

- Sample size: a convenient sample of all patients meeting the inclusion criteria was selected (142 patients were included in the study).

- Methods:

+ Data collection: clinical and paraclinical data were collected through direct examination and investigations for prospective patients, and from medical records for retrospective patients.

+ Patient grouping: patients were divided into two groups: those with hemiparesis and those without. Clinical characteristics and cranial CT imaging findings were analyzed within each group and compared between the two groups.

+ Analysis, evaluation, and conclusion.

- Study variables:

+ General characteristics of patients: age, gender, proportion of patients with and without paralysis.

+ Clinical features and cranial CT imaging characteristics in each patient group.

+ Comparison and evaluation of clinical and CT imaging differences between the two groups.

- Ethics: the study was approved by the Ethics Committees of the Military Central Hospital 108 and Military Hospital 103. All patient information was kept confidential and used solely for research purposes.

- Data analysis: data were processed using IBM SPSS version 20.0. Continuous variables were presented as mean or median values; categorical variables were presented as proportions. Continuous variables were compared using the Student's t-test or Mann–Whitney U test, while categorical variables were compared using the Chi-square test.

3. RESULTS

- General characteristics:

Table 1. Characteristics of the studied patients (n = 142)

Characteristics		Result
Gender	Male	118 (83.1%)
	Female	24 (16,9%)
Mean Age		67.2 ± 11.5 years
Paralysis symptoms	Yes	92 (64.8%)
	No	50 (35.2%)

Table 1 shows that the patients had a mean age of 67.2 ± 11.5 years. The proportion of male patients (83.1%) was higher than that of female patients (16.9%). Most patients presented with paralysis symptoms (64.8%).

Comparison of clinical characteristics between patients with and without paralysis symptoms:

Table 2. Comparison of clinical characteristics between patients with and without paralysis symptoms

Characteristics		Non-paralysis group (n = 50)	Paralysis group (n = 92)	p
Mean age		62.3 ± 11.9	69.8 ± 10.5	0.000
Average GCS score (points)		15 ± 1	14 ± 1	0.000
Gender	Male	38 (70.0%)	80 (86.9%)	0.106
	Female	12 (30.0%)	12 (13.1%)	

Characteristics		Non-paralysis group (n = 50)	Paralysis group (n = 92)	p
Medical history	Hypertense	14 (28.0%)	38 (41.3%)	0.145
	Diabetes mellitus	6 (12.0%)	15 (16.3%)	0.623
	Anticoagulant use	1 (2.0%)	6 (6.5%)	0.421
	Head trauma	35 (70.0%)	65 (70.7%)	1.000
Associated symptoms	Headache	49 (98.0%)	80 (86.9%)	0.033
	Nausea/Vomiting	13 (26.0%)	17 (18.5%)	0.389
	Dizziness	11 (22.0%)	18 (19.6%)	0.828
	Pupillary dilation	1 (2.0%)	1 (1.1%)	1.000
	Cognitive impairment	0	12 (13.0%)	0.008
	Sphincter dysfunction	0	3 (3.3%)	0.552

Table 2 shows that there was no statistically significant difference in gender and medical history between patients with and without paralysis symptoms ($p > 0.05$).

The proportion of patients with headaches in the non-paralysis group (98.0%) was higher than in the paralysis group (86.9%), with a statistically significant difference ($p < 0.05$). However, the rate of cognitive impairment in the non-paralysis group (0%) was significantly lower than in the paralysis group (13.0%), $p < 0.05$.

The mean age of patients in the non-paralysis group (62.3 ± 11.9 years) was lower, and the mean Glasgow Coma Scale (GCS) score (15 ± 1 points) was higher compared to the paralysis group (69.8 ± 10.5 years and 14 ± 1 points, respectively), with statistically significant differences ($p < 0.05$).

Comparison of CT imaging characteristics between patients with and without paralysis symptoms:

Table 3. Comparison of CT imaging findings between patients with and without paralysis symptoms

Lesion characteristics on CT imaging		Paralysis symtoms		p
		No (n = 50)	Yes (n = 92)	
Hematoma thickness (mm)		17.8 ± 5.1	21.9 ± 5.5	0.000
Midline shift (mm)		5.9 ± 5.6	9.2 ± 5.6	0.001
Lesion location	Unilateral	28 (56.0%)	68 (73.9%)	0.039
	Bilateral hemisphere	22 (44.0%)	24 (26.1%)	
Hematoma density	Hyperdese	13(26.0%)	17(18.5%)	0.462
	hypodense	13 (26.0%)	34 (17.0%)	
	Mixeddensity	12 (24.0%)	24 (38.3%)	
	isodense	12 (24.0%)	17 (18.5%)	

There were statistically significant differences in hematoma thickness, degree of midline shift, and lesion location on CT scans between the patient group without hemiparesis symptoms and the group with paralysis symptoms ($p < 0.05$).

4. DISCUSSIONS

4.1. Clinical characteristics

Our patients had an average age of 67.2 ± 11.5 years, which is similar to the findings of Le Xuan Duong (67.5 ± 15.46 years) [2] and Geo S.K (67.78 ± 12.03 years) [3]. CSDH commonly occurs in the elderly due to brain atrophy, which leads to an enlarged subdural space and stretching of bridging veins. These predisposing factors facilitate the tearing of the arachnoid membrane, resulting in slow bleeding into the subdural space after minor head trauma. Additionally, elderly individuals often have comorbid conditions such as atherosclerosis and hypertension, making their blood vessels more vulnerable to injury and less capable of spontaneous hemostasis compared to younger individuals. Most authors have found that CSDH is more prevalent in males. This aligns with the fact that men are generally at greater risk of head trauma. Furthermore, estrogen in females plays an effective role in protecting the vascular endothelium. According to Ge R, female CSDH patients tend to be significantly older than male patients, and female sex is considered a risk factor for mortality in this patient group [4].

Table 1 shows that 64.8% of patients presented with hemiparesis, a rate higher than that reported by Nguyen Hung Minh (50%) [5], and comparable to that of Abebe Mersha (68.2%). Upon analysis, we observed that hemiparesis symptoms were associated with patient age. The average age of patients in the paralysis group was 69.8 ± 10.5 years, which was higher than that of the non-hemiparesis group (62.3 ± 11.9 years), a statistically significant difference ($p < 0.05$). Similarly, the study by Motiei L reported that the average age in the hemiparesis group (74.6 ± 12.6 years) was significantly higher than that in the non-paralysis group (69.6 ± 13.4 years), with $p = 0.03$. Motiei L also identified age as one of the prognostic factors for hemiparesis in patients with CSDH [6].

No significant differences were found in terms of gender or medical history between the patient groups with and without paralysis ($p > 0.05$). However, the mear Glasgow Coma Scale (GCS) score in the hemiparesis group (14 ± 1) was significantly lower than in the non-paralysis group (15 ± 1). Paralysis is related to damage in the brain regions responsible for motor control; therefore, its presence is a clear indicator of brain tissue injury. Gender and comorbidities do not affect the location of brain lesions, and thus do not significantly influence the clinical manifestation of paralysis. Consequently, patients with paralysis tend to have more severe brain injury than those without. The incidence of headache was higher in the non-paralysis group (98.0%) compared to the paralysis group (86.9%). On the other hand, the rate of cognitive impairment was significantly lower in the non-paralysis group (0%) compared to the paralysis group (13.0%), with statistically significant differences ($p < 0.05$). This may be attributed to the degree of brain parenchymal damage between the two groups; patients with paralysis likely have more severe brain injury, leading to a higher rate of cognitive dysfunction and a decreased ability to perceive pain due to impaired awareness.

4.2. CT imaging characteristics of the lesion

Currently, computed tomography (CT) remains the most widely used imaging modality for diagnosing intracranial pathologies in general, and chronic subdural hematoma in particular. Table 3 shows that the hemiparesis group exhibited more severe brain injury than the non-hemiparesis group, with significantly greater hematoma thickness and midline shift ($p < 0.05$). The study by Motiei L identified hematoma thickness and midline shift as prognostic factors for hemiparesis in patients with CSDH. Specifically, in patients with unilateral hematomas, those with a maximum hematoma thickness of 20 mm and a midline shift of 6 mm had a 50% increased risk of developing hemiparesis [6].

This study also recorded a statistically significant difference in lesion location on CT scans between the two groups ($p = 0.039$), consistent with the findings of Motiei L and colleagues, who reported that up to 87.5% of hemiparesis patients had unilateral hematomas [6]. Although the exact mechanism linking lesion location and paralysis remains unclear, compression of the motor cortex is believed to be the main cause. Another proposed mechanism is that localized hematomas can cause a greater increase in focal pressure and tension compared to diffuse intracranial pressure. Tomita Y's report suggested that these factors contribute to the development of hemiparesis [7].

In a study using CT with Xenon isotopes to measure regional cerebral blood flow in 38 patients with unilateral CSDH, Ikeda et al. found that all patients without hemiparesis had normal cerebral blood flow, while those with paralysis frequently exhibited reduced blood flow-especially in the Rolandic area on the same side as the hematoma [8].

Regarding hematoma density on CT imaging, no significant difference was found between the two patient groups ($p > 0.05$), which is consistent with the findings of Motiei L [6]. Chronic subdural hematoma is defined as chronic when the lesion persists for more than two weeks. The condition typically evolves over a relatively long period, which explains the wide variation in hematoma densities observed on imaging.

5. CONCLUSIONS

This study included 142 patients with chronic subdural hematoma who underwent surgical treatment at Military Hospital 103 and the 108 Central Military Hospital from January 2022 to January 2024. The conclusions are as follows:

The average patient age was 67.2 ± 11.5 years; the proportion of male patients (83.1%) was higher than that of females (16.9%). Most patients presented with paralysis (64.8%).

The incidence of headache was higher in the non-hemiparesis group (98.0%) compared to the hemiparesis group (86.9%), whereas the incidence of cognitive impairment was significantly lower in the non-hemiparesis group (0%) compared to the hemiparesis group (13.0%), with a statistically significant difference ($p < 0.05$). The average age in the non-hemiparesis group (62.3 ± 11.9 years) was lower, and their average Glasgow Coma Scale score (15 ± 1) was higher compared to the hemiparesis group (69.8 ± 10.5 years and 14 ± 1 points, respectively), with statistically significant differences ($p < 0.05$).

Statistically significant differences were found between the paralysis and non-paralysis groups in terms of hematoma thickness, midline shift, and lesion location on CT scans ($p < 0.05$).

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