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Symptomatic calcified chronic subdural hematoma treated surgically. A case report with review of the literature

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ABSTRACT

Background: Calcified chronic subdural hematoma (CSDH) is unusual. The majority of calcified CSDHs are found near the convexity, and the amount of calcification varies greatly. The progression of calcification in a CSDH is unknown. Seizures, mental and physical impairment, hemiparesis, and gait abnormalities are some of the symptoms; nevertheless, some people are asymptomatic. Surgical intervention is preferred for a calcified CSDH that is expanding. However, there is no agreement on surgical therapy for asymptomatic calcified CSDHs.

Case Presentation: A 69-year-old man was reported to have had behavioural abnormalities and seizures in the past couple of years. He had a three-year history of minor head trauma. On clinical examination, he appeared confused and had no hemiparesis. His Computed Tomography (CT) brain revealed a calcified frontoparietal CSDH on the left side. A calcified CSDH was discovered in his brain by Magnetic Resonance Imaging (MRI) as well. This patient underwent a left-sided frontoparietal craniotomy, and the calcified CSDH was removed to the greatest extent possible. It was firmly attached to the underlying surface of the brain parenchyma. The postoperative period was straightforward, and the patient's behavioural alterations improved noticeably.

Conclusions: We described a patient who had a rare, persistent, calcified CSDH that was successfully removed, leading to a noticeable recovery. Based on our assessment of the literature and our patient's experience, we believe surgical treatment for calcified CSDH is viable and typically results in neurological improvement.

Keywords
chronic subdural hematoma,
calcification,
ossification,
traumatic brain injury,
craniotomy

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INTRODUCTION

Chronic subdural hematoma (CSDH) usually results from trivial head trauma or from use of anticoagulants and is more common in older age. Symptoms take weeks or months to appear. While CSDH is very common, calcified CSDH is a rare entity with some patients being asymptomatic and others having neurological symptoms such as balance problems, weakness or numbness, confusion, dizziness, behavioural abnormalities, and seizures. The mechanism of

calcification in CSDH is likely to be multifactorial, involving both vascular and metabolic factors.[1,2]

CSDH is surgically treated to reduce pressure on the brain. Burr hole drainage is a popular surgical technique, and a drain is typically left in place to let the blood to drain out; a craniotomy is seldom ever necessary for a straightforward CSDH. The neurosurgical removal of the calcified hematoma frequently necessitates craniotomy, which can be difficult due to the calcified hematoma's adhesion to the meninges and underlying brain tissue. As calcified hematoma removal is difficult due to calcified hematoma adhesion to the underlying cortex, surgery is only suggested when acute or progressive neurological symptoms emerge.[3,4] According to reports, the incidence of calcified CSDH ranges from 0.3% to 2.7%.[1,4-11] Despite the fact that surgical treatment for the CSDH is largely acknowledged, there is still some debate over its application.[11]

Case presentation

A 69-year-old man went to the outpatient clinic with concerns of behavioural changes and seizures during the previous couple of years. He had a history of trivial head trauma three years prior. He had also been seeing a psychiatrist for his behaviour troubles. He was on Levetiracetam for seizures. He seemed disoriented and had no hemiparesis on clinical evaluation. His Computed Tomography (CT) brain plain revealed a left sided frontoparietal calcified CSDH, as indicated in Figures 1 A & B.

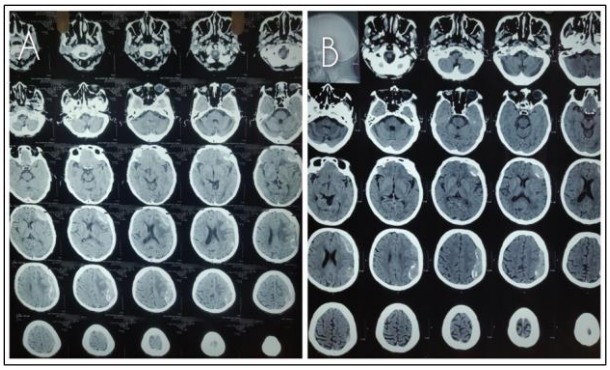

Figure 1. A & **B**: CT scan brain plain showing left sided frontoparietal calcified chronic subdural hematoma.

His Magnetic Resonance Imaging (MRI) brain revealed a calcified CSDH, as seen in Figures. 2 A, B, C, and D. This patient had left sided frontoparietal craniotomy after counselling and signed informed permission, and the calcified CSDH was expunged as much as feasible. It was rigorously adhered to the underlying surface of the brain parenchyma and so that part did not dislodge. The postoperative phase was simplistic, and the patient's behavioural changes improved significantly.

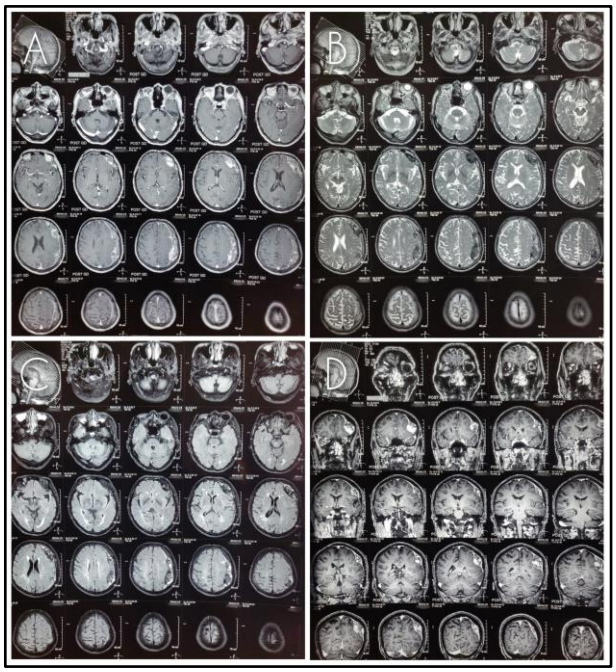

Figure 2. A: MRI Axial T1 weighted image with contrast, **B**: MRI Axial T2 weighted image, **C**: MRI FLAIR image, **D**: MRI Coronal T1 weighted image with contrast showing left sided frontoparietal calcified chronic subdural hematoma

Discussion

CSDH is one of the most common consequences of mild head trauma. Coagulation disorders, therapeutic anticoagulant use, intracranial hypotension (secondary to overdrainage in shunted patients), chronic alcoholism, vascular malformations, and primary and metastatic tumours may all play a role in the aetiology of CSDH.[12] An "Armoured brain" or "Matrioska head" is one in which the surface of the brain is covered by a calcified wall. Despite being thin, this calcified region is said to have strong adhesions to the dura mater and the surface of the brain. The risk of harming the underlying cortex prevents regular surgical removal of the calcification. It is advised that patients who are elderly, asymptomatic, and whose neurological state has not changed suddenly or significantly be

monitored. It has been found that symptomatic and young patients require surgical treatment.[4,6,7,10,12,13,14]

The term "calcified CSDH" refers to the 0.5% to 2.0% of CSDH patients that experience calcification.[15] Von Rokitansky wrote about calcified CSDH as an autopsy finding in 1884.[1,10] The first instance of an armoured brain or calcified CSDH was described by Goldhan in 1930.[1,10,16,17] The mechanism of calcification development in CSDH is not established.[1,10,18] However, the hematoma may develop progressively from hyalinization to calcification and, eventually, ossification due to tissue irritation. Calcification after a hemorrhage often takes 6 months to several years to occur. Poor circulation and absorption into the subdural space, vascular thrombosis, an inherent metabolic tendency to calcification, the presence of a hematoma in the subdural space for an extended period of time, stagnant blood due to adequate arterial supply but insufficient venous return, a thick connective tissue membrane, and other local factors are thought to contribute to the development of CSDH calcification.[1,10]

Table 1: A comprehensive literature review through the PubMed and Google Scholar databases showing cases of calcified/ossified CSDH from 2000 to 2023.

S.no.	Authors' name	Year reported	No. of cases reported	Gender/Age (y=years m=months)	Cause	Treatment offered
1.	Imaizumi S et al.[1]	2001	5	i.M/3.8y ii.M/2.6y iii.M/78y iv.M/69y v.M/77y	i.Shunting ii.Trauma + Shunting iii.Unknown iv.Bleeding diathesis v.Trauma	i.Craniotomy ii.Craniotomy iii.Craniotomy iv.Craniotomy v.Craniotomy
2.	Gotoh M et al.[20]	2001	1	M/54y	Lymphoma	Craniotomy
3.	Narsinghani U et al.[21]	2002	1	M/5y	Unknown	Unknown
4.	Sgaramella E et al.[3]	2002	1	Unknown	Unknown	Conservative
5.	Wakamoto H et al.[22]	2003	1	M/46y	Trauma	Craniotomy
6.	Al Wohaibi M et al.[23]	2003	1	M/10m	Shunting	Conservative
7.	Jong-Soo P et al.[24]	2003	1	M/37y	Unknown	Craniotomy
8.	Moon HG et al.[25]	2003	1	M/67y	Unknown	Craniotomy
9.	Yang HZ et al.[11]	2004	1	M/59y	Unknown	Craniotomy
10.	Sato K et al.[26]	2005	1	M/50y	Unknown	Craniotomy
11.	He XS et al.[27]	2005	1	M/15y	Shunting	Craniotomy
12.	Per H et al.[6]	2006	1	M/3.5y	Trauma	Craniotomy
13.	Tatli M et al.[18]	2006	1	M/16y	Unknown	Craniotomy
14.	Dimogerontas G et al.[28]	2006	1	M/43y	Shunting	Conservative
15.	Moon KS et al.[13]	2007	1	M/47y	Unknown	Craniotomy

16.	Evans SJ[29]	2007	1	F/21y	Shunting	Conservative
17.	Dammers R et al.[4]	2007	1	M/67y	Trauma	Craniotomy
18.	Amr R et al.[30]	2008	1	F/30y	Shunting	Conservative
19.	Papanikolaou PG et al.[31]	2008	1	M/33y	Shunting + Trauma	Conservative
20.	Kaplan M et al.[12]	2008	1	M/22y	Trauma	Craniotomy
21.	Galldiks N et al.[7]	2010	1	M/86y	Trauma	Burr holes
22.	Rao Z et al.[9]	2010	1	M/75y	Unknown	Craniotomy
23.	Oda S et al.[19]	2010	1	F/32y	Unknown	Craniotomy
24.	Petraglia AL et al.[32]	2010	1	F/38y	Shunting	Conservative
25.	Turgut M et al.[33]	2010	1	F/30y	Trauma	Craniotomy
26.	Akhaddar A et al.[34]	2011	1	M/7y	Shunting	Conservative
27.	Rahman A et al.[35]	2012	1	M/65y	Unknown	Craniotomy
28.	Juan WS et al.[36]	2012	2	i.M/10y ii.F/35y	i.Shunting ii.Shunting + Aneurysmal bleed	i.Craniotomy ii.Craniotomy
29.	Sugita Y et al.[37]	2012	1	M/77y	Lymphoproliferative disorder + Trauma	Craniotomy
30.	Taha MM et al.[10]	2012	1	M/12y	Shunting	Conservative
31.	Pappamikail L et al.[38]	2013	1	M/73y	Unknown	Craniotomy
32.	Tandon V et al.[39]	2013	1	F/54y	Trauma	Conservative
33.	Garg K et al.[67]	2013	1	M/24y	Shunting	Conservative
34.	Chaudhry FS et al.[40]	2013	1	M/47y	Arrested hydrocephalus	Conservative
35.	Goyal PK et al.[41]	2013	1	F/15y	Unknown	Craniotomy
36.	Salunke P et al.[14]	2013	1	M/15y	Shunting	Burr holes
37.	Ito M et al.[42]	2014	1	M/72y	Unknown	Craniotomy
38.	Cai J et al.[43]	2014	1	M/77y	Glioblastoma	Craniotomy
39.	Arán-Echabe E et al.[44]	2014	1	Unknown	Unknown	Unknown
40.	Djoubairou BO et al.[8]	2015	1	M/22y	Shunting	Conservative
41.	Gupta SK et al.[45]	2015	1	M/30y	Shunting	Craniotomy

42.	Yang X et al.[2]	2015	1	F/54y	Infection	Craniotomy
43.	Siddiqui SA et al.[17]	2016	1	M/30y	Shunting	Craniotomy
44.	Li H et al.[46]	2017	1	M/61y	Trauma	Craniotomy
45.	Viozzi I et al.[47]	2017	1	F/15y	Shunting	Conservative
46.	Keser N et al.[48]	2017	1	F/35y	Trauma	Craniotomy
47.	Chan ZW et al.[66]	2018	1	Unknown	Shunting + Glioblastoma	Craniotomy
48.	Satyarthee GD et al.[49]	2018	1	M/8y	Shunting	Burr hole Craniostomy
49.	Qin G et al.[50]	2019	1	M/58y	Skull angiosarcoma	Craniotomy
50.	Fang J et al.[51]	2019	1	F/7y	Trauma	Craniotomy
51.	Ding H et al.[16]	2019	1	M/15y	Postoperative	Conservative
52.	Liu X et al.[52]	2019	1	M/46y	Lymphoproliferative disorder	Craniectomy
53.	Tian W et al.[53]	2019	1	M/49y	Unknown	Craniotomy
54.	Turgut M et al.[54]	2019	1	M/59y	Trauma	Craniotomy
55.	Rong J et al.[55]	2020	1	M/46y	Trauma	Craniotomy
56.	Snopko P et al.[5]	2020	1	F/81y	Unknown	Craniotomy
57.	Songnatsiri P et al.[56]	2020	1	M/83y	Trauma	Craniotomy
58.	Zhang S et al.[57]	2020	1	M/60y	Unknown	Craniotomy
59.	Marini A et al.[65]	2020	1	M/15y	Shunting	Craniotomy
60.	Bhardwaj S et al.[58]	2020	1	M/25y	Shunting	Craniotomy
61.	Pakrasi R et al.[59]	2021	1	M/75y	Unknown	Craniotomy
62.	Prasad PK et al.[60]	2021	1	M/50y	Unknown	Craniotomy
63.	Chaulagain D et al.[15]	2022	1	M/65y	Unknown	Craniotomy
64.	Bett D[61]	2022	1	M/96y	Unknown	Craniotomy
65.	Girotto AL[62]	2022	1	M/62	Unknown	Craniotomy
66.	Wang H et al.[63]	2023	1	M/69y	Unknown	Craniotomy
67.	Mansour M et al.[64]	2023		F/34y	Trauma	Craniotomy

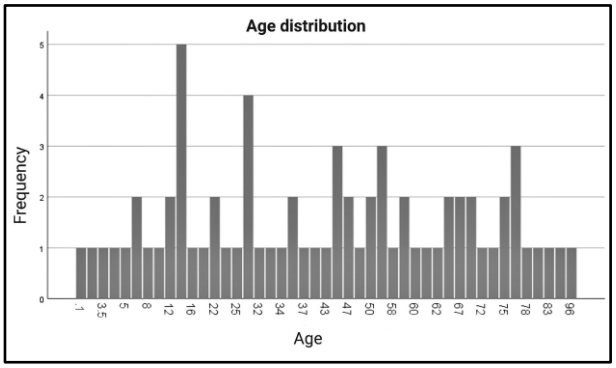

Figure 3: Age distribution among the reviewed cases.

Table 1: A comprehensive

Total no. of cases	72	
Mean age (years)	42.57 ± 25.62 SD (mini. 10m, max. 96y)	
Gender distribution	Male	55 (76.4%)
	Female	14 (19.4%)
	Unknown	3 (4.2%)
Cause distribution	Shunting	21 (29.2%)
	Trauma	16 (22.2%)
	Shunting + Trauma	2 (2.8%)
	Tumour related	3 (4.2%)
	Bleeding diathesis	1 (1.4%)
	Lymphoproliferative disorder	2 (2.8%)
	Arrested hydrocephalus	1 (1.4%)
	Infection	1 (1.4%)
	Postoperative	1 (1.4%)
	Unknown	24 (33.3%)
Treatment offered	Craniotomy	51 (70.8%)
	Craniectomy	1 (1.4%)
	Craniostomy	1 (1.4%)
	Burr holes	2 (2.8%)
	Conservative	15 (20.8%)
	Unknown	2 (2.8%)

Conclusions

We presented a patient who had an uncommon, calcified CSDH that was successfully removed, resulting in a satisfactory recovery. Based on the literature analysis and our patient's experience, we feel that surgical therapy for calcified CSDH is viable and commonly results in neurological improvement.

Abbreviations

CSDH: Chronic subdural hematoma;
CT: Computed Tomography;
MRI: Magnetic Resonance Imaging;
SPSS: Statistical Package for Social Sciences.

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