

## Distinct Neuro-Recovery Pattern in Calcified Subdural Hematoma with False-Localizing Sign: A Case Report

Armaan Kush Malhotra<sup>1,2,\*</sup>, Haiyang Li<sup>1,\*</sup>, Lai Shenglong<sup>1\*</sup>, Yazhou Xing<sup>1</sup>, Qiang Li<sup>3</sup>, Zhiyuan Sheng<sup>1</sup>, Emal Zemmar<sup>1</sup>, Jack L. Fleming<sup>1</sup>, Juha Hernesniemi<sup>1</sup>, Qinghua Liang<sup>1</sup>, Ajmal Zemmar<sup>1</sup>

<sup>1</sup>Juha Hernesniemi International Neurosurgery Center, Henan Provincial People's Hospital, Henan University, Zhengzhou, China.

<sup>2</sup>Faculty of Medicine, University of British Columbia, Vancouver, British Columbia, Canada

<sup>3</sup>Department of Radiology, People's Hospital of Zhengzhou University (Henan Provincial People's Hospital), 7 Weiwu Road, Zhengzhou, Henan, 450003, China

**Corresponding Author** : Juha Hernesniemi, Ajmal Zemmar, Juha Hernesniemi International Neurosurgery Center, Henan Provincial People's Hospital, Henan University, Zhengzhou, China. **E-mail**: [ajmal.zemmar@gmail.com](mailto:ajmal.zemmar@gmail.com)

**Received date**: August 23, 2019; **Accepted date**: September 09, 2019; **Published date**: September 23, 2019

**Citation** : Hernesniemi J., Zemmar A., Malhotra R.K., Haiyang L., Shenglong L., Yazhou X., Qiang L. et al. (2019) Distinct Neuro-Recovery Pattern in Calcified Subdural Hematoma with False-Localizing Sign: A Case Report. *J. Neuroscience and Neurological Surgery*. 4(5); DOI: [10.31579/2578-8868/088](https://doi.org/10.31579/2578-8868/088)

**Copyright**: © 2019 Juha Hernesniemi, Ajmal Zemmar. This is an open-access article distributed under the terms of The Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Abstract

**Background**: Chronic subdural hematoma is a frequently encountered clinical entity in neurosurgical practice. A small subgroup of chronic subdural hematomas present with calcification or ossification. This entity can pose different operative challenges and distinct clinical features.

**Case Description**: We describe a 39-year-old male with adult-onset epilepsy presenting with gradual development of headaches and dizziness with right-sided weakness and hyperreflexia. He was found to have a large, right-sided calcified chronic subdural hematoma and underwent craniotomy for evacuation. Postoperatively, the patient had full-strength on the right side but was plegic on the left side, which gradually improved back to normal strength.

**Conclusion**: We present the case of an adult patient with false-localizing sign and distinct motor recovery pattern attributable to a large calcified chronic subdural hematoma which required delicate resection due to cortical adherence.

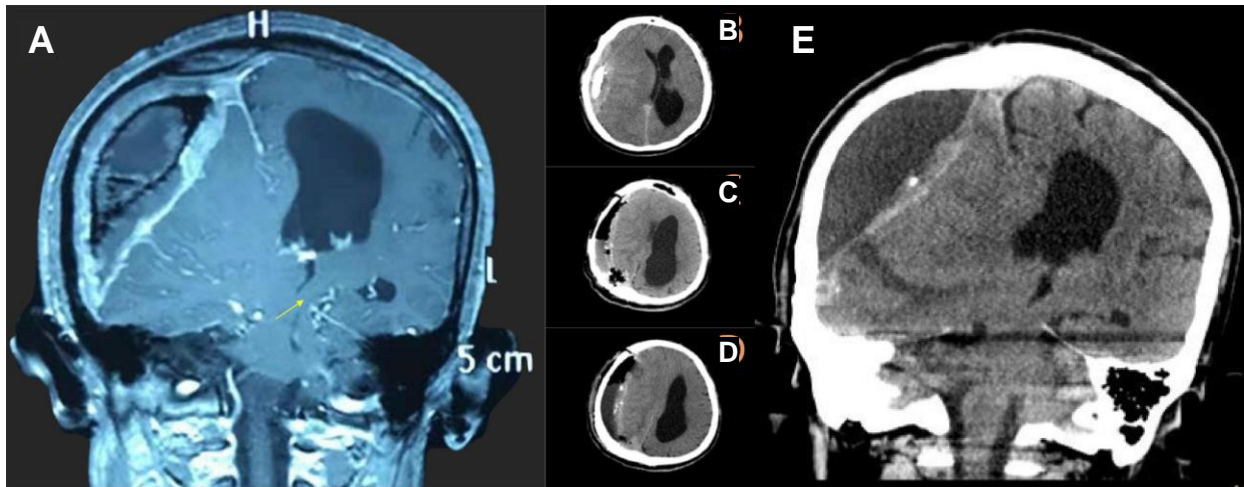
### Introduction

Chronic subdural hematomas (CSDH) are a frequently encountered neurosurgical pathology. By comparison, calcification and ossification of CSDH are rare phenomena occurring in approximately 0.3-2.7% of cases. [1] Though approximately 100 cases have been reported in the literature, the exact etiology remains unclear. Calcification and ossification has been observed in post-traumatic subdural hematomas, post-infectious subdural collections and in patients undergoing ventriculoperitoneal (VP) shunting for hydrocephalus.[5] The operative management of calcified CSDHs may be complicated by adherence of the internal subdural membrane to the brain cortex posing challenges for resection. [6] Yet, delicate resection is critical to preserve the plasticity required for motor recovery. Here, we report a case of a large calcified CSDH with Kernohan-Woltman phenomenon.

### Case Report

A 39-year-old, right handed male presented with insidious onset of dizziness and headaches for six months. The patient had a 6-year history of epilepsy of unknown etiology and was managed on phenytoin. His seizure frequency had culminated up to 5 seizures daily. An electroencephalogram (EEG) demonstrated epileptiform discharges originating from the right cerebral hemisphere, computed tomography (CT) was significant for a large right-sided calcified pan-hemispheric chronic subdural collection resulting in 4/5 motor power in the right upper (UE) and lower extremities (LE) and right-sided hyperreflexia. Figures & Figure Legends. (Fig.1A).

Figures & Figure Legends



**Figure 1:** A: Pre-operative coronal CT scan demonstrating a large, right sided chronic calcified subdural hematoma with significant mass effect resulting in impingement of the contralateral descending motor fibers against the tentorium cerebelli (yellow arrow). B-D: Axial CT scans immediately after evacuation (B), at 2 weeks (C) and 4 weeks (D) post-evacuation. E: Coronal image 2-months after evacuation, note the relationship between descending motor fibers and left tentorium cerebelli despite presence of midline-shift.

A right-sided craniotomy was performed, the inner CSDH membrane was adherent to the cortical surface. A small incision was made into the margin of the internal layer, which was delicately dissected from the cortical surface below. The central membranous portion was tightly adherent to the cortex and left in situ to avoid cortical damage. Strikingly, on postoperative exam, the patient had full-strength (5/5) in both right extremities but was now plegic on the left UE and LE (0/5). CT showed no acute hemorrhage, a chronic subdural collection and midline shift (Fig. 1B), which improved at discharge (Fig. 1C) correlating with significantly enhanced motor strength in left LE & UE (4<sup>+</sup>/5). Midline-shift regressed at 1-month (Fig. 1D) and 2-month follow-up, at which motor strength was back to normal (5/5) and seizure frequency had decreased back to baseline with normal phenytoin blood levels.

**Discussion**

We present the case of a large, calcified CSDH producing Kernohan’s phenomenon. After a tightly adherent membrane was delicately separated and left in situ to protect the cortex, a distinct neuroplasticity pattern was observed postoperatively: Ipsilateral hemiparesis recovered rapidly whereas contralateral hemiplegia developed. A likely explanation is a shift in mechanical compression: Once the descending fibers were released at the contralateral tentorium, the fibers recovered resulting in postoperative functional recovery on the ipsilateral side. This was likely paralleled by compression of significant fibers attributable to contralateral motor function, which recovered over time leading to full bilateral recovery at 2-month follow-up. These dynamics identify the remarkable ability of the central nervous system to promote plasticity and functional recovery within a fast-temporal scale. This is a rare presentation of a large calcified CSDH with this distinct pattern of neuroplasticity. A critical aspect was the extent of resection of the subdural membrane.

Li et al. reviewed treatment strategies and outcomes among patients with calcified/ossified CSDH. [3] They identified 21 patients, 18 of whom underwent neurosurgical intervention. Total removal of the subdural hematoma was possible in 8 of 16 patients undergoing craniotomy. Dissection of the inner subdural membrane was identified as the critical operative step. Others reported thinning of the

membrane using a high-speed drill, [4] cutting the inner membrane in a grid-like fashion to resolve tension of adherent membrane on the cortex [6] or tenting the inner subdural membrane to the dura. [2] In our case, despite rigorous attempt, en-bloc resection was not possible. Thus, the tightly adherent central visceral membranous attachment was left in situ to achieve maximal-safe resection of subdural membrane and maximally protect the cortex.

**Conclusion**

We present an adult patient with right-sided calcified subdural hematoma and a distinct motor recovery profile: Although ipsilateral hemiplegia resolved completely post-operatively, the patient developed contralateral hemiplegia, which improved back to normal function. The authors opted for maximal-safe resection of the tightly adherent hematoma membrane, which led to favorable neurological outcome.

**Sources of Funding:** This work was supported by grants from the Henan Provincial People’s Hospital Outstanding Talents Founding Grant Project, the Heidi Demetriades Foundation and the ETH Foundation (HE-327) to AZ.

**References**

1. Iplikcioglu CA, Akkas O, Sungur R. (1991) Ossified chronic subdural hematoma: case report. The journal of trauma: injury, infection, and critical care, 31,272-275.
2. Juan WS, Tai SH, Hung YC, Lee EJ. (2012) Multiple tenting

techniques improve dead space obliteration in the surgical treatment for patients with giant calcified chronic subdural hematoma. *Acta neurochir*, 154,707–710.

3. Li J, Li H, Mao X, Tao X, Liu B, Wu Z. (2017) A tortuous process of surgical treatment for a large calcified chronic subdural hematoma. *World neurosurgery*, 108,996e1-e6.
4. Oda S, Shimoda M, Hoshikawa K, Shiramizu H, Matusmae M. (2010) Organized chronic subdural haematoma with a thick calcified inner membrane successfully treated by surgery: a case report. *Tokai journal exp clin med*, 35,85-88.
5. Siddiqui SA, Sawarkar D, Singh PK, Singh M, Sharma BS. (2016) Bilateral ossified chronic subdural hematoma presenting as diabetes insipidus- a case report and literature review. *World neurosurgery*, 98,520-524.
6. Zhang S, Wang X, Liu Y, Mao Q. (2018) Resection of a huge calcified chronic subdural haematoma: case report, *British journal of neurosurgery*,1-3.