



# Effects of Dexamethasone in the Treatment of Recurrent Chronic Subdural Hematoma

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■ **OBJECTIVE:** Recurrent chronic subdural hematoma (CSDH) is not rare. Some studies have demonstrated the role of dexamethasone in the medical management of chronic subdural hematoma. However, no systematic study in the treatment of recurrent CSDH has been published. The aim of our study is to evaluate the efficacy and safety of dexamethasone in patients with recurrent CSDH.

■ **METHODS:** We retrospectively reviewed medical records of consecutive patients from July 2010 to September 2014. A total of 27 patients with symptomatic recurrent CSDH were included in the analysis. Follow-up for each patient consisted of computed tomography or magnetic resonance imaging every 28 days from admission to the resolution of hematoma. Data were collected on hematoma volume, complications, and outcome.

■ **RESULTS:** Among the 27 patients, 3 patients with recurrent CSDH were only treated by burr hole surgery. Of the other 24 patients who primarily underwent dexamethasone treatment, 17 (70.8%) patients were treated successfully with medical treatment, whereas 7 patients required reoperation. Complications were noted in 3 (12.5%) patients (1 hyperglycemia, 1 urinary tract infection, and 1 pneumonia). There was 1 mortality (4.2%) for massive brain infarction. Twenty-one of the 24 patients (87.5%) recovered to their previous functional levels. There was no statistical significance in Fisher text between surgery and dexamethasone regarding success, complication, and functional recovery rate.

■ **CONCLUSIONS:** Patients with recurrent CSDH can be treated successfully and safely with the nonsurgical

medical treatment of dexamethasone. By use of this method, reoperation may be avoided.

## INTRODUCTION

Chronic subdural hematoma (CSDH) is one of the most common neurosurgical conditions. Perhaps the most important complication of CSDH is recurrence necessitating reoperation, which rates in the literature vary widely, from 5% to 30%.<sup>1,2</sup> However, reoperation is not only associated high mortality and morbidity<sup>3-5</sup> but also results in significant unhappiness to the patient and his or her relative.<sup>6</sup> Furthermore, CSDH increasingly occurs in older patients, who may have some severe diseases in their background, which adversely influences the operating prognosis of hematoma and carries a greater risk of perioperative complication.<sup>7</sup> Thus, alternative and more conservative therapies may be necessary for nonemergency recurrent patients. There is increasing evidence that dexamethasone could be used in the treatment of mild CSDH, either as monotherapy or as an adjunct to surgical treatment. Apart from few case reports,<sup>8</sup> however, there has not been any systematic study on dexamethasone treatment of recurrent CSDH. The aim of our study is to evaluate the efficacy and safety of dexamethasone in the medical treatment of recurrent CSDH.

## METHODS

### Patient Population

We identified patients by retrospective analysis of the medical records and neuroradiographic studies for consecutive patients seen at the Department of Neurosurgery of our hospital between July 2010 and September 2014. Two neurosurgeons evaluated all

### Key words

- Chronic subdural hemorrhage
- Dexamethasone
- Hematoma
- Recurrence

### Abbreviations and Acronyms

**CSDH:** Chronic subdural hematoma

**CT:** Computed tomography

**GCS:** Glasgow Coma Scale

**MRI:** Magnetic resonance imaging

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imaging studies and clinical symptoms of each patient. The data were extracted from medical records and follow-up computed tomography (CT) scans. All patients who had surgical treatment for CSDH were identified. After the established surgical protocol, i.e., the creation of a burr hole and drainage of the hematoma cavity, case notes of patients who had recurrent CSDH were reviewed. Recurrence was defined as the occurrence of symptoms for an ipsilateral CSDH confirmed by CT scan within 6 months of the previous surgical evacuation. Inclusion criteria for analysis included 1) age of 16 years or older; 2) the presence of CSDH from CT or magnetic resonance imaging (MRI); and 3) occurrence of symptoms for an ipsilateral CSDH within 6 months of the previous surgical evacuation. We excluded those patients 1) with allergy to dexamethasone or another glucocorticoid; 2) on long-term glucocorticoid; 3) on long-term steroid; and 4) pregnancy or on breastfeeding.

### Treatment Protocol

Admitted with a diagnosis of recurrent CSDH, patients with a Glasgow Coma Scale (GCS) score of  $<13$  or risk of immediate brain herniation were proposed for the surgical protocol, including burr hole craniostomy, twist drill craniostomy, and craniotomy. Other patients (GCS  $\geq 13$  and without risk of immediate brain herniation) were given dexamethasone (4 mg), either oral or intravenously, every 8 hours for 3 days. The patient with dexamethasone could eat and kept on bed rest. Tablets of omeprazole (20 mg per day) also were administered orally to the patients. The patient's neurologic status was checked every day and the effectiveness of dexamethasone therapy was re-evaluated after 48–72 hours. Those patients whose symptom did not improve were proposed for the surgical protocol. The rest were discharged and dexamethasone was tapered slowly (reducing 1 mg per day every 3 days) until complete withdrawal was achieved.

### Outcome Measures

During the initial clinic visit, clinical histories were taken, and neurologic examinations were conducted. Each patient was followed up every 28 days at least 6 months. Two neurosurgeons independently evaluated the patients. Each patient had a CT or MRI scan of the head at the baseline before treatment. A hematoma volume was calculated based on the Coniglobus formula. CT or MRI also was performed every 28 days after the treatment to calculate hematoma volume. If a patient had more than one hematoma, a total volume of multiple hematomas was calculated. The effect of dexamethasone was evaluated by changes in hematoma volume and symptom. During follow-up, patients who had recurrent symptoms and hematoma volume termed failed medical treatment and were taken to surgery.

## RESULTS

### Clinical Presentations

We included 27 recurrent patients with CSDH during the study period; 19 were men (70.4%) and 8 were women (30.0%), ranging from 46 to 92 years of age (average age, 68.3 years). Original surgery included 22 cases (81.4%) of burr hole craniostomy and 5 cases (18.5%) of twist drill craniostomy. Patients presented with headache (9 patients, 33.3%) and gait disturbance (12 patients,

44.4%) in most cases. Neurologic defects included confusion (7 patients, 26.0%), hemiparesis (7 patients, 25.9%), dementia (3 patients, 11.1%), and drowsiness (1 patients, 3.7%). (Table 1).

### Treatment Outcomes

Burr hole craniostomy was first performed for 3 patients (14%) (Cases 25, 26, and 27) in the initial stages of CSDH because of a GCS  $<13$ . The other 24 patients primarily underwent dexamethasone treatment. In the initial 3 days, 5 of the 24 patients receiving dexamethasone did not show any improvement in their symptoms on dexamethasone. Four of them were operated on by burr hole craniostomy and 1 underwent craniotomy; 19 of the 24 patients showed improvement in the initial 3 days on dexamethasone (Table 2). Nonetheless, symptoms recurred during follow-up in 2 patients, and repeat CT scans showed persistent hematoma with mass effect. These patients were termed as having not responded to medical treatment and were taken to reoperation by burr hole craniostomy. The remaining 17 (70.8%) patients were relieved completely of the symptoms, and the repeat scans during follow-up showed near total or total resolution of the SDH. Figure 1 shows the changes in the volumes of the hematomas in the 17 patients who did not undergo surgery. No second recurrence was found in all 27 patients within 6 months of follow-up.

Among the 24 patients with dexamethasone, 3 (12.5%) patients developed complications: 1 hyperglycemia (case 7), 1 pneumonia (case 10), and 1 urinary tract infection (case 19). At 6 months of follow-up, 1 patient had died of massive brain infarction after the hematoma disappeared (case 5) and no second recurrence was found; 5 patients became partially dependent, but 3 (case 10, 19, 22) of the patients had been partially dependent before onset of the hematoma; 18 patients remained independent and capable of normal daily activities. Therefore, 21 of the 24 patients (87.5%) recovered to their previous functional levels before onset of the hematoma (Table 3). Among the 3 patients with surgery, 1 patients had pneumonia and become partially dependent.

Success, complication, and functional recovery rate between the surgery and dexamethasone groups were compared by the Fisher test. Statistical significances were not found regarding the variables.

The patient in case 6 represented a common case from this study (Figure 2). The patient was an 81-year-old man who had bilateral CSDH, and the patient was a treat for burr hole surgery and discharged from the hospital 3 days later. However, 2 months after surgery, he complained of gait disturbance and hemiparesis. CT scanning showed a thin subdural hematoma on the right side of her head and a thick subdural hematoma on the left side. Dexamethasone was then given, after which the reoperation varied; initially, the density decreased, and then the hematoma diminished. The hematoma was completely resolved 3 months later.

Patient 19 was treated with craniotomy after not responding to medical treatment. This patient, 62 years old, first received a burr hole surgery for feeling gait disturbance and hemiparesis. However, his symptoms recurred 2 weeks after surgery. Then, dexamethasone was given but did not work. After extensive membranes were found on MRI an immediate craniostomy was conducted. Finally, he fully recovered.

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