



# Post Operative Treatment Chronic Subdural Hematoma with or without Dexamethasone : A Systematic Review

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## ABSTRACT

**Introduction:** Discovering If the post-operative patient is given dexamethasone or without dexamethasone, it can cause recurrence of Chronic Subdural Hematoma patients. This systematic review aims to summarize the research on the link between dexamethasone and recurrent chronic subdural hematoma.

**Method:** We present systematic reviews reported according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) and adhere to a structured review protocol. We searched PubMed, ScienceDirect, and British Medical Journal databases using the following search strategy from inception to March 2023.

**Result:** Four studies were included for further analysis. CSDH can be treated as medical, surgical, or both medical surgeries. Medical treatment for post-traumatic and post-operative prophylaxis of seizures and for preventing edema and ischemia. Surgery has been shown to be most effective in the treatment of cSDH. The evacuation of subdural collections forms the basis of the surgery in cSDH. After treatment, residual subdural fluid collections are standard. The most critical and dangerous complications of surgical treatment of acute post-operative bleeding.

**Conclusion:** Chronic subdural hematoma is an event of head bleeding that occurs for more than three weeks. It can be examined using CT (Computed Tomography). Often occurs in parents. The operation was carried out using the burr-hole method, and post-operative treatment can be given using dexamethasone. Recurrent bleeding may occur in patients with chronic subdural hematoma.

**Keywords:** Burr-hole craniostomy, Chronic subdural hematoma, Dexamethasone, Recurrence

## 1. Introduction

Head trauma, which has become one of the most important problems in our time, is a pathology that requires long-term treatment and care and can be fatal, can cause disabling, and ranks 4th among the causes of death. Traffic accidents, falls, beatings, work accidents, and injuries occurred during sports or at home create the leading causes of head trauma. The relative frequency of each cause varies according to different age groups and between regions. The collection of blood in the subdural space between the dura mater and an arachnoid membrane is called subdural hematoma (SDH). SDHs can be classified as acute, subacute, and chronic according to torn vessel size, shape hematoma development, and, more importantly, formed by the interest rate and severity of the signs and symptoms. [1] Acute Subdural Hematoma refers to bleeding in the subdural space after the early phase (first 72 hours) of the trauma. Subacute Subdural Hematoma refers to the subdural hemorrhage collected between 3 days-3 and weeks. However, these lesions generally behave clinically like an acute or chronic hematoma. Chronic Subdural Hematoma refers to bleeding detected after the third week. [2]

Chronic subdural hematoma (CSDH) represents one of the most common neurosurgical disorders, with an estimated incidence of approximately 58 per 100.000 per year among people older than 70 years. Its incidence has been progressively increasing along with life expectancy, mainly in high-income countries. [3] CSDH is a kind of intracerebral hemorrhage disease, which is insidious in onset and slow in progression. The expansion of hematoma leads to intracranial hypertension, resulting in clinical manifestations such as headache, dizziness, or

limb dysfunction. CT scans and MRIs can help make a definite diagnosis. The severity of the disease is often evaluated according to the size of the hematoma and the degree of midline shift. However, a hematoma develops slowly, and elderly patients with CSDH often have multiple intracranial volume compensation factors, such as brain atrophy. As a result, these patients with more severe imaging performance tend to have mild symptoms and signs (many patients, therefore, refuse to operate). [4]

Markwalder's team proposed the Markwalder's grading scale and Glasgow Coma Scale (MGS–GCS scale) based on the careful consideration of clinical symptom severity and consciousness state score of patients. MGS–GCS system is recommended to be used as the clinical evaluation standard for the severity of patients with CSDH (moderate-quality evidence, strong recommendation). [5]

**Table 1.** Definition of Markwalder's Grading Scale-Glasgow Coma Scale

Patient's grade	GCS	Markwalder's Grading Scale
<b>Grade 0</b>	15	Normal neurological status without symptoms
<b>Grade 1</b>	15	Without neurological deficits, but with symptoms such as headache or unsteady gait
<b>Grade 2</b>	13-14	Focal neurological deficits, such as drowsiness or disorientation, or variable neurological deficits such as hemiparesis
<b>Grade 3</b>	9-12	With stupor but appropriate responses to noxious stimuli and several focal neurological signs such as hemiplegia
<b>Grade 4</b>	< 9	Coma with absent motor responses to noxious stimuli and decerebrate or decorticate posturing.

Most CSDH often increases gradually. Patients' conditions continue to worsen with the increase in space-occupying effect; even brain hernia occurs and endangers life (hematoma in a few patients can be absorbed naturally after observation and symptomatic treatment). Surgical treatment is usually the first choice for patients with CSDH having a significant space-occupying effect. Often drilling or burr-hole drainage is chosen. Besides, small bone flap craniotomy or endoscope-assisted evacuation methods are also used. Most of the patients showed promising results from surgical treatment, but still, some patients had a post-operative recurrence. The recurrence rate was up to 33%. Even patients had to accept multiple surgical treatments or embolization of the middle meningeal artery because of repeated recurrence. [6]

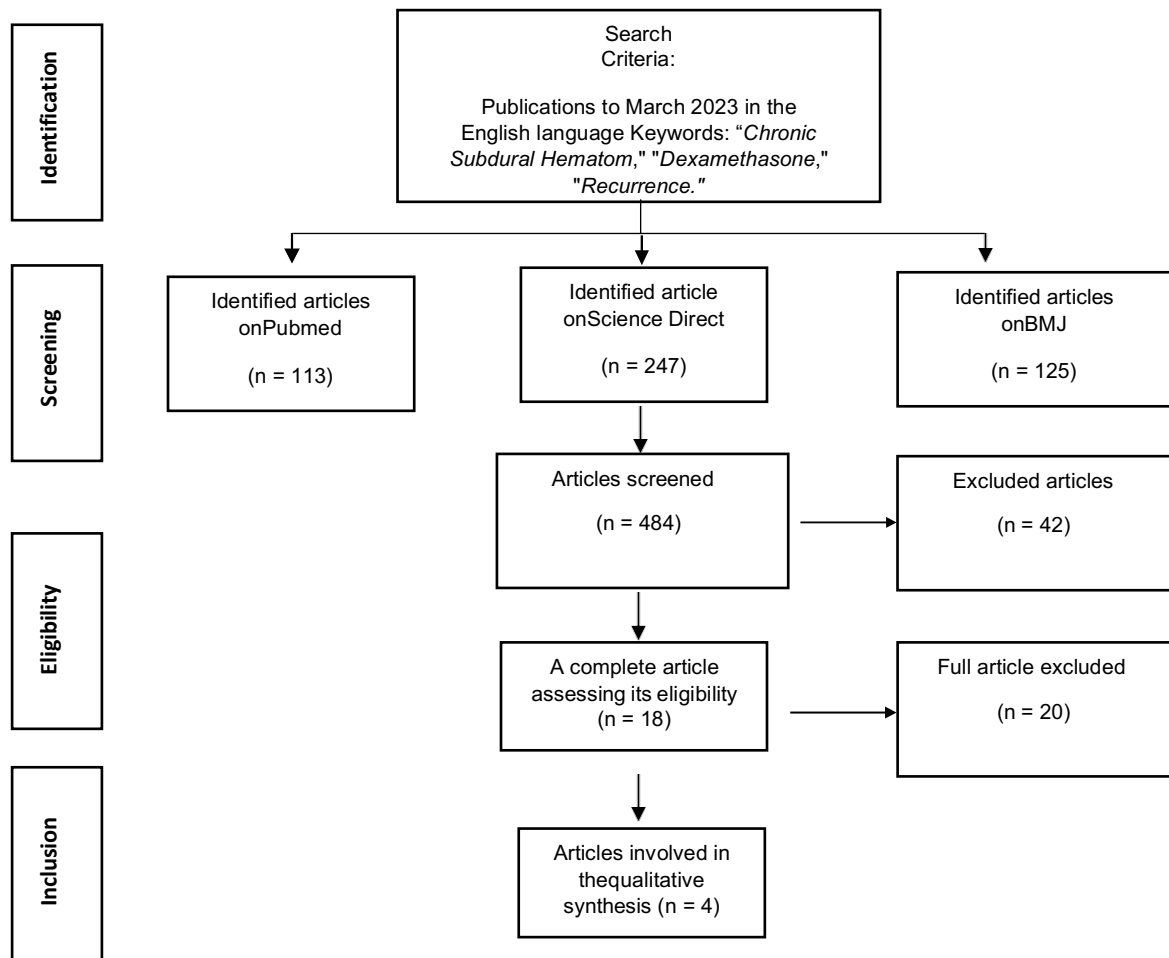
The aim of drug treatment is to improve the symptoms and signs of patients and promote hematoma absorption. Drug treatment can be divided into symptomatic treatment and treatment promoting hematoma absorption. The purpose of symptomatic treatment is to improve neurological symptoms and signs of patients and create conditions for surgery or other treatments. The treatment promoting hematoma absorption can not only provide a simple and less painful treatment for patients but also can be used to prevent a post-operative recurrence. It can provide a safe and effective treatment for elderly patients who are weak, are intolerable to surgery, or failed in surgery. [7]

The indications of drug treatment for promoting hematoma absorption are as follows: (1) vital signs stable, and MGS–GCS grade 0–2; (2) image showing that the midline shift is less than 1 cm, with no need for emergency surgical intervention; (3) patients having multiple-organ failure, coagulation dysfunction, and other unsuitable or refused surgeries; and (4) the recurrence being prevented after surgery. The contraindications are as follows: (1) MGS–GCS grade 3–4; (2) image showing that the brain is severely compressed and the mid-line shift is more than 1 cm; (3) signs of brain hernia, such as consciousness disorder, nausea, and vomiting; and (4) allergy to the used drug or contraindications of the used drug. The recommended drugs for CSDH treatment in this consensus are atorvastatin and dexamethasone. [8]

Steroids have long been used in the context of CSDH, and in 1974 it was summarised that steroids aid the resolution of CSDH. In 1976 Glover and Labadie used an experimental rat model of CSDH to show that dexamethasone could inhibit the formation of an expanding encapsulated hematoma from an implanted blood clot, which did form in 47% of the untreated rats. They suggested that dexamethasone inhibited the inflammatory response and hence the process driving membrane development. Dexamethasone could be successfully employed as a conservative treatment option, with 25/26 patients who received dexamethasone and no surgery experiencing complete CSDH resolution. Several other studies have supported these findings of successful conservative management but also shown reductions in recurrence in surgical patients treated additionally with dexamethasone. [9]

## 2. Method

The results of the present systematic review were reported according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) and adhered to a structured review protocol. The author (M.R.H) performed a search of PubMed, ScienceDirect, and British Medical Journal databases using the following search strategy: (“Chronic Subdural Hematom” OR “Subdural Hematom”) AND (“Dexamethasone” OR “Steroid”) AND (Recurrence). The author searched the articles from inception to March 2023. The author then independently excluded non-relevant articles based on a review of the full-text articles before comparing selected publications reporting on outcomes of patients with postoperative chronic subdural hematoma with dexamethasone treatment and without dexamethasone. published in the English language were included. Upon uncertainty of including a publication, we consulted an additional author. The flow of studies included is presented in Figure 1



**Fig. 1** The PRISMA flowchart in identifying the literature included

## 3. Results

Four hundred eighty-four articles were enrolled from the preliminary literature search: 113 papers from PubMed, 247 from ScienceDirect, and 125 from British Medical Journal. We excluded studies without data about the difference between good and poor responders from this initial screening. Finally, we identified 18 articles as relevant after reading the titles and abstracts, and after reading the complete text, four studies were selected for inclusion in our systematic review.

Chronic subdural hematoma is a common neurosurgical pathology, and it is more frequent in the elderly. CSDH can be described as a collection of blood and its degradation products encapsulated between the dura and arachnoid mater. CSDH can cause mass effects and increase intracranial pressure manifesting with lateralizing neurologic signs and deteriorating consciousness. [10]

CSDH can be treated as medical, surgical, or both medical surgeries. Medical treatment post-traumatic and post-operative prophylaxis of seizures and for preventing edema and ischemia. Anticonvulsant agents can be cut off after a few weeks if post-operative seizures do not appear at all. Surgery has been shown to be most effective in the treatment cSDH. The evacuation of subdural collections forms the basis of the surgery in cSDH. After treatment, residual subdural fluid collections are common. The most critical and dangerous complications of surgical treatment of acute post-operative bleeding. Infectious complications such as subdural empyema, brain abscess, and meningitis can occur. These are rare and are between 1.5 to 4.2%.<sup>11</sup> Several high-quality studies have suggested post-operative chronic subdural hematoma treatment with dexamethasone and without dexamethasone, as shown in Table 2.

**Table 2.** Summary of studies included postoperative chronic subdural hematoma

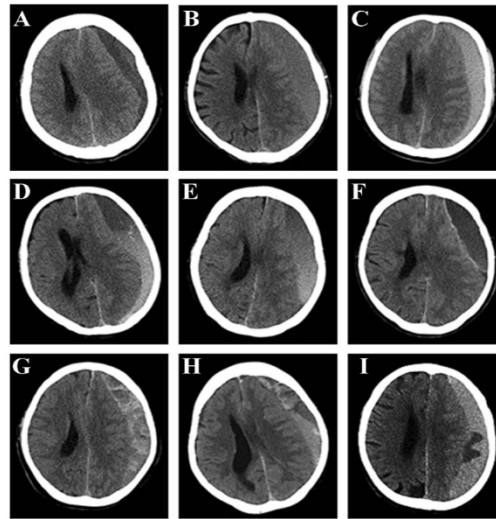
Research	Burr-hole craniostomy & Dexamethasone (A)	Burr-hole craniostomy (B)	Result recurrency
Fountas K et al	20	92	A:1 B:10
Y. Navruz et al	21	21	A:3 B: 11
Hutchinson P.J et al	286	306	A:6 B:25
Fabio C et al	195	401	A:11 B:45

#### 4. Discussion

This study suggests that in patients with CSDHs, the recurrence rate was lower when treated with BHC + DX and with poorer outcomes in conservative treatment with DX monotherapy. (Table 2); Between BHC with DX and no DX, the combination technique should be considered a first choice (recurrence was 4%); Furthermore, the recurrence rate associates well with the shift of middle line and hematoma volume in pre-operative CT scan and with post-operative GCS. Values > 8.0 mm, > 170.3 cc, and < 12, respectively, have the best performance to identify recurrence, and beyond these cutoffs, the recurrence seems to be more frequent. Among the other three therapy options that were performed in this study, the BHC plus DX treatment offers the best outcome. [12]

This was a retrospective study of 171 patients with chronic subdural hematoma between January 2012 and December 2016 and was derived into three groups: Group A: burr-hole craniostomy (BHC) with DX as an adjunct to surgery; Group B: BHC surgery without DX. Patients with CSDHs have better outcomes when treated with BHC plus DX, as the majority of them in the present study were effectively treated with a low incidence of recurrence; between BHC with DX as an adjunct to surgery and without the use of DX, the combination of steroids and surgery technique should be considered a first choice. Values>8.0mm for the shift of the middle line in the pre-operative CT scan, > 170.3 cc for the pre-operative hematoma volume, and post-operative GCS < 12. [13]

In other studies, 42 patients were treated and evaluated who were diagnosed with a chronic subdural hematoma and admitted to the Neurosurgery Clinic of Okmeydani Training and Research Hospital between January 2004 and March 2010. The diagnosis of all patients was confirmed by computed tomography. 21 randomly selected patients with chronic subdural hematoma were started on dexamethasone, and the other 21 patients were not given dexamethasone. The number of patients seen collections in the control tomography was more in the group dexamethasone not used, and some patients required re-surgery in this group. However, the number of patients seen collections in the control tomography was so less in the group dexamethasone used, and no patient required re-surgery. The amount of fluid drained from the cavity was statistically significantly less in the dexamethasone use group compared to the dexamethasone not used group. [11]



**Fig 2.** The classification of CSDH according to the hematoma density on CT performance. This classification is based on previous research.<sup>10</sup> (A) Homogenous hypodense. (B) Homogenous isodense. (C) Homogenous hyperdense. (D) Separated type, the two components of the hematoma are clearly separated. (E) Gradation type, the density of the hematoma gradually changes from hyperdense to hypodense. (F) Laminar type, a linear hyperdense located in the inner membrane of the hematoma. (G) Trabecular type, the hematoma was separated by several high-density septa. (H and I) Mixed density, two or more types of CT density appear on one layer or on the different layer in one patient. [14]

A total of 596 were analyzed by Cofano F et al., A total of 401 patients did not undergo any corticosteroid treatment (55.8%) 195 patients underwent pre-operative or post-operative corticosteroid treatment (14.9%). Considering corticosteroid therapy, lower recurrence rates following Dexamethasone therapy were recorded ( $p = 0.013$ ). Specifically, patients that did not receive dexamethasone at all, patients receiving therapy only before the procedure, patients that received dexamethasone only after surgery, and patients. Post-operative corticosteroid therapy was proven to be associated with a reduced relapse rate. Post-operative, corticosteroid administration was not directly associated with a decreased fatality rate. [15]

P.j Hutchinson et al. analyzed a randomized trial in the United Kingdom that enrolled adult patients with symptomatic chronic subdural hematoma. Patients were assigned in a 1:1 ratio to receive a 2-week tapering course of oral dexamethasone, starting 8 mg twice daily, or placebo. There are 286 patients with BHC + dexamethasone and 306 with only BHC. The result is that patients with only BHC had more recurrence than those with BHC + dexamethasone. [16]

This study is presented based on the latest literature, and several comparisons in several areas can be developed for the health sector, especially in the neurosurgery department. This study focuses on the postoperative treatment of chronic subdural hematoma with or without dexamethasone. However, only four literatures can be compared. For further research, literature that specifically discusses post-operative treatment of chronic subdural hematoma can be enlarged.

## 5. Conclusion

Chronic subdural hematoma is a brain hemorrhage that lasts more than three weeks. Recurrent bleeding may occur in patients with chronic subdural hematoma. The surgery was carried out using BHC, and the treatment used dexamethasone. Several research techniques were carried out using dexamethasone and placebo after surgery. It was found that treatment with dexamethasone after surgery reduced the incidence of recurrent bleeding by an average of 4 compared to without using dexamethasone. Paying attention to post-operative patients is necessary so that the results are promising.

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## Conflict of Interest

The no conflicts of interest.

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