Chronic subdural hematoma: tailoring treatment

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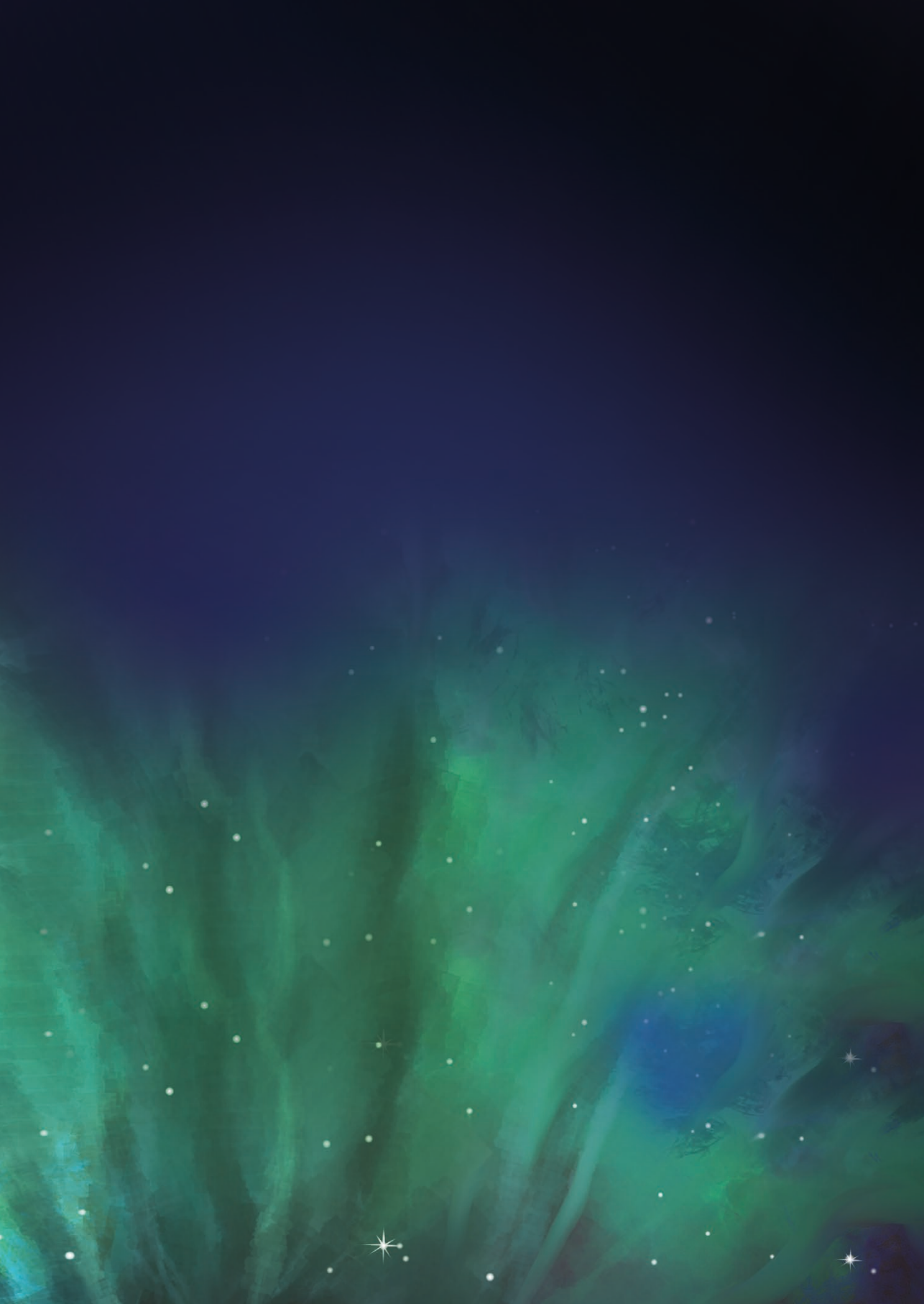

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Dexamethasone Therapy in Symptomatic Chronic Subdural Hematoma (DECSA–R): A Retrospective Evaluation of Initial Corticosteroid Therapy versus Primary Surgery

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Abstract

Worldwide, different strategies are being applied for symptomatic chronic subdural hematoma (CSDH). The aim of this study was to evaluate the efficacy of two treatment strategies for symptomatic CSDH: initial dexamethasone (DXM) therapy versus primary surgery by burr hole craniostomy (BHC). We retrospectively collected data for 120 symptomatic CSDH patients in two neurotrauma centers between 2014 and 2016, each with their own treatment protocol. Sixty patients received primary BHC (center A), and another 60 initial DXM therapy (center B). Primary outcome was evaluated by dichotomized modified Rankin Scale (mRS) score (0–3 and 4–6) and Markwalder Grading Scale (MGS) score at three months. Secondary outcomes were additional interventions, CSDH recurrence, mortality, complications, and duration of hospital stay. Baseline characteristics were similar in both groups. At three months, a favorable mRS score (0–3) was observed in 70% and 76% of patients in cohort A and B, respectively (odds ratio [OR] 0.77, 95% CI 0.30–1.98; p=0.59). A favorable MGS score (0–1) was observed in 96% of patients in both groups (OR 0.98, 95% CI 0.45–2.15; p=0.95). CSDH recurrence was 12% in cohort A and 22% in cohort B (p=0.15). Mortality was 10% in both cohorts. In cohort B, additional surgery was performed in 83% at a median of six days, and significantly more patients had complications (55% vs. 35%, p = 0.02), a prolonged hospitalization (10 vs. 5 days; p = 0.02), and one or more follow-up cranial CT's (85% vs. 48%; p<0.001). To achieve a favorable clinical outcome, initial DXM therapy was associated with a high rate of crossover to surgery, significantly longer overall hospital stay, and more complications compared to primary surgery.

Introduction

Chronic subdural hematoma (CSDH) is a common neurological disease in the elderly population with a rapidly rising incidence due to increasing age and use of anticoagulant therapy [1,2]. Worldwide different treatment strategies are applied for symptomatic patients, which consists of primary surgery or corticosteroid therapy as monotherapy or adjuvant therapy prior to or after surgery [3]. The administration of different treatment modalities depends on expert opinion of the treating physician and scarce data from previous studies. To date, there is a lack of consensus regarding the optimal treatment strategy for symptomatic CSDH.

Surgery with subdural drainage is the mainstay treatment [4]. Due to relevant surgical complications, a recurrence risk up to 30% and increased mortality in this vulnerable patient population, corticosteroid therapy is being administered as an alternative or adjuvant treatment modality [3-7]. It has been postulated that corticosteroids have the capacity to block the anti-inflammatory changes in the formation of the hematoma and in particular impede the formation of neo-membranes and neo-capillaries by their powerful inhibition of inflammatory mediators [8-11].

Previous studies revealed possible beneficial effects of dexamethasone (DXM) therapy applied as monotherapy or adjuvant therapy, achieving an equal or slightly superior effect on clinical outcome compared to primary surgery alone [12-18]. Further, the administration and longer duration of DXM therapy as monotherapy or prior to surgery might also lower recurrence risk and mortality [16-19]. These results however must be interpreted with caution due to selection bias of patients and evident heterogeneity in the evaluated cohorts.

The aim of this study is to assess the effect of primary surgery by burr hole craniostomy (BHC) versus initial DXM therapy on clinical outcome in two equal retrospective cohorts of symptomatic CSDH patients. Furthermore, the effect of both treatment strategies on CSDH recurrence, complications, and duration of hospital stay is evaluated.

Methods

Overall study design

This retrospective study evaluates the effect of initial DXM therapy versus primary surgery by BHC in symptomatic CSDH patients. This comparison was made by collecting data of 120 consecutive patients in two large Dutch neurotrauma centers during the timeframe of inclusion, January 2014 to December 2016. Participating centers were Haaglanden Medical Center, The Hague (HMC, center A) and Elisabeth—TweeSteden Hospital, Tilburg (ETZ, center B), each applying a different treatment regimen for symptomatic CSDH patients. Primary surgery was performed in center A and initial DXM therapy was administered in center B.

Patient population

Patients were eligible for inclusion if they: 1) were at least 18 years of age; 2) presented with symptomatic CSDH, defined as an iso-dense or hypodense hematoma in the subdural space on cranial CT-scan (hyperdense components may be present but must com- promise less than 1/3 of the hematoma); 3) had a correlation of clinical symptoms to CSDH; and 4) had a symptom severity score 1 or 2 on the Markwalder Grading Scale (MGS) [20]. Exclusion criteria were: 1) acute subdural hematoma; 2) asymptomatic CSDH (MGS 0); and 3) severe symptoms due to CSDH with MGS score of 3 or 4 prompting emergency surgery. Asymptomatic patients (MGS 0) were excluded because this patient group received an approach with observation only in both hospitals.

Study treatment

The surgical procedure was identical in both hospitals and consisted of a burr hole craniostomy (BHC), with either general (center B) or local anesthetics (center A). One or two burr holes were drilled over the maximum width of the hematoma, depending on the hematoma configuration. After the subdural collection was washed out with Ringer's lactate saline at body temperature, a subdural drain was inserted for two days. In both hospitals, the moment of surgery depended on the clinical condition of the patient, use of anticoagulant agents or anti-platelet therapy and surgical capacity.

DXM treatment was administered orally in tablets or intravenously when oral administration was not possible due to the clinical condition of the patient. DXM starting dose consisted of 3 or 4 mg twice daily with or without an initial

(higher) bolus intravenously. Whether a bolus was applied and the duration of DXM therapy depended on the opinion of the treating physician and the clinical condition of the patient. Additional surgery by BHC took place when there was insufficient response to DXM treatment (i.e., persistence or deterioration of symptoms), but also based on the discretion of the treating physician to obtain optimal clinical outcome.

Study outcomes

The primary outcome of the study was clinical outcome ex- pressed by a dichotomized modified Rankin Scale (mRS) score (mRS 0–3 vs. 4–6) and MGS score at three months [21]. Secondary outcomes, if applicable, were mRS and MGS scores at discharge, if applicable MGS score prior to surgery and six months follow-up, CSDH recurrence, and additional treatment, including a repeated DXM scheme, number of additional surgeries performed after initial DXM treatment (crossover to surgery), and re-operation after a previous (first) surgery. An additional intervention was performed if there was an insufficient response of the initial treatment strategy, defined as persistence or progression of clinical symptoms. Further, we evaluated mortality, complications, and duration of hospital stay. CSDH recurrence was defined as recurrence of symptoms and neurological signs after initial improvement with recurrence or increase of CSDH on follow up CT. All data were processed in a clinical trial management system (Castor EDC, Amsterdam, The Netherlands).

Data collection

We collected all patient data from electronic medical records. Baseline patient characteristics included age, sex, history of trauma, use of anti-coagulant and/or anti-platelet therapy, clinical condition prior to symptom onset (living situation/ housing, mobility, mRS), and radiologic CSDH parameters (CSDH laterality, thickness, midline-shift, acute components). A dichotomized mRS and MGS score were formed by evaluation of patient records by the treating physician, rehabilitation specialist, nurses, and physical and ergo therapist at discharge, if applicable, prior to surgery and at three and six months, with a deviation of 6–16 and 20–30 weeks, respectively. The study protocol was reviewed by the local Medical Ethics Committee (METC Zuid West Holland, No. 17-022), and informed consent was waived.

Statistical analysis

The following assumptions were made for sample size calculation: An estimated good functional outcome (mRS 0–3) achieved in 80% of the primary surgery study group and 55% after initial DXM therapy was considered as an equal good outcome. With a two- sided alpha of 0.05 and beta error of 20% (power of 80%), a calculated sample size of 54 patients in each group was necessary to test the null hypothesis of equal probability of a good functional outcome. We enrolled consecutive series of the first 60 patients in HMC to cohort A and 60 patients in ETZ to cohort B in line with the centers local policy as first-line treatment. For the baseline characteristics quantitative data was analyzed with Mann-Whitney U tests and categorical data with Fisher's exact test or chi-squared tests. We performed regression analysis for the primary and secondary outcome parameters, adjusting for age, sex, and baseline symptom severity expressed by MGS score. SPSS 25.0 (IBM Corporation, NY) was used for statistical analysis.

Results

Patients were screened from January 2014 to December 2016 until the 60th, consecutive inclusion was reached in both centers. Of the 308 patients who had a CSDH, 188 did not meet the inclusion criteria because of the severity of symptoms (MGS 0, 3 or 4), presence of a subdural hygroma or concurrent presence of other intracranial lesions such as traumatic intra-parenchymal, or subarachnoid hemorrhage. Sixty consecutive patients in each hospital were included in cohort A or B.

Baseline characteristics were similar in both groups (table 1). In cohort A 60 patients received primary surgery (without DXM as an adjunct to surgery) and 60 patients in cohort B initiated DXM therapy. In both cohorts, anti-coagulant or anti-platelet therapy was ceased immediately after CSDH diagnosis. Resumption of anti-coagulant or antiplatelet therapy took place in all patients in cohort A, compared with 76% in cohort B (p=0.004). The time-interval until resumption also was significantly shorter in cohort A, with 7 days (range 7–34) compared to 22 days (3–100 range) in cohort B ($p < 0.001$). The median follow-up periods for the three- and six months evaluations were 66 (interquartile range [IQR] 54–85) and 194 days (IQR 166–253), respectively.

Table 1. Baseline characteristics

	Cohort A: Surgery (n=60)	Cohort B: DXM (n=60)
Age, y (mean, range)	73 (34-95)	72 (34-92)
Sex, F (%)	11 (18%)	15 (22%)
Evident history of head trauma, n (%)	45 (75%)	47 (78%)
Duration trauma until presentation, d (median, min-max)	1 (0-51)	6 (0-79)
Anti-coagulant or anti-platelet therapy, n (%)	31 (52%)	25 (42%)
Ceased at diagnosis, n (%)	31/31 (100%)	25/25 (100%)
Resumption of therapy, n (%)	31/31 (100%)	19/25 (76%)*
Duration until resumption, d (median; min-max)	7 (3-34)	22 (3-100)**
Comorbidities		
Cardiac history	34 (57%)	32 (53%)
Stroke (ischemic, hemorrhagic)	17 (28%)	13 (22%)
Diabetes mellitus	13 (22%)	9 (15%)
Neurodegenerative	6 (10%)	5 (8%)
Malignancies	11 (18%)	13 (22%)
Clinical condition prior to CSDH:		
mRS 0-3, n (%)	48/58 (83%)	48/60 (80%)
mRS 4-6, n (%)	10/58 (17%)	12/60 (20%)
Living situation:		
Independent, n (%)	56/60 (93%)	54/60 (90%)
Nursing home, n (%)	4/60 (7%)	6/60 (10%)
Mobilization:		
Independent	59/60 (98%)	57/60 (95%)
With aid of person or wheel chair, n (%)	1/60 (2%)	3/60 (5%)
Clinical condition at admission:		
MGS: 1, n (%)	17/60 (28%)	17/60 (28%)
MGS 2, n (%)	43/60 (72%)	43/60 (72 %)
mRS: 0-3, n (%)	17/60 (28%)	22/60 (37%)
mRS 4-6, n (%)	43/60 (72%)	38/60 (63%)
Radiological findings		
CSDH Right, n (%)	25 (42%)	26 (43%)
CSDH Left, n (%)	14 (23%)	17 (28%)
Bilateral CSDH, n (%)	21 (35%)	17 (28%)
Thickness, mm (median, min-max)	24 (8 – 38)	25 (10 – 40)
Midline shift, n (%)	55 (92%)	57 (95%)
Midline shift, mm (median, min-max)	9 (0 – 19)	8 (0 – 17)
Acute on chronic, n (%)	18 (30%)	20 (33%)

* Significant difference with $p < 0.05$; ** Significant difference with $p < 0.001$.

Primary outcome

Results on primary outcome are described in table 2, figure 1, and figure 2. In cohort A, a favorable mRS score (0–3) was reported in 70% of patients at 3 months compared with 76% in cohort B.
A good MGS score (0–1) was observed in 96% at 3 months in both cohorts. From logistic regression analysis for a good outcome of mRS 0–3, age appeared to be an (independent) significant predictor (OR 0.95, 95% CI 0.90–0.99, p = 0.03) as was male sex for a worse MGS score (OR 0.27, 95% CI 0.10–0.74, p = 0.01). Difference in treatment strategy between the cohorts did not significantly predispose for a good functional outcome at 3 months for the mRS (OR 0.77, 95% CI 0.30–1.98, p=0.59), nor MGS score (OR 0.98, 95% CI 0.45–2.15, p=0.95).

Secondary outcomes

Results on secondary outcomes are described in figures 1 and 2 and tables 3 and 4. Logistic regression analyses showed age (OR 0.93, 95% CI 0.89–0.97, p = 0.001) and baseline MGS score (OR 2.66, 95% CI 1.0–7.05, p = 0.05) to be (independent) predictors for mRS score 0–3 at discharge, as were male sex (OR 0.37, 95% CI 0.14–0.98, p = 0.05) and age (OR 1.04, 95% CI 1.01–1.07, p = 0.01) for a rise in MGS score at discharge. No significant differences were found in clinical outcome at discharge (mRS OR 0.89, 95% CI 0.40– 1.98, p=0.77; MGS OR 0.82, 95% CI 0.40–1.72, p=0.60) and follow-up 6 months (mRS OR 1.42, 95% CI 0.34–5.91, p=0.63; MGS OR 1.24, 95% CI 0.29–5.37, p = 0.77) between both groups.

For the remaining secondary outcome, logistic regression revealed only age to be a (independent) predictor for mortality (OR 1.10, 95% CI 1.02–1.19, p = 0.2). At six months, CSDH recurrence occurred in 22% (13/60) in cohort A compared with 12% (7/60) in cohort B (OR 2.11, 95% CI 0.77–5.79, p=0.15), leading to a

Table 2. Primary outcome

Clinical condition	Cohort A: Surgery (n=60)	Cohort B: DXM (n=60)
At follow – up 3 months		
mRS: 0-3, n (%)	37/53 (70%)	38/50 (76%)
mRS: 4-6, n (%)	16/53 (30%)	12/50 (24%)
MGS 0, n (%)	29/53 (54%)*	29/54 (54%)
MGS 1, n (%)	22/53 (42%)	23/54 (42%)
MGS 2, n (%)	2/53 (4%)	2/54 (4%)
MGS 3-4, n (%)	0	0

*Because of rounding, percentages may not add to 100%.

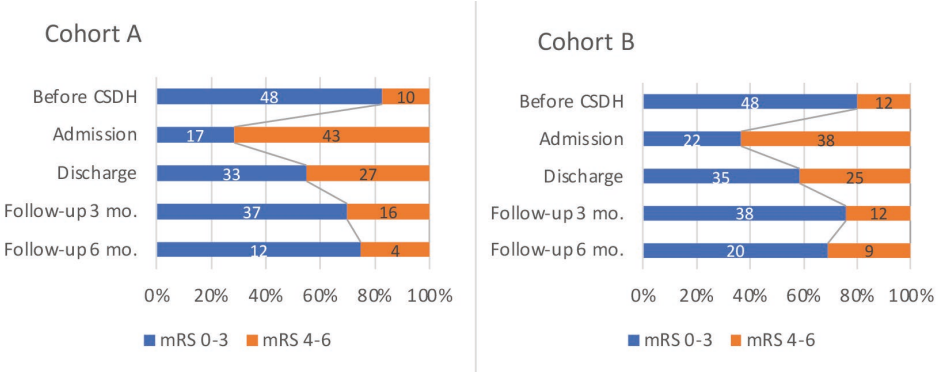

Figure 1. Modified Rankin Scale (mRS) score after primary surgery and initial DXM therapy. A. Cohort A (primary surgery); B. Cohort B (initial DXM). Green = mRS 0–3; Orange = mRS 4–6. Value in bars represents the absolute number of available patients with the relevant mRS score. Percentages indicate the proportion of patients with the relevant mRS value.

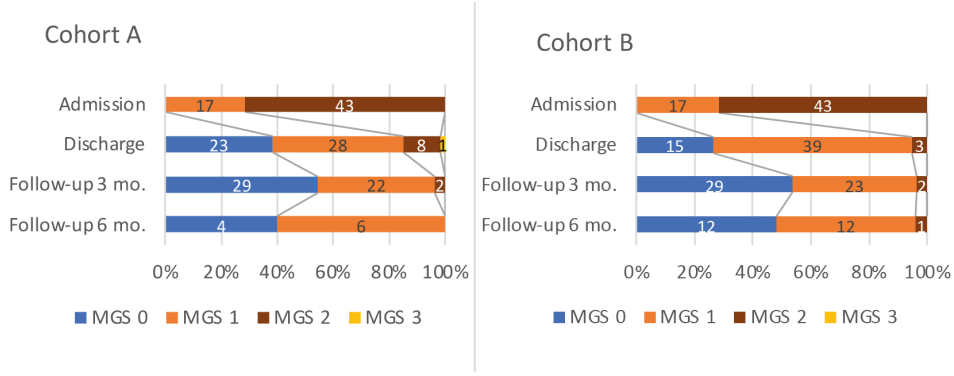

Figure 2. Markwalder Grading Score (MGS) cohort A (primary surgery) and B (initial DXM). Green = MGS 0; Light green = MGS 1; Red = MGS 2; yellow = MGS 3 (there were no patients with MGS 4). Value in bars represents the absolute number of available patients with the relevant MGS – score. Percentages indicate the proportion of patients with the relevant MGS value.

surgical re-intervention (re-operation) in nine of 13 patients in cohort A, and (additional surgery) in seven of seven patients in cohort B. Four patients with CSDH recurrence in cohort A received observation only due to the preference of the patient or treating physician. Total re-operation rate in cohort A was 11 because of one post-operative empyema and one acute hemorrhage in the BHC-trajectory necessitating a re-intervention. Of the 60 patients receiving primary BHC in cohort A, 88% (53/60) had an unchanged MGS score prior to surgery compared to baseline, 10% (6/60) had a 1-point worsening in MGS score (two

from MGS 1 to 2, four from MGS 2 to 3) and 2% (1/60) had a 1-point improvement (from MGS 1 to 0). This latter patient only reported headache at admission, which was absent prior to surgery on the next day. In cohort B ultimately 83% of patients (50/60) required a crossover to surgery after a median time period of six (IQR: 3–10) days of DXM therapy. Of these 50 patients, 80% (40/50) had an unchanged MGS score prior to surgery compared to baseline, 10% (5/50) had a 1-point worsening in MGS score (three from MGS 2 to 3, two from MGS 1 to 2 and 10% (5/50) had a 1-point improvement in MGS score (all from MGS 2 to 1). Two patients refused surgery and 48 underwent an additional operation.

Three patients had a re-operation (second surgery) in cohort B due to insufficient clinical improvement and hematoma persistence on follow-up CT. Surgery was prevented in 17% (10/60). Of these 10 patients, eight had an improvement in MGS score at discharge (five from MGS 2 to 1, two from MGS 1 to 0, one from MGS 2 to 0) and two had an unchanged MGS score compared to baseline (MGS 1). Overall, fewer patients in cohort A suffered from one or more complications

Table 3. Secondary outcomes.

	Cohort A: surgery (n=60)	**Cohort B: DXM (n=60)**	**OR (95% CI)**	**p**
Mortality, n (%)	6/60 (10%)	6/60 (10%)	1.04 (0.29-3.76)	0.96
CSDH recurrence, n (%)	13/60 (22%)	7/60 (12%)	2.11 (0.77-5.79)	0.15
Additional treatment, n (%) Repeated DXM scheme, n (%) Additional surgery after DXM, n (%) Re-operation after first surgery, n (%)	 n.a. n.a. 11/60 (18%)	 4/60 (7%) 50/60 (83%) 3/48 (6%)	 n.a. n.a. 3.55 (0.92-13.74)	 n.a. n.a. 0.06
Interval diagnosis-surgery, d (median, IQR)	1 (1-4)	6 (3-10)	OR 0.001 (<0.00-0.05)	<0.01
Duration DXM scheme, d (median, min-max)	n.a.	12 (1-155)	n.a.	n.a.
Length of hospitalization, d (median, min-max)	5 (2-35)	10 (1-47)	0.04 (0.00-0.66)	0.02
Number of patients with ³1 follow – up CT, n (%)	29/60 (48%)	51/60 (85%)	6.16 (2.53-14.95)	<0.01

(35% vs. 55%; OR 0.42, 95% CI 0.20–0.89, p=0.02). Hyperglycemia occurred in two patients with pre-existing diabetes mellitus (DM) in cohort A, versus 11 patients in cohort B of whom nine had known DM (3% vs. 18%, p=0.02). More urinary tract infections (1 vs. 7) were observed in the DXM group although the latter being not statistically significant. Mortality at 6 months was 10% in both groups (OR 1.04, 95% CI 0.29–3.76, p=0.96). More days of hospitalization were observed in the initial DXM group with a median of ten days per patient (range 1–47) versus five days (range 2–35) in the primary surgery group (OR 0.04, 95% CI 0.00–0.66, p=0.02). Radiologic monitoring by means of one or more follow-up CT-scan took place in significantly more patients (85%; 51/60) after initial DXM therapy compared with 48% (29/ 60) primary surgical (OR 6.16, 95% CI 2.53–14.95, p < 0.001).

Discussion

The present study demonstrates no difference in clinical outcome in symptomatic CSDH patients after initial DXM therapy compared with primary surgery. Although additional surgery was required in the vast majority of patients, an operation could be prevented in 17% receiving initial DXM therapy. Starting with a conservative approach however, seems to prolong the duration of hospitalization, leads to more intensive radiologic monitoring, and is associated with a higher complication rate in the present cohorts. CSDH

Table 4. Complications

	Cohort A: Surgery (n=60)	Cohort B: DXM (n=60)	p
Complications, n (number of patients)	21 (35%)	33 (55%)	0.02
Wound infection, n	0	2	0.50
Hemorrhage surgical area, n	0	2	0.50
Subdural empyema, n	3	0	0.24
Thromboembolic events	2	2	1.000
Epileptic seizure, n	7	5	0.76
Delirium	7	12	0.32
Urinary tract infection, n	1	7	0.06
Remaining infections, n	8	4	0.36
Cardiac complications, n	3	1	0.62
Fall, n	4	6	0.74
Hallucinations, behavioral changes, n	0	4	0.12
Hypoglycemia, n	1	0	1.000
Hyperglycemia, n	2	11	0.02
Remaining complications, n	0	1	1.000

recurrence occurred slightly more often in the primary surgical group (22% vs. 12%), although this was not statistically significant.

Consistent with previous research, our study revealed similar functional outcome in both treatment groups [12,13]. To our knowledge five observational studies have been performed to evaluate the effect of DXM therapy versus surgery in CSDH [12,13,18,22,23]. Only one retrospective and one prospective study evaluated the effect on functional outcome [12,13]. A good outcome, expressed by MGS 0-2 or Glasgow Outcome Scale (GOS) score 4-5, has been reported in 84-96% after initial DXM treatment compared to 77-93% after primary surgery [12-13]. Based on these results, authors recommended the use of DXM therapy as a conservative alternative treatment in selected patients. However, patients who received DXM in these studies were less severely affected (mainly MGS 1-2) compared to the surgical group (MGS 3-4), refused an operation or had a contraindication for surgery. These factors introduce a high load of selection bias and patient heterogeneity, and preclude a fair comparison between these treatments. The strength of our study is the highly comparable baseline profile making a comparison between groups fair.

We observed a very high cross-over rate in the initial DXM arm, with the prevention of surgery in 17% of patients. Higher success rates were revealed in two previous studies that showed 42 – 68% of patients to achieve complete recovery or MGS score 0-1 after DXM monotherapy [13-14]. Apart from the selection bias in given treatment strategy and unknown baseline symptom severity (MGS score) in one study, this discrepancy might also be explained by the higher dosing and possible longer duration of DXM therapy. In both previous studies DXM was administered in a daily dose of 12 mg/day during the first three days (in one study combined with prednisolone 30 mg/day), after which the dose was tapered down and treatment was stopped after two to four weeks. In our study DXM was dosed 6-8 mg/day with a median duration of 12 days. Taking into account the postulated pathophysiology in CSDH with inflammatory mediators, a more intensive corticosteroid treatment regimen could be more effective in reducing the subdural collection.

The high cross-over rate to surgery might also be due to a lower threshold to surgery maintained by treating physicians, without further awaiting the effect of DXM in the more severe cases. This led to additional surgery based on expert-opinion of the consulted neurosurgeon, who considered additional surgery to be the best treatment strategy to achieve good recovery taking into account the

current clinical condition as well as patient comorbidities and radiologic CSDH appearance. These observations underline the current lack of clear treatment strategies which causes inter-physician variation in treatment, and emphasize the need for an unambiguous treatment strategy for this vulnerable patient population.

Despite similarities in good clinical outcome, treatment burden seems to be higher in the initial DXM group. We found a significant longer duration of hospitalization when an initial conservative approach with DXM was applied (ten days) compared to primary surgery (five days). This finding is in contrast with previous studies that showed similar lengths of hospital stay, which ranged from 3.5-7 days after initial DXM treatment compared to 4-8 days after primary surgery [12-13]. This discrepancy could be attributed to the abovementioned heterogeneity in patient population reported in previous studies and the higher rate of surgery in this study after an initial DXM therapy. In accordance with the hospital treatment policy in cohort B, medically stable patients on DXM therapy were discharged home or to a rehabilitation facility if possible, awaiting the effect of DXM. However, regional differences in waiting time until a vacancy in these centers might have prolonged hospitalization in some patients. Finally, the higher occurrence of complications observed in patients with initial DXM therapy (35% versus 55%) compared to primary surgery, also influenced the duration of hospital stay. Data is scarce regarding DXM related complications in this patient group and varying results have been published previously [12,13,17,19]. Consistent with others hyperglycemia, which mainly was observed in patients with pre-existing DM, and (urinary tract) infections occurred most often after DXM treatment. The relatively high complication rate found in both groups in our study might also be due to our well-defined definitions of a complication, and the extensive and complete electronic documentation of patient records. Furthermore, the general anesthesia applied in cohort B might also influence the higher complication rate in this group [24]. All together, these findings highlight the fragility of this elderly population, also being illustrated by a mortality rate of 10%.

Interestingly, CSDH recurrence seemed lower after initial DXM therapy (12% versus 22%) as well as the operative recurrence rate (6% versus 18%), both not reaching statistical significance. Beneficial effect of DXM pre-operatively on CSDH recurrence risk has been postulated in previous retrospective studies without confirmation in randomized trials [13,16-19]. In our study however,

the earlier and higher resumption of anti-platelet and -coagulant therapy in the surgical group might impact the higher recurrence rate.

Based on our results higher health care costs are to be expected when treatment is initiated with DXM therapy and prospective, randomized data is desirable to obtain reliable insight into the health care costs. For this aim, the prospective randomized DECSA – trial has been initiated in 2016 to evaluate the effect of initial DXM therapy versus surgery on functional outcome as well as cost-effectiveness [25]. In this nationwide RCT symptomatic CSDH patients (MGS 1-3) will be randomized for corticosteroid therapy during 19 days (16 mg daily during four days, after which dose is tapered by half) or surgery by BHC with subdural drainage.

A limitation of this study is the retrospective design, which necessitated a dichotomized mRS score, allowing smaller differences in clinical outcome to be missed. Also, the absence of a fixed DXM dosing regimen and the inter-physician variation in the decision for a cross-over to surgery might have influenced the cross-over to surgery.

Conclusion

In this retrospective study we found no difference in good functional outcome after initial DXM therapy compared with primary surgery for symptomatic CSDH. Although surgery was pre- vented in 17% after initial DXM treatment, this strategy is still associated with a high rate of crossover to surgery, a significantly longer overall hospital stay and more complications. These results warrant a prospective, randomized controlled trial to firmly establish the optimal treatment strategy.

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