Acute subdural hematoma case series

2022

Single-center retrospective review of adult patients with traumatic brain injury from 2018 to 2021 revealed 45 large aSDHs that met inclusion criteria. Inpatient outcomes included mortality, length of stay, and discharge disposition. Follow-up data included rate of surgery for chronic SDH progression. Patients with large aSDHs were 2:1 propensity score-matched to patients with small (<1 cm) aSDHs based on age, Injury Severity Scale, Glasgow Coma Scale, and Rotterdam computed tomography scale.

Results: Median age (78 years), sex (male 52%), and race (Caucasian 91%) were similar between both groups. Inpatient outcomes including length of stay (P = .32), mortality (P = .37), and discharge home (P = .28) were similar between those with small and large aSDHs. On multivariate logistic regression (odds ratio [95% CI]), increased in-Hospital mortality was predicted by Injury Severity Scale (1.3 [1.0-1.6]), Rotterdam computed tomography scale 3 to 4 (99.5 [2.1-4754.0), parafalcine (28.3 [1.7-461.7]), tentorial location (196.7 [2.9-13 325.6]), or presence of an intracranial contusion (52.8 [4.0-690.1]). Patients with large aSDHs trended toward higher progression on follow-up computed tomography of the head (36% vs 16%; P = .225) and higher rates of chronic SDH surgery (25% vs 7%; P = .110).

Conclusion: In conservatively managed patients with minimal symptoms and mass effect on computed tomography of the head, increasing SDH size did not contribute to worsened in-Hospital mortality or length of stay. Patients with large aSDHs may undergo an initial course of nonoperative management if symptoms and the degree of mass effect are mild [1)].

A total of 101 patients with confirmed diagnosis of acute subdural hematoma (ASDH) who underwent surgical evacuation by consultant neurosurgeon were included in the study. A detailed clinical proforma was designed to document all the clinical and demographic details of these patients at the time of admission. Glasgow Coma Scale outcome score (GOS) was used to assess the outcome of patients after the surgery. Sociodemographic and clinical parameters were associated with outcome of surgery in our study participants.

Results: Out of 101 patients, 55 (54.5%) were males and 46 (45.5%) were females. Mean age was 43.66±19.66 years with 7.39 as mean Glasgow Coma Scale (GCS) at presentation. Road traffic accident (RTA) 62 (61.4%) was most frequent mechanism of injury followed by fall from height (19.8%) and history of assault (13.9%). In our study, 59 patients had poor outcomes while 42 had good outcomes. Elder age, low GCS at presentation, and use of oral anticoagulant were associated with poor outcomes while pupillary reaction had no effect on the outcome after application of test of significance.

Conclusion: More than half of the patients managed with surgical evacuation for acute subdural hematoma as per guidelines at our neurosurgical unit had poor outcomes according to Glasgow Coma Scale. In this study, advancing age (>60 years), low GCS score at presentation, and use of oral anticoagulation therapy emerged as significant risk factors for poor outcomes in participants. Pupillary reaction had no effect on outcomes as per this study but this needs further evaluation in

future studies [2)]

Of 256 patients who underwent decompressive craniectomy for isolated traumatic Acute subdural hematomas between April 2013 and December 2020 were included. We evaluated the risk factors for intraoperative acute diffuse brain swelling using a multivariate logistic regression analysis.

Results: The incidence of intraoperative acute diffuse brain swelling in patients with isolated traumatic ASDH was 21.88% (56/256). Dilated pupils (OR = 24.78), subarachnoid hemorrhage (OR = 2.41), and the time from injury to surgery (OR = 0.32) were independent risk factors for intraoperative acute diffuse brain swelling, while no independent associations were observed between these risk factors and sex, age, the mechanism of injury, the Glasgow Coma Scale score, site of hematoma, thickness of hematoma, midline shift and the status of the basal cistern, although the mechanism of injury, the Glasgow Coma Scale score and the status of the basal cistern were correlated with the incidence of intraoperative acute diffuse brain swelling in the univariate analyses.

This study identified the risk factors for intraoperative acute diffuse brain swelling in patients with isolated traumatic ASDH. An increased risk of intraoperative acute diffuse brain swelling occurs in patients with bilaterally dilated pupils, subarachnoid hemorrhage, and a shorter time from injury to surgery. These findings should help neurosurgeons obtain information before surgery about intraoperative acute diffuse brain swelling in patients with isolated traumatic ASDH [3)].

2019

Kaestner et al., identified patients presenting between January 2012 and September 2017 with an aSDH. All patients treated conservatively were selected retrospectively, and the following parameters were documented: age, sex, chronification status, Glasgow Coma Scale score on admission and discharge, hematoma thickness and density, the degree of midline shift (MLS), prior anticoagulants and administration of procoagulants, thrombosis management, other coagulopathies, initial length of hospital stay, interval between discharge and readmission, and interval between initial injury and date of surgery and last follow-up. The cohort was divided into patients with complete resolution of their aSDH, and patients who needed surgery due to chronification.

A total of 75 conservatively treated patients with aSDH were included. A chronification was observed in 24 cases (32%). The process of chronification takes an average of 18 days (range: 10-98 days). The following factors were significantly associated with the process of chronification: age ($p = 0.001$), anticoagulant medication (acetylsalicylic acid [ASA], Coumadin, and novel anticoagulants [NOACs]) before injury ($p = 0.026$), administration of procoagulants ($p = 0.001$), presence of other coagulopathies such as thrombocytopenia ($p = 0.002$), low hematoma density at discharge ($p = 0.001$), hematoma thickness on admission and discharge ($p = 0.001$), and the degree of MLS ($p = 0.044$).

Chronification occurred in a third of all patients with conservatively treated aSDH, on average within 3 weeks. The probability of developing a cSDH is 0.96 times higher with every yearly increase in age, resulting in 56% chronification in patients ≥ 70 years. Hematoma thickness and impairment of the coagulation system such as anticoagulant medication (ASA, Coumadin, and NOACs) or thrombocytopenia are further risk factors for chronification [4)].

2018

Beynon et al. analyzed the medical records of consecutive patients treated at our institution for acute SDH during anticoagulation therapy with Direct oral anticoagulants (DOAC) or vitamin K antagonists (VKA) during a period of 30 months. Patient characteristics such as results of imaging and laboratory studies, treatment modalities and short-term patient outcomes were included.

A total of 128 patients with preadmission DOAC (n = 65) or VKA (n = 63) intake were compared. The overall 30-day mortality rate of this patient cohort was 27%, and it did not differ between patients with DOAC or VKA intake (26% vs. 27%; p = 1.000). Similarly, the rates of neurosurgical intervention (65%) and intracranial re-hemorrhage (18%) were comparable. Prothrombin complex concentrates were administered more frequently in patients with VKA intake than in patients with DOAC intake (90% vs. 58%; p < 0.0001). DOAC treatment in patients with acute SDH did not increase in-hospital and 30-day mortality rates compared to VKA treatment.

These findings support the favorable safety profile of DOAC in patients, even in the setting of intracranial hemorrhage. However, the availability of specific antidotes to DOAC may further improve the management of these patients [5)]

2017

A retrospective chart review of consecutive patients age ≥ 16 with Glasgow Coma Score (GCS) ≥ 13 and CT-documented isolated SDH presenting to a university affiliated, urban, 100,000-annual-visit ED from 2009-2015. Demographic, historical and physical exam variables were collected. Primary outcome was a composite of neurosurgical intervention, worsening repeat CT and neurological decline. Univariate analysis was performed and statistically important variables were utilized to create a logistic regression model.

644 patients with isolated SDH were reviewed, 340 in the derivation group and 304 in the validation set. Mortality was 2.2%. 15.5% of patients required neurosurgery. A decision instrument was created: patients were low risk if they had none of the following factors: SDH thickness ≥ 5mm, warfarin use, clopidogrel use, GCS < 14 and presence of midline shift. This model had a sensitivity of 98.6% for the composite endpoint, specificity of 37.1% and a negative likelihood ratio of 0.037. In the validation cohort, sensitivity was 96.3%, specificity was 31.5% and negative likelihood ratio was 0.127.

Subdural hematomas are amenable to risk stratification analysis. With prospective validation, this decision instrument may aid in triaging these patients, including reducing the need for transfer to tertiary centers [6)].

Won et al. analyzed 139 patients with aSDH treated from 2007 until 2015. Baseline characteristics and clinical findings including Glasgow coma scale (GCS) at admission, 24 hours after operation, timing of operation, anticoagulation, Glasgow outcome scale (GOS) at hospital discharge and after 3 months were analyzed. Multivariate logistic regression analysis was performed to detect independent predictors of seizures and a scoring system was developed.

Of 139 patients, overall incidence of seizures was 38%, preoperatively 16% and postoperatively 24%. Ninety percent of patients with preoperative seizures were seizure-free after operation for 3 months.

Independent predictors of seizures were GCS < 9 (OR 3.3), operation after 24 hours (OR 2.0) and anticoagulation (OR 2.2). Patients with seizures had a significant higher rate of unfavorable outcome at hospital discharge (p=0.001) and in 3 month follow-up (p=0.002). Furthermore a score system (GATE-24) was developed. In patients with GCS < 14, anticoagulation or surgical treatment 24 hours after onset a prophylactic antiepileptic treatment is recommended.

Occurrence of seizures affected severity and outcomes after surgical treatment of aSDH. Therefore, seizure prophylaxis should be considered in high-risked patient based on GATE-24 score to promote better clinical outcome [7)].

Vilcinis et al. performed a prospective review of all adult patients with ASDH operated on by craniotomy from January 2009 to January 2016. Mortality and discharge outcomes (Glasgow Outcome Scale) were analyzed as a function of surgical method adjusting for age, admission Glasgow Coma Scale score, ASDH thickness and midline shift.

OC was performed in 394 (61%) patients, and DC was performed in 249 (39%) patients. Patients undergoing DC were younger, with lower Glasgow Coma Scale score, greater ASDH thickness, and greater midline shift (P < 0.001). Mortality rate (54% vs. 20%; P < 0.001) and proportion of patients with poor discharge outcomes (85% and 45%; P < 0.001) were greater in DC patients versus OC patients. Glasgow Outcome Scale score was lower and mortality rate was greater (P ≤ 0.048) in DC patients versus OC patients across all patient subgroups. Outcomes were similar between the 2 groups in patients with Glasgow Coma Scale score of 3 and midline shift of ≥2 cm. Adjusting for disease severity, DC remained associated with greater risk for in-Hospital mortality (odds ratio = 3.442 [95% confidence interval 2.196-5.396], P < 0.001) and unfavorable discharge outcome (odds ratio = 5.277 [95% confidence interval 3.030-9.191], P < 0.001).

DC was performed more often in younger and more severely injured patients. DC is associated with greater mortality and handicap rates independent of disease severity. Clinical trials investigating optimal surgical management strategy of patients with ASDH are needed [8)].

2016

Renzi et al., present a retrospective analysis of 316 consecutive cases of post-traumatic aSDH operated on between 2003 and 2011.

Mortality was 67% (n = 212); a useful recovery was achieved in 16.4% cases (n = 52). Age >65 years, a preoperative Glasgow coma scale (GCS) ≤ 8, specific pre-existing medical comorbidities (hypertension, heart diseases) were found to be strong indicators of unfavorable outcomes and death during hospitalization.

The results, compared with those of the inherent literature, led the authors to question both the “aggressiveness” of neurosurgical care indications in certain subpopulations of patients being known to fare worse or even die regardless of the treatment administered and the relevance of the results concerning mortality and functional recovery reported by third authors [9)].

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2015

All cases of acute traumatic SDH (869) presenting over a 4-year period were reviewed. For all conservatively treated SDH, the proportion of delayed surgical intervention and the Glasgow Outcome Scale score were taken as outcome measures. Multiple factors were compared between patients who required delayed surgery and patients without surgery.

Of the 869 patients with acute traumatic SDH, 646 (74.3%) were initially treated conservatively. A good outcome was achieved in 76.7% of the patients. Only 6.5% eventually required delayed surgery, and the median delay for surgery was 9.5 days. Factors associated with deterioration were as follows:

1) thicker SDH ($p < 0.001$)

2) greater midline shift ($p < 0.001$)

3) location at the convexity ($p = 0.001$)

4) alcohol abuse ($p = 0.0260$)

5) history of falls ($p = 0.018$). There was no significant difference in regard to age, sex, Glasgow Coma Scale score, Injury Severity Score, abnormal coagulation, use of blood thinners, and presence of cerebral atrophy or white matter disease.

The majority of patients with SDH are treated conservatively. Of those, only 6.5% later required surgery, for raised intracranial pressure or SDH progression. Patients at risk can be identified and followed more carefully [11].

2014

A retrospective review was performed of 522 consecutive patients admitted to a single center from 2006-2012 who underwent emergent craniectomy for acute subdural hematoma. After excluding patients with unknown time of injury, penetrating trauma, concurrent cerebrovascular injury, epidural hematoma, or intraparenchymal hemorrhage greater than 30 mL, there remained 45 patients identified for analysis. Using a multiple regression model, they examined the effect of surgical timing,

in addition to other variables on in-Hospital mortality (primary outcome), as well as the need for tracheostomy or gastrostomy (secondary outcome). They found that increasing injury severity score (odds ratio [OR] 1.146; 95% confidence interval [CI] 1.035-1.270; p=0.009) and age (OR1.066; 95%CI 1.006-1.129; p=0.031) were associated with in-Hospital mortality in multivariate analysis. In this model, increasing time to surgery was not associated with mortality, and in fact had a significant effect in decreasing mortality (OR 0.984; 95%CI 0.971-0.997; p=0.018). Premorbid aspirin use was associated with a paradoxical decrease in mortality (OR 0.019; 95%CI 0.001-0.392; p=0.010). In this patient sample, shorter time interval from injury to surgery was not associated with better outcomes. While there are potential confounding factors, these findings support the evaluation of rigorous preoperative resuscitation as a priority in future study [12].

Based on a retrospective study, the records of all patients admitted between 2001 and 2007 to a large emergency hospital with acute SDH resulting from traumatic brain injury (TBI) were analyzed. An initial Glasgow coma score (GCS), clinical state, and Glasgow outcome score (GOS) were recorded for all patients. All computer assisted tomography and MRI scans obtained from patients were saved on an electronic storage device and were reviewed by a neurosurgeon and a neuroradiologist. The coagulation parameters were analyzed for all patients. Coagulopathy was defined as international normalized ratio more than 1.2 or partial thromboplastin time more than 37 s. One hundred and five women and 214 men aged between 1 and 100 years (mean 59 years) were included in the study. Patients with coagulopathy had a significantly worse outcome. Almost twice as many patients died in the coagulopathy group (mean GOS 3.10 ± 1.46) than in the group without coagulopathy (mean GOS 2.16 ± 1.45), ($P < 0.001$). In-Hospital mortality is twice as frequent in patients with coagulopathy with traumatic SDH compared with noncoagulopathic patients, even if the initial severity of the TBI does not differ [13].

2012

1,427 patients had a mean age of 58 years, and most of them were male (63%). Glasgow Coma Scale (GCS) score on presentation was greater than 12 in 58%; the average Injury Severity Score (ISS) was 27.5. Mean length of stay was 9.6 days (range, 1-110), with 40% spending 2 or more days in the intensive care unit. Twenty-eight percent experienced medical complications. At discharge, 94% had GCS score of 13 or greater. Independence with expression, feeding, and locomotion at discharge was noted for 92%, 81%, and 43%, respectively. Inpatient mortality was 16% and did not differ significantly between the evacuated group (15%) and the nonevacuated group (17%).

This large cohort of patients with acute traumatic subdural hematoma demonstrated a lower mortality rate than those of previous reports, including among patients requiring surgical evacuation [14].

1997

Patients with traumatic acute subdural hematoma were studied to determine the factors influencing outcome. Between January 1986 and August 1995, 113 patients underwent craniotomy for traumatic acute subdural hematoma. The relationship between initial clinical signs and the outcome 3 months after admission was studied retrospectively. Functional recovery was achieved in 38% of patients and

the mortality was 60%. 91% of patients with a high Glasgow Coma Scale (GCS) score (9-15) and 23% of patients with a low GCS score (3-8) achieved functional recovery. All of 14 patients with a GCS score of 3 died. The mortality of patients with GCS scores of 4 and 5 was 95% to 75%, respectively. Patients over 61 years old had a mortality of 73% compared to 64% mortality for those aged 21-40 years. 97% of patients with bilateral unreactive pupil and 81% of patients with unilateral unreactive pupil died. The mortality rates of associated intracranial lesions were 91% in intracerebral hematoma, 87% in subarachnoid hemorrhage, 75% in contusion. Time from injury to surgical evacuation and type of surgical intervention did not affect mortality. Age and associated intracranial lesions were related to outcome. Severity of injury and pupillary response were the most important factors for predicting outcome [15)].

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