



## Acute Traumatic Subdural Hematoma: Surgical Management in the Presence of Cerebral Herniation—A Single-Center Series and Multivariate Analysis

Motaz Hamed, Patrick Schuss, Frederick H. Daher, Valeri Borger, Ági Güresir, Hartmut Vatter, Erdem Güresir

**BACKGROUND:** Traumatic acute subdural hematoma (aSDH) is a severe disease. Surgical treatment is still controversially discussed, especially in patients with additional signs of cerebral herniation. However, previously investigated patient populations were heterogeneous. We therefore performed an analysis of our institutional data in a large homogenous selection of patients with traumatic aSDH to analyze factors determining clinical outcome.

**METHODS:** Between 2010 and 2014, 196 patients with aSDH underwent surgical treatment in our department. Information including patient characteristics, treatment modality, radiologic features, and functional outcome were analyzed. Outcome was assessed according to the Glasgow Outcome Scale (GOS) at 6 months and was dichotomized into favorable (GOS score, 1–3) and unfavorable (GOS score 4–5) outcome. Furthermore, a multivariate analysis was performed to identify independent predictors of functional outcome.

**RESULTS:** Overall, 26% of patients with aSDH achieved favorable outcome. In further analysis, unilateral or bilateral dilated pupils as a sign of cerebral herniation were present in 47% of the included patients. In the multivariate analysis, age >70 years and the presence of cerebral herniation were significant prognostic predictors for unfavorable outcome in patients with aSDH. However, 15% of patients with aSDH and signs of cerebral herniation achieved favorable outcome during follow-up.

**CONCLUSIONS:** We provide detailed data on patients with aSDH and signs of cerebral herniation. Despite mydriasis, favorable outcome may be achieved in many patients. Nevertheless, careful individual decision making is necessary for each patient, especially when signs of cerebral herniation have persisted for a long time.

### INTRODUCTION

Traumatic acute subdural hematoma (aSDH) occurs in one third of patients with traumatic brain injury (TBI).<sup>1,2</sup> Nevertheless, the presence of extracranial concomitant injuries in patients with TBI is high and might also affect functional outcome.<sup>3</sup> Therefore, we focused on patients with isolated aSDH caused by TBI to minimize possible interference in this heterogeneous patient population. In patients with traumatic aSDH, surgical evacuation is most commonly performed via craniotomy or decompressive craniectomy (DC).<sup>4-6</sup> Furthermore, several risk factors for unfavorable outcome in these critically ill patients have been identified. Previous studies reported relation between outcome and age, neurologic status on admission, previous use of anticoagulation, and signs of cerebral herniation.<sup>7,8</sup> Therefore, early and aggressive treatment has been suggested in these patients to facilitate functional outcome. However, aggressive therapy in patients with signs of cerebral herniation is still controversially discussed. We therefore performed an analysis of our institutional data to analyze factors determining outcome in patients with isolated traumatic aSDH and signs of cerebral herniation.

### Key words

- Acute subdural hematoma
- Cerebral herniation
- Surgical treatment
- Traumatic brain injury

### Abbreviations and Acronyms

- aSDH:** Acute subdural hematoma
- CI:** Confidence interval
- DC:** Decompressive craniectomy
- GCS:** Glasgow Coma Scale
- GOS:** Glasgow Outcome Scale
- MLS:** Midline shift

**OR:** Odds ratio

**TBI:** Traumatic brain injury

Department of Neurosurgery, Rheinische Friedrich-Wilhelms-University, Bonn, Germany

To whom correspondence should be addressed: Patrick Schuss, M.D.

[E-mail: [patrick.schuss@ukb.uni-bonn.de](mailto:patrick.schuss@ukb.uni-bonn.de)]

Citation: *World Neurosurg.* (2016) 94:501-506.

<http://dx.doi.org/10.1016/j.wneu.2016.07.061>

Journal homepage: [www.WORLDNEUROSURGERY.org](http://www.WORLDNEUROSURGERY.org)

Available online: [www.sciencedirect.com](http://www.sciencedirect.com)

1878-8750/\$ - see front matter © 2016 Elsevier Inc. All rights reserved.

## METHODS

### Patients

Between January 2010 and December 2014, 196 patients with isolated traumatic aSDH were treated at our institution. aSDH was diagnosed by computed tomography. Information, including patient characteristics on admission and during treatment course, treatment modality, radiologic features, signs of cerebral herniation (dilated pupils), and functional neurologic outcome were collected and entered into a computerized database (SPSS, version 22 [IBM Corp., Armonk, New York, USA]). Patients were dichotomized into 2 groups according to their age: patients aged  $\leq 70$  years and patients aged  $>70$  years.<sup>9</sup> The Glasgow Coma Scale (GCS) was used to grade patients on admission.<sup>10,11</sup> Patients with traumatic aSDH were divided into mild TBI (GCS score 13–15) versus moderate to severe TBI (GCS score 3–12) on admission. Antiplatelet therapy or anticoagulation before hospitalization were assessed and further analyzed. In patients with aSDH and known antithrombotic agent use before hospitalization, urgent reversal of antithrombotic therapy with vitamin K antagonists was achieved by individual treatment approaches using vitamin K substitution (oral or parental), fresh frozen plasma, prothrombin complex concentrates, and recombinant factor VIIa. Reversal of antiplatelet therapy was achieved by individual treatment approaches including substitution of antifibrinolytics, such as tranexamic acid, desmopressin, and platelet transfusion.

All patients included in the analysis were treated by surgical evacuation of the space-occupying aSDH via craniotomy or DC. A decision on treatment modality was made by the treating neurosurgeon based on case-specific factors. Patients deemed too hemodynamically unstable for any treatment were not included in further analysis. Patients who underwent craniotomy for aSDH evacuation with persisting brain swelling during treatment course underwent subsequent DC to reduce intractable increased intracranial pressure.<sup>12</sup> In survivors who previously underwent DC, autologous cranioplasty was performed as previously reported.<sup>13–15</sup> Outcome was assessed according to the Glasgow Outcome Scale (GOS) after 6 months and stratified into favorable (GOS score 4–5: moderate disability and good recovery) vs. unfavorable (GOS score 1–3: death, vegetative status, or severe disability).

### Statistics

Data analyses were performed using the computer software package SPSS (version 22). An unpaired *t* test was used for parametric statistics. Categorical variables were analyzed in contingency tables using the Fisher exact test. Results with  $P < 0.05$  were considered statistically significant.

Furthermore, a multivariate analysis was performed to find independent predictors of unfavorable functional outcome in patients with traumatic aSDH using binary logistic regression analysis to find confounding factors between potentially independent predictors. Variables with significant *P* values in the univariate analysis were considered as potentially independent variables in a multivariate analysis. A backward stepwise method was used to construct a multivariate logistic regression model in relation to favorable outcome as a dependent variable with an inclusion criterion of a *P* value  $< 0.05$ .

## RESULTS

### Patient Characteristics

Overall, 196 patients with traumatic aSDH were treated at the authors' institution between January 2010 and December 2014. Of 196 patients, 153 underwent craniotomy with subsequent hematoma evacuation (78%), and 43 were treated by DC (22%).

Overall, favorable outcome was achieved in 51 patients with aSDH (26%). The mortality was 33%. Mean age did not differ significantly between patients with favorable outcome and patients with unfavorable outcome ( $69 \pm 17$  years vs.  $74 \pm 16$  years;  $P = 0.06$ ). Furthermore, mean age did not differ significantly between patients with mild TBI and patients with severe TBI ( $76 \pm 14$  years vs.  $72 \pm 17$  years;  $P = 0.2$ ). However, favorable outcome was significantly more often achieved in patients aged  $\leq 70$  years compared with patients aged  $>70$  years (39% vs. 20%;  $P = 0.008$ ; odds ratio [OR], 2.5; 95% confidence interval [CI], 1.3–4.9).

Patient characteristics, including age, sex, clinical status, radiologic findings, treatment modality, time interval from injury to admission at neurosurgical department, time interval from injury to surgery, and clinical outcome of the present series are shown in **Table 1**.

### Neurologic Status on Admission

A total of 32 patients (16%) presented with mild TBI and 164 patients (84%) with moderate to severe TBI on admission. Favorable outcome was achieved in 16 of 32 patients with mild TBI, and in 35 of 164 patients with moderate to severe (50% vs. 21%;  $P = 0.002$ ; OR, 3.7; 95% CI, 1.7–8.1). Time interval from injury to admission at our neurosurgical department as well as the time interval from injury to surgery did not differ significantly between patients who achieved favorable outcome compared with patients who did not.

### Treatment Modality

A total of 153 patients (78%) underwent craniotomy and subsequent hematoma evacuation, whereas 43 patients (22%) underwent DC. Forty-five of 153 patients (29%) who underwent craniotomy and subsequent hematoma evacuation achieved favorable outcome versus 6 of 43 patients (14%) who underwent DC ( $P < 0.05$ ; OR, 2.6; 95% CI, 1.0–6.5).

### Preoperative Midline Shift

Patients with traumatic aSDH who achieved favorable outcome presented with significantly smaller preoperative midline shift (MLS) compared with patients who achieved unfavorable outcome ( $10 \pm 4$  mm vs.  $13 \pm 6$  mm;  $P = 0.007$ ; 95% CI, 0.7–4.5). However, preoperative MLS in patients with aSDH who underwent craniotomy and subsequent hematoma evacuation did not differ significantly compared with patients who underwent DC ( $12 \pm 5$  mm vs.  $14 \pm 6$  mm;  $P = 0.06$ ).

### Influence of Preoperative Antiplatelet or Anticoagulation Therapy

Overall, 117 of 196 patients (60%) with aSDH were on preoperative antiplatelet or anticoagulation therapy. In detail, 55 of 196 patients (28%) received antiplatelet therapy and 62 of 196 patients (32%) received anticoagulation therapy before hospitalization.

Download English Version:

<https://daneshyari.com/en/article/3094638>

Download Persian Version:

<https://daneshyari.com/article/3094638>

[Daneshyari.com](https://daneshyari.com)