



Opening the Internal Hematoma Membrane Does Not Alter the Recurrence Rate of Chronic Subdural Hematomas: A Prospective Randomized Trial

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■ **BACKGROUND:** Factors determining the recurrence of chronic subdural hematomas (CSDHs) are not clear. Whether opening the so-called internal hematoma membrane is useful has not been investigated.

■ **OBJECTIVE:** To investigate whether splitting the inner hematoma membrane influences the recurrence rate in patients undergoing burr-hole craniotomy for CSDH.

■ **METHODS:** Fifty-two awake patients undergoing surgery for 57 CSDHs were prospectively randomized to either partial opening of the inner hematoma membrane (group A) or not (group B) after enlarged burr-hole craniotomy and hematoma evacuation. Drainage was left in situ for several days postoperatively. Groups were comparable with regard to demographic, clinical, and imaging variables. Outcome was assessed after 3–6 weeks for the combined outcome variable of reoperation or residual hematoma of one third or more of the original hematoma thickness.

■ **RESULTS:** Fourteen patients underwent reoperation for clinical deterioration or residual hematoma during follow-up ($n = 6$ in group A, 21%; $n = 8$ in group B, 28 %) ($P = 0.537$). Residual hematoma of \geq one third not requiring surgery was present in 7 patients in group A (25%) and 10 patients in group B (36%) ($P = 0.383$). The overall cumulative failure rate (reoperation or hematoma thickness \geq one third) was 13/28 (46%) in group A and 18/28 in group B ($P = 0.178$; relative risk, 0.722 [95% confidence interval, 0.445–1.172]; absolute risk reduction –16% [95% confidence interval, –38% to 8%]).

■ **CONCLUSIONS:** Opening the internal hematoma membrane does not alter the rate of patients requiring revision

surgery and the number of patients showing a marked residual hematoma 6 weeks after evacuation of a CSDH.

INTRODUCTION

Chronic subdural hematoma (CSDH) is a common condition with a reported annual incidence of 3–5.4 per 100,000 people,^{1,2} characterized by the formation of neomembranes within the subdural space that enclose a liquefied hematoma.^{3–6} Membranes usually consist of a thicker and highly vascularized outer neomembrane and a thinner inner neomembrane.^{6–9} CSDHs are typically seen in the later stages of life^{1,7,10–12} and often in multimorbid patients.

Techniques proposed for hematoma evacuation in symptomatic patients⁶ include bedside twist-drill craniotomy, burr-hole craniotomy, or minicraniotomy and drainage of the hematoma blinded, under sight, or aided by an endoscope.^{11,13} Large craniotomies with complete resection of hematoma membranes are usually reserved for patients with multiple membranes and recurrent hematomas.^{14,15} Although it has been the subject of much debate, a recent prospective trial strongly favored the insertion of continuous closed-system drainage into the subdural space for some days after hematoma evacuation.¹⁶

Surgical evacuation is considered to be a minimally invasive procedure. Nevertheless, mortality ranges from 0% to 6% and morbidity from 0% to 76%.¹ Recurrence rate after surgery of 0.35%–33% has been reported.^{2,8,10,17} Risk factors for recurrence include a thick subdural membrane on contrast-enhanced computed tomography (CT),⁷ advanced age,¹⁷ coagulation disorders,¹⁷ bilateral haematomas,¹⁷ brain atrophy,¹⁷ postoperative subdural air accumulation,¹⁷ and early removal of subdural drainage.¹⁷

One factor considered pivotal for hematoma recurrence is the failure of the brain to fill the dead space resulting from

Key words

- Burr-hole
- Chronic subdural hematoma
- Craniotomy
- Membranectomy
- Recurrence

Abbreviations and Acronyms

- CI: Confidence interval
- CSDH: Chronic subdural hematoma
- CT: Computed tomography

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hematoma evacuation in the mostly elderly population. Techniques to facilitate brain expansion include lumbar puncture and intrathecal instillation of artificial cerebrospinal fluid^{6,18,19} or replacement of hematoma with oxygen after subdural tapping,^{20,21} postoperative avoidance of head elevation for the first days after hematoma drainage,^{17,22} and to open the internal hematoma membrane in a radiate fashion during enlarged twist-drill craniotomy.²³

The goal of our prospective randomized study was to analyze whether partial opening of the inner hematoma membrane influences the recurrence rate in patients undergoing enlarged burr-hole craniotomy for CSDH.

PATIENTS AND METHODS

Ethical Issues

All patients gave informed consent to participate in the study. The study protocol was approved by the ethics committee of the Innsbruck Medical University (UN 3065, SN 258/4.6).

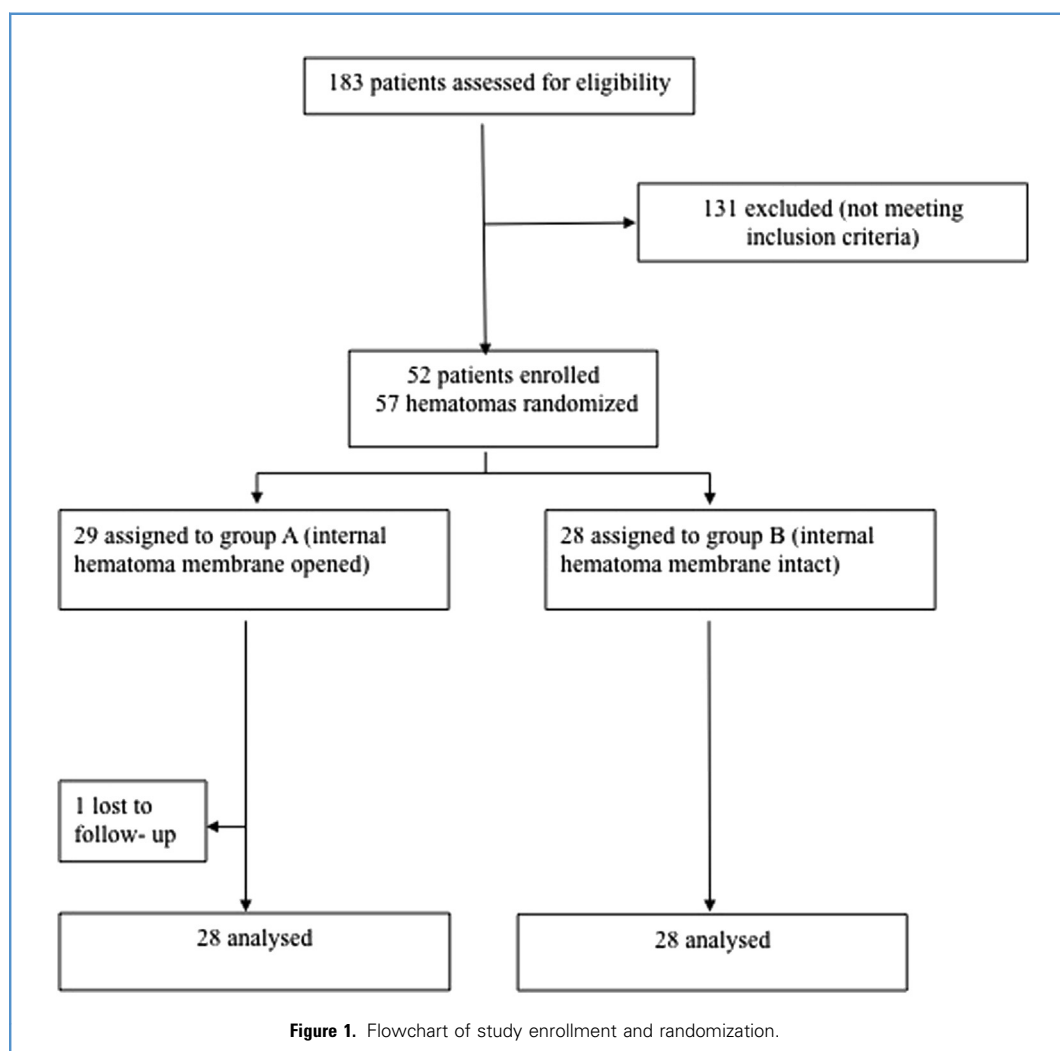
Study Design

The study was conducted as a prospective, randomized, blinded trial at the Neurosurgical Department of Innsbruck Medical University between February 2008 and January 2010. The ethics committee allowed inclusion only of patients able to give fully informed consent into this study.

Patient Characteristics

We consecutively enrolled 52 eligible patients with 57 CSDHs. Inclusion criteria were age >18 years, diagnosis of symptomatic CSDH confirmed by CT or magnetic resonance imaging, and the ability to understand and sign an informed consent form. Patients unable to understand the study proposal, patients with impaired consciousness on admission, patients requiring early postoperative anticoagulation (ie, within the first 4 weeks) and patients with multiple membranes (>4) as visualized on preoperative imaging were excluded from the study (Figure 1).

Eligible participants represented 28% of all patients ($n = 183$) treated for CSDH during the same period (Table 1). Mean age was



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