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Research report

The use of endoscopic-assisted burr-hole craniostomy for septated chronic subdural haematoma: A retrospective cohort comparison study

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ABSTRACT

Objective: To complete a retrospective comparison of endoscope-assisted burr-hole craniostomy (EBHC) and ordinary burr-hole craniostomy (OBHC) in the treatment of septated chronic subdural hematoma (SCSH).

Methods: A retrospective case note review comparing EBHC and OBHC of SCSH was therefore performed. Data of patients with a SCSH for EBHC or OBHC during the period from January 2011 to December 2016 were retrospectively collected and analysed. Of 73 patients, 42 underwent EBHC and 31 patients were treated by OBHC. The primary outcome measure was recurrence rate and secondary outcome measures were clinical outcome at first postoperative day, discharge and 6 months, the length of hospital stay for neurosurgery, the operative time, and the placement time of drainage tube.

Result: The rate of recurrence was significantly lower in the EBHC (0/42 0%) than in the OBHC (8/31, 25.8%) group ($p = .0030$). The rate of morbidity was significantly lower in the EBHC (2/42, 4.8%) than in the OBHC (11/31, 35.5%) group ($p = .0121$). At 30 days, mortality did not differ between groups. Significantly more patients treated with EBHC were alive at 6 months than were those with OBHC. No patient died as a consequence of the operative procedure in the both groups. A discharge GCS of 15 was recorded in more participants with EBHC than in those with OBHC. Gross neurological deficit was significantly less frequent in those with EBHC than in those with OBHC at first postoperative day and discharge, but did not differ at 6 month follow-up. The mean placement time of drainage tube was significantly less in those with EBHC (27.2 h) than in those with OBHC (52.0 h, $p = .0055$). The mean length of hospital stay for neurosurgery was 4 days in the EBHC group, while it was 5 days in the OBHC group ($p = .0015$). The mean hematoma reduction rate was significantly higher in those with EBHC than in those with OBHC at first postoperative day (85.3% vs 72.5%, $p = .0037$) and discharge (90.3% vs 85.1%, $p = .0127$).

Conclusion: Comparing two minimally invasive procedure protocols for treatment of SCSH, EBHC is a safe and effective surgical technique. It significantly surpasses the results obtained in OBHC in lowering recurrence rate, morbidity rate, placement time of drainage tube, and length of hospital stay for neurosurgery. We recommend EBHC technique to be widely used in the treatment of SCSH, even common chronic subdural hematoma (CSH), subacute and acute subdural hematomas, acute epidural hematomas and empyemas to avoid large craniotomies, particularly in elderly patients, so that patients can receive the best treatment on the basis of minimal trauma.

1. Introduction

Chronic subdural hematoma (CSH), which was first described by Rudolf Virchow in 1857 (Virchow, 1857), is a common increasingly detected neurosurgical disease characterized by the abnormal collection of blood products in the subdural space (Roh et al., 2017; Miranda et al., 2011; Maurice-Williams, 1999). It is considered the "bread and butter" of traditional neurosurgery (Shofty and Grossman, 2016). The overall incidence of CSH was reported to range from 1.72-20.6/100000 persons per year in the general population (Foelholm and Waltimo, 1975; Sarti et al., 1991; Asghar et al., 2002; Balser et al., 2015) and it raises to 58.1/100000 inhabitants in the group of patients over 65 years old (Foelholm and Waltimo, 1975; Kudo et al., 1992; Chen and Levy, 2000). A trend

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toward an increase in incidence has been observed, because of the overall aging population resulting from an increase in life expectancy (Farhat Neto et al., 2015; Santarius et al., 2010; Kolias et al., 2014) and the increase in the use of anticoagulation and anti-aggregation therapy (Shofty and Grossman, 2016). It is expected that in 2030, its incidence will double (Iliescu, 2015). Today, the treatment for CSH is generally surgical evacuation, usually resulting in great improvement in neurological condition. Three techniques are most often used—twist-drill craniostomy, burr-hole craniostomy (BHC) and craniotomy (Weigel et al., 2003).

In rare cases, CSH are compartmentalized by fibrin septa as well as an inner thicker membrane (Ducruet et al., 2012; Hellwig et al., 2000, 1996; Masopust et al., 2003), these specific cases are called septated chronic subdural hematoma (SCSH) (Fig. 2B and Fig. 3A). The nonseptated CSH can be treated easily using the BHC method (Mobbs and Khong, 2009), whereas treatment of SCSH remains a therapeutical problem. The main problem is the division of the hematoma by neomembranes into compartments, which hinder the efflux of the hematoma fluid through one or two burr-holes. However, it's a frequent cause of failure and recurrence in the treatment of CSH (Berhouma et al., 2014). SCSH classically requires craniotomy, which has been replaced by BHC with it carries significant morbidity and mortality rates, particularly in elderly patients (Berhouma et al., 2014).

Endoscope-assisted BHC (EBHC) of CSH is an established, although not widely used technique. It is a combination of burr-hole evacuation of CSH and inspection of the subdural space with an endoscope. However, the advantages and disadvantages of EBHC compared with the ordinary BHC (OBHC) in the treatment of SCSH are not clearly. The aim of this study was to complete a retrospective comparison of EBHC and OBHC in the treatment of SCSH.

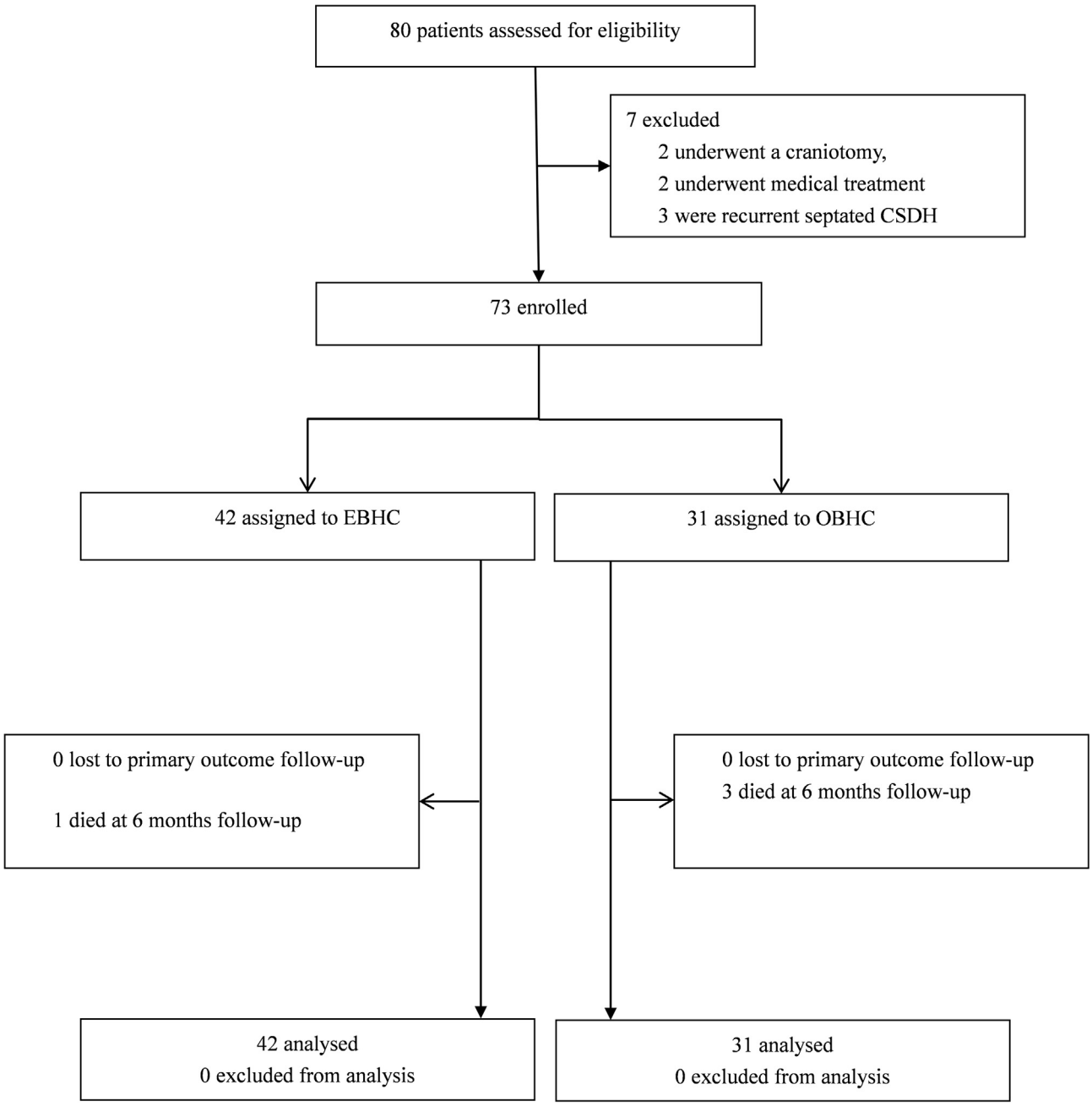

Fig. 1. Trial profile.