



Available online at www.sciencedirect.com

ScienceDirect

journal homepage: <http://www.elsevier.com/locate/medici>



Original Research Article

Safety and efficacy of stereotactic aspiration with fibrinolysis for deep-seated spontaneous intracerebral hemorrhages: A single-center experience

Giedrimantas Bernotas, Karolis Simaitis^{*}, Adomas Bunevičius, Arimantas Tamašauskas

Neuroscience Institute, Medical Academy, Lithuanian University of Health Sciences, Kaunas, Lithuania

ARTICLE INFO

Article history:

Received 9 June 2016
 Received in revised form
 26 June 2017
 Accepted 20 July 2017
 Available online xxx

Keywords:

Intracerebral hemorrhage
 Minimally invasive treatment
 Fibrinolysis
 Clot aspiration

ABSTRACT

Objective: The aim of this study was to evaluate feasibility and safety of stereotactic aspiration with fibrinolysis of deep-seated intracerebral hemorrhages (ICH).

Materials and methods: From March 1995 until December 2016, 58 adult patients (34 men and 24 women; mean age of 56.8 ± 11.8 years) presenting with deep-seated spontaneous supratentorial ICH were treated using a minimally invasive technique. Intracerebral hematomas were aspirated until obvious resistance to free-hand suction and subsequent clot fibrinolysis was done using either streptokinase or recombinant tissue-type plasminogen activator. CT scans were performed at intervals ranging from 24 to 72 h. At discharge, functional outcomes were evaluated using the Glasgow outcome scale (GOS). The 30-day mortality rate was evaluated in all patients.

Results: The average ICH volume on initial CT scan was 34.7 ± 11.1 cm³ (range, 20–90 cm³). Mean residual hematoma volume after the treatment was 8.0 ± 5.1 cm³ (range, 3–32 cm³). There was statistically significant reduction of ICH volume after the treatment ($P < 0.001$). Median ICH reduction rate was 5 cm³/d (range, 1.5–16.0 cm³/d) and 17.2%/d (range, 5.27–40.0%/d). Median discharge GOS score was 3 (range, 1–4). Six (10.9%) patients died during the 30-day follow-up period. Treatment related complications were observed in three (5.5%) patients. In two patients asymptomatic increase of ICH volume occurred and one patient was diagnosed with CNS infection.

Conclusions: Stereotactic clot aspiration with subsequent fibrinolytic therapy is safe and feasible treatment procedure associated with significant hematoma resolution rates and acceptable patient outcomes.

© 2017 The Lithuanian University of Health Sciences. Production and hosting by Elsevier Sp. z o.o. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

^{*} Corresponding author at: Neuroscience Institute, Medical Academy, Lithuanian University of Health Sciences, Eivenių 4, 50161 Kaunas, Lithuania.

E-mail address: k.simaitis@yahoo.com (K. Simaitis).

<http://dx.doi.org/10.1016/j.medici.2017.07.006>

1010-660X/© 2017 The Lithuanian University of Health Sciences. Production and hosting by Elsevier Sp. z o.o. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Non-traumatic intracerebral hemorrhage (ICH) is the second commonest type of stroke with annual incidence rate ranging from 10 to 30 cases per 100,000 population [1]. The incidence rate of spontaneous ICH is constantly growing due to aging population, and increasing use of anticoagulant and thrombolytic therapies [2]. Intracerebral hemorrhage is the most devastating type of all strokes that is associated with the highest mortality, morbidity and disability rates [3,4]. Estimated 1-year survival of ICH victims is approximately 46%, while 5-year survival reaches only 29% [5].

The optimal treatment strategy of ICH remains controversial. The Surgical Trial in Intracerebral Hemorrhage (STICH) trial compared early surgery with optimal medical therapy for treatment of spontaneous ICH [6] and did not find overall benefit from early surgery when compared with conservative treatment. However, a subgroup analysis showed that patients with superficial ICHs may benefit from early surgery [6]. Consequently, a subsequent STICH-II trial compared early surgery with conservative treatment for superficial spontaneous supratentorial ICH, but also showed no significant outcome differences at 6 months between the two treatment groups [7]. The main reason for lack of benefit from surgical clot removal could be attributed to additional damage to healthy brain overlying the hematoma caused by the surgical intervention [8] because surgical approach of deep-seated lesions necessitates dissection of white matter tracts and brain retraction, both of which can increase risk for postoperative venous infarction, cerebral edema and seizures [9].

To overcome surgery-related brain damage, minimally invasive techniques for deep-seated ICH removal have been developed and are becoming increasingly used [10]. The most commonly employed minimally invasive treatment modalities include stereotactic aspiration and endoscopic ICH evacuation with or without intra-clot fibrinolysis. An increasing body of evidence suggests that minimally invasive techniques of deep-seated spontaneous ICH removal are associated with adequate clot removal, lower surgery-related morbidity and improved patient outcomes [11,12]. Further studies investigating safety and optimal protocols of minimally invasive ICH removal techniques are warranted.

The aim of this study was to evaluate feasibility and safety of stereotactic aspiration with fibrinolysis of deep-seated ICHs.

2. Materials and methods

2.1. Patients

From March 1995 until December 2016, 74 patients presenting with spontaneous supratentorial ICH were treated using minimally invasive technique at the Neurosurgery Department of the Hospital of Lithuanian University of Health Sciences, Kaunas, Lithuania. The study inclusion criteria were deep-seated subcortical ICH located in the basal ganglia or thalamus; and ICH volume ranging from 10 to 100 cm³. The study exclusion criteria were patient age of less than 18 years; secondary ICH due to trauma or tumor; underlying vascular

abnormalities (arteriovenous malformation or cerebral aneurysm); and infratentorial or brainstem ICH extension. A total of 58 (34 men and 24 women) patients meeting the study criteria were selected for the present report. The patients' age ranged from 18 to 84 years with a mean age of 56.8 ± 11.8 years. Study was approved by institutional review board.

2.2. Diagnostic evaluations

On admission, all patients were evaluated for level of consciousness (Glasgow coma scale or GCS [13]), neurological deficits and timing of symptom onset, and underwent non-enhanced brain computed tomography (CT) scanning. After surgery, patients were followed daily for adverse events. At discharge, functional outcomes were evaluated using the Glasgow outcome scale or GOS [14]. The 30-day mortality rate was evaluated in all patients.

Volume of ICH was calculated using the ABC/2 method [15], where A is the largest diameter of the hematoma on axial CT cuts, B is the diameter of the hematoma perpendicular to A line on the same cut, and C is the number of CT slices in which hematoma is visible multiplied by the slice thickness in centimeters. Presence of intraventricular hemorrhage, acute hydrocephalus and midline shift were also recorded. Digital subtraction angiography or CT angiography were performed in selected cases where vessel malformation or an aneurysm rupture were suspected.

2.3. Treatment protocol

In the operating room, following skin incision, burr hole and dural opening, the ventricular catheter was stereotactically placed using the Leksell stereotactic frame. The goal of the insertion was to center the catheter along the long axis of the clot. Special attention was paid to avoid eloquent brain areas. Following catheter placement, the hematoma was carefully aspirated using syringe until obvious resistance to free-hand suction. When no more blood could be withdrawn, the hematoma cavity was thoroughly rinsed with isotonic saline, until the saline fluid was clear. In three cases, more than 80% of the hematoma volume was successfully aspirated, therefore procedure was finished and subsequent clot fibrinolysis was not performed. In the remaining 55 cases, the catheter was left in the hematoma cavity and skin incision was closed. After the surgery, CT scan was performed for assessment of catheter placement. Usually one catheter was left in the hematoma cavity; however, under certain circumstances (i.e. large hematoma) two catheters were used.

After the surgery, patients were transported to neurosurgery intensive care unit and clot fibrinolysis and drainage were performed immediately at the bedside using sterile techniques. Fibrinolytics were selected based on hospital availability. In 45 cases fibrinolysis was done using streptokinase and in 10 cases recombinant tissue-type plasminogen activator (rt-PA) was used. After fibrinolytic injection, the drainage system was closed and left for 1 h to allow fibrinolytic-ICH interaction. After 1 h the system was opened to allow hematoma drainage. Fibrinolytic dose and injection interval varied case by case, and was based on hematoma volume reduction rate. A single streptokinase dose varied from 2500 to 10,000 units and rt-PA dose, from 4 to 10 mg.

Download English Version:

<https://daneshyari.com/en/article/8585499>

Download Persian Version:

<https://daneshyari.com/article/8585499>

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