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Safety of Very Early Evacuation of Intracerebral Hemorrhage with Minimally Invasive Parafascicular Surgery

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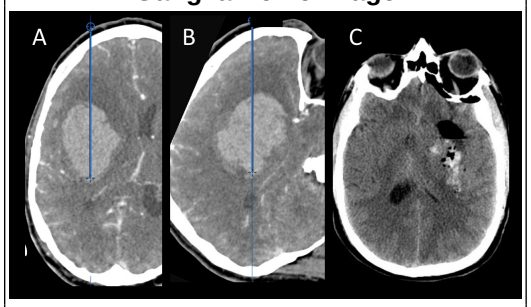
Introduction

Although some recent trials failed to demonstrate efficacy of surgery for intracerebral hemorrhage (ICH), newer methods such as minimally invasive parafascicular surgery (MIPS) allow for extensive hematoma removal with minimal morbidity. The optimal timing of surgery is unclear, and previously published cases of MIPS for ICH have reported relatively long intervals between hemorrhage onset and surgery. We sought to evaluate the safety of very early surgery using this technique.

Methods

We retrospectively reviewed all cases at our institution of MIPS for evacuation of acute spontaneous ICH within eight hours of symptom onset or time last known well (LKW). Patient charts and radiological studies were reviewed to extract clinical characteristics and treatment outcomes. The primary outcome was reaccumulation of hematoma requiring re-operation.

Figure 1: Illustrative Case: Left Basal Ganglia Hemorrhage



(A/B) - Trajectory (C) Postoperative CT

All MIPS cases were performed using a standard operative technique. An illustrative case is shown in **Figure 1**. A CTA was performed preoperatively and utilized in conjunction with the frameless stereotactic navigation system to plan a trajectory to the hematoma based on surrounding functional cortex and subcortical fibers (**Figure 1A/B**). A 3-cm craniotomy was performed, and the Brainpath tubular retractor system (NICO Corp., Indianapolis, IN) was used to cannulate the hematoma. Post-operative CT was performed and used to evaluate extent of evacuation (**Figure 1C**). Patients underwent routine post-operative care.

Results

Thirteen cases of MIPS were performed within 8 hours of symptom onset or LKW. Patient characteristics are summarized in **Table 1**. The most commonly identified ICH etiology was hypertension. A small proportion of patients were on therapeutic anticoagulation (n=2) or had intrinsic coagulopathy (n=3). ICH expansion (n=2) and spot sign (n=2) were noted in a few patients on preoperative CTA.

Table 1: Patient Characteristics

Total number	13
Age (years), mean ± SD	62 ± 9
Location, No.(%)	
Basal ganglia	9 (69%)
Lobar	2 (15%)
Thalamus	1 (8%)
Cerebellum	1 (8%)
Volume (mL)	
Mean ± SD	47 ± 26
range	8 - 97
Aspirin use	5 (38%)
Anticoagulant use, No.(%)	2 (15%)
Intrinsic coagulopathy, No.(%)	3 (23%)
Positive CTA Spot sign, No.(%)	2 (15%)
Hematoma expansion, No.(%)	2 (15%)
Etiology, No.(%)	
HTN	9 (69%)
High-grade glioma	2 (15%)
Endocarditis	1 (8%)
Amyloid angiopathy	1 (8%)

Surgical outcomes are listed in **Table 2**. MIPS resulted in mean hematoma evacuation of 93%. Thirty-day mortality occurred in two patients (15%), and one patient (8%) developed significant hematoma re-accumulation that required reoperation.

Table 2: Surgical Results

Extent of evacuation, mean ±SD	93 ± 7%
30-day mortality, No.(%)	2 (15%)
Expected* 30-day mortality, No.(%)	4.7 (36%)
Reop for reaccumulation, No.(%)	1 (8%)

* Stroke. 2001;32(4):891-7.

Conclusions

ICH evacuation via MIPS can be performed safely within the first few hours following the onset of symptoms. It may not be necessary to delay surgery to allow for hematoma stability. Given that time-dependent outcomes have been observed for other types of neurologic insults, we should consider the goal of early hematoma removal to maximize the chance of providing an efficacious surgical option for ICH.

Learning Objectives

1. Describe the complication profile for minimally invasive ICH evacuation performed within eight hours of symptom onset.
2. Discuss the potential impact of surgical timing on the outcome of clinical trials.

References

- Morganstern LB, et al. Neurology. 2001;56(10):1294-99.
- Gregson BA, et al. Stroke. 2012;43(6): 1496-504.
- Przybylowski CJ, et al. J Clin Neurosci. 2015;22(11):1727-1732.
- Bauer AM, et al. Oper Neurosurg (Hagerstown). 2017;13(1):69-76.
- Labib MA, et al. Neurosurgery. 2017;80(4):515-524.