Intraparenchymal hemorrhage evacuation using the Vycor retractor system

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INTRODUCTION

- Minimal invasive craniotomies for the surgical management of intracerebral hemorrhage (ICH) have been developed
- Some of the current equipment used for evacuation of hematomas in a minimally invasive way are often cost prohibitive.
- In an effort to improve outcomes for patients with ICH in rural settings we have developed a novel and affordable technique using the Vycor retractor system.

OBJECTIVES

- We developed a new operative technique for ICH evacuation using the Vycor retractor system.
- This is a simple technique that may be used with basic neurosurgical equipment available at most hospitals at minimal cost.
- This method will allow any rural and regional hospital with limited resources to provide minimally invasive evacuation of ICH without investing in expensive and complex equipment.

METHODS

- Patients that meet the inclusion criteria undergo general anesthesia and are placed on a donut head rest. Mayfield frame is not necessary. Frameless Stealth navigation was occasionally used to localize the intraparenchymal hemorrhage.
- A small linear incision is marked over the region of the bleed. A small craniotomy is performed. The dura is coagulated using bipolar cautery. The dura is opened in a cruciate manner a corticectomy is performed.
- Subsequently a 17mm large Vycor retractor is placed in the hematoma. The clot is evacuated using suction and bipolar cautery.
- Hemostasis is achieved, the dura is reapproximated and the small bone flap is replaced.

RESULTS

- Fifteen consecutive patients were completed using the Vycor retractor system. Five were female and ten were males with a mean age of presentation of 68 years of age. The mean operative time was 58 minutes.
- The median Glasgow Coma Scale (GCS) score at presentation was 11±2.14 (range, 8-14). The median hematoma volume as identified on head CT scan on admission was 52.4 ±20.2 mL (110-33 mL) while the median hematoma volume after surgery was 6.77±7.50mL.
- The degree of hematoma evacuation was >95% in five patients, between 90-95% in five patients, 85-90% in one patient, 80-85% in two patients, 75-80% in one patient and 35.7% in one patient. The degree of evacuation of the hematoma was statistically significant ($p<0.001$).
- The average length of stay in the neuro ICU was 4.8 days and the average length of hospital days was 9.6.

CONCLUSIONS

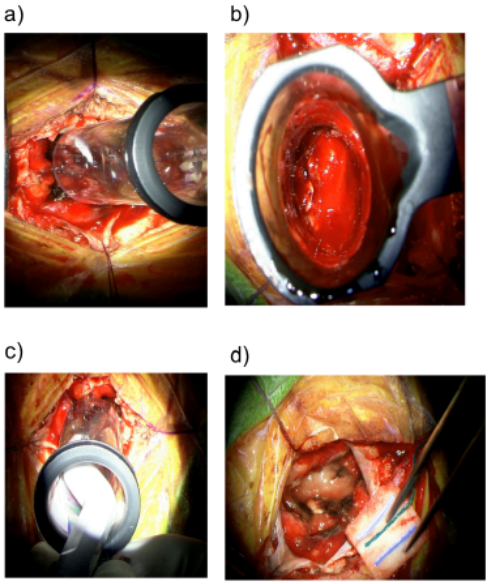
- Using the Vycor retractor system in combination with Stealth navigation we were able to develop a simple technique for removal of an intracerebral hematoma.
- With this technique we reached statistical significance for the reduction of intracerebral hematoma volume.

In this project, we have shown that by using the Vycor retractor system we had a significant intracerebral hematoma volume reduction. This is a novel, simple and affordable technique for the management of patients with intracerebral hemorrhage in rural hospitals.

Table 1: Inclusion and Exclusion criteria of study

Inclusion Criteria	Exclusion Criteria
Age of patient between 18-80 years old	Vascular malformation on CT angiogram of the head, hemorrhagic conversion of ischemic stroke, ICH due to tumor or trauma
Non-contrast head CT scan showing spontaneous supranterorial ICH the volume of which was between 30-90cc	Non-contrast head CT scan demonstrates expanding hemorrhage and/or spot sign on CT angiogram of the head
Performing surgery within 24 hours of ictus	Infrantentorial ICH
GCS on arrival between 5-14 and NIHSS greater than 6	Intraventricular hemorrhage involving more than 50% of ventricular system, or requiring treatment as a result of mass effect or shift
Prehospital mRS 2 or less	Midbrainn or thalamic hemorrhage
Systolic blood pressure less than 180mmHg sustained	Patient's on long-term anticoagulation or anti-coagulants that cannot be reversed
Non-contrast head CT with Stealth protocol	

Figure 1: Vycor retractor system used for the evacuation of ICH



a) Vycor retractor placed in the clot
b) Clot as seen through the Vycor retractor system
c) Stealth probe can be used to localize hematoma
d) Clot evacuated and Vycor retractor removed from cavity