

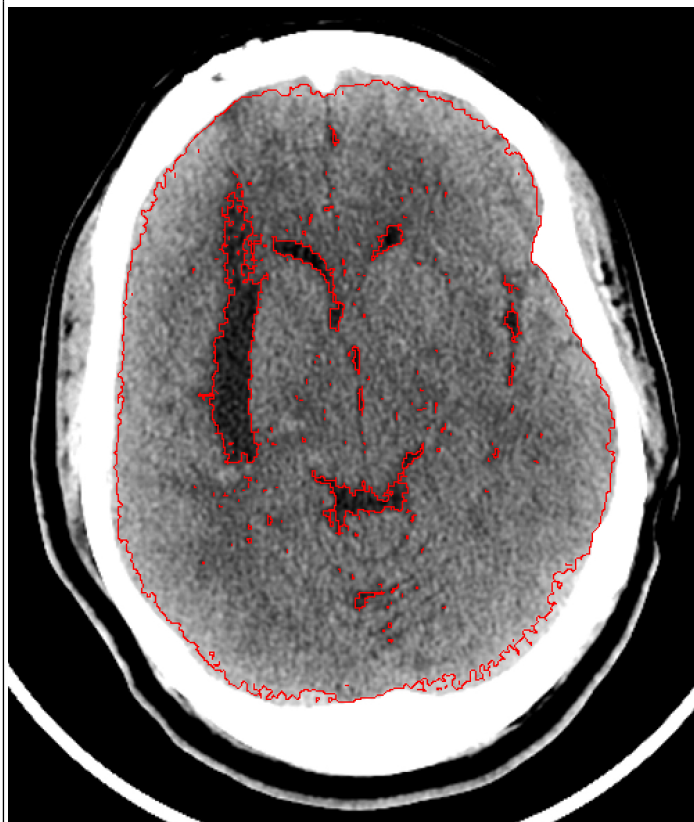
## Introduction

Intracerebral hemorrhage (ICH) remains a significant cause of morbidity and mortality in patients. Perihematoma edema (PHE) is an area of significant interest in ICH research, due to the potential reversibility of insult to this area via therapeutic intervention. While studies have shown marginal clinical benefit to ICH evacuation using traditional surgical techniques, minimally invasive techniques have shown some promise. Endoscopic evacuation of the hemorrhage may reduce the PHE and subsequent atrophy around the hemorrhage cavity. Endoscopic evacuation is an ideal to study the effects of hematoma evacuation on surrounding brain parenchyma, due to minimal surgical manipulation. This study aims to quantify the changes in cavity volume following hematoma evacuation.

## Methods

Patients from the INVEST registry of minimally invasive ICH evacuation were included retrospectively if follow-up computed tomography (CT) scans were available for analysis. Patient characteristics and axial CT scans were obtained. Hematoma cavity volumes were calculated from the immediate post-procedural and three-month follow-up CT scans using the Analyze Pro software.

### Peri-Lesional Brain Volume Measurement



Volume measuring technique using the Analyze Pro software. Axial CT slices were used to create Hounsfield-unit threshold based renderings to calculate cavity volumes. Whole brain volumes may similarly be calculated.

## Results

Twenty patients had follow-up CT scans, at a mean time of 93 days (range 35-187 days) from hematoma evacuation. The average cavity size at follow-up was found to be 11938.12 mm<sup>3</sup> (SD: 6996.49). The change in cavity size compared to the prior CT was 6396.74 mm<sup>3</sup> (median 2542; range: -1030-27543; SD: 8472.45). This represented an average growth in cavity volume of 54% (median 26%). Four patients (20%) had a smaller cavity size at 3-month follow-up. Factors associated with growth of the cavity size included peri-ventricular location of the cavity.

## Conclusions

This study provides preliminary data describing increase in cavity size after endoscopic minimally invasive evacuation of ICH. Correlating this data to whole brain volumes will help quantify relative atrophy as well as global brain volume loss. Comparison to atrophy in conservatively-managed patients is another avenue of research.

## Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Describe different minimally-invasive techniques for ICH evacuation;
- 2) Identify the hematoma cavity after ICH evacuation through minimally invasive surgery;
- 3) Describe observed trends in cavity volume over time; and
- 4) Discuss various theories regarding reasons for cavity atrophy after ICH.