

# SOFT CHANNEL MINIMALLY INVASIVE DRAINAGE VERSUS CRANIOTOMY FOR INTRACRANIAL HEMATOMA EVACUATION: A SINGLE-CENTER COMPARATIVE STUDY

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## Background and Aims

Minimally invasive soft channel techniques and conventional craniotomy represent divergent approaches for intracranial hematoma evacuation, yet comparative data on efficacy and outcomes remain limited. This study aimed to explore the complication rates and functional recovery between these two surgical strategies.

## Methods

A retrospective analysis was conducted on 197 consecutive patients with hypertensive basal ganglia hemorrhage treated at our hospital between October 2022 and March 2025. Patients were divided into the soft channel drainage group (n=103, mean age 67 years, 67 men and 36 women) and craniotomy group (n=94, mean age 65 years, 56 men and 38 women). The primary endpoints included operation duration, CT-measured hematoma clearance rate, and intraoperative blood loss. Secondary outcomes encompassed Glasgow Coma Scale (GCS) improvement at 72 hours postoperative complications of infection and modified Rankin Scale (mRS) at 90-day follow-up.

## Results

There were no significant differences with regard to age and sex between the two groups. The soft channel group demonstrated significantly shorter operative duration ( $0.38 \pm 0.13$ h vs  $1.04 \pm 0.32$ h,  $P < 0.001$ ) and reduced blood loss ( $205 \pm 38$  ml vs  $398 \pm 57$  ml,  $P < 0.001$ ). Hematoma clearance rates (77/103 vs 71/94,  $P = 0.90$ ) and GCS improvement ( $P = 0.87$ ) were comparable. Craniotomy patients exhibited higher rates of surgical site infection (2/103 vs 9/94,  $P = 0.02$ ). At 90 days, favorable functional outcomes as defined as mRS  $< 3$  were achieved in 57.28% of soft channel patients versus 42.55% of craniotomy patients ( $P = 0.04$ ).

## Conclusion

Soft channel drainage offers distinct advantages in procedural efficiency, reduced blood loss, lower post-operative infection rate and better functional outcomes than craniotomy.

**Keywords:** Craniotomy, Functional outcomes, Intracranial hemorrhage