

## Introduction

Minimally invasive endoscope-assisted (MIE) evacuation of spontaneous intracerebral hemorrhage (ICH) is simple and effective, but the limited working space may hinder meticulous hemostasis and might lead to re-bleeding. Management of intra-operative hemorrhage is therefore a critical issue of this study. This study presents experience in the treatment of patients with various types of ICH by MIE evacuation followed by direct local injection of FloSeal Hemostatic Matrix (Baxter Healthcare Corp, Fremont, CA, USA) for hemostasis.

## Materials and Methods

The retrospective nonrandomized clinical and radiology-based analysis enrolled forty-two patients treated with MIE evacuation of ICH followed by direct local injection of FloSeal Hemostatic Matrix. Rebleeding, morbidity, and mortality were the primary endpoints. The percentage of hematoma evacuated was calculated from the pre- and post-operative brain computed tomography (CT) scans. Extended Glasgow Outcome Scale (GOSE) was evaluated at 6 months postoperatively.

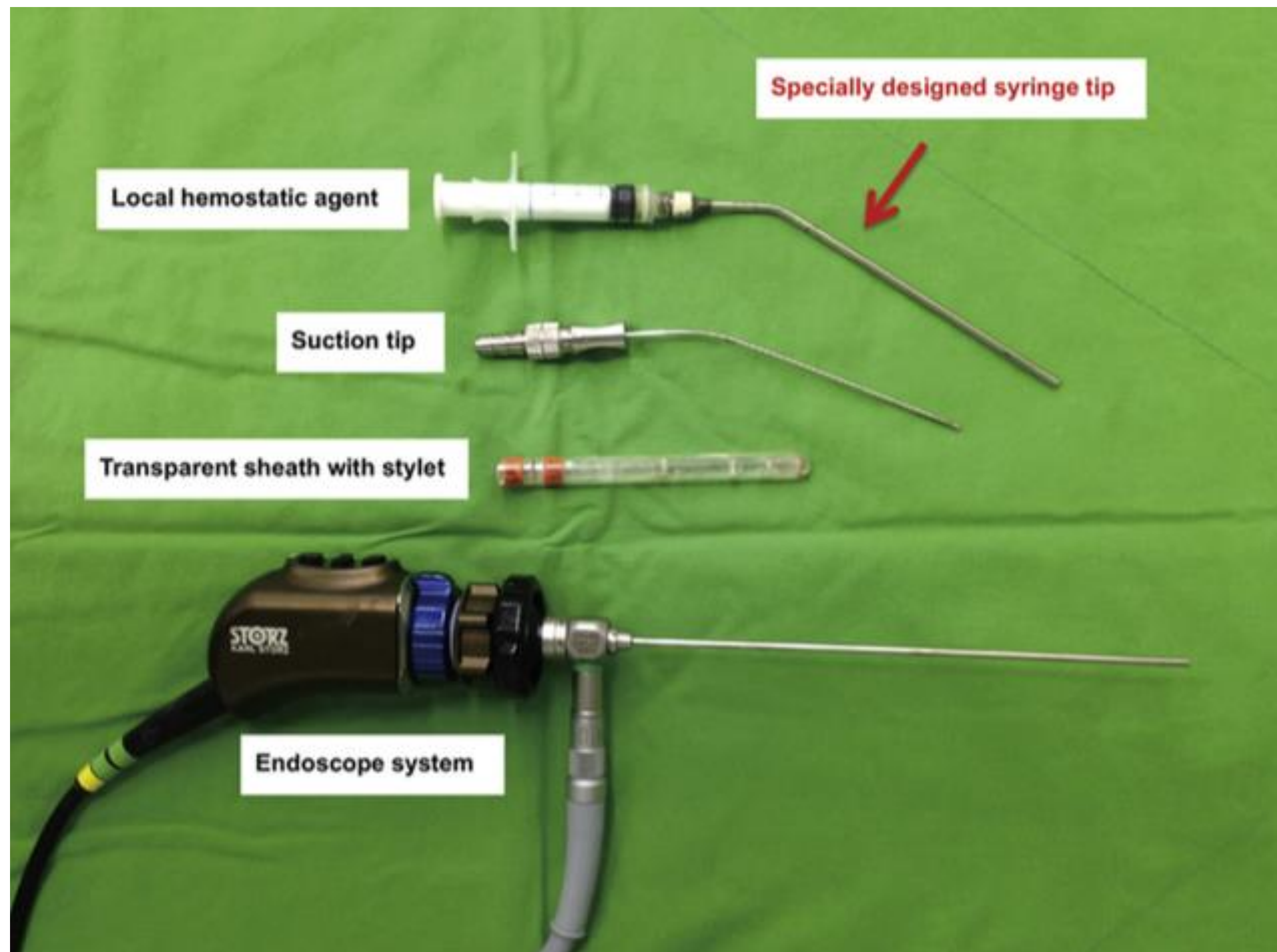


Figure 1. Devices for the MIE evacuation of ICH (especially the specially designed syringe tip for local hemostatic agent application via the narrow sheath).

## Results

Forty-two ICH patients were included in the present study, among these, 23 patients were putaminal hemorrhage, 16 were thalamic ICH, and the other three were subcortical type. Surgery-related mortality was 2.4%. The average percentage of hematoma evacuated was 80.8%, and the rebleeding rate was 4.8%. The mean operative time was 102.7 minutes and the average blood loss was 84.9 mL. The mean postoperative GOSE score was 4.55 at 6-months' follow-up.

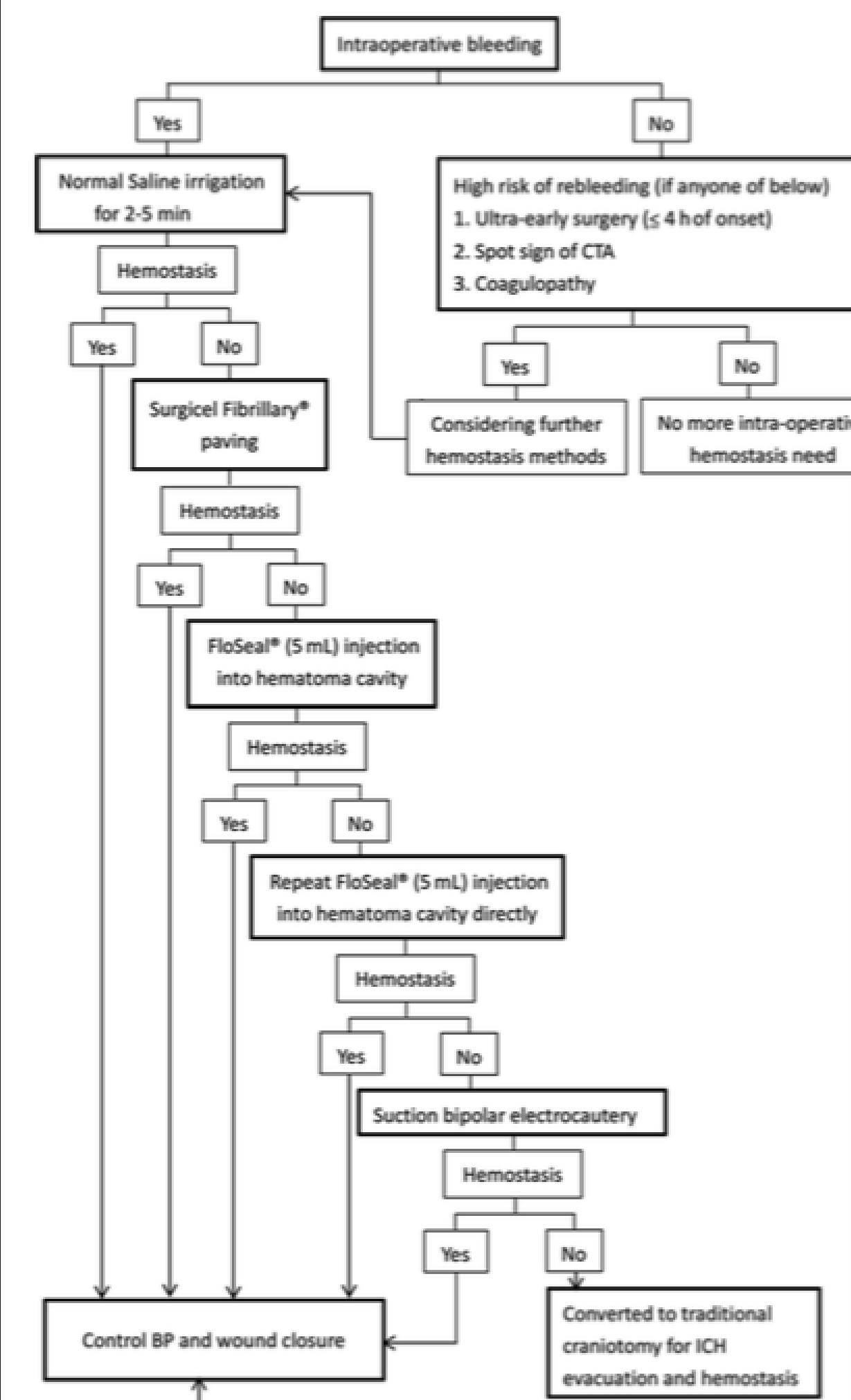


Figure 2. Flow chart to illustrate intra-operative hemostasis strategy.

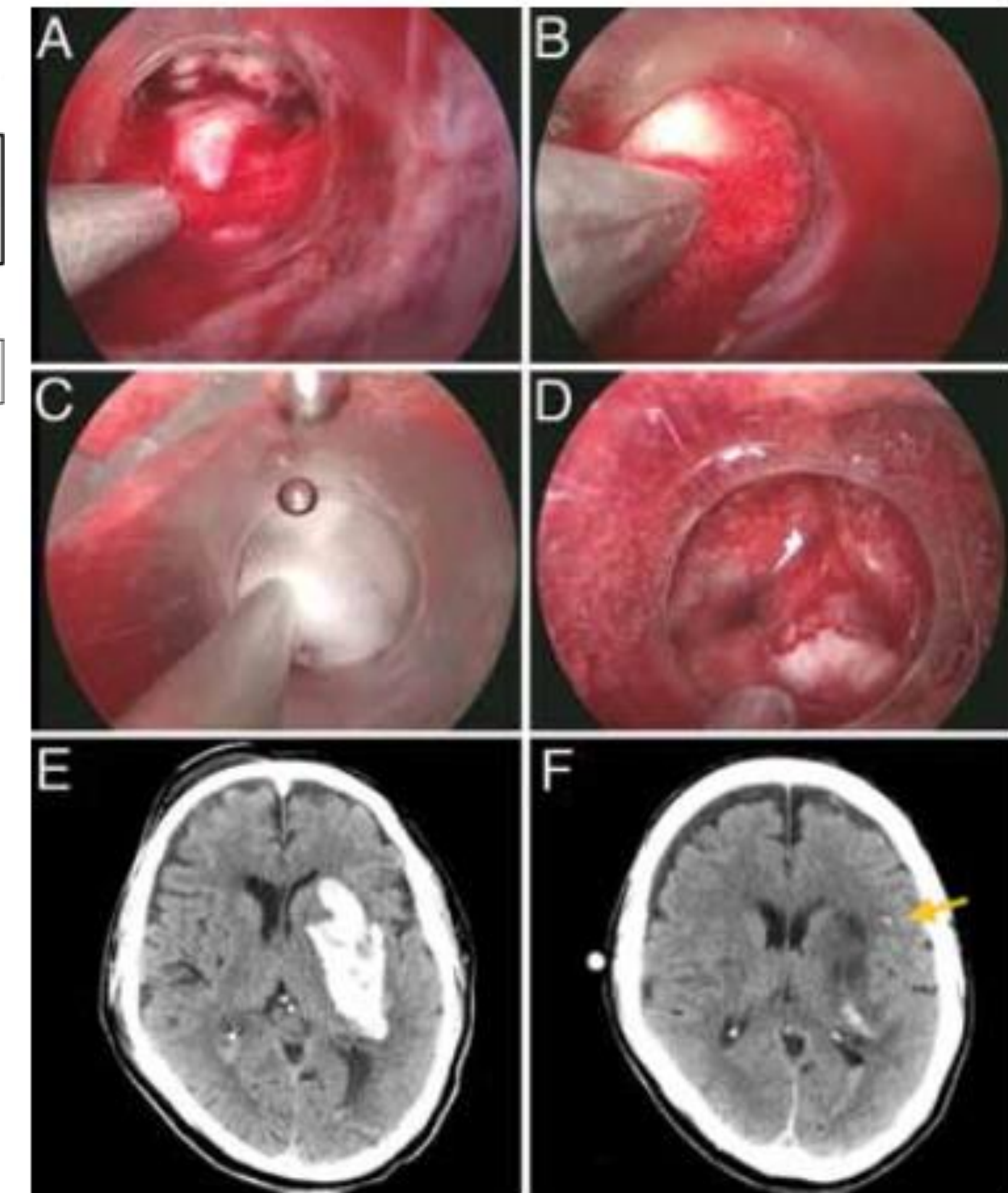


Figure 3. Using a hemostatic agent in a case of putaminal ICH. (D) FloSeal crystals coating on the hematoma cavity.

## Conclusions

**Local application of FloSeal Hemostatic Matrix is safe and effective for hemostasis during MIE evacuation of ICH. This shortens the operation time, especially in cases with intra-operative bleeding.**