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Minimally Invasive Technique for Spontaneous Intraparenchymal Hemorrhage

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Abstract

Objective The aim of this study was to introduce a cost-effective and less invasive method for the evacuation of intraparenchymal hemorrhage (IPH).

Background IPH in the presence or absence of intraventricular hemorrhage has severe morbidity and has almost 50% mortality whether the patient is managed surgically or medically. Development of minimally invasive surgical techniques offers better outcomes but requires the use of special instruments and a unique skill set that is costly and requires special training.

Method We inserted infant feeding tube within the hematoma via the left Kocher's burr hole. We instilled 40,000 IU of urokinase serially at an 8 hours interval for 3 days to evacuate the left gangliocapsular hematoma.

Result We have treated a 50 years old hypertensive male patient with left gangliocapsular IPH and right hemiparesis (power: ⅖ on admission). After a month, on follow-up, the patient was conscious and oriented with improved right hemiparesis (power: ⅘).

Conclusion This technique of evacuating hematoma is instrumental in peripheral centers in developing as well as under-developed countries where there are limited resources and a better outcome is expected with minimal morbidity.

Keywords
- IPH
- urokinase
- MIS

Introduction

Only 15% of all strokes are hemorrhagic strokes. They are notorious for their tendency to develop subsequent severe debilitating neurological deficits.[1] Intracranial hemorrhage (ICH) with or without the intraventricular hemorrhage tends to have significant morbidity owing to mass effect and secondary brain injury.[2] When hemorrhage occurs in the absence of any coagulopathy or vascular anomaly, it is primary ICH. The most common cause is hypertension.[3] Options and indications for surgical or medical management remain controversial. Although surgical management might have some advantages, it is undone by the parenchymal damage caused.[4]

Minimally invasive surgery has improved outcomes to some extent. In the present study, we suggest modification of the classic technique using common neurosurgical equipment. This study aims to introduce a new cost-effective way for intraparenchymal hemorrhage (IPH) evacuation with reduced morbidity.

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Technique and Case report

A 50-year-old hypertensive male patient was admitted with a history of altered consciousness for a day. All routine investigations and computed tomography (CT) scans showed the left gangliocapsular region with a volume of hematoma was 36 mL. He was stuporous with the Glasgow coma scale of E2V1M3. He had right hemiparesis with grade ⅖ power in his upper and lower limbs. Reflexes in the right lower limb were exaggerated and the right plantar reflex was extensor. Because of his clinical condition, an emergency evacuation of the hematoma was done. The precise location of the hematoma was decided with the help of a CT scan. A burr hole was performed at the left Kocher's point. Dura was cauterized and opened. A no.10 infant feeding tube (IFT) was inserted perpendicular to the brain surface into the left midpupillary line up to 6.5 cm. The hematoma was encountered. Approximately, 5 mL of blood clots were removed and after that 40,000 IU urokinase was instilled in the hematoma location via in situ IFT. The patient had shifted to neuro-intensive care unit for postoperative management. After an hour of administration of urokinase, 3 to 5 mL of the blood clot was meticulously evacuated from in situ IFT. The cycle was repeated 8 hours daily for 3 days, followed by a CT scan to assess the volume of hematoma that showed a declining trend. After 3 days of the cycle, there was only a 4 mL hematoma at the left gangliocapsular region. Concurrent improvement in neurological conditions was also evident. There was a spontaneous eye opening. He was able to localize suprasternal painful stimulus. The patient was discharged on the 14th postoperative day after suture removal and with Ryle's tube and per-urethral catheter in situ. CT scan at the time of diagnosis was suggestive of a small area of gliosis at the site of the hematoma. The patient was asked to follow-up after 10 days. Ryle's tube and the per-urethral catheter were removed. The patient was conscious and oriented. There was a significant improvement in right lower limb power as to grade ⅘.

Clinical Significance

IPH is notorious for associated morbidity and mortality, but the data remain the same for the past 30 years despite advancements in the medical field. Incidence is higher in males.[5] ICH invariably presents with focal neurological deficits that localize to the bleeding site. Convulsion, vomiting, and headache are associated symptoms due to raised intracranial pressure. Bleeding incites edema and dissects through parenchyma and may reach up to ventricles. Deterioration is at a maximum within 3 days of the event due to local edema and neuronal death. CT scan is the investigation of choice and helps determine the volume of hematoma.[6]

Patients can be managed either surgically or medically. Some studies compare the efficacy of these two and their timely implementation according to clinical and radiological parameters.[7] Minimal invasive surgery (MIS) with the use of urokinase is the latest dimension of treatment.[8] Numerous modifications of MIS have been proposed. Different studies show one similar conclusion that early surgical intervention improves outcomes. The use of fibrinolytic agents is better than decompressive craniectomy alone.[7,8] The main hurdle while implementing this technique is its cost and availability to peripheral centers in third-world countries. In this case, we tried to overcome those limitations by using IFT and imaging calculation to replace MIS and stereotactic instruments. The use of urokinase is also cost-effective when compared with recombinant tissue plasminogen activators. It is safe in comparison to streptokinase.

In the current case, we have demonstrated the use of imaging studies to precisely localize the hematoma and the usage of IFT by modification of the Extra Ventricular Drainage (EVD) insertion technique to instill urokinase into the hematoma. We have got positive results in this 50-year-old patient with IPH. The parent model for this technique is Minimally Invasive Surgery plus Rt-PA for ICH Evacuation (MISTIE) and Clinical Trial on Treatment of Intraventricular Hemorrhage (CLEAR) trials.[9,10] To prevent infection while using IFT, same technique (minimal possible handling, no touch to surroundings) is followed as using a ventricular catheter. Subgaleal course is kept more than 5 cm. The outlet is secured with a sterile dressing. While instilling, a three-way connector is used.

It is just a case report. The large series with comparative groups are required to provide evidence for the application of this cost-effective technique. The takeaway message is that this is doing more with less and provides a dimension for future research and application. Currently, a longitudinal study is being undergone in our center that will compare the results of this technique with existing treatment modalities.

Conclusion

ICH requires prompt and proper intervention. Early surgical intervention is the key in a few cases. With the use of the minimal neurosurgical facility, we can provide better patient care with less morbidity and good clinical outcome, specifically in areas that lack advanced neurosurgical services, such as peripheral centers in developing and underdeveloped countries. MIS has significantly less morbidity. It limits exposure to the normal brain parenchyma and has a higher complication rate. Conventionally, it is used with stereotaxy making it expensive and restricting it to higher centers. We propose a simple technique that is cost-effective and easy to apply even in peripheral centers.

Conflict of Interest
None declared

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