



Case Report

Endoscopic-assisted removal of bilateral traumatic intracerebral hemorrhage: A case report

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ABSTRACT

Background: Decompressive craniectomy or craniotomy is an effective method for reducing intracranial pressure in patients with traumatic brain injury. However, contralateral intracranial hematoma is a rare but serious complication. Recently, the endoscopic technique has been described as a minimally invasive, safe, and effective treatment for intracranial hematoma evacuation. To the best of our knowledge, no technical report has described bilateral traumatic intracerebral hemorrhage (TICH) evacuation using a neuroendoscope.

Case Description: A 62-year-old man was admitted to the hospital after a fall due to intoxication. His initial Glasgow Coma Scale (GCS) score was 14. Initial computed tomography (CT) revealed a right temporal skull fracture, bilateral frontal and right temporal tip contusions, and acute subdural hematoma. During admission, his condition deteriorated to a GCS score of 6 points, and follow-up CT showed hemorrhagic progression of left frontal and right temporal contusion with midline shift and brainstem compression. Emergency surgery was performed for TICH in the left frontal lobe and right temporal lobe. A burr hole was made in each of the left frontal and right temporal regions, and we used a neuroendoscope to assist in the evacuation of the hematoma. Postoperative CT showed adequate evacuation of the hematoma. The patient regained consciousness and was discharged after 2 months.

Conclusion: Bilateral TICH was rapidly and sequentially removed by burr-hole craniotomy and endoscopic hematoma evacuation without rapid decompression by craniotomy. The hematoma did not increase. This report demonstrates that the endoscopic-assisted technique allows the safe treatment of bilateral TICH.

Keywords: Bilateral traumatic intracerebral hemorrhage, Burr hole, Endoscopic surgery, Minimally invasive, Traumatic brain injury

INTRODUCTION

Traumatic intracerebral hemorrhage (TICH) is estimated to occur in 25–45% of cases of severe traumatic brain injury (TBI) and in 3–12% of cases of moderate TBI.^[1,8,11] TICH may occur alone or in association with severe or diffuse cerebral edema. The primary goal in the surgical management of patients with TBI is adequate decompression.^[13] Endoscopic surgery is a treatment option for TICH if the indication is carefully considered. Although insufficient for hemostasis, endoscopic surgery is less invasive and can sufficiently reduce intracranial pressure relative to craniotomy or craniectomy.^[12,13] Recent studies suggest that endoscopic surgery

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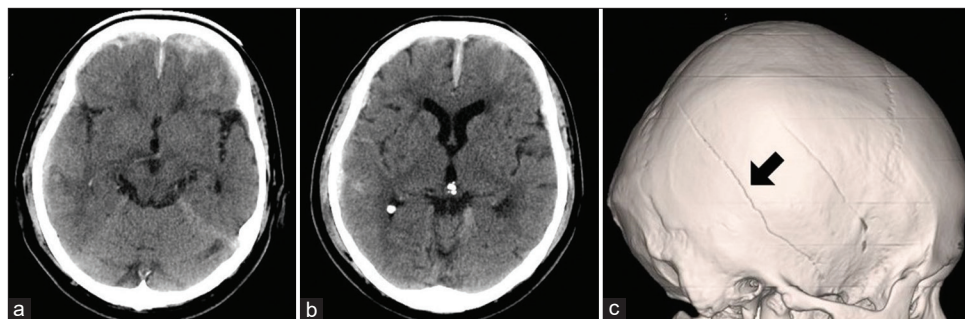


Figure 1: Initial computed tomography (CT) scan showing bilateral frontal and right temporal tip contusions (a) and acute subdural hematoma (b). Three-dimensional CT revealing a right temporal skull fracture (c, arrow).

can provide both adequate decompression and maximize neurological recovery in patients with TBI.^[12,13] Furthermore, patients with TBI undergoing unilateral decompression surgery for hematoma evacuation are at risk of contralateral hematoma enlargement.^[3,5,10] This report describes the case of an elderly patient who developed bilateral TICH following a fall. To the best of our knowledge, this is the first report describing the surgical management of bilateral TICH using endoscopic hematoma evacuation.

CASE DESCRIPTION

A 62-year-old man with well-controlled hypertension and diabetes was admitted to the hospital after a fall due to intoxication. He lost consciousness after the accident and regained consciousness shortly after arrival at the emergency department. His initial Glasgow Coma Scale (GCS) score was 14 (E4V4M6). Computed tomography (CT) revealed a right temporal skull fracture, bilateral frontal and right temporal tip contusions, and acute subdural hematoma [Figure 1]. During admission, the patient's condition deteriorated to a GCS score of 6 points (E1V1M4). Follow-up CT showed hemorrhagic progression of the left frontal and right temporal contusion with midline shift and brainstem compression [Figure 2]. Emergency surgery was performed for TICH in the left frontal lobe and right temporal lobe. Considering the bilateral TICH and the need for rapid decompression, endoscopic surgery was chosen. Endoscopic surgery was performed under general anesthesia. A 4-cm incision was made on the scalp where a burr hole was subsequently made with a hand drill, after which the dura was opened in a cruciate fashion. A corticotomy was performed to place the access system using a transparent trocar identical to that used for intracerebral hemorrhage (ICH). The length of the trocar was estimated using pre-operative CT images, and a stylet was inserted until it reached the hematoma. After the removal of the stylet, a 4-mm zero-degree rod lens endoscope was inserted into a transparent sheath to allow visualization during TICH removal. A suction catheter was then inserted with the endoscope to evacuate

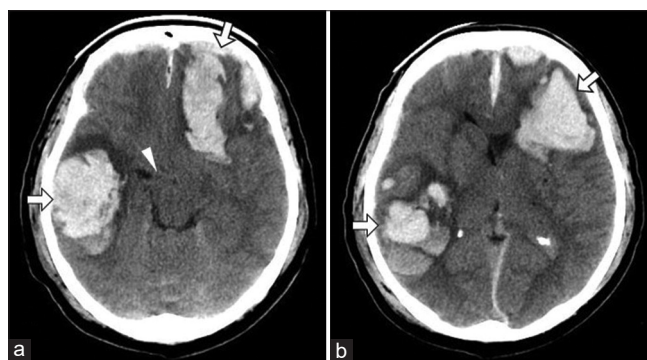


Figure 2: Follow-up computed tomography showing hemorrhagic progression of the left frontal and right temporal contusion (arrow) with midline shift and brainstem compression (arrow head) (a and b).

the hematoma. As the hematoma was removed, the cavity gradually collapsed, revealing normal brain tissue. The residual hematoma was visible through the transparent trocar, which was removed by adjusting the depth and angle of the trocar. In cases where arterial bleeding was detected, the bleeder was identified and cauterized. Once hemostasis was achieved, the trocar and endoscope were removed, the dura repaired and the wound closed in a standard fashion. Blood loss was <10 mL and the operative time was 100 min.

Postoperative CT showed more than 90% TICH removal with adequate decompression [Figure 3]. The patient regained consciousness postoperatively to a GCS score of 14 points (E4V4M6), but with higher cerebral dysfunction including cognitive dysfunction and irritability. He was discharged with a Glasgow Outcome Scale score of 4 after 2 months.

DISCUSSION

The clinical course and complications associated with TICH and ICH are similar. Following the primary injury, re-bleeding and cerebral edema are the most common significant adverse events.^[7,13] Endoscopic hematoma removal is increasingly used to treat ICH. Studies support the safety and efficacy of endoscopic hematoma removal and show that it is associated

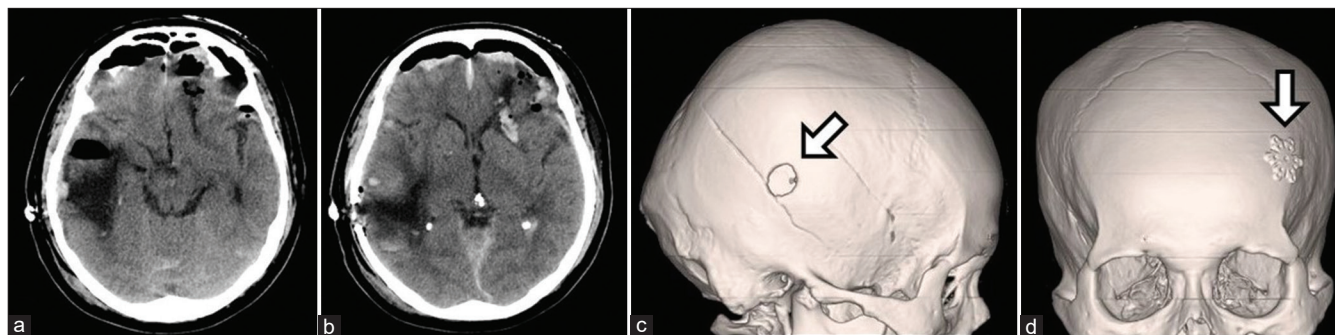


Figure 3: Postoperative computed tomography (CT) showing adequate hematoma evacuation (a) and improved midline shift after surgery (b). Three-dimensional CT showing two burr holes made in the right temporal (c, arrow) and left frontal (d, arrow) regions for the endoscopic removal of bilateral traumatic intracerebral hemorrhage.

with improved neurological recovery.^[7] TICH patients with GCS scores of 6–8, contusions $>20\text{ cm}^3$ in volume, a midline shift of at least 5 mm and/or cisternal compression on CT, and volume of any lesion $>50\text{ cm}^3$ are treated surgically.^[6]

We perform endoscopic hematoma removal in the management of TICH, similar to how we routinely manage ICH. In cases of intracranial pressure $>20\text{ mmHg}$ after removal of TICH by endoscopic hematoma evacuation, we consider decompressive craniectomy. As the present case had no significant cerebral edema, postoperative neurological recovery was faster.

Extra-axial hematomas (EAH) progress in 22% of patients with TBI at the original frontotemporal site after contralateral decompression surgery (CDS).^[2] The pathogenesis of delayed progression of EAH after CDS includes loss of the tamponade effect, abnormal vasomotor mechanisms, and acute coagulopathy.^[4,14] Risk factors for progressive EAH include a hematoma volume $\geq 10\text{ mL}$ at the initial impact site.^[2] Although this case was TICH, there was concern that CDS would increase contralateral TICH. Accordingly, a burr-hole procedure was chosen instead of craniotomy or craniectomy. This strategy allows for gradual decompression while advancing the initial operative time and preventing a sudden decrease in the tamponade effect. As such, reducing the risk of contralateral TICH associated with decompression may help.^[9] In the present case, the bilateral TICHs were rapidly and sequentially removed by burr-hole craniotomy and endoscopic hematoma evacuation without rapid decompression by craniotomy. No increase in the hematoma was observed.

CONCLUSION

Bilateral TICH was rapidly and sequentially removed by burr-hole craniotomy and endoscopic hematoma evacuation without rapid decompression by craniotomy without an increase in the hematoma. Our report demonstrates that bilateral TICH can be safely treated with endoscopic-assisted techniques.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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