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Intraparenchymal haemorrhage after burr hole drainage: A case report and review of literature

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Abstract

Intraparenchymal haemorrhage after burr hole drainage for the treatment of chronic subdural haemorrhage is a complication that should not be over looked. Here we report a case of a 93 years-old man with a history of hypertension under medical control who suffered progressive left hemiparesis over the course of three days. His brain CT showed bilateral subacute subdural hematomas, so we arranged bilateral burr hole drainage with placement of frontal subdural closed drainage systems on each side. His perioperative blood pressure remained in normal range. However, on the first postoperative day the patient's muscle power declined on the left side and his consciousness became drowsy. Hypertension with bradycardia ensued in this patient which suggested increased intracranial pressure. This prompted a follow up MRI which showed intraparenchymal haemorrhage at the right lentiform nucleus. CTA showed no vascular malformation or neoplasm, nor hemorrhagic diathesis, and the patient's preoperative coagulation parameters were normal. Although a hypertensive history increases the risk for spontaneous ICH in this area, we cannot rule out an increased risk due to the surgical procedure or the anesthetic process. The patient was given hydration and bed rest, as well as medication for blood pressure control. There was no further neurological decline and both drainage tubes were removed six days postoperatively. This case raises awareness that intraparenchymal hemorrhage in a procedure such as the burr hole craniotomy is possible, and its cause may be related to the patient's hypertension, to the opening of the drainage system or the relief of intracranial pressure from the burr hole procedure itself.

Keywords

chronic subdural hemorrhage; burr hole drainage; putaminal hemorrhage

Abbreviations

CT: Computed Tomography; CTA: Computed Tomography Angiography; SDH: Subdural Hematoma

Introduction

Subdural hematoma (SDH) is blood forming in the space between the dura and arachnoid [1]. Head trauma is the most common cause of SDH, and chronic SDH is most commonly seen in the elderly [1,2,3]. It is a condition more common in older adults due to the stretching and weakening of bridging veins in an atrophic brain. It occurs bilaterally in 19% of all cases and is more common in the male sex

[4,5]. A haematoma develops when bridging veins are torn, usually due to a head injury [6]. Typical treatment for symptomatic subacute or chronic SDH is to undergo a burr hole craniotomy for the release of subdural blood collection [7]. This procedure is relatively low risk and effective and consists of drilling a hole in the skull and draining the liquefied blood through a drainage tube or with sterile saline irrigation [8]. Usually after drainage of a SDH, 80 to 90 percent of patients show significant improvement in brain function [9]. Here we report a case of intraparenchymal haemorrhage at the right lentiform nucleus after bilateral burr hole craniotomy for bilateral subacute subdural hematoma. In addition to presenting the clinical course of an unusual case, we will discuss the possible mechanisms of intracranial haemorrhage after burrhole drainage.

Case Report

This is a case of a 93 years-old man with a known history of prostate cancer, stage III, status post hormone and radio therapy. He also has hypertension currently under medical control. He was found by his family to exhibit progressive left hemiparesis over the course of three days. On the third day, he fell from his bed in the morning due to left-sided weakness and was brought to our ER. Tracing back to his recent condition, he recalled a falling injury two weeks ago, but could not recall the exact injury site. On examination at the emergency room, he was alert and conscious and normotensive. Neurological examination showed weakness of left-sided limbs with Medical Research Council muscle power grading of 4 in left upper and lower limbs, and grade 5 on the right. No other focal neurological deficits were found. Brain CT showed bilateral subacute subdural haematomas at the frontotemporal region, with a thickness of 22mm on the right side and 12mm on the left (**Figure 1**). After a detailed discussion of possible surgical risks, the patient and his family chose to undergo surgical treatment. Therefore, bilateral burr hole craniotomy was done at the Kocher's point on either side. Upon opening of the dura, xanthochomic fluid was drained and the subdural space was irrigated gently with normal saline until the outflow was clear. It is routine for our chronic subdural hematoma cases that we use a stiff endoscope to peer into both burr holes if there was sufficient space to do so, to ensure hemostasis inside without obvious septum formation. Two external ventricular drainage tubes were placed at the frontal subdural space and fixed with purse-string sutures. Both drains were connected to a closed drainage system on either side.

Perioperative blood pressure remained within normal range and he was monitored and medicated during his ICU stay. However, there was a spike in blood pressure on the post-operative day. The patient's muscle power declined further over the left side and consciousness became drowsy. This prompted a follow up MRI which showed new intraparenchymal haemorrhage at the right lentiform nucleus (**Figure 2A, B, C**). CTA showed no vascular malformation or neoplasm, nor hemorrhagic diathesis, and coagulation parameters were normal. He was not on any anticoagulants nor did he have any bleeding disorders, cerebral amyloid angiopathy, arterial aneurysms, arteriovenous malformations, or other vascular anomalies. Patient was given hydration and bed rest, as well as medication for blood pressure control. His drainage tubes were removed six days postoperatively. After medical treatment, the patient's consciousness recovered and there was no further neurological decline, and we arranged in-hospital rehabilitation and discharged him three weeks later.

Discussion

Intraparenchymal haemorrhage is a low incidence complication of burr hole drainage for the treatment of subdural hematoma [10,12,13]. There are a few case reports describing postoperative cerebellar haemorrhage after burr hole trephination [14,15]. One case series reported three cases of IPH in the frontal, parietal, and temporal region, respectively, with a reviewed incidence range between 0.7-4% [16]. However, other studies have shown that patients with chronic subdural haematomas tend to have diminished blood flow especially in the ipsilateral basal ganglia and thalamus, as according to SPECT studies [17,18]. Post-operative normalization of this imbalance of blood flow could be a causal factor of intraparenchymal haemorrhage, especially in the elderly [19]. In our study, although the location of our haemorrhage is a common site for hypertensive IPH, it is also a suspicious site for post burr hole craniotomy complications. Although most cases in the literature occur at the ipsilateral side of the burr hole [16], in our case bilateral burr holes were made, and this resulted in a right sided IPH. Further investigation may be required to assess whether bilateral burr hole craniotomies incur higher risks of IPH and if so, the likely location and sidedness of the haemorrhage.

The most common sites for intracranial haemorrhage due to hypertension are the basal ganglia (especially the putamen), thalamus, pontine, and cerebellum [11]. In this case, an independent occurrence of intracerebral haemorrhage cannot be ruled out due to the patient's hypertensive history. However, quantitative evaluation of PET scans shows blood flow changes in these areas in cases of chronic subdural haemoatomas [17], which suggests a release of pressure from an action such as burr hole evacuation may also play a role in the occurrence of this ICH. The patient's blood pressure was under intense monitoring and careful medication during his ICU hospitalization. Although it is more likely that his haemorrhage preceded the spike in blood pressure, in this case hypertensive haemorrage still cannot be completely ruled out [11]. Other explanations for spontaneous intracerebral haemorrhage after burr hole craniotomy includes sudden changes in cerebral blood flow with decrease in intracranial pressure after the procedure [16], as well as perioperative medication use and fluid supplementation. Another likely cause may be the overdrainage of the subdural space by two drainage systems causing a rapid parenchymal shift, leading to the resultant intraparenchymal haemorrhage [13]. This can be suspected from the amount of pneumocephalus present on MRI imaging (**Figure 2**). There was also the possibility of an underlying pathology such as a vascular legion or metastasis, given his history of prostate cancer, however, MRI showed no signs of tumor and CTA revealed no obvious vascular lesions.

Conclusion

Through this case, we are reminded that although spontaneous haemorrhage after burr hole craniotomy is unusual, it is a possible complication that cannot be lightly overlooked. Its occurrence may have been related to the patient's hypertension, to the shift in intracranial pressure after relief of the chronic SDH, or to the over drainage of the subdural space causing a rapid parenchymal shift.

Figures

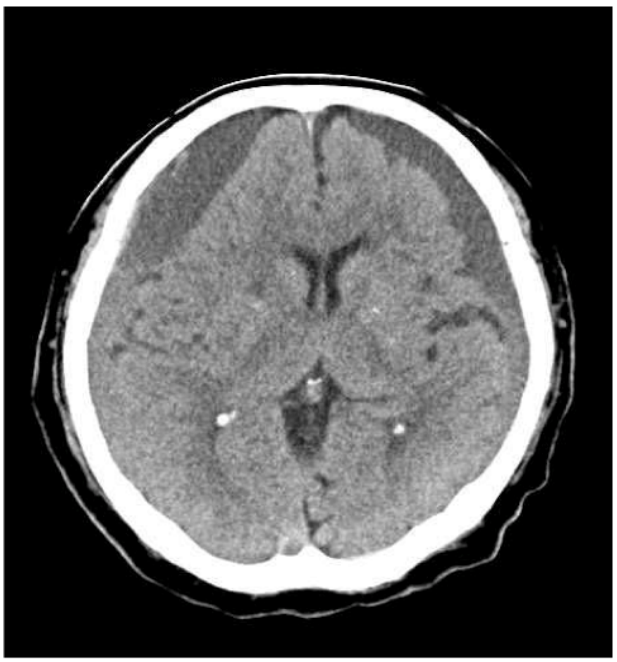

Figure 1: Non-contrast brain CT showing subacute SDH over bilateral frontotemporal region, with a maximum thickness of 22mm on the right and 12mm on the left.

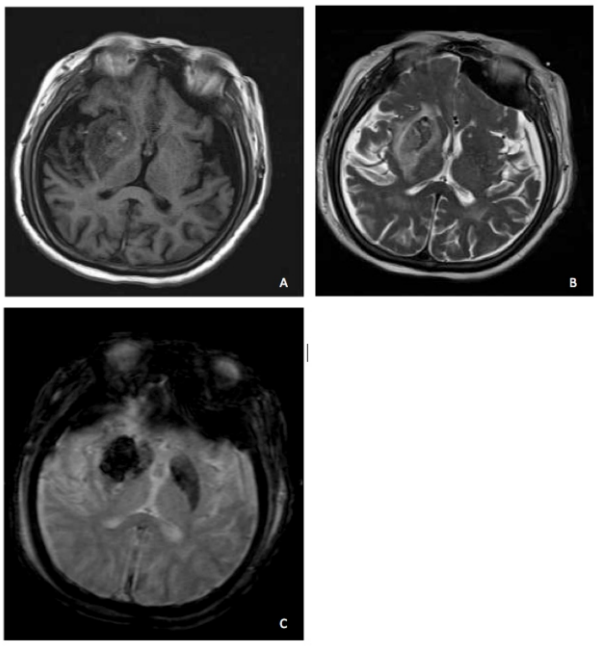

Figure 2: MRI T1 (A), T2 (B), and SWI (C) showing acute intraparenchymal hemorrhage about 2.5 cm in right lentiform nucleus, and bilateral pneumocephalus with bilateral EVD placed in both Kocher's points.

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