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Case Report

Surgery Section

Remote Cerebellar Haemorrhage Occurring after Transcranial Pituitary Surgery

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ABSTRACT

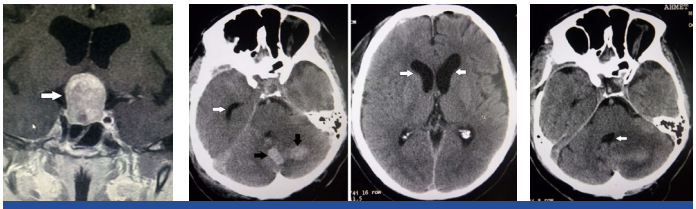
Post supratentorial and spinal surgeries, in rare cases, Remote Cerebellar Haemorrhage (RCH) develops as a complication. Although the exact aetiology of RCH remains uncertain, excessive drainage of the Cerebrospinal Fluid (CSF) is accepted as the most possible cause. It has been suggested that overdrainage of CSF leads to stretching and resultantly tearing of the cerebellar veins. Early diagnosis and appropriate management decrease mortality and morbidity significantly. In this report, we present a case of RCH encountered on the third postoperative day of transcranial pituitary surgery and discuss the possible causative factors. Excessive loss of CSF is considered to be the major cause of RCH. To our knowledge this is the first case of RCH seen after transcranial macroadenoma surgery reported in the literature so far.

Keywords: Excessive CSF drainage, Transcranial pituitary surgery, Visual impairment

CASE REPORT

A 63-year-old male patient was referred to the Department of Neurosurgery with a six-month history of gradually increasing headache and a three-month history of visual impairment. The physical and laboratory examinations were unremarkable. No neurological deficit was detected other than bitemporal hemianopsia. Cranial Magnetic Resonance Imaging (MRI) scan revealed a pituitary macroadenoma, expanding suprasellar cistern and compressing the optic chiasm [Table/Fig-1]. Preoperative coagulation parameters were within normal limits. After preoperative evaluations the patient underwent an operation of gross total excision of pituitary macroadenoma via a right pterional craniotomy.

Upon deterioration of consciousness with a Glasgow Coma Score (GCS) of 10 and emerging of a hypertensive attack on the third postoperative day, a non-contrast enhanced cranial CT (Computed Tomography) scan was taken. A left cerebellar haematoma causing partial compression of the fourth ventricle and mild hydrocephalus were detected [Table/Fig-2a,b]. An external ventricular drain was immediately placed in order to decrease and control the intracranial pressure. No further surgical intervention was considered and the patient was followed in intensive care unit. On the first postoperative day of external ventricular drain insertion, the patient's neurological status improved to normal levels (GCS: 15) and no neurological deficit was observed. On the seventh day of cerebellar haemorrhage, cranial CT scan revealed the nearly-total resolution of cerebellar haemorrhage [Table/Fig-3]. The patient's drain was pulled out on the eighth day of cerebellar haemorrhage. The patient was closely monitored for five more days after removing external ventricular drainage catheter in order to make sure of normal intracranial pressure. The patient was discharged from hospital on the 15th postoperative day of pituitary surgery with no neurological deficits. The patient's follow up examinations were carried out at regular intervals. No abnormality was noted in two year follow up period.



[Table/Fig-1]: Preoperative contrast enhanced T1-weighted coronal cranial MRI scan revealed a pituitary macroadenoma expanding suprasellar cistern and compressing the optic chiasm (shown with white arrow). **[Table/Fig-2]:** a) Axial cranial CT scan taken on the third postoperative day reveals the left cerebellar haemorrhage (shown with black arrows) compressing and obstructing the fourth ventricle and enlargement of the right temporal horn (shown with white arrow); b) Postoperative CT scan taken on the third postoperative day reveals a mild hydrocephalus with rounded and slightly enlarged lateral ventricles (shown with white arrows). **[Table/Fig-3]:** Postoperative CT scan taken on postoperative day nine (on the seventh day of cerebellar haemorrhage) reveals nearly-total resolution of cerebellar haemorrhage and the fourth ventricle returning to normal (shown with white arrow).

DISCUSSION

Postoperative intracranial haemorrhages at the operation site are frequently encountered complications due to insufficient haemostasis during the surgery. However, RCH which may be observed after supratentorial and spinal surgeries is an extremely rare complication [1,2]. The estimated incidence of RCH is around 0.3 to 4.9 % [3]. It is a rare but potentially life threatening complication of supratentorial and spinal surgeries. The occurrence of RCH following supratentorial surgery is most commonly seen between the ages of 30 and 60 years [4].

The most common presenting symptoms of RCH are decreased level of consciousness, motor deficits and gait ataxia, while some of them remain asymptomatic and found incidentally on postoperative CT or MR [5]. RCH appears to be located bilaterally 53.5% and unilaterally 46.5%. Concerning the bleeding pattern in RCH, it occurs in the sulcus situated on the superior tentorial surface of the cerebellum and accompanied by the bleeding of cerebellar vermis [1]. However, the RCH in the pure cerebellar vermis is rarely seen. In our case, it presented as decreased level of consciousness. An early cranial CT was then taken, and it revealed RCH localised in the left cerebellar vermis.

RCH might occur after tumour surgery, aneurysm surgery, temporal lobectomy, evacuation of acute and chronic subdural haematomas and spinal surgeries with unintended durotomies [6-8]. Different from the current literature; the indexed patient is a case of RCH seen after transcranial pituitary surgery, which has not been reported so far.

The exact pathophysiological mechanism giving rise to RCH is unclear. Konig A et al., asserted that the coagulation abnormalities were underlying reasons for the occurrence of RCH [6]. Even though Freidman JA et al., reported that the use of ASA (Acetylsalicylic Acid) increased the risk of RCH, they pointed out that there were no differences between control and RCH patients' coagulation parameters [4]. Arterial hypertension was also considered as a

predisposing factor for the RCH [8]. However, RCH was reported in the patients presented with even no history of arterial hypertension. Many authors believe that the RCH originates from the bleedings from venous system [3,9-11]. In a retrospective study, it has been postulated that intraoperative hypertension plays a particular role in the development of postoperative RCH [6]. Occult arteriovenous malformation, coagulation disorders or jugular venous obstruction from extreme head rotation are the other hypotheses proposed to explain the underlying pathology [1]. However, most authors have accepted two facts: a) RCH has a venous origin, and the superior vermian vein is mostly affected; b) RCH is probably the result of a massive loss of CSF in intraoperative and, even in postoperative period [12]. Konig A et al., reported that the remarkable decrease in the intracranial pressure emerging after the excision of supratentorial lesions and drainage of CSF give rise to a reciprocal rise in venous pressure and causes cerebellar haemorrhage [6]. Yoshida S et al., postulated that excessive intraoperative CSF drainage results in downward displacement of the cerebellum, which resultantly causes the stretching and tearing of the superior vermian vein leading to haemorrhage [12]. Friedman JA et al., adopted the downward displacement hypothesis; however, they underlined the haemorrhagic transformation of venous infarction caused by the stretching of the veins as the underlying reason [4]. In our case, consistent with the literature, intraoperative excessive drainage of CSF after cisternal dissection is believed to give rise to development of RCH.

The treatment methods of RCH vary from case to case. Conservative treatment should be preferred for asymptomatic cases with no raised intracranial pressure and when haematoma does not cause brain stem compression. The patient follow up examinations with appropriate imaging studies should be carried out at regular intervals up to complete resolution of haematoma. However, intracranial pressure should be decreased to normal levels through external ventricular drainage when obstructive hydrocephalus is seen on CT. Evacuation or decompression should be done if a large haematoma causing mass effect is encountered [12]. The regulation of systemic blood pressure and, if exists, coagulation disorders should also be treated [3]. In our case, the external ventricular drainage was promptly inserted due to the obstruction of fourth ventricle and a mild hydrocephalus. Intracranial pressure was decreased by this way which was probably an important factor for the patient's good prognosis.

Mortality and morbidity rates of RCH have been reported as 7.8% and 8.4% respectively [8,12]. RCH is frequently a benign complication and approximately 50% of the patients recover completely or they are discharged with minor neurological symptoms. Size and width of haemorrhage, are also the factors affecting prognosis [3].

Even though the underlying mechanisms of the RCH might not be completely explained, some preventive measures have been proposed in the literature that might decrease the risk of this complication. Although there is no consensus on these methods; the major recommendations proposed to decrease RCH development are: a) careful and gentle control of blood pressure during surgery; b) if exist, the management of preoperative coagulopathy; c) avoiding excessive CSF drainage during the surgery; d) avoiding unintended durotomy during spinal surgery; e) watertight closure of the dura; f) the placement of subgaleal drain instead of epidural drain [3,6,9,11].

CONCLUSION

RCH is one of the rare complications occurring after supratentorial and spinal surgeries. Although, the exact pathophysiological mechanism behind this remains unclear, it is considered that overdrainage of CSF during surgery plays significant role in the development of RCH. RCH is usually benign, yet it may occasionally give rise to serious morbidity and/or mortality. Preferred treatment methods of RCH should be specific to the patient. Asymptomatic RCH can be managed conservatively, but in cases with larger haemorrhages causing significant mass effect, surgical decompression should be preferred. Likewise, external ventricular drainage placement should be preferred in cases with acute hydrocephalus. Timely diagnosis and appropriate management are the key factors for a good prognosis in the cases of RCH.

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