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Suspected hypothalamic injury during trans-sphenoidal pituitary surgery – A rare yet dreaded complication

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Abstract

Background: Trans-sphenoidal resection of pituitary tumors is a commonly performed neurosurgery. A wide array of postoperative complications may occur which include pain, nausea and vomiting, airway obstruction, hypopituitarism, diabetes insipidus, cerebrospinal fluid leak, meningitis and cranial nerve dysfunction. Inadvertent iatrogenic hypothalamic injury, though quite rare may occur due to close proximity of the structure to the pituitary gland. Indirect injury because of vasospasm of vessels is also a possibility.

Case Presentation: We herein report a case of 35 years old female who was a known case of non-secretory pituitary macroadenoma. She underwent combined microscopic as well as endoscopic transnasal trans-sphenoidal resection of the tumor and sustained indirect injury of hypothalamus. The intraoperative period was uneventful but postoperatively patient failed to gain consciousness, and had inadequate respiratory efforts. The patient was shifted to ICU for ventilation where she developed high grade fever and intractable arrhythmias, resulting into cardiac arrest. Despite best resuscitative efforts, the patient could not be salvaged and expired around 36 hours after surgery.

Discussion: Due precautions should be take while excision of large macroadenoma having suprasellar extension and high index of suspicion should be kept for this rare and dreaded complication so that early management can be executed.

Keywords: Pituitary Surgery, Complications, Hypothalamic Injury, Arrhythmia

Introduction

Pituitary adenomas are one of the most common central nervous system neoplasms with incidence as high as 20%. Transsphenoidal approach to pituitary tumors is a surgical method over 100 years old. Recent surgical advancements include microsurgery and endoscope for surgical resection. Perioperative management of patients for pituitary surgery presents unique challenges due to associated comorbities and the surgical procedure itself.[1,2] However, there are wide array of complications reported following transsphenoidal

resection of pituitary tumors such as temporary diabetes insipidus, anterior pituitary insufficiency, damage to optic chiasma or carotid artery and CSF leaks.[3] Hypothalamic injury is a rare and devastating complication which may occur due to close proximity of hypothalamus to pituitary gland but in literature it is rarely reported. We hereby describe a patient who underwent transsphenoidal resection of pituitary macroadenoma and sustained hypothalamic injury.

Case Presentation

A 35 years old female with history of headache and difficulty in vision since one year, was diagnosed with pituitary macroadenoma and scheduled to undergo trans-sphenoidal resection of pituitary tumor. (Figure 1) She belonged to ASA physical status- I, had a BMI of 22 kgm^{-2} and airway examination was normal. There was no past significant medical history. All haematological, biochemical investigations and hormonal profile were within normal limits.

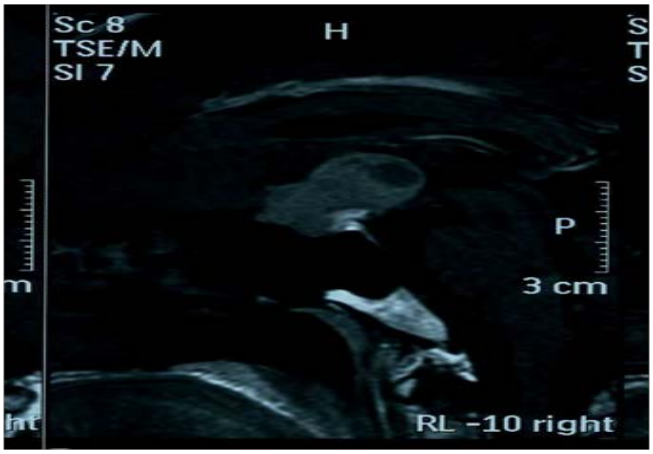

Figure 1: MRI showing Pituatary Tumour.

Anaesthesia was induced with glycopyrrolate, fentanyl, thiopentone and vecuronium. Orotracheal intubation alongwith oral packing was done. Maintenance of anaesthesia was done with oxygen and nitrous oxide in isoflurane, fentanyl for analgesia and vecuronium for neuromuscular relaxation were administered. The surgery lasted for 3 hours during which trans-sphenoidal resection of tumor was done, initially under microscope followed by endoscope. The sellar part of tumor was soft and sucable, however suprasellar part was firm in consistency. There was minimal blood loss and patient remained haemodynamically stable. There was no CSF leak intraoperatively. Postoperatively she failed to gain consciousness even after 30 minutes of surgery. There were slight respiratory efforts but inadequate, and pupils were normal in size and reactive to light. Non-contrast CT-scan was done which revealed slight residual tumor with no hematoma or infarct with air in bilateral frontal horns. (Figure 2) Patient was shifted to intensive care unit and put on elective ventilation.

Figure 2: Post-operative CT Scan.

On first postoperative day her GCS was $E_1V_TM_2$, pupils were mid-dilated and sluggishly reacting to light. The patient was haemodynamically stable and urine output was 80 ml/hr. All routine investigations, hormonal profile and chest X-ray were normal. Suddenly she developed fever (temperature- 104°F) for which cold sponging was done and inj. Paracetamol 1gm IV was given but the temperature did not come down.

Nimesulide was administered since fever was not responding to conventional treatment. ECG showed sinus tachycardia which eventually converted to ventricular arrhythmias and there was associated hypotension. Treatment was given in the form of lignocaine, adenosine and DC shock but she suffered cardiac arrest and could not be salvaged. The whole episode occurred within 30-45 minutes.

Discussion

Surgeries pertaining to brain are precarious due to close proximity of vital structures. Transsphenoidal resection of pituitary tumors is relatively a short procedure but quite difficult and challenging for surgeons too. In recent years, use of endoscope for transnasal transsphenoidal resection of pituitary tumours is increasing. Endoscope provides wide panoramic view and chances of residual tumors are less. However, whether it leads to less complication rates in experienced hands is yet to be proven.[4]

In our case, initially surgeons carried out microscopic resection followed by endoscopic resection of pituitary tumor. The tumor size was quite big and complete resection without causing any injury to surrounding structures was prime objective. The surgeons were experienced in this technique and regularly performing it since last three years. Intraoperative period was uneventful and it was postoperatively that the patient failed to regain consciousness. Delayed recovery after neurosurgery is not uncommon and the potential etiologies are prolonged effect of drugs, hypothermia, hypothyroidism, electrolyte imbalance, cerebral hypoxia, bleed or infarct.[5] All these possible etiologies were ruled out. Despite 30 minutes of switching off of anaesthetic agents, the patient was unconscious though slight but inadequate respiratory efforts were present. Temperature was normal, there was no dyselectrolytemia and CT scan failed to show any haematoma or infarct. Blood sample was sent for hormone profile and patient was electively ventilated.

The development of high grade temperature postoperatively was an alarming sign and it was not responding to any treatment. The differential diagnosis were infective pathology, thromboembolism, drug fever, transfusion reaction and subarachnoid haemorrhage.[6] TLC count, chest X-ray, color doppler of femoral vessels and CT-scan were nonremarkable. We speculate that thermoregulatory centre being located in hypothalamus must have been disturbed due to intraoperative injury to hypothalamus. Overenthusiastic wide excision of large size pituitary tumors are more prone for this dreaded and devastating complication. However, CT scan revealed no significant hematoma; hence instead of direct injury there must have been indirect injury to the structure due to ischemic compromise. During removal of tumour the hypophyseal vessel must have been stretched or compressed causing their vasospasm and ischemic compromise. CT scan being done in early postoperative period may not have revealed any infarct. Cerebral vasospasm is frequently accompanied with subarachnoid haemorrhage. Other conditions in which they may be associated are traumatic brain injury, cerebral tumors and craniopharyngiomas.[7,8]

Vasospasm after pituitary surgery is quite rare and there are anecdotal case reports in the literature.[9,10] Kasliwal et al observed vasospasm of left internal carotid artery at the point of bifurcation on thirteenth postoperative day.[9] Most of these patients have expired despite best management. The exact etiology however remains to be defined. Arrhythmias can also be explained by

hypothalamic injury since autonomic centres are located in the hypothalamus or they could be secondary to high grade temperature which was unresponsive to any treatment. Transcranial Doppler could not be done since this facility was lacking in our institution. MRI and angiography were lacking in our case which would have been confirmatory but the entire episode occurred too quickly and patient could not undergo these investigations.

Conclusion

We speculate that indirect ischemic injury to hypothalamus was the probable cause of mortality in our patient and highlights this uncommon yet serious complication of commonly performed procedure. Hence due precautions should be taken while excision of large macroadenoma especially having firm consistency and suprasellar extension. High index of suspicion should be kept for this rare and dreaded complication so that early management can be executed.

Consent: Patient has given his informed written consent for this case report to be published.

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