CASE REPORT

Hypopituitarism After Neurosurgery for Suprasellar Tumour: A Case Report

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Abstract

Hypopituitarism is a rare yet notable complication following neurosurgery in the suprasellar region. We report the case of a 42-year-old woman who developed both clinical and laboratory-confirmed hypopituitarism and diabetes insipidus after undergoing surgical resection of a meningioma that involved the optic chiasm and pituitary stalk. While the tumor was successfully removed, the patient faced postoperative challenges, including elevated intracranial pressure, polyuria, and hormonal deficiencies, which were indicative of secondary hypopituitarism. This case underscores the necessity for prompt endocrine assessment and vigilant postoperative surveillance in patients undergoing neurosurgical procedures affecting the hypothalamic-pituitary region. Timely diagnosis and treatment of hypopituitarism are crucial for improving patient outcomes and reducing the risk of long-term complications.

1. Introduction

The pituitary gland, also known as the hypophysis, is a gland approximately 1 cm in diameter located in the sella turcica, a bony cavity at the base of the skull, and is connected to the hypothalamus by the pituitary stalk. Physiologically, the pituitary can be divided into two parts: the anterior pituitary (adenohypophysis) and the posterior pituitary (neurohypophysis)[1].

The hormones produced by the adenohypophysis include growth hormone (GH), adrenocorticotropic hormone (ACTH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), and prolactin (PRL). The hormones produced by the hypothalamus and released by the neurohypophysis include oxytocin and antidiuretic hormone (ADH)[1].

Reduced secretion of one or more of these hormones is known as hypopituitarism. This decreased secretion can be congenital or occur at any point in life. In adults, it is typically divided into three main causes. Two are related to tumor conditions—craniofaryngiomas or chromophobic tumors—that may compress the pituitary gland, leading to complete or near-total destruction of the pituitary cells. The third cause is related to thrombosis of the pituitary blood vessels, which

may occur in women following childbirth[1][2].

Meningioma is the most common primary tumor of the central nervous system (CNS), accounting for 36% of all cases and 53% when considering only benign tumors, with an incidence of 7.86 cases per 100,000 people per year[3][4].

Most meningiomas are benign and are often discovered incidentally through imaging tests. There is no pathognomonic clinical presentation, and symptoms generally correlate with the location of the tumor. Typically, meningiomas grow slowly and may manifest as a mass effect, causing focal neurological symptoms, seizures, and increased intracranial pressure (ICP)[5].

Due to its location in the sella turcica, the pituitary gland is anatomically and physiologically closely related to the central nervous system and may be affected by various events in this region.

Bevengna et al. conducted a literature review of 357 cases of hypopituitarism following traumatic brain injury (TBI) published until 1998[6]. Additionally, pituitary and CNS tumors, such as meningiomas, can cause hypopituitarism due to mass effect or invasion.
A review of the literature in SciELO did not yield reports of cases of hypopituitarism following neurosurgery for CNS tumors. Therefore, due to the scarcity of articles on this subject, it is crucial to present this case report on hypopituitarism following neurosurgery for a tumor in the suprasellar region. Moreover, because post-neurosurgery hypopituitarism is a rare condition, screening and diagnosis are often not performed in the postoperative period.

For this reason, further studies on the topic are imperative to increase awareness of the condition and develop screening protocols, including laboratory and clinical exams, for those considered at risk of developing hypopituitarism following neurosurgical procedures. Additionally, referrals for specialized outpatient follow-up with endocrinologists should be considered.

2. Objective

To report the case of a patient who underwent neurosurgery for a tumor in the suprasellar region and subsequently developed clinical and laboratory hypopituitarism.

3. Case Report

A 42-year-old female lawyer, residing in Curitiba, was admitted to the University Hospital in Curitiba on April 18, 2023, for an elective neurosurgical procedure. She presented with a one-year history of progressively worsening left-sided visual disturbances, associated with headache and vomiting.

Magnetic resonance imaging (MRI) conducted on March 30, 2023, revealed an extra-axial expansive lesion with a broad dural base, located adjacent to the posterior margin of the sphenoid plane and tuberculum sellae. The lesion extended into the sella turcica, obliterating the suprasellar cistern and part of the interpeduncular cistern, with homogeneous

gadolinium enhancement measuring 4.3 mm x 3.6 mm. The lesion involved the optic chiasm and the supra-chiasmatic portions of the optic nerves. Additionally, the lesion had extensive contact with the medial and superior walls of the supraclinoid segments of the internal carotid arteries, circumferentially involving the C7 segments of the internal carotid arteries and segment A1 bilaterally, with circumferential contact with A2 bilaterally. A hyperintense focus in T2/FLAIR was also noted in the left parietal white matter.

Given the involvement of the optic chiasm and supra-chiasmatic portions of the optic nerves, the patient was indicated for surgical resection, which was performed on April 18, 2023, classified as Simpson grade 2.

During the resection, cerebral edema was observed, prompting the decision to maintain sedation and place a catheter for intracranial pressure (ICP) monitoring. A control imaging exam (cranial CT) performed the following day showed right frontal hypodensity associated with a "salt and pepper" appearance contusion. The patient's ICP remained controlled, requiring clinical management to stabilize it.

However, the patient developed increased ICP and anisocoria, which was reversed with clinical measures. A second surgical intervention was performed on April 20, 2023, to drain the contusion and resect the area of right frontal hypodensity. Post-surgery, the ICP improved, sedation was withdrawn, and after regaining consciousness, the patient was extubated. The patient experienced a single seizure, which was managed with phenytoin, and no further seizures occurred.

Postoperatively, the internal medicine team began managing a new onset of polyuria, polydipsia, and orthostatic hypotension on April 26, 2023. The clinical presentation, combined with the surgical procedure in the suprasellar region and episodes of hypernatremia between April 21 and 23, 2023, led to the suspicion of diabetes insipidus. A serum sodium test was performed on April 27, 2023, showing a value of 140 mEq/L (reference range: 136-145 mEq/L).

Given the clinical findings and laboratory results, the possibility of structural and functional damage to the pituitary gland following neurosurgery in the suprasellar region was raised. Hormonal tests were ordered to evaluate the hypothalamic-pituitary-adrenal axis, including ACTH, serum cortisol, TSH, and free T4. The results were as follows: ACTH < 5.0 pg/mL (reference range: 0.0-46.0 pg/mL, measured between 07:00 and 10:00 hours), cortisol 0.11 mcg/dL (reference range: 6.02-18.40 mcg/dL between 06:00 and 10:00 hours), TSH 2.52 (reference range not specified), and free T4 0.54 (reference range not specified).

These laboratory findings suggested a disorder in the hypothalamic-pituitary-adrenal axis, specifically ACTH deficiency (< 5.0 pg/mL) and hypoadrenalism (cortisol 0.11 mcg/dL). As a result, hydrocortisone therapy was initiated at a dose of 100 mg every 8 hours for one day, followed by a reduction to 100 mg every 12 hours the following day. Subsequently, the patient was switched to prednisone at 20 mg daily until the next follow-up appointment in two weeks.

At the follow-up consultation in the outpatient clinic on June 1, 2023, the patient continued to report symptoms of polyuria and polydipsia. Additional tests were ordered to investigate the possibility of hypopituitarism, and the prednisone dose was reduced to 10 mg daily. Laboratory results obtained during the follow-up visit were as follows: glucose 71 mg/dL

(reference range: 66-99 mg/dL), ACTH 5.8 pg/mL (reference range: 0.0-46.0 pg/mL between 07:00 and 10:00 hours), free T4 0.63 ng/dL (reference range: 0.54-1.24 ng/dL), TSH 5.413 µIU/mL (reference range: 0.34-5.60 µIU/mL), and cortisol 0.19 mcg/dL (reference range: 6.02-18.40 mcg/dL, measured between 06:00 and 10:00 hours).

Based on these findings, the diagnosis of secondary hypopituitarism resulting from the neurosurgical procedure for tumor resection in the suprasellar region was confirmed.

During the follow-up consultation with the neurosurgery team, the histopathological report of the tumor confirmed the diagnosis of meningioma, meningothelial type (Grade I).

On June 22, 2023, the patient returned to the emergency department with complaints of persistent polyuria, polydipsia, and episodes of syncope. A serum sodium level of 138 mEq/L (reference range: 135-145 mEq/L) was measured, and the prednisone dose was reduced from 10 mg to 7.5 mg per day. Given the continued symptoms of polyuria and polydipsia, a diagnosis of diabetes insipidus secondary to the neurosurgical procedure was suspected, and plans were made for inpatient admission for further investigation and management. Informed consent was obtained from the patient for the publication of this case report, including all associated clinical details and images.”

4. Discussion

Hypopituitarism is a recognized complication following surgery in the suprasellar region, especially when the pituitary gland or hypothalamus is directly affected. In this case, the patient developed clinical and laboratory signs of pituitary dysfunction following the resection of a meningioma located near the optic chiasm and pituitary stalk. The development of polyuria, polydipsia, and hypernatremia, in conjunction with abnormal pituitary function tests, led to the diagnosis of secondary hypopituitarism.

This case highlights the importance of early recognition of hormonal deficiencies following neurosurgery, especially in patients undergoing procedures near the pituitary gland. Hypopituitarism can present insidiously, and without appropriate screening, patients may suffer from long-term consequences. Therefore, post-surgical endocrine monitoring, including hormonal assays and clinical evaluation, is crucial for the timely identification of hypopituitarism and initiation of appropriate treatment

5. Conclusion

This case illustrates the rare but important occurrence of hypopituitarism following neurosurgery for a suprasellar tumor. The clinical and laboratory findings in this patient underscore the need for heightened awareness and systematic screening for endocrine dysfunction following such procedures. Early diagnosis and treatment can significantly improve patient outcomes, preventing further complications related to hormonal deficiencies.

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