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CASE REPORT

# Pituitary macroadenoma with optic chiasm compression and hypopituitarism: a case report

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## ABSTRACT

**INTRODUCTION**

Pituitary macroadenomas are benign pituitary tumors measuring more than 1 cm in diameter that constitute a substantial proportion of intracranial neoplasms. Despite their benign histology, these tumors may lead to significant morbidity due to local mass effects and endocrine dysfunction. Compression of the optic chiasm can result in progressive visual impairment and irreversible blindness if not promptly treated. Additionally, pituitary hormonal deficiencies may cause life-threatening metabolic and systemic complications. Early recognition and multidisciplinary management are therefore essential to prevent permanent sequelae and optimize functional recovery.

**CASE DESCRIPTION**

A 40-year-old woman presented with a one-year history of recurrent headaches accompanied by progressive blurring of vision, diplopia, and visual field defects. She also reported irregular menstruation and unintended weight loss. Brain magnetic resonance imaging demonstrated a 2.13 × 2.28 × 3.05 cm pituitary macroadenoma with a characteristic "snowman appearance" compressing the optic chiasm. Hormonal evaluation revealed secondary adrenal insufficiency, hypogonadotropic hypogonadism, suppressed thyroid-stimulating hormone (TSH) with elevated free thyroxine (T4), and hyperprolactinemia attributed to the stalk effect, consistent with hypopituitarism and thyroid dysfunction. Initial stabilization with hydrocortisone and methimazole was performed prior to definitive management. The patient subsequently underwent transsphenoidal tumor resection with appropriate perioperative glucocorticoid coverage. Postoperatively, she remained clinically stable with improvement in headache and visual symptoms, and continued hormonal therapy under close endocrinological supervision.

**CONCLUSIONS**

This case underscores the importance of comprehensive hormonal assessment, timely neurosurgical intervention, and coordinated multidisciplinary care in managing pituitary macroadenomas complicated by optic chiasm compression and hypopituitarism to achieve favorable clinical outcomes.

**Keywords:** Pituitary macroadenoma, optic chiasm compression, hyperprolactinemia, secondary adrenal insufficiency, transsphenoidal surgery

## INTRODUCTION

Pituitary macroadenomas are benign pituitary tumors with a diameter greater than 1 cm.[1] Pituitary adenomas are the second most common primary intracranial tumors, with macroadenomas (≥10 mm) comprising approximately 48% of all pituitary adenomas.[1,2] It is a relatively rare tumor, particularly in regions with limited diagnostic modalities. The clinical manifestations of pituitary macroadenomas are primarily determined by two pathophysiological mechanisms: mass effect on adjacent neurological structures and disruption of normal pituitary function.[1] Mass effects occur when tumor expansion compresses surrounding structures including the optic chiasm, cavernous sinus, hypothalamus, and third ventricle.[2] Optic chiasm compression and hypopituitarism are among the common complications of pituitary macroadenoma, both of which require appropriate treatment.[3,4]

Management of pituitary macroadenomas requires a multidisciplinary approach involving endocrinologists, neurosurgeons, and ophthalmologists.[5,6] Transsphenoidal surgery remains the primary treatment modality for symptomatic macroadenomas, particularly those causing visual compromise or significant mass effect.[7] However, optimal outcomes depend critically on proper perioperative endocrine management, as unrecognized or inadequately treated hypopituitarism can lead to life-threatening complications including adrenal crisis.[1,8]

The aim of this case report was to provide a comprehensive clinical overview of a pituitary macroadenoma presenting with optic chiasm compression and multiple pituitary hormone deficiencies, and to emphasize the critical role of multidisciplinary management in optimizing visual recovery and endocrine stabilization. This report also seeks to contribute practical insights into diagnostic challenges and perioperative hormonal management strategies in complex pituitary tumors.

## CASE REPORT

A 40-year-old female with recurring headache for one year, presented with blurring of vision, diplopia, and increasingly progressive visual field defects in the same period of time. In addition, she presented with irregular periods (her last menstruation being six months ago), along with 3 kg weight loss in the preceding three months. She had no history of nipple discharge.

Physical examination revealed a blood pressure of 120/70 mmHg, visual field deficits, and normal pubertal status. Contrast-enhanced brain MRI demonstrated a pituitary macroadenoma measuring 2.13 × 2.28 × 3.05 cm with a characteristic "snowman appearance" (Figure 1), compressing the optic chiasm.

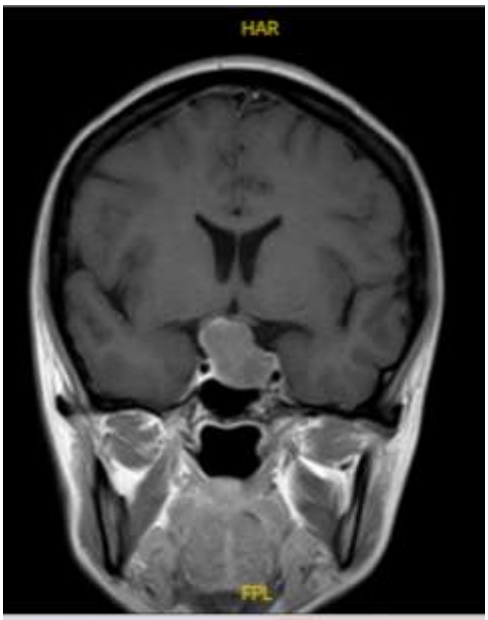


**Figure 1.** Contrast-enhanced brain MRI: pituitary macroadenoma with optic chiasm compression (Size: 2.13 × 2.28 × 3.05 cm).

Laboratory tests conducted in August 2024 revealed a cortisol level of 1 µg/dL (normal: 3.7–19.4 µg/dL), luteinizing hormone (LH) 1.62 mU/L (normal: 2.4–12.6 mU/L), follicle-stimulating hormone (FSH) 5.01 mU/L (normal: 3.5–12.5 mU/L), free thyroxine (FT4) 28.32 pmol/L (normal: 12–22 pmol/L), thyroid-stimulating hormone (TSH) 0.02 µIU/mL (normal: 0.27–4.2 µIU/mL), and prolactin 70.84 ng/mL. The patient presented with a pituitary macroadenoma and compression of the optic chiasm, secondary adrenal insufficiency, hypogonadotropic hypogonadism, and hyperthyroidism. The presence of more than one pituitary hormone deficiency indicated the occurrence of hypopituitarism. Hyperprolactinemia was accounted for by the stalk effect caused by the pituitary macroadenoma.

The patient was treated with methimazole 10 mg and hydrocortisone 20 mg. On follow-up,

cortisol increased to 4.7 µg/dL, FT4 normalized to 15.3 pmol/L, though TSH remained low (<0.05 µIU/mL). The patient was then prepared for transsphenoidal tumor resection, with perioperative management being hydrocortisone, methimazole, and dexamethasone. Transsphenoidal approach surgery was performed. Postoperatively, the patient remained stable with less headache and aptly controlled vital signs. Hydrocortisone 20 mg/day and methimazole 10 mg/day were prescribed postoperatively, while dexamethasone was stopped. The patient remained stable with minimal headache and nasal discomfort. Informed consent was obtained from the study subject and this case report was conducted in accordance with the Declaration of Helsinki.

## DISCUSSION

Pituitary macroadenoma is a benign pituitary gland tumor that is larger than 1 cm, commonly discovered inadvertently by brain imaging.[1,9] It accounts for around 48% of intracranial tumors and can impact numerous bodily functions either directly or indirectly by inducing hormonal imbalance.[1] Its high incidence is attributed to the fact that the majority of patients are not symptomatic during the early stages and thus are only incidentally detected on brain imaging scans.[10]

The effect of pituitary macroadenoma on the body is mediated by two primary mechanisms: local mass effect and hormonal disturbances.[4,11] The mass effect is caused by tumor compression of surrounding structures, such as the optic chiasm, brainstem, and cranial nerves. Compression leads to varying degrees of neurological dysfunction, depending on the tumor's location and the extent of compression. Larger tumors compress surrounding structures more significantly, worsening clinical symptoms. Complications from mass effects generally result in severe symptoms, including visual field defects, diplopia, chronic headaches, and, in the event of non-treatment, blindness.[12]

One of the most life-threatening complications of pituitary macroadenoma is compression of the optic chiasm. Visual loss due to optic chiasm compression is one of the most common presentations of this tumor.[13] Bitemporal hemianopia may result due to progressive optic chiasm compression, with the patient losing vision for objects on the outer field of vision. This is due to the interruption of visual information transmission from the retina to the brain by nerve fibers crossing between the two under compression. Chronic compression of the optic nerve that is not relieved in time can result in permanent atrophy of the optic nerve, culminating in complete blindness.[14] In addition to mass effects, pituitary macroadenomas most frequently disrupt hormonal function by either excess hormone secretion (such as hyperprolactinemia) or hormone deficits caused by the tumor compressing the anterior pituitary.[15] The hyperprolactinemia caused by prolactin-secreting pituitary tumors results in reproductive dysfunctions such as amenorrhea and galactorrhea. Endocrine disorders in the form of hormonal imbalances include adrenal insufficiency, hypogonadotropic hypogonadism, and secondary hypothyroidism which when untreated, would produce systemic and life-threatening consequences. Lack of more than one pituitary hormone is called hypopituitarism.[16,17] Reduced secretion of thyroid or cortisol hormones in pituitary macroadenoma can cause severe metabolic illness such as weakness, weight loss, and hypotension for which prompt and appropriate medical treatment should be given.[18]

The present case demonstrates several features consistent with previously published studies on pituitary macroadenomas (Table 1). Our patient presented with a tumor measuring 30.5 mm in largest diameter with optic chiasm compression and visual field defects. This aligns with the findings of Lee et al.,[19] who reported that 77.4% (89 of 115 patients) with pituitary macroadenomas presented with abnormal visual fields, although true bitemporal hemianopsia was exceedingly rare (only 1 of 115 patients). Similarly, Najmaldin et al.[20] reported visual field defects in 78.3% of patients with non-functioning pituitary macroadenomas, confirming that visual impairment is indeed one of the most common presenting features of these tumors.

Regarding hypopituitarism, our patient demonstrated deficiencies in three hormonal axes (adrenal, gonadotropic, and thyroid), which is comparable to the study by Mavromati et al.[21] showing that 67% of patients with non-functioning pituitary macroadenomas had at least one abnormal pituitary axis preoperatively, with hypogonadism being the most common (62.4%). However, the simultaneous presence of three hormonal deficiencies in our case represents a more severe degree of hypopituitarism than

typically reported, emphasizing the advanced nature of pituitary compression at presentation. Similarly, Prinzi et al.[22] reported that 37.2% of patients with prolactinomas had at least one pituitary hormone deficiency at diagnosis, with hypogonadism occurring in 34.5%, comparable to the gonadal dysfunction observed in our case.

The postoperative improvement in our patient, characterized by reduced headache and stable clinical condition, is consistent with multiple studies documenting high visual recovery rates following transsphenoidal surgery. A study by Subramanian et al.[23] reported that visual recovery or improvement following surgery occurred in 92% of cases with preoperative visual defects. These comparative findings underscore the critical importance of early surgical intervention combined with comprehensive perioperative endocrine management in optimizing outcomes for patients with pituitary macroadenomas presenting with both mass effect and endocrine complications.

Table 1. Comparison of present case with published studies on pituitary macroadenomas

| Authors | Study design | Tumor size | Visual field defects (%) | Hypopituitarism (%) | Surgical approach | Visual recovery rate (%) |
|---|---|---|---|---|---|---|
| Present case | Case report | 30.5 mm | Visual field defects present | Multiple axes deficiency (adrenal, gonadal, thyroid) | Transsphenoidal | Clinical improvement reported |
| Lee et al.[19] | Retrospective | Macroadenomas | 77.4% (89/115) had abnormal VF; bitemporal/mixed: 42.6% (49/115); true bitemporal hemianopsia: <1% (1/115) | Not reported | Not specified | Not reported |
| Najmaldin et al.[20] | Retrospective cohort | Mean: 26.8 ± 1.1 mm | 78.3% had visual field defects | Preoperative: 50.7%; recovery of ≥1 axis: 36.1% | Transsphenoidal | Not reported |
| Mavromati et al.[21] | Retrospective | Median: 24.8 mm | 58.4% had visual impairment | Preoperative: 67% had ≥1 abnormal axis (hypogonadism 62.4%, hypothyroidism 41%, adrenal insufficiency 30.8%) | Transsphenoidal | Recovery of ≥1 pituitary axis: 46% |
| Prinzi et al.[22] | Retrospective multicenter | Macroadenomas and microadenomas | Not reported | 37.2% (54/145) had ≥1 hormone deficiency; hypogonadism: 34.5%, adrenal insufficiency: 8.3%, hypothyroidism: 7.6%, GHD: 6.9% | Variable | Recovery of ≥1 pituitary axis: 66.7% |
| Subramanian et al.[23] | Retrospective | Mean not specified (macroadenomas) | 92% (72/78) had preoperative visual field defects | Preoperative hypopituitarism present; 24% recovered ≥1 hormone axis | Transsphenoidal | Visual recovery/improvement: 92% (72/78) in patients with preoperative VF defects; full recovery: 35% (27/78) |

The management of pituitary macroadenoma mostly depends on the size, site, and clinical effect of the tumor. Surgery is the treatment of choice, particularly in those with significant mass effects, such as optic chiasm compression.[24] Transsphenoidal surgery is the preferred method of resection of pituitary tumors due to its minimally invasive nature, shorter recovery time, and lower risk of neurological complications compared to craniotomy. However, for very large or intruding tumors, this technique is not possible and must be augmented with other techniques, such as craniotomy. Additionally, radiotherapy is also used as an adjuvant therapy in the case of residual tumors during surgery or in inoperable tumors to reduce the tumor's size and its impact on the surrounding structures.[24,25]

Comprehensive postoperative surveillance is essential to ensure optimal outcomes and early detection of recurrence in patients with pituitary macroadenomas. According to current guidelines, postoperative monitoring should encompass three critical domains: mass effect assessment through neuroimaging, visual function evaluation, and endocrine assessment.[26] For radiological surveillance, magnetic resonance imaging (MRI) remains the gold standard modality for detecting residual tumor and monitoring for recurrence. Early postoperative MRI performed within 48-72 hours after surgery demonstrates high sensitivity (100%) and specificity (98%) for detecting residual tumor, and is superior to both intraoperative assessment and delayed imaging.[27] Visual function assessment is equally critical in postoperative follow-up, as visual field defects represent one of the most common presenting features of pituitary macroadenomas. Patients are reviewed at 3 months, followed by examinations every 6 months until visual function stabilizes, and thereafter monitored annually.[28]

For hormonal function assessment, the hypothalamic-pituitary-adrenal (HPA) axis is the most commonly affected, with new-onset central adrenal insufficiency occurring in 10% of postoperative cases, followed by thyroid axis (10%) and gonadal axis (2%).[29] If no acute complications occur in the immediate postoperative period, the first assessment of anterior pituitary function is performed 4–6 weeks after surgery.[28] Morning serum cortisol serves as a surrogate marker for ACTH assessment, with levels ≤3.2 μg/dL (89 nmol/L) indicating secondary adrenal insufficiency and >14 μg/dL (386 nmol/L) suggesting normal HPA axis function.[30] Thyroid axis evaluation is performed by measuring free T4, as TSH levels alone can be misleading in central hypothyroidism where TSH may be inappropriately normal despite low free T4.[31] For gonadal axis assessment, testosterone levels in males and estradiol levels in premenopausal women serve as surrogate markers for LH and FSH function, while postmenopausal women with inappropriately low FSH relative to their age suggest gonadotrophic dysfunction. Growth hormone axis is assessed through IGF-1 levels, which serve as a stable surrogate marker for GH secretion, with dynamic GH stimulation testing reserved for patients with clinical suspicion of deficiency.[32]

Effective management of pituitary macroadenoma is realized with a multidisciplinary surgical team, strict diagnostic evaluation, and adequate hormonal management. Considering the clinical relevance of visual and hormonal impairment, early and appropriate treatment should be carried out in order to avoid long-term complications and attain proper functional recovery of the patient.[33,34]

## CONCLUSIONS

Comprehensive hormonal evaluation is crucial in patients with pituitary macroadenoma to detect associated endocrine dysfunction. Macroadenomas complicated by optic chiasm compression require timely surgical intervention to prevent irreversible visual loss. Optimal perioperative hormonal stabilization, particularly in cases of hypopituitarism, is essential to ensure surgical safety, improve recovery, and achieve favorable long-term clinical outcomes.

### Conflict of Interest

The Authors declare no conflict of interest.

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### Authors Contributions

Authors contributed to the conception and design of the study, data collection, analysis, and manuscript drafting. DA was involved in data acquisition, literature review, and manuscript preparation. ED provided critical revisions, expert

insights, and supervision throughout the study. All authors reviewed and approved the final version of the manuscript.

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**Data Availability Statement**

The data supporting the findings of this study can be obtained from the corresponding author upon request.

**Declaration of AI Usage in Scientific Writing**

Nothing to declare

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