

The Visual Field Recovery Following Transnasal Transphenoidal Surgery for Pituitary Adenoma: A Case Report

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Purpose: To report a pituitary adenoma case with compression of the optic chiasma and visual field defect recovery following transnasal transphenoidal surgery.

Method: A Case report

Result: A 65-year-old female patient presented with the primary complaint of decreased visual acuity (VA) and visual field defects in both eyes. Visual field examination revealed bitemporal hemianopia, Ganglion Cell – Inner Plexiform Layer (GCIPL) atrophy in the left eye. Magnetic resonance imaging (MRI) of the sella and parasellar region showed a lesion of the optic chiasm approximately 30 mm in diameter compressing the optic chiasm and the floor of the third ventricle, eroding the sellar floor, with “snowman sign”. Transnasal transphenoidal surgery was promptly performed following the diagnosis, leading to improvement in VA and visual field defect 25 days postoperative.

Conclusion: Clinicians should be aware that patients with non-functioning pituitary adenomas (NFPAs) usually seek ophthalmologists because of the visual disturbance, such as impaired visual acuity and visual field defects. This case report highlights the importance of early diagnosis and timely neurosurgical intervention in preventing irreversible visual impairment in patients with pituitary macroadenomas.

Conflicts of Interest: None.

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Introduction

Pituitary tumors account for roughly 12-15% of all brain tumors, with pituitary adenomas being the most frequent causes of compressive optic neuropathy.¹ Non-functioning tumors account for approximately 42.32% of all pituitary adenomas.² Histologically, NFPAs are benign neoplasms that originate from the adenohypophyseal cells and are not associated with clinical evidence of hormonal hypersecretion.³ The absence of clinical manifestations of hormonal hypersecretion usually results in significant diagnostic delay and

therefore NFPAs may not be diagnosed until they cause mass effects to surrounding structures,³ causing symptoms such as headaches, visual disorders, and/or cranial nerve dysfunction. Their hormonal inactivity often delays diagnosis compared to functioning pituitary adenomas.⁴ Studies have shown that 96.5% of nonfunctioning adenomas manifest as macroadenomas, with 67.8% of affected patients experiencing visual impairments.⁵ For NFPAs, neurosurgery is the treatment of choice.⁶

Patients who receive timely intervention demonstrate improved visual acuity, midline alignment, and visual field function following diagnosis and surgery.⁷ Conversely, delayed diagnosis significantly affects both preoperative and postoperative visual outcomes, highlighting the importance of early detection in preventing irreversible optic nerve damage and optimizing treatment strategies.⁸

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The current study aimed to report a pituitary macroadenoma case with compression of the optic chiasma and visual field defect recovery following transnasal transphenoidal surgery.

Case report

A 65-year-old female patient presented to Ho Chi Minh Eye Hospital in November, 2024 with chief complaints of blurred vision in both eyes for 1 year. The patient reported intermittent mild headaches in the past 3 months. The headache tended to be moderate in intensity and did not respond well to common analgesics. It was usually dull and persistent, located in the frontal or retro-orbital region. There were no neurological deficits such as weakness. Past medical history was unremarkable, and her BMI was 24.5. At initial presentation, the general examination was found to be normal. No thyroid enlargement was found. Systemic examination was found to be normal; her best corrected visual acuity (BCVA) was 1/10 in the right eye and counting fingers at 1 meter in the left eye. Intraocular pressure measurement by Icare tonometer: 17 mmHg in the right eye, 15 mmHg in the left eye. Extraocular movements were completely intact. Fundus examination revealed slightly pale optic discs with clear margins and no disc edema. However, the presence of cataracts in both eyes limited accurate evaluation of

optic nerve appearance. 30-2 Humphrey Visual Field with target III exam, optical coherence tomography (OCT) were requested.

OCT reveals a thinning of the superior and nasal fiber layers in the right eye, along with a mild thinning of the superior and temporal fiber layers and GCIPL atrophy in the left eye (Figure 4). Visual field exam reported bitemporal hemianopia (Figure 1), thus, MRI of the brain were requested because we suspected a pituitary adenoma.

After detailed ophthalmological examination and neuroimaging, she was diagnosed with a pituitary lesion compressing the optic chiasm and the floor of the third ventricle, eroding the sellar floor, most probably diagnosed as NFPAs, with “snowman sign”, measuring approximately 30x21x19 mm, well-defined margins (Figure 3).

She was managed surgically via transnasal transsphenoidal surgery of the tumor on December 22, 2024, and was confirmed to be a pituitary cystic adenoma. Ophthalmologic examination 25 days postoperative reported that BCVA is 7/10 in the right eye and 8/10 in the left eye. Visual field recovery was progressive and apparent in both eyes. Post-operative OCT reveals improvement in the right eye, while the left eye exhibits GCIPL atrophy and a decrease in temporal retinal nerve fiber layer (RNFL) (Figure 5).

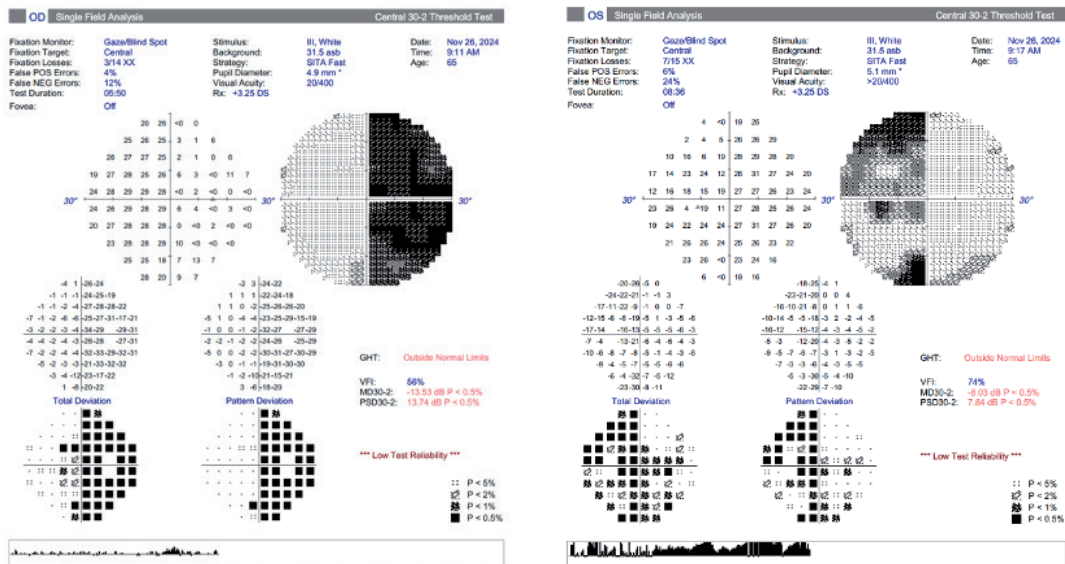


Figure 1: Pre-operative 30-2 Humphrey Visual Field of the right eye (*right*) and left eye (*left*): Bitemporal hemianopia.

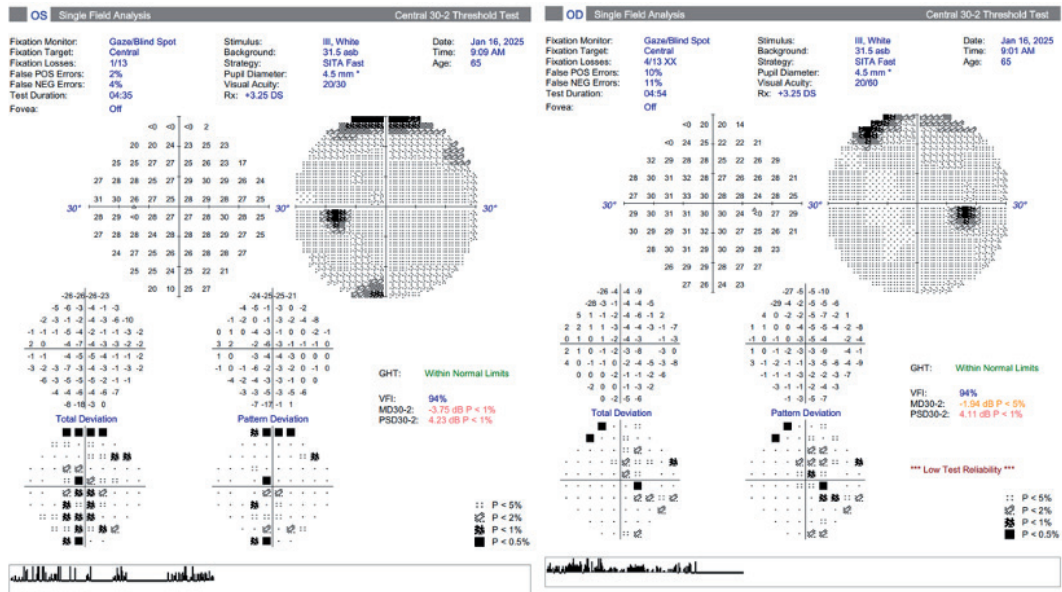


Figure 2: Post-operative visual field of the right eye (*right*) and left eye (*left*): shows improvement of the bitemporal visual field defect.

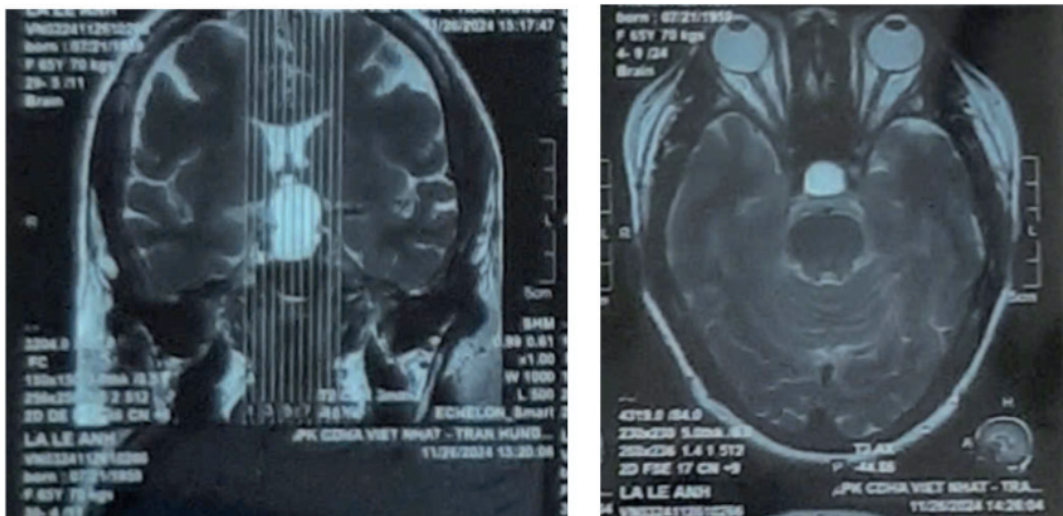


Figure 3: (*Left*)The MRI image shows a T2-weighted coronal brain demonstrating a hyperintense lesion in the sellar region with the characteristic ‘snowman sign.’ (*Right*) The image depicts a T2-weighted axial MRI revealing a hyperintense lesion centered within the sella turcica. No evidence of diffuse cerebral edema or intracranial hemorrhage is noted.

Discussion

This case highlights the importance of early diagnosis and timely surgical intervention in cases of pituitary macroadenoma compressing the optic chiasm. Our patient presented with progressive visual decline over one year, with bitemporal hemianopia on perimetry, a hallmark of chiasmal compression. MRI confirmed a large pituitary adenoma, demonstrating the classic “snowman sign”.

Early detection of NFPAs remains challenging due to the absence of hormonal hypersecretion and the presence of nonspecific symptoms. As the tumor enlarges, it elevates and stretches the chiasm, producing neuro-ophthalmological manifestations such as visual field loss, headache, reduced acuity, and progressive vision loss.⁹ In this case, severe visual deterioration had already occurred, with BCVA reduced to 1/10 in the right eye and counting fingers at 1 meter in the left eye.

Interestingly, there was a discordance between peripapillary RNFL and GCIPL findings. OCT disc analysis suggested greater damage in the right eye; however, this may have been influenced by a superior peripapillary artifact on the right eye OCT, underestimating RNFL thickness and exaggerating structural loss.

The more severe temporal visual field loss in the right eye can be explained by preferential compression of the nasal retinal fibers of the right eye, possibly due to a pituitary tumor with slight leftward deviation. On MRI, chiasmal compression with subtle asymmetry toward the left would be consistent with worse visual acuity in the left eye and more pronounced temporal field loss in the right eye. Importantly, because the patient presented with bitemporal hemianopia, a relative afferent pupillary defect would not be expected, unlike in optic tract lesions producing homonymous hemianopia, where RAPD is a characteristic finding.

Transnasal transsphenoidal surgery remains the gold standard treatment for symptomatic pituitary macroadenomas with minimal invasiveness.¹⁰ Postoperative assessment in this case demonstrated substantial visual improvement, with BCVA improving to 7/10 in the right eye and 8/10 in the left eye within 25 days. Additionally, visual field examination confirmed a significant recovery in bitemporal hemianopia, aligning with previous studies

reporting favorable visual outcomes following transsphenoidal surgery. OCT may also serve as a valuable prognostic tool. Patients with marked field loss but relatively preserved peripapillary RNFL thickness (commonly around 75 μm , age-dependent) generally have a favorable prognosis for visual recovery, regardless of preoperative acuity.¹¹

Postoperatively, RNFL improved in the right eye, while residual GC-IPL atrophy and temporal RNFL thinning persisted in the left. These findings suggest that while decompression facilitates functional recovery, prolonged chiasmal compression may lead to irreversible retinal ganglion cell damage. OCT is a useful tool for detecting fiber loss resulting from chiasmal compression. Supporting this, a prospective SD-OCT study demonstrated that fiber and ganglion cell loss can be detected even without overt compression or visual loss, highlighting the role of OCT in early diagnosis and management before compression occurs.¹²

There have been contradictory findings in previous studies regarding predictive factors for recovery of vision in these patients including the duration and severity of preoperative visual loss, tumor size, and degree of chiasmal compression. The variability in findings may be attributed to differences in patient populations, tumor characteristics, the extent of tumor resection, and adjuvant treatments such as postoperative radiotherapy. Studies have shown that patients with shorter symptom duration and milder preoperative visual deficits tend to achieve better visual outcomes.¹³ In this clinical case, despite the patient presenting with markedly reduced visual acuity and visual field before surgery, the peripapillary RNFL thickness was relatively preserved, which contributed to the significant postoperative improvement in both visual acuity and visual field.

Conclusion

This case emphasizes the critical role of timely detection and prompt neurosurgical intervention in preventing permanent visual deficits in patients with pituitary macroadenomas. OCT plays an increasingly valuable role not only in detecting structural damage but also in predicting the potential for postoperative visual recovery. Further research into OCT-based markers, along with other clinical predictors,

could enhance surgical decision-making and optimize outcomes for patients. Further research into predictors of visual recovery post- transnasal transsphenoidal surgery could enhance clinical decision-making and optimize patient outcomes.

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