



**EARLY DETECTION OF PITUITARY MACROADENOMAS – THE OPHTHALMOLOGIST'S PERSPECTIVE**

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**ABSTRACT**

Pituitary macroadenoma, primarily a benign neurological condition initially may present to the Ophthalmologist with loss of vision.

We report 3 cases of Pituitary macroadenomas. that presented to our out patient services with headache and decreased visual acuity. Confrontation tests elicited a field defect in each patient superior quadrantanopia in one, a hemianopic field defect in the second and bitemporal hemianopia in the third which were confirmed by Automated Perimetry. Magnetic Resonance Imaging (MRI) revealed the presence of Pituitary macroadenoma in all three. This article highlights the significance of confrontation tests in the out patient department and careful clinical examination including testing of visual acuity, colour vision, swinging torch light test to elicit relative afferent pupillary defect and fundus examination in a patient presenting with headache and blurred vision.

**KEYWORDS :**

Pituitary Macroadenomas, Superior Bitemporal Quadrantanopia, Bitemporal hemianopia, visual prognosis

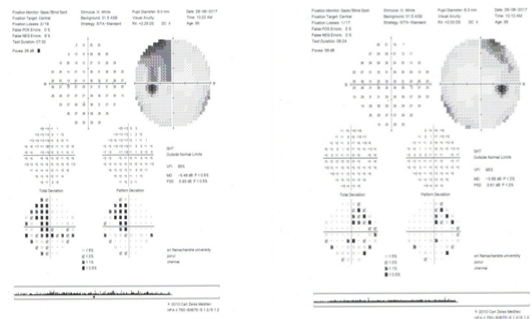
The pituitary gland is lodged within the sella turcica. The sella turcica is located in the middle cranial fossa and is situated behind the chiasmatic groove and the tuberculum sella.<sup>[1]</sup> The lesions affecting the Pituitary gland are adenomas, Rathke cleft cysts and Craniopharyngiomas<sup>[2]</sup> Apart from these, the pituitary gland can be affected by inflammations, infections and vascular affections such as infarction and apoplexy.<sup>[1]</sup> The prevalence of Pituitary adenomas amongst Pituitary tumours is 16.7%<sup>[2]</sup>.

The most common symptoms of Pituitary adenomas are headache and defective vision.<sup>[3]</sup> Pituitary tumours are classified as micro adenomas and macroadenomas depending on the size (<10 mm microadenoma, > 10mm macroadenoma).<sup>[3]</sup> When the size is more than 10mm, the diaphragm sella is breached and the patient presents with headache. As long as the tumour stays within the sella, the patient does not have any symptoms. By the time the patient presents with headache, the tumour is already a macroadenoma and signs of optic tract compression evolve. The compression of the infronasal fibres of the optic chiasm gives rise to superior quadrantanopia initially progressing to bitemporal hemianopia.<sup>[3]</sup> Lateral extension of the tumour would cause invasion of the cavernous sinus and oculomotor palsy with resultant diplopia. Most of the cases of Pituitary adenoma are diagnosed at the stage when the tumour produces bitemporal hemianopia or when there is gross loss of vision and the fundus shows optic disc pallor. The fact that colour vision, colour desaturation and visual field tests aid in the early detection of Pituitary adenomas cannot be overemphasized.

**Case 1**

36-year old male presented with diminished visual acuity in the left eye of 4 months duration. He also complained of headache of more than 6 months duration. On examination, his Best Corrected Visual Acuity was 6/6 N6 in the right eye and 6/12 N8 in the left eye. Colour vision by Ishiharas was normal. Fundus examination was normal. Visual field by confrontation elicited a superior quadrantanopic field defect in the left eye. Humphreys automated perimetry showed a bitemporal superior quadrantanopia.[Fig 1] MRI revealed the presence of Pituitary macroadenoma . [Fig 2] Hormone assay revealed elevated levels of prolactin and associated Hypothyroidism. He underwent adequate medical management for his endocrine dysfunction. There was no surgical intervention Subsequent visual fields did not show any progression.

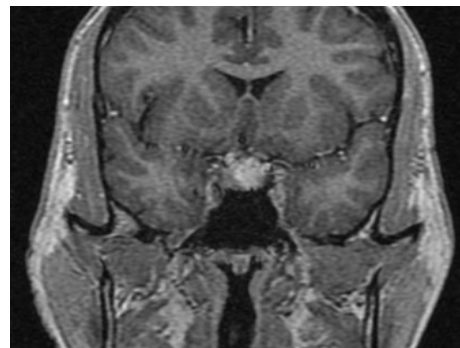
**Fig. 1 a & b. Superior bitemporal quadrantanopia by Humphreys Automated Perimetry**



**Fig. 1a**

**Fig. 1b**

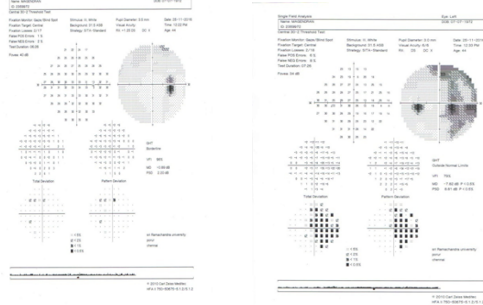
**Fig. 2. Contrast enhanced T1 weighted image in MRI showing Pituitary Macroadenoma 14mm x17mm x 16mm in size.**



**Case 2**

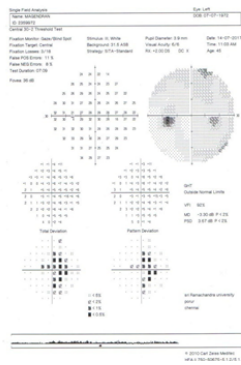
A 46-year old male presented with diminished vision in his left eye of 6 months duration. His BCVA was 6/6N6 and 6/18 N18. His colour vision for red and green was impaired in the left eye. Confrontation test elicited a left temporal visual field defect. Humphreys confirmed the presence of a Left hemianopic field defect [Fig 2] MRI confirmed the presence of sellar tumour, Pituitary macroadenoma with suprasellar extension [Fig 4] The Prolactin levels were elevated and this patient also had associated Hypothyroidism. He also underwent medical management of his endocrine dysfunction and did not undergo any surgery for the resection of the adenoma.

**Fig 3. Visual field 30-2 threshold test by Humphreys showing near normal right field (a), left hemianopic field defect (b) and good response to medical therapy for Prolactinoma ©**

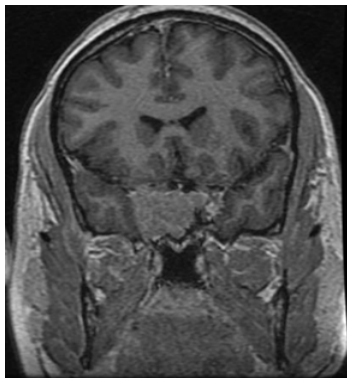


**Fig 3a**

**Fig 3b**



**Fig 3C showing visual field recovery following medical management of Prolactinoma**

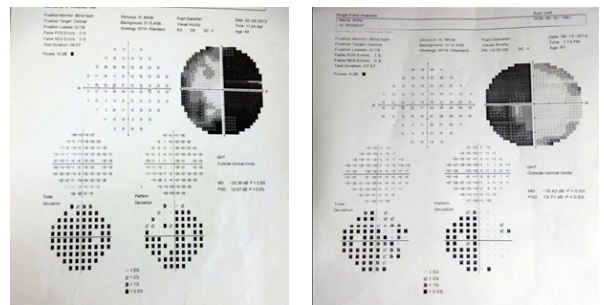


**Fig 4 – Contrast enhanced T1 weighted image showing Pituitary macroadenoma, 45mm x 32mm x 16mm with supra, infra and retro sellar extension, invading the cavernous sinus and encasing the carotids (Knosp 2)**

**Case 3**

A 47-year old female patient presented defective vision in the right eye .On examination of the visual acuity, she was found to be missing the temporal letters by Snellens. Visual field by confrontation elicited a right temporal field defect but Humphreys revealed the presence of bitemporal hemianopia.[Fig 5] Her colour vision in the right eye was impaired for red and green. There was an RAPD (grade 2) in the right eye and fundus examination showed temporal pallor of the disc. Her MRI showed a large Pituitary macroadenoma with cavernous sinus involvement.[Fig 6] She had a non secretory adenoma and underwent trans sphenoidal resection of the tumour through the nasal endoscopic route.She also underwent Gamma stereo tactic radiation for the tumour remnant. Six months later, she underwent cataract extraction in both eyes followed by multifocal intra ocular lens implantation. Her unaided vision was 6/18 in the right eye N18 and 6/6 N6 in the left eye. Her temporal visual field defect remained in the right eye whereas the field defect had completely recovered in the left eye.

**Fig 5. The classical bitemporal hemianopia indicating chiasmal compression. There is also involvement of the nasal field in the right eye.**



**Fig 6 – Coronal T1 weighted image in MRI with fat suppression , showing a large Pituitary macroadenoma with supra-sellar and infra-sellar extension, measuring 60mm x 31 mm x 40mm .The macroadenoma is seen encasing the cavernous segments of the internal carotid arteries (Knosp grade 4)**

**Discussion**

The prevalence of Pituitary adenomas is 16.7%.<sup>[2]</sup> Males are more commonly affected as reported by Fernandez A *et al.*<sup>[4]</sup>. The median age at presentation is 32 in Prolactinomas and 51.5 in non secreting or non functioning adenomas according to Fernandes A *et al.*<sup>[4]</sup> and Antii Raappana *et al.*<sup>[5]</sup> Headache in Pituitary adenomas can be non specific<sup>[3]</sup> and this contributes to diagnostic delay. Jackson *et al.*<sup>[6]</sup> in a study group of 64 patients had reported an incidence of 68.8% incidence of headache . Headache in Pituitary adenomas has been attributed to stretching of the duramater and increased intra sellar pressure<sup>[6]</sup> Even though headache is the most common presenting symptom, all three patients in our series had presented with loss of vision. Lateral expansion into cavernous sinus also causes headache<sup>[7]</sup>. The characteristic pattern of bitemporal hemianopia is diagnostic of chiasmal compression.<sup>[8]</sup> The commonest visual field defect is bitemporal hemianopia has also been reported by Alexander *et al.*<sup>[9]</sup> and Huang WC *et al.*<sup>[10]</sup> Huang WC *et al* had demonstrated a linear relationship between visual field defect and chiasmal compression. He also concluded that the visual field defects were more dense in non secreting adenomas. In a study of 119 patients, Lee *et al* found bitemporal hemianopia was more common in patients whose MRI showed a displacement of the optic pathway of more than 3 mm from the baseline.<sup>[11]</sup> Although automated perimetry is the gold standard of assessing visual field defects in the modern era, simple tests like finger confrontation tests and colour desaturation at the out patient services cannot be ignored. Trobe JD *et al*<sup>[12]</sup> had established that static finger counting tests had elicited 42% of chiasmal hemianopic defects. He concluded that kinetic and static colour confrontation tests were 78.6% sensitive to hemianopias.

The swinging torch light test elicits RAPD and signifies optic neuropathy which in these cases is compressive. The other signs of optic neuropathy are impaired colour vision and pallor of the optic disc. These signs are more common when the chiasm is post fixed.<sup>[3]</sup> MRI of the brain is the imaging modality of choice in the diagnosis of Pituitary tumours. Knosp grading system grades the cavernous sinus involvement of the Pituitary adenomas.<sup>[13]</sup> The Magnetizing Transfer Ratio differentiates secretory tumours from non secreting tumours.<sup>[14]</sup> Hormonal assay identifies the secretory nature of

Pituitary tumours. The surgical management of Pituitary macroadenomas is Resection via the transnasal endoscopic sphenoidal route.<sup>[15]</sup>

### Conclusion

When examining a patient with headache, we recommend simple visual function tests such as testing of visual acuity, colour vision, visual field by confrontation, at the out patient department or a consultants chamber of the Ophthalmologist, Neurologist or even a General Physician. Swinging torch light test at the out patient services would elicit the presence of RAPD. Visual field defect by confrontation tests can give a clue to the underlying neurological condition and prevent diagnostic delay. It is important to detect the adenoma even when it starts producing a superior quadrantanopia. Magnetic Resonance Imaging is the imaging modality of choice. Which confirms the diagnosis. Radioimaging in patients with persisting headache of duration of more than 6 months could detect the presence of the sellar tumours and would pave towards the early medical and surgical management of these tumours. The presence of RAPD and temporal pallor of the optic disc at initial presentation are poor prognostic indicators for post surgical visual recovery.

### References:

1. Imaging of the sella: anatomy and pathology. Elster AD, Semin Ultrasound CT MR. 1993; 14(3):182-94.
2. Ezzat S, Asa SI, Couldwell WT, Barr CE, Dodge WF, Vance MI *Et al*: The prevalence of pituitary adenomas: a systematic review. Cancer 2004. 101:613-619.
3. Kanski's Clinical Ophthalmology. A systematic approach. 8<sup>th</sup> Ed. Elsevier. In. Neurophthalmology, p813-815
4. Fernandez A, Karavitaki N, Wass JA. Prevalence of pituitary adenomas: a community-based, cross-sectional study in Banbury (Oxfordshire, UK). Clin Endocrinol (Oxf). 2010; 72(3):377-82.
5. Raappana A, Koivukangas J, Ebeling T, Pirilä T. Incidence of pituitary adenomas in Northern Finland in 1992-2007. J Clin Endocrinol Metab. 2010; 95(9):4268-75
6. Jackson A, Gondim AE, Joaõ Paulo Cavalcante de Almeida. Headache associated with pituitary tumors. J Headache Pain. 2009; 10:15-20
7. Jean-Philippe Cottier, Christophe Destrieux, Laurent Brunereau, Philippe Bertrand. Cavernous Sinus Invasion by Pituitary Adenoma: MR Imaging. Radiology. 2000; 215(2):463-9.
8. Munoz Negrete FZ, Rebelleda G. Automated perimetry and neurophthalmology, topographic correlation, Arch Soc Esp Ophthalmol 2002; 77(8):413-28
9. Poon A, McNeill P, Harper A, O' Day J. Patterns of visual loss associated with pituitary Macroadenomas. Aust N Z J Ophthalmol. 1995. 23(2):107-15.
10. Huang WC<sup>1</sup>, Lee L S. Visual field defects in patients with pituitary adenomas. Zhonghua Yi Xue Za Zhi (Taipei). 1997; 60(5):245-51.
11. Lee IH, Miller NR, Zan E, Tavares F, Blitz AM, Sung H, Yousem DM, Boland MV. Visual Defects in Patients With Pituitary Adenomas: The Myth of Bitemporal Hemianopsia. AJR Am J Roentgenol. 2015; 205(5):W512-8
12. Trobe JD, Acosta PC, Krischer JP, Trick GL. Confrontation visual field techniques in the detection of anterior visual pathway lesions. Ann Neurol. 1981; 10(1):28-34.
13. Mooney MA, Hardesty DA, Sheehy JP, Bird R, Chapple K, White WL, Little AS. Interrater and intrarater reliability of the Knosp scale for pituitary adenoma grading. Neurosurg. 2017; 126(5):1714-1719.
14. Chaudhary V, Bano S. Imaging of the pituitary: Recent advances. Indian J Endocrinol Metab. 2011; 15 Suppl 3:S216-23.
15. Yadav Y, Sachdev S, Parihar V, Namdev H, Bhatele P. Endoscopic endonasal trans-sphenoid surgery of pituitary adenoma. J Neurosci Rural Pract. 2012; 3(3):328-37