

A STUDY ON OPHTHALMIC MANIFESTATIONS IN PITUITARY GLAND TUMOURS

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ABSTRACT

BACKGROUND

Pituitary adenoma is a benign tumour that originates from the adenohypophyseal cells of the anterior lobe of pituitary gland. It accounts for 12% to 15% of all intracranial tumours. A spectrum of ocular manifestations are seen with these tumours ranging from the absence of any visual symptoms to severe visual field defects and loss of vision.

The aim of the study is to study the various ocular features and its effect on vision, visual fields and ocular motility in cases of pituitary adenoma diagnosed on CT or MRI.

MATERIALS AND METHODS

This is a prospective study for a period of 1 year and 8 months conducted in Regional Institute of Ophthalmology, Madras Medical College. 25 patients aged between 25 to 65 years diagnosed as pituitary adenomas on radiological imaging who presented to squint clinic were evaluated after detailed history with visual acuity, pupillary reaction, colour vision, extraocular movements, slit lamp and fundus examination. Visual field examination was done with Octopus field analyser.

RESULTS

In our study, 25 patients of pituitary adenoma diagnosed on radio imaging were enrolled and evaluated. Most patients were above 50 years, 15 patients of the 25 were above 50 yrs. (60%). Females were predominantly affected (76%). Visual acuity of the patient was between 6/12-6/6 (62%) on presentation. Headache was the commonest mode of presentation (80%). 76% showed field defects of which bitemporal hemianopia was the commonest in 52.9%. Pituitary macroadenoma 96% was the commonest type. Optic atrophy was seen only in 4 cases. Others had normal fundus.

CONCLUSION

Neuro-ophthalmic evaluation plays a major role not only in early detection, planning of treatment and further follow up, but also prevents visual loss if intervened early.

KEYWORDS

Pituitary Adenoma, Visual Acuity, Visual Field, Bitemporal Hemianopia.

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BACKGROUND

Pituitary adenoma is a benign tumour that originates from the adenohypophyseal cells of the anterior lobe of pituitary gland. It accounts for 12% to 15% of all intracranial tumours.¹ A spectrum of ocular manifestations are seen with these tumours ranging from the absence of any visual symptoms to severe visual field defects and loss of vision.

The clinical manifestations depend on the cell type of the tumour, hypo or hypersecretion of hormones, direction of local spread and compression of adjacent structures.

Pituitary adenomas are of 2 types according to the size- microadenomas (≤ 10 mm) and macroadenomas (> 10 mm).² In comparison to men, women have a 2-fold increased risk of developing pituitary adenomas. Pituitary adenoma is a benign tumour, however, it has a tendency of recurrence. Clinical features of adenomas are either due to hypersecretion or hyposecretion of hormones or compression of pituitary adenoma to the surrounding structures.²

Pituitary gland is situated in the sella turcica, 10-13 mm below the optic chiasm. Therefore, when it increases in size, it can easily compress the optic nerve fibres at the chiasma. Microadenomas can have a little effect on the optic nerve or on the function of other glands, whereas macroadenomas can cause significant visual impairment.

Compression of the frontal part of the optic nerve, affects the visual fields, visual acuity and contrast sensitivity.

Compression of optic chiasma for a long duration can cause severe vision impairment due to optic atrophy. Functioning adenomas cause less specific visual symptoms

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as they are diagnosed earlier due to hormone-specific symptoms.

Non-functioning pituitary adenomas cause progressive visual loss as they grow slowly and compress the optic chiasm.³ Pituitary adenomas are diagnosed earlier nowadays because of the availability of radioimmunoassay techniques for the hormones and use of CT scanning and MRI imaging done for indications unrelated to suspicion of pituitary tumours like head injury and evaluation of headache.

The arrangement of fibres characteristically account for a classical bitemporal hemianopia, however, other defects like arcuate scotomas, junctional defects, nasal field loss can occur. Other manifestations like ophthalmoplegia due to involvement of 3, 4, 5, 6 cranial nerves, see-saw nystagmus, disturbance in depth perception, optic atrophy related to compression of surrounding structures can occur.

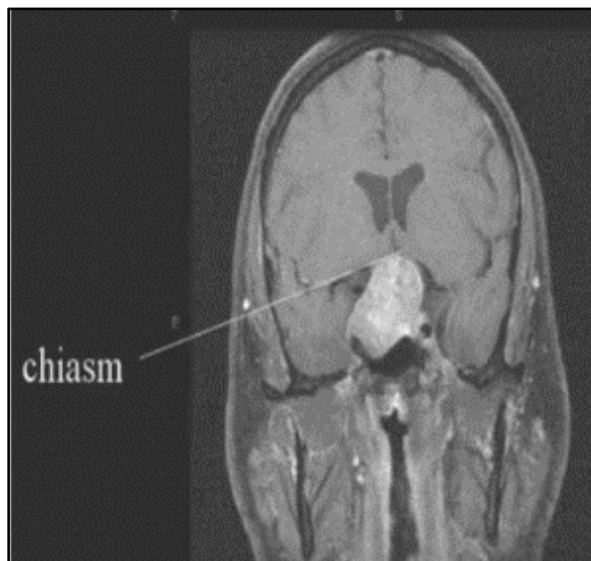


Figure 3. Pituitary Macroadenoma

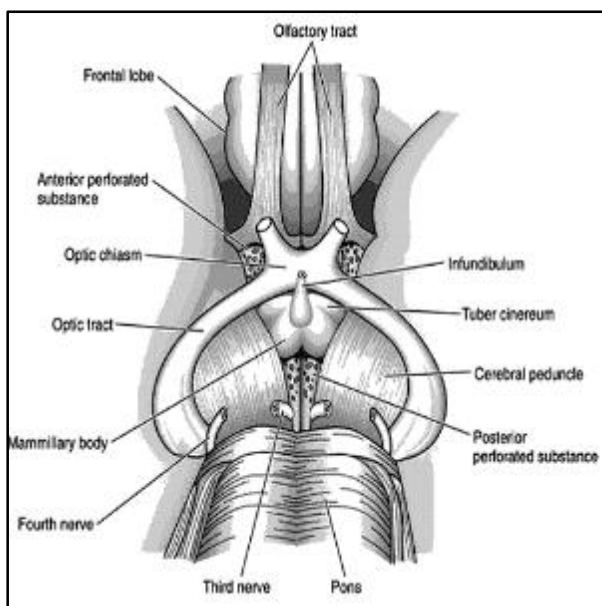


Figure 1. Relations of Chiasma

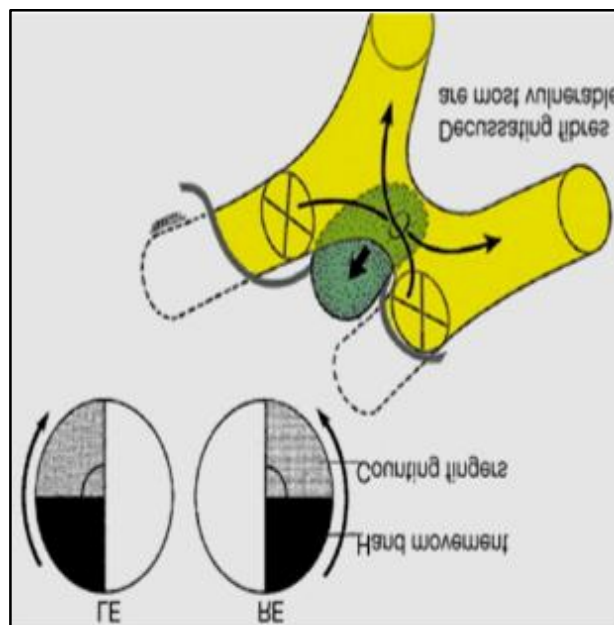


Figure 4. Progression of Visual Field Defects

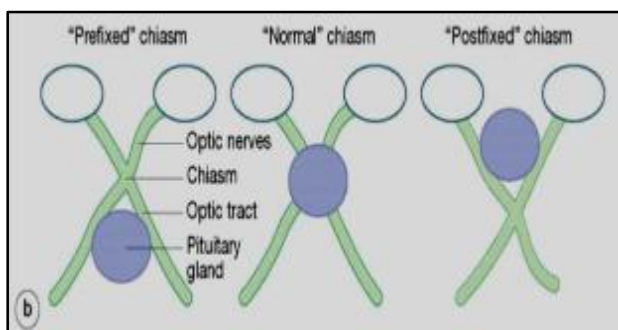


Figure 2. Types of Chiasma



Figure 5. Optic Atrophy



Figure 6. MRI Showing Pituitary Adenoma

Aims and Objectives

Primary objective is to study the various ophthalmic manifestations in cases of pituitary tumours diagnosed on radiological imaging and to analyse the proportion of cases presenting with ophthalmic manifestations.

Secondary objective is to analyse the sensory visual disturbances like degree of visual loss, pattern of visual field defects and ocular motility defects in diagnosed cases of pituitary adenomas.

MATERIALS AND METHODS

Study was conducted from January 2015 to August 2016. 25 patients who are diagnosed with pituitary adenoma on radiological imaging presenting to Squint and Neuro-ophthalmology services were registered and evaluated during the study period.

A detailed history of the patient, evaluation of visual acuity on Snellen chart, extraocular movement and pupillary assessment, colour vision by ishihara pseudoisochromatic chart, visual field examination by 32 program on octopus field analyser octopus, slit-lamp examination and fundus examination with +90 D lens and indirect ophthalmoscopy were done.

Inclusion Criteria

1. Patients diagnosed as having pituitary tumour on radiological imaging.
2. Age 25-65 years.

Exclusion Criteria

1. Patients with other ocular pathologies affecting visual fields such as glaucoma, optic neuritis and retinitis pigmentosa.
2. Patients with pre-existing defective vision due to other causes.
3. Patients with ocular media opacities.
4. Patients physically or mentally unfit for detailed ocular examination.

RESULTS

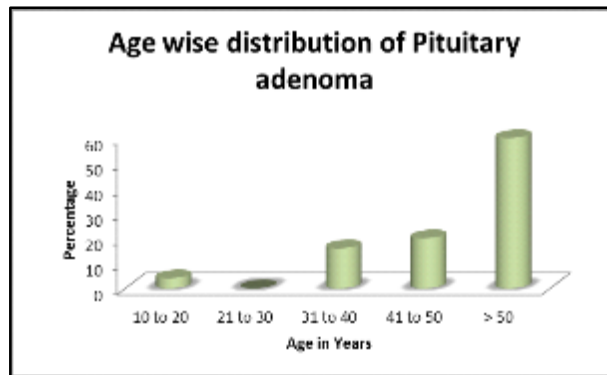


Chart 1. Age Distribution

In the present study of 25 patients, 15 patients (60%) were above the age of 60 years, followed by 5 patients in the age group between 41 to 50 years, 4 patients were in the age group of 31 to 40 years and one patient was below 20 years.

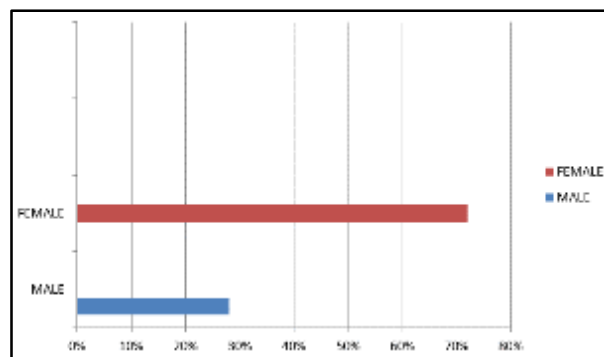


Chart 2. Gender Distribution

In our study, females were predominantly affected (72%) when compared to males (28%).

		Best Corrected Visual Acuity			Total
		6/6 to 6/12	6/18 to 6/36	<6/60	
Right eye	Frequency	16	6	3	25
	Percentage	64	24	12	100
Left eye	Frequency	15	8	2	25
	Percentage	60	32	8	100
Total	Frequency	31	14	5	50
	Percentage	62	28	10	100

Table 1. Visual Acuity of Patients Studied

Out of 25 patients studied, 62% had visual acuity between 6/6 to 6/12 on presentation.

28% of patients had a visual acuity between 6/18 to 6/36 and only 10% had an acuity below 6/60.

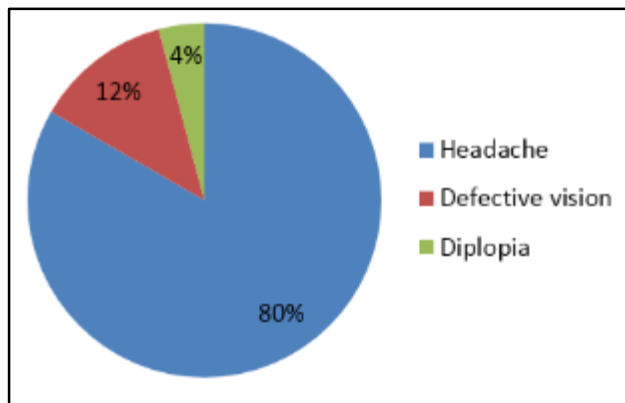


Chart 3. Mode of Presentation

Headache was the predominant symptom in most of the patients (80%).

Four (12%) patients presented with complaints of defective vision and 1 (4%) patient had complaints of diplopia.

Out of 25 cases of radiologically-diagnosed cases of pituitary adenomas studied, 24 cases were macroadenomas and the remaining 1 case was microadenoma.

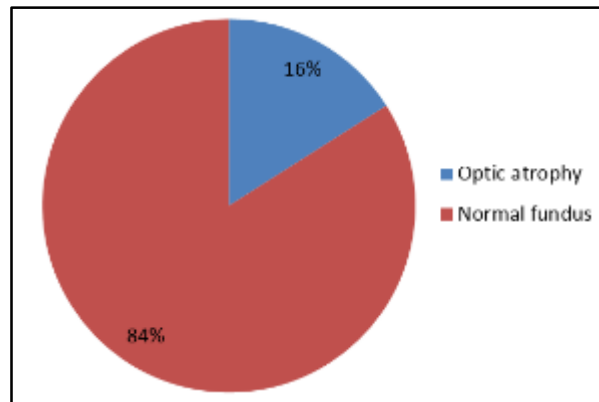


Chart 5. Fundus Examination Findings in Patients Diagnosed with Pituitary Adenomas

Of the 25 cases, 4 cases showed features of optic atrophy on ophthalmoscopic examination of the fundus and the remaining cases were normal.

Visual Fields	Frequency	Percentage
Bitemporal hemianopia	11	57.9
Nonspecific changes	2	10.5
One eye blind and contralateral temporal hemianopia	2	10.5
One eye temporal hemianopia, other eye superotemporal quadrantanopia	1	5.3
One eye temporal hemianopia, other eye involvement of 3 quadrants	2	10.5
Fields not possible (poor visual acuity)	1	5.3
Total	19	100.0

Table 2. Distribution of Pattern of Visual Field Defects

Out of 25 patients studied in the present study, 76% showed field defects and the remaining 24% had no field abnormalities. The most common visual field defect was bitemporal hemianopia (57.9%). 10.5% of patients presented with one eye blind and contralateral temporal hemianopia.

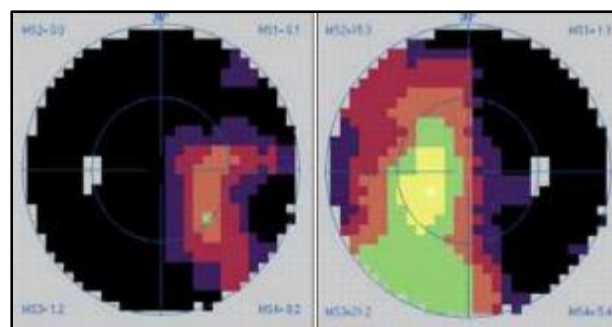


Figure 7. Showing Bitemporal Hemianopia

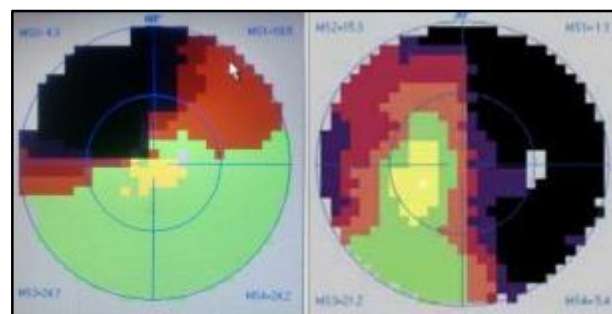


Figure 8. Showing RE Superotemporal Quadrantanopia and LE Showing a Temporal Hemianopia

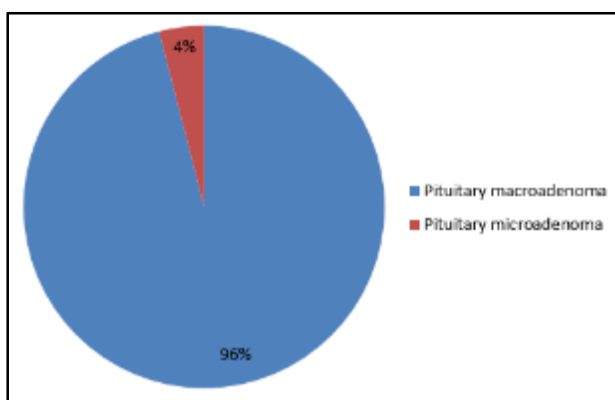


Chart 4. Number of Patients with Different Types of Adenomas

DISCUSSION

The present study titled "a study on ophthalmic manifestations in pituitary gland tumours" was conducted on 25 patients who were radiologically-diagnosed cases of pituitary adenoma and were evaluated for various ophthalmic manifestations. 25 patients were recruited in our study according to the inclusion and exclusion criteria.

In the present study, among the 25 patients, the vulnerable age group were those above the age of 50

years (60%), followed by age group of 41 to 50 years (20%). The mean age at which the pituitary adenoma was diagnosed was determined as 50.68 years.

The observations regarding the mean age at which pituitary adenoma was diagnosed is in agreement with the mean age of 45.8 ± 15.6 years (range 19 to 86 years) reported by Jung Pil Lee, Yun Suk Chung (2011).⁴

In the reports of Thomas et al (2002),⁵ pituitary adenomas were diagnosed in patients of the age group 16 to 69 years and the mean age was reported as 45 years.

Khalid et al (2010)⁶ reported that the vulnerable age group was 30 to 49 years and the mean age at which the pituitary adenoma was diagnosed was 42.92 years.

In another study (Elgamal et al 2007),⁷ a mean age of 42 years was observed with a range of 14 to 85 years among 62 patients.

However, Dhasmana et al (2011)⁸ reported that among 18 patients in which pituitary adenoma was diagnosed, the mean age at the time of diagnosis was slightly lower than the results observed in the present study (35.1 ± 9 years).

In the present study, out of 25 patients enrolled, 72% were females and 28% were males.

Thus, there was a predominance of females in diagnosed cases.

A higher incidence of pituitary adenomas in females has also been reported by Khalid et al (2010) who reported that the incidence in females was about 4 times higher than in males.

A similar higher incidence in females is reported from the studies made at King Saud University by Elgamal et al (2007).⁷

In contrast, Thomas et al (2002)⁵ reported the incidence of pituitary adenomas to be 2 times higher in males as compared to females.

However, Dhansama et al (2011)⁸ observed that the incidence of pituitary adenoma was only slightly higher in males (55.5%) as compared to females (45.5%).

In view of these conflicting reports, it becomes difficult to assess whether the incidence of pituitary adenoma is influenced by the gender. A study involving a larger number of patients would probably give a true picture.

In the present study, among 25 patients studied, the chief presenting complaint was headache (80%). This observation indicated that every patient presenting with a complaint of nonspecific headache showed have a detailed ophthalmic evaluation. Four patients (12%) gave complaints of defective vision and 1 (4%) had diplopia. This observation indicates that cases of pituitary adenoma can also result in ophthalmoplegia, although at a lower frequency. Oculomotor nerve palsy was also reported by Saul, Robert et al, January 2011, in 4 out of 5 patients as the only neurological manifestation of pituitary adenoma.

Of the 50 eyes studied, 62% of patients had a visual acuity between 6/6 to 6/12, followed by 28% with visual acuity of 6/18 to 6/36 and the remaining 10% had a visual acuity of less than 6/60.

Thomas et al (2010)⁵ also stated that visual acuity was normal in 64.52% of the patients with pituitary adenomas. A normal visual acuity was also observed in 61.3% of the patients with pituitary adenomas examined at King Saud University (Elgamal et al 2007).⁷ Dhasmana et al (2011)⁸ in the study observed that among 18 patients (36 eyes), 28 eyes (77.78%) had normal visual acuity (6/6-6/12).

Meenakshi and Niranjana (2011) reported that in the study on 57 cases - 54.38% (62 eyes) had a visual acuity of 6/6.

The observations made in present study as well as in the earlier reports seem to suggest that visual acuity remains normal in nearly two-third of the patients with pituitary adenomas and therefore is not a significant ophthalmological manifestation in patients with pituitary adenomas.

In the present study, visual field defects were observed in 76% (19) of patients. This incidence is similar to the observations made by Jung et al (2011) wherein the incidence of field defects in cases of pituitary adenomas was reported as 74%. However, Thomas et al (2002) observed the field defects were present in a vast majority of patients with pituitary adenomas (94.6%). Further typical field defects were observed in 74.2% of the patients, while it was atypical in 20.4% of the cases.

In patients with visual field defects, a little over 50% (57.9%) exhibited bitemporal hemianopia. The other field patterns observed were one eye blind with contralateral eye showing a temporal hemianopia (10.5%, 2 patients), temporal hemianopia in the one eye and a three-quadrant involvement in the other eye (10.5%, 2 patients) and one eye temporal hemianopia and contralateral eye superotemporal quadrantanopia (10.5%, 2 patients). Two patients showed nonspecific field changes and the visual fielding was not possible in 1 patient due to poor visual acuity. However, in 24% (6 patients) of patients with pituitary adenoma, visual fields were normal.

Jung et al (2011)⁴ in their study observed the incidence of field defect of 74%. Bitemporal hemianopia was the most common field defect (22%).

In a study conducted by Farooq et al (2010),⁶ 52 of the total 100 patients had field defects with bitemporal hemianopia being the commonest.

Dhasmana et al (2011)⁸ observed that in a total of 36 cases, 24 cases (66.67%) had visual field defects of which bitemporal hemianopia was the commonest pattern in 6 patients (33.33%).

In another study conducted at King Saud University (Elgamal et al 2007),⁷ 44.4% of cases of pituitary adenomas had visual field defects and bitemporal hemianopia was most common defect (69%).

Neuro-ophthalmic examination reaches a maximum importance with the tumours of pituitary gland not so much because it permits an exact localisation, but because the symptoms produced by these tumours in the initial as well as fully developed stage are ocular symptoms therefore sooner or later these symptoms will bring the patient to ophthalmologist.

It should be emphasised that symmetrical progressive stages in the deterioration of the visual field of the two eyes are characteristic of pituitary tumours. In addition, there are other less pathognomonic forms. The field loss for instance may progress more rapidly in one eye than the other as was observed in some cases in the present study such as amaurosis of one eye with a temporal hemianopia, therefore, should be evaluated with great caution.

Nevertheless, the present study clearly observed that visual field defect was the most significant manifestation in patients with pituitary adenomas and emphasises the importance of ophthalmological evaluation in suspected cases of pituitary tumours.

Among the 25 patients in the present study, 24 were radiologically diagnosed to have pituitary macroadenoma constituting 96% (24 patients) and 4% (1 patient) had pituitary microadenoma.

Of the 25 cases in the present study, 4 cases showed features of optic atrophy on ophthalmoscopic examination of the fundus and the remaining cases were normal.

The prognosis of return of visual function in patients whose tumours have caused loss of visual acuity, visual field or both depends on the duration of symptoms, severity of visual loss, presence or absence of optic atrophy, age of the patient and size of tumour.⁹

CONCLUSION

As the primary goal in the management of pituitary adenoma revolves around restoration of visual loss, a neuro-ophthalmic evaluation is essential for early detection, planning treatment and subsequent follow up.

The classic dictum that an unexplained decrease in visual acuity should prompt testing of the visual fields to look for a bitemporal hemianopia of field loss remains valid. Instances of delay in the diagnosis of pituitary tumour when this rule is violated.

Although, a bitemporal visual field defect is a pathognomonic ophthalmic finding in cases of pituitary adenomas, various other clinical features like headache, ophthalmoplegia, sensory visual disturbances and other field defects were also noted in our study. Hence, a thorough clinical evaluation is warranted in pituitary adenomas.

Neuro-ophthalmic examination reaches a maximum importance with tumours of pituitary gland not so only because it permits exact localisation, but because the

symptoms produced by these tumours in the initial as well in the fully developed stage are ocular symptoms. Hence, sooner or later, these symptoms will bring the patient to the ophthalmologist.

In addition to the characteristic bitemporal hemianopia, few less pathognomonic forms for instance - Field loss may progress rapidly in one eye with amaurosis and a temporal hemianopia in its fellow eye can occur. Therefore, temporal hemianopia should be evaluated with great caution.

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