Pituitary macroadenomas are benign tumors. The most common subtype is clinically nonfunctioning pituitary adenomas, which are defined by an absence of clinical evidence of hormonal hypersecretion.1 Patients with pituitary macroadenomas may present to an eye clinic with symptoms related to mass effect on surrounding structures, which can include headache, bitemporal visual defects, and ocular motor deficits (see Key Ocular Findings in Pituitary Macroadenoma).2-4

If you suspect that a patient has a nonfunctioning pituitary adenoma, the following steps are warranted: visual acuity testing, color plates, a cranial nerve examination, an assessment for a relative afferent pupillary defect, an evaluation of the optic discs’ appearance, visual field testing, and OCT imaging. In addition to narrowing the differential diagnosis, the information gathered by these assessments can guide treatment strategies, predict prognostic factors for recovery, inform providers’ and patients’ expectations, and document postoperative recovery after resection or radiotherapy.5

**AT A GLANCE**

- Pituitary macroadenomas are benign tumors that are commonly diagnosed as incidental findings on imaging, or patients may present initially with peripheral vision loss and/or headache. The eye clinic is therefore often a patient’s first point of care.

- By understanding the clinical signs associated with pituitary adenomas, eye care providers can ensure that a patient with associated visual defects receives an early diagnosis and can provide information that helps to guide treatment and set reasonable expectations.

**KEY OCULAR FINDINGS IN PITUITARY MACROADENOMA**

- **Visual field defects**
  - Superior progressing to complete bitemporal hemianopsia
  - Junctional scotoma (postfixed chiasm or anterior tumor spread)
  - Rarely, macular bitemporal hemianopsia or homonymous visual field loss (prefixed chiasm or posterior tumor spread)

- **Pituitary apoplexy**

- **Diplopia**
  - Hemifield slide
  - Cranial nerve palsies, especially multiple

- **See-saw nystagmus**
  - Thinning of the binasal macular ganglion cell layer and temporal retinal nerve fiber layer on OCT
  - Temporal or bow-tie atrophy of the optic disc on examination

**VISUAL FIELD DEFECTS**

Visual field testing is central to the workup of pituitary adenomas. In a review of eight studies, visual field disturbances were the most common symptoms at presentation, found in approximately 46% of all patients.4 It is important to note, however, that slow tumor growth may delay patients’ presentation to an eye clinic, and some asymptomatic cases are detected incidentally on glaucoma screening.
Bitemporal hemianopsia can occur as a result of suprasellar growth of the pituitary lesion and direct inferior compression of the optic chiasm first, where the axons that give rise to the superior temporal visual field cross (see Differential Diagnosis of Bitemporal Hemianopsia).6

Tumors may grow asymmetrically, and different configurations of the optic chiasm relative to the pituitary gland can contribute to the observed pattern of presentation. If the optic chiasm sits anterior to the pituitary gland within the tuberculum sellae, referred to as a prefixed chiasm, a pituitary adenoma is more likely to compress the posterior chiasm and optic tracts to produce a macular bitemporal hemianopsia or homonymous visual field loss. Conversely, postfixed chiasms overlying the dorsum sellae may produce patterns of visual field loss related to the optic nerve or a junctional scotoma due to compression at the confluence of the optic nerve and chiasm.6

OCULAR IMAGING IN DIAGNOSIS AND MANAGEMENT

OCT imaging is useful for visualizing the retinal nerve fiber layer (RNFL) and macular ganglion cell layer (GCL) in patients with visual...
field loss from chiasmal compression (Figure 1). Pituitary adenomas cause compression of the axons from the nasal retinal fibers, which correspond to the temporal visual fields. This damage is reflected after weeks to months in binasal macular ganglion cell atrophy and its corresponding temporal and then nasal peripapillary RNFL. When the superior and inferior RNFL quadrants are relatively spared, atrophy with a characteristic bow-tie or band appearance eventually occurs.

Recent studies have shown that OCT imaging can provide useful guidance on treatment strategy. Because extensive RNFL thinning and macular GCL thinning indicate retrograde atrophy of fibers from chiasmal compression, patients with intact RNFL and GCL on OCT at diagnosis may have a greater potential for recovering optic nerve function and visual fields after surgical intervention.

**MANAGEMENT**

MRI with and without contrast of the brain and/or orbits with attention to the sella is the recommended medium for diagnosis (Figure 2). A patient with a confirmed pituitary macroadenoma should be referred to both neurosurgery and endocrinology. Asymptomatic patients with incidental macroadenomas should receive continued ophthalmologic surveillance because any new visual

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**PITUITARY APOPLEXY**

Pituitary apoplexy is a rare vascular emergency caused by infarction or hemorrhage of the pituitary gland. Although eye care providers are unlikely to see a patient with apoplexy in the clinic, it is important to educate patients with a history of pituitary adenoma about the red flags:

- Sudden changes in vision, especially peripheral visual field loss or diplopia
-Abrupt onset of severe thunderclap headache, usually retroorbital
- Altered mental status or personality changes from acute changes in cerebral blood flow
- Nausea, vomiting, or loss of appetite
- Low blood pressure
- Hormone insufficiency

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Figure 2. Sagittal midline precontrast T1-weighted MRI showing enlargement of the sella turcica and superior extension of a pituitary macroadenoma (arrow, A). Coronal T1-weighted MRI with contrast showing the optic chiasm stretched and compressed over the mass (arrows, B).

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HEMIFIELD SLIDE

Diplopia without oculomotor involvement, referred to as hemifield slide, can occur with bitemporal hemianopsia in patients who are experiencing compression of the optic chiasm. This syndrome arises when the eyes no longer share an area of visual field, leading to a loss of binocular fusion in a patient with preexisting phoria. When the eyes move apart from one another in decompensated esophoria, the patient may perceive the nasal hemifields overlapping centrally as a central strip. In esophoria, intermittent crossing of the eyes may be observed as a central strip of diplopia, causing visual confusion. In decompensated esophoria, the two nasal visual fields may appear to separate, leaving a linear central scotoma. Similarly, a vertical phoria may produce a superior or inferior segment of missing or jumbled vision (Figure).

Figure. Hemifield slide can arise from a loss of motor alignment in patients with pituitary adenoma by interfering with the binocular visual field. Exotropia creates an overlapping strip of nasal visual field that causes visual confusion, esotropia creates a central strip scotoma, and hypertropia results in a superior or inferior segment scotoma and central visual field misalignment.