

CLINICAL CHALLENGES RONALD M. BURDE, EDITOR

Retinitis Pigmentosa. A Mimic of Neurologic Disease

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Abstract. Six patients with various forms of retinitis pigmentosa who were misdiagnosed as having neurologic disease are presented. In five of the patients, visual field defects were misinterpreted as being secondary to a neurologic rather than a retinal problem. In two patients, optic nerve drusen, which accompanied the retinal degeneration, were mistaken for papilledema. Since the diagnosis of retinitis pigmentosa is not always obvious on ophthalmoscopy, the clinician must be aware of the various manifestations of this disorder and be able to distinguish visual field defects on a retinal from a neurologic basis. (*Surv Ophthalmol* 32:45-51, 1987)

Key words. pseudotumor cerebri • retinal degeneration • retinitis pigmentosa

Retinitis pigmentosa can cause a variety of visual field defects which at times may appear similar to defects caused by neurologic disorders. The diagnosis, however, may not be obvious on funduscopy examination, particularly for the nonophthalmologist.

In this paper we describe six patients with retinal degenerations in whom a neurologic diagnosis for visual loss was considered or made. One patient actually had a surgical procedure performed and several underwent invasive diagnostic tests. The purpose of this paper is to help the clinician avoid the diagnostic pitfalls represented by these cases.

Case Reports

CASE 1

A 19-year-old man was evaluated because of progressive visual field loss, presumed to be secondary to pseudotumor cerebri. Six years earlier, he had noted visual field loss in each eye (Fig. 1A) and optic disc elevation was discovered and verified by an ophthalmologist. Computed tomography and pneumoencephalography were normal, but the cerebro-

spinal fluid pressure at the time of the pneumoencephalogram was 350 mm of water. A diagnosis of pseudotumor cerebri was made and the patient was placed on 3 mg of Decadron® (dexamethasone) daily. Five days later, the opening pressure on lumbar puncture was 190 mm of water. The corticosteroids were tapered over several months. One year later visual loss had progressed and a lumboperitoneal shunt was placed. It was revised after three years because of further visual loss.

The visual fields continued to worsen and, since the opening pressure on repeat lumbar punctures was normal, he was referred for further evaluation. Visual acuity was 20/25 in each eye. Intraocular pressure was normal. Perimetry showed marked depression of the entire field with peripheral constriction in each eye (Fig. 1B). Funduscopy revealed mild elevation of each optic disc with irregularly blurred margins but no evidence of edema (Fig. 2, top). On close inspection, a diffuse retinal degeneration with arteriolar narrowing and a few peripheral perivascular bony spicule pigmentary changes were apparent in each eye (Fig. 2, bottom). A diagnosis of retinitis pigmentosa was made and confirmed with

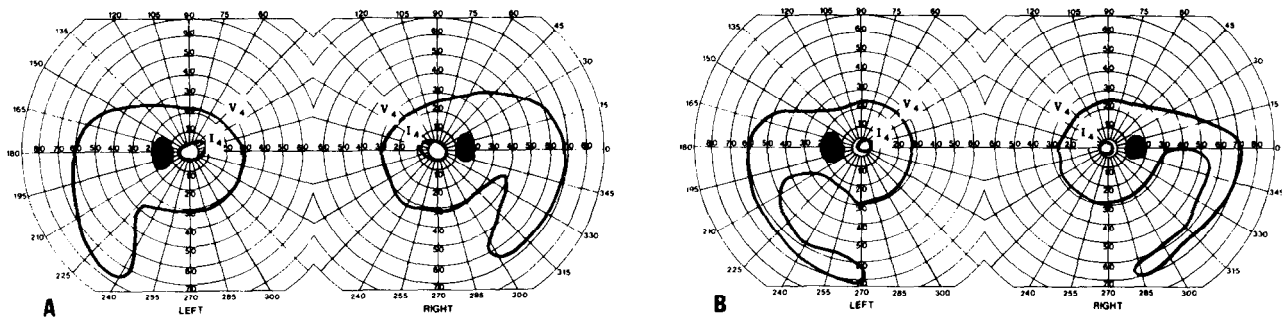


Fig. 1. Case 1. Perimetry showing (A) generalized constriction plus absolute peripheral loss of visual field in both eyes at onset of symptoms and (B) worsening of peripheral visual field loss six years later.

an electroretinogram, which was unrecordable under scotopic conditions and reduced under photopic conditions.

A review of optic disc photographs taken at the onset of symptoms showed that there had been no interval change in the optic disc appearance. There was a family history of retinitis pigmentosa in the patient's maternal grandfather that had not been previously elicited.

Comment. In this patient, retinitis pigmentosa occurred in association with optic disc drusen. Unfortunately, both diagnoses were missed. The disc drusen were mistaken for papilledema and the visual field defects due to retinal degeneration were thought to be secondary to increased intracranial pressure. We presumed that the elevated intracranial pressure recorded at the time of the pneumoencephalogram was a spurious measurement. A diagnosis of retinitis pigmentosa was not obvious without careful ophthalmoscopy, since retinal bony spicule changes were minimal. Nevertheless, a proper examination should have differentiated true from pseudopapilledema (Table 1), and should have ascribed the visual field defects to be secondary to retinal pathology rather than increased intra-

cranial pressure.

The visual field defects occurring in pseudotumor cerebri are usually in a pattern related to the distribution of the nerve fibers at the level of the optic disc. The fibers from the temporal retina, which take an arcuate path around the macula to enter the disc at the superior and inferior poles, are preferentially affected. These fibers respect the horizontal raphe of the retina; i.e., fibers from the superior retina enter the superior pole of the optic disc and fibers from the inferior retina enter the inferior pole of the retina. Hence, the defects in chronic papilledema are usually nasal and do not cross the horizontal meridian. There may be a nasal step along the horizontal meridian. The defects generally do not affect central vision until late. This patient had visual field defects that crossed the horizontal meridian in each eye and thus were much more suggestive of bilateral retinal disease than papilledema.

CASE 2

A 23-year-old woman with a known history of retinitis pigmentosa since age 13 was found to have elevated optic discs. She was adopted and no biological family history was available. An inpatient

TABLE 1
Distinguishing Features of Papilledema and Pseudopapilledema

	Early Papilledema	Pseudopapilledema
Disc color	Hyperemic	Pink, yellowish-pink
Disc margins	Indistinct, early: superior and inferior poles; later: entire margin	Irregularly blurred, may be lumpy
Disc elevation	Minimal	Minimal to marked, center of disc most elevated
Vessels	Normal distribution, slight fullness, spontaneous venous pulsations absent	Emanate from center, frequent anomalous pattern, +/- spontaneous venous pulsations
Nerve fiber layer	Dull due to edema which may obscure blood vessels	No edema, may glisten and appear whitish from light reflections
Hemorrhages	Splinter	Subretinal, retinal vitreous

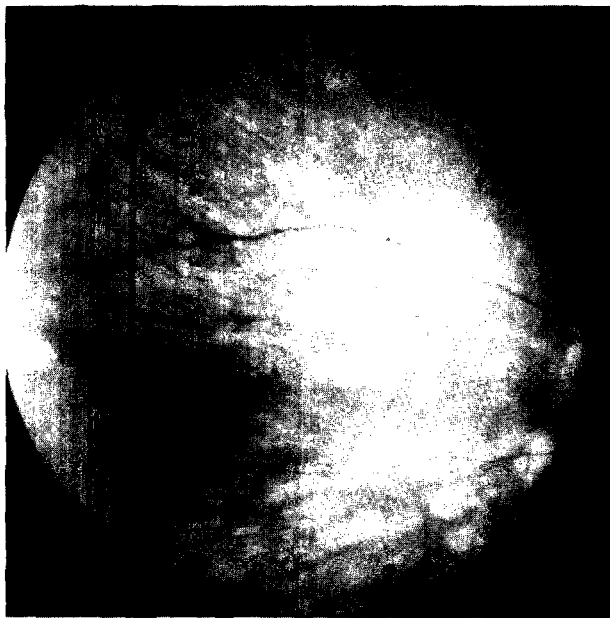


Fig. 2. Case 1. Fundus photographs showing (Top) irregularly blurred disc margin in both eyes and (Bottom) peripheral perivascular pigmentary changes.

evaluation including lumbar puncture, electroencephalogram and computed tomography was normal. A neuro-ophthalmic consultation was requested.

Visual acuity was hand motion in the right eye and 20/300 in the left eye. The visual fields were markedly constricted in each eye. Funduscopy revealed diffuse retinal pigment epithelial atrophy, narrowed vessels and peripheral bony spicule changes. Both discs were elevated, with irregular lumpy borders but no evidence of nerve fiber layer edema (Fig. 3). A diagnosis of retinitis pigmentosa with optic disc drusen was made.

Comment. This additional case of retinitis pigmentosa and disc drusen illustrates the importance of recognizing the differences in ophthalmoscopic appearance between true papilledema and disc

drusen.

CASE 3

A 50-year-old man was referred for evaluation of bitemporal visual field loss. He had been followed for one year by a neurologist and an ophthalmologist. Several tangent screen examinations had revealed scotomas in the temporal field of each eye. Because of suspicion of a chiasmal lesion, computed tomography and carotid angiography were performed and were normal.

On examination, visual acuity was 20/20 in each eye. Perimetry showed large temporal and small nasal scotomas in each eye (Fig. 4). Funduscopy revealed pigment clumping primarily in the nasal retina (Fig. 5), attenuated vessels and normal appearing optic discs bilaterally. A history of decreased night vision was elicited and a diagnosis of retinitis pigmentosa was made. The patient refused electrophysiologic testing. There was no family history of retinal degeneration.

Comment. Retinitis pigmentosa may involve primarily the nasal retina producing temporal visual field defects. However, the pattern of the defect should make the differentiation from a chiasmal lesion an easy one. In this patient the temporal visual field defects did not extend to the vertical midline and careful testing revealed the additional presence of nasal defects. Proper interpretation of the fields would have pointed to the need for a further evaluation for retinal disease and avoided the performance of invasive neuroradiologic studies.

CASE 4

An 18-year-old woman with a 1½ year history of decreased vision was found to have temporal visual field loss in each eye and was referred for evaluation of a chiasmal lesion. Her mother had a history of night blindness.

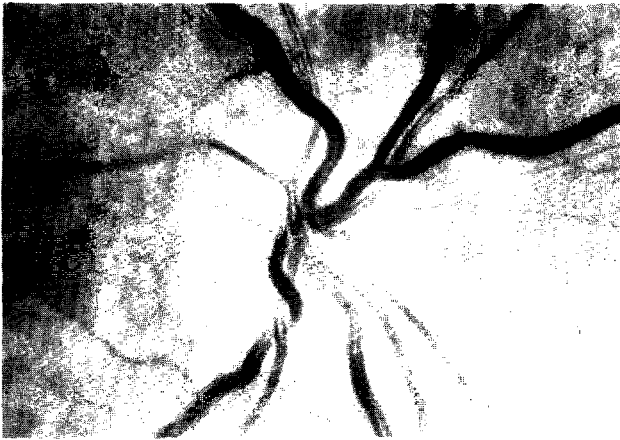


Fig. 3. Case 2. Fundus photographs showing optic disc drusen in each eye.

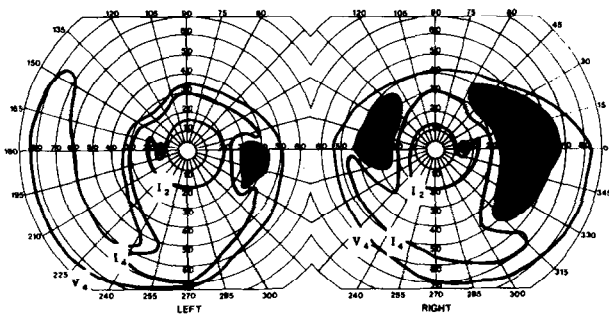


Fig. 4. Case 3. Perimetry showing large temporal plus small nasal scotomas in each eye.

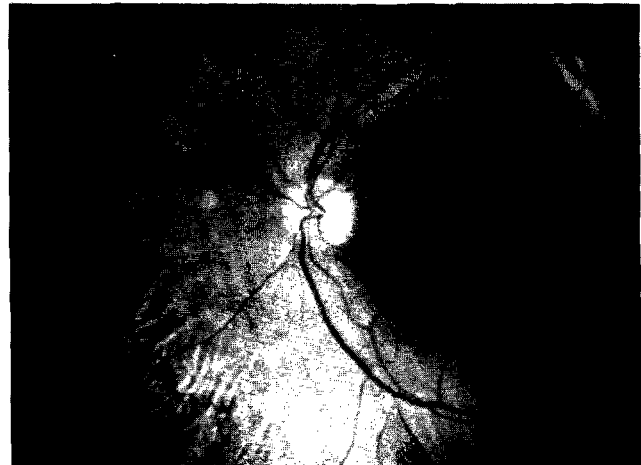


Fig. 5. Case 3. Fundus photograph showing nasal retinal pigmentary changes and arteriole attenuation in the left eye. The right eye appeared similar. Note that without pupillary dilation and a careful evaluation of the peripheral retina, these changes would be missed.

Visual acuity was 20/20 in each eye. Large temporal scotomas were present bilaterally (Fig. 6). The peripheral retinal vessels were attenuated and the discs were somewhat pale. Fluorescein angiography (Fig. 7) and electroretinography were consistent with a diagnosis of a retinitis pigmentosa variant.

Comment. In this case, complete and accurate visual fields were obtained but were misinterpreted. Although the funduscopic changes were subtle, careful examination of the visual fields should have led to the realization that they were inconsistent with a chiasmal abnormality, since they crossed the vertical midline in each eye. Bilateral retinal disease should have been suspected.

CASE 5

A 55-year-old woman presented with a 15–20 year history of decreased vision. She had been in several motor vehicle accidents in recent years and noted trouble finding objects on her desk and difficulty reading. There was no family history of ocular

disease.

Visual acuity was 20/30 and there was a very small central island of vision surrounded by a dense ring scotoma on perimetry in each eye (Fig. 8). The patient underwent extensive inpatient evaluation for an optic neuropathy or bilateral occipital lobe infarctions, including lumbar puncture and computed tomography. No diagnosis was established.

Two years later visual acuity and perimetry were unchanged. A careful funduscopic examination revealed narrowed retinal arterioles and granularity of the macular pigment epithelium in each eye. Fluorescein angiography confirmed the macular changes (Fig. 9) and electroretinography showed subnormal cone responses and borderline subnormal rod responses, consistent with a retinal degen-

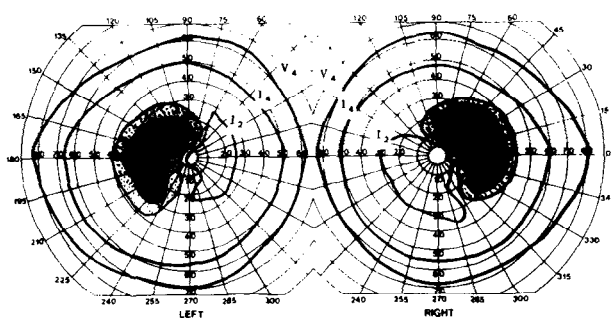


Fig. 6. Case 4. Perimetry showing temporal scotomas in each eye. Note that the scotomas do not respect the vertical midline.

eration. A diagnosis of a central form of retinitis pigmentosa was made.

Comment. This form of retinitis pigmentosa in which the central retina is predominantly involved is rare. The diagnosis was not obvious on ophthalmoscopy. However, the pattern of visual field loss made optic neuropathy or bilateral occipital lobe infarctions unlikely and should have raised the index of suspicion for a retinal degeneration. Optic neuropathies are usually associated with central or cecentral scotomas. The pattern of visual field loss in this patient with sparing of tiny central islands of vision would be very unusual with optic nerve disease. Bilateral occipital lobe infarctions could produce visual field defects similar to the ones present in this case, but a vertical step at the edges of the scotomas should be present. The fact that the defects crossed the vertical midline without a step would be evidence against occipital lobe infarctions.

CASE 6

A 46-year-old woman with a history of amblyopia in the left eye (secondary to esotropia) presented with a long history of intermittent but progressive visual loss in the right eye. She had been hospitalized for an evaluation three times in the past with diagnoses of optic neuritis, brain tumor, and hysteria. A recent evaluation included a normal metrizamide CT scan, electroencephalogram and carotid arteriogram. There was no family history of any ocular diseases.

On examination, visual acuity was 20/70 in the right eye (decreased from 20/30 one year earlier), and counting fingers in the left eye (unchanged). There was a large relative afferent pupillary defect in the left eye. Color vision by Ishihara plates was normal in the right eye. The visual field was markedly constricted in both eyes (Fig. 10). To confrontation, the visual fields appropriately expanded as



Fig. 7. Case 4. Fluorescein angiography in the left eye delineating the area of pigmentary change (appears white). The right eye appeared similar.

the distance between the examiner and the patient was increased. Fundusoscopic examination revealed marked retinal atrophy and narrowed arterioles, but only minimal bony spicule changes. The optic discs appeared normal. Fluorescein angiography and electroretinography were characteristic of a diffuse retinal degeneration. A diagnosis of retinitis pigmentosa was made.

Comment. This case was complicated by amblyopia in the left eye, an inconsistent history of intermittent decreased vision in the right eye, and a form of retinitis pigmentosa with minimal pigmentary changes (*sine pigmento*). Nevertheless, by assessing the visual field at various distances, it was possible to demonstrate that the visual field constriction was consistent with organic disease. Marked constriction of the field should always raise the suspicion of a retinal degeneration. In this patient, careful fundusoscopic examination would have revealed that the arterioles were narrowed and the retina atrophic.

It should also be noted that relative afferent pupillary defects can be present in some cases of retinitis pigmentosa when the retinal degeneration is asymmetric in the two eyes.² In this patient the relative afferent pupillary defect was probably due to the retinal disease, as no evidence of optic nerve dysfunction was found and amblyopia would not have produced a relative afferent pupillary defect this large.

Discussion

Retinitis pigmentosa is a progressive retinal degeneration characterized by night blindness, progressive visual loss and an abnormal or nonrecorda-

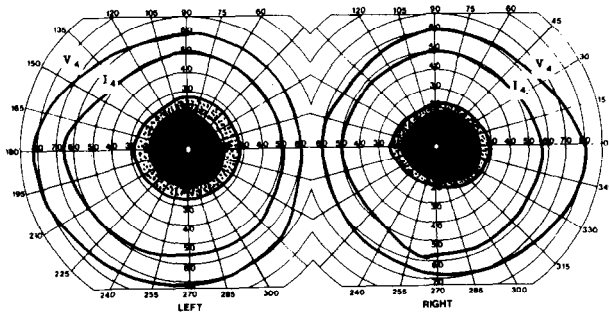


Fig. 8. Case 5. Perimetry showing dense ring of scotoma with preservation of central island of vision in each eye.

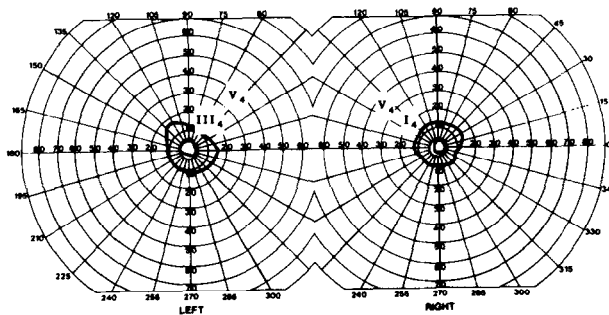


Fig. 10. Case 6. Perimetry showing marked constriction of visual field in both eyes.

ble electroretinogram.^{3,4} Its incidence in the United States has been calculated to be 1 per 3700.¹ Most cases are inherited, with either an autosomal recessive (often with no family history), autosomal dominant, or sex-linked recessive transmission. Upon careful searching, many apparent sporadic cases are found to have relatives with histories of night blindness or blindness of unknown etiology.

There are many varieties of retinitis pigmentosa, and a uniformly accepted method of classification has not been established. In the classic form, night vision and peripheral vision are affected early (usually by the second decade of life), with central vision persisting until late in the disease process. Funduscopy demonstrates attenuated vessels, bony spicule pigmentary changes and waxy disc pallor. Electroretinography shows diffuse rod loss with eventual extinction. Although these are the classic findings, there is great potential variability in the clinical profile. Patients of any age may be affected. The central retina or sectors of retina may be primarily involved rather than the periphery and the degree of retinal pigmentary change varies from case to case; in some cases the classic bony spicules are not present (*sine pigmento*).

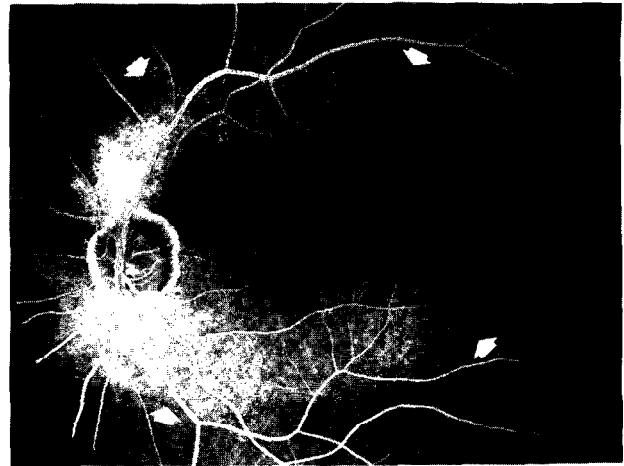


Fig. 9. Case 5. Fluorescein angiography in the left eye demonstrating abnormal ring of pigmentation surrounding fovea. Arrows delineate the outer extent of the changes. The right eye appeared similar.

Visual field defects develop as the retinal degeneration progresses. A generalized depression or constriction of the field and ring-shaped scotomas are the most common findings.⁴ However, patterns of field loss vary depending on the portions of the retina that are affected. When primarily the nasal retina is involved, temporal field loss will predominate (as in cases three and four), raising suspicion for a chiasmal lesion. Regardless of the form of retinitis pigmentosa, the visual field defects have in common a disregard for the horizontal and vertical meridians.

The cases described herein illustrate the diagnostic difficulties that can arise in retinitis pigmentosa. In all of the cases, neurologic diagnoses were considered, including pseudotumor cerebri, chiasmal mass, optic neuropathy, and hysteria. In five of the cases, invasive neurologic studies were performed, and in one case surgery. The current diagnosis in all cases could have been established with careful funduscopy and proper interpretation of the visual fields. In some of the cases the magnification obtained with a Hruby lens examination aided in identifying the retinal atrophy. In three patients (cases 4, 5, and 6), the retinal changes became more obvious with fluorescein angiography. Electroretinography was employed primarily as a confirmatory tool, as a clinical diagnosis of retinal degeneration was made independent of electrophysiologic studies in all cases. A family history was not generally helpful in diagnosis in these particular cases but, of course, should be elicited whenever a retinal degeneration is suspected.

In all but one case, visual field defects were misinterpreted as being secondary to a neurologic rather

than a retinal process. However, in each of these cases, careful analysis of properly performed fields indicated that the horizontal and vertical meridians were not obeyed, hence pointing to bilateral retinal rather than neurologic disease.

The ophthalmoscopic diagnosis of a retinal degeneration was obvious in only one of the six patients (case 2). In one other patient (case 4) a retinal degeneration was suspected, but in the other four cases the patient had been evaluated by an ophthalmologist who had not made the proper diagnosis. This pitfall could have been avoided had the clinician noted not only the retinal changes but also, in most cases, that the retinal arterioles were attenuated. This latter finding is frequently a tip-off to observe the retina closely for signs of degeneration.

In two cases, optic disc drusen were mistaken for papilledema. The association of retinitis pigmentosa and drusen is a real one with retinitis pigmentosa being present in up to 4% of patients with disc drusen.⁶ In most cases the clinician should be able to distinguish ophthalmoscopically between true and pseudopapilledema. Table 1 summarizes the differentiating features.

Thus, retinitis pigmentosa can be a great mi-

micker of neurologic disease. It behooves the clinician to be able to distinguish visual field defects with a retinal basis from those with a neurological basis and to be able to diagnose a retinal degeneration in the absence of the classic bony spicule changes. Hopefully, this paper will alert clinicians to the many possible ways retinitis pigmentosa can mimic neurologic disease and enhance their diagnostic capabilities.

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