Principles and Practice of Clinical Electrophysiology of Vision

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A Year Book Medical Publishers imprint of Mosby-Year Book, Inc.

Mosby-Year Book, Inc.
11830 Westline Industrial Drive
St. Louis, MO 63146

1 2 3 4 5 6 7 8 9 0 CL CL MV 95 94 93 92 91

Library of Congress Cataloging-in-Publication Data
Principles and practice of visual electrophysiology / [edited by]
John R. Heckenlively, Geoffrey B. Arden.
p. cm.
Includes bibliographical references.
Includes index.
ISBN 0-8151-4290-0
1. Electroretinography. 2. Electrooculography. 3. Visual evoked response. I. Heckenlively, John R. II. Arden, Geoffrey B. (Geoffrey Bernard)
[DNLM: 1. Electrooculography. 2. Electrophysiology. 3. Electroretinography. 4. Evoked Potentials, Visual. 5. Vision Disorders—physiopathology. WW 270 P957]
RE79.E4P75 1991 91-13378
617.7 1547—dc20 CIP
DNLM/DLC
for Library of Congress

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Pituitary Syndromes

Graham E. Holder

The optic chiasm is the focus of interest for clinical visual electrophysiologists in disease of the pituitary gland. The classic triad of neuro-ophthalmic signs in pituitary tumors of reduced visual acuity, visual field defects, and optic atrophy results from suprasellar extension and resulting compression of the chiasm. The investigation of choice in patients with suspected chiasmal compression is computed axial tomography (CT scanning) or magnetic resonance imaging (MRI), and the question therefore arises as to the role of electrophysiological testing in such patients. There are probably two roles: the first is in the initial assessment and diagnosis of patients with visual symptoms; the second is in the follow-up and management of those patients with radiologically confirmed lesions who may or may not show suprasellar extension and signs of visual pathway dysfunction.

DIAGNOSTIC ASPECTS

The delayed or misdiagnosis of chiasmal dysfunction can result in severe irreversible visual loss, and it is therefore of critical importance that the correct diagnosis be promptly reached. Lesions other than pituitary tumors such as a craniopharyngioma, suprasellar meningioma, etc., can all cause chiasmal compression but will not specifically be considered further. The visual evoked potential (VEP) findings typical of chiasmal compression, the "crossed" asymmetry first fully evaluated by Halliday's group,[4] have been documented elsewhere in this volume (see Chapter 71) and will not be reiterated. It is sufficient to say that a single midline recording channel is inadequate; the ability to detect asymmetrical scalp distribution is essential. Equally, stimulus parameters must be given adequate consideration. Although a small full-field stimulus can be successfully used,[6] a large hemifield stimulus may be more sensitive in the detection of early chiasmal dysfunction.[2]

Reports of misdiagnoses in the literature[3, 6, 10, 13] include (atypical) retrobulbar neuritis, glaucoma, cataract, hysteria, macular degeneration, refractive error, choroidal sclerosis, and vascular lesions. Most of the patients described had unilateral visual loss, and the delay in diagnosis was often due to a failure of clinicians to elicit an accurate history, perform perimetry, or obtain a plain-skull radiograph. Note that the classic bitemporal hemianopia occurs in fewer than 50% of patients with pituitary tumors and visual loss,[7, 16] unilateral visual loss occurring in some 13% of patients.[1] Perimetry should always include the use of a red target.

Careful application of electrodiagnostic testing should help resolve most of the diagnostic errors. The "crossed" pattern VEP (PVEP) abnormality regularly found in chiasmal lesions is not a feature of retrobulbar neuritis, and VEP recording must be performed in any "atypical" case. Pattern electroretinography (PERG)[5, 12] can usually distinguish more distal anterior visual pathway dysfunction from optic nerve disease and is now routine in the author's laboratory in all patients with delayed PVEPs and visual symptoms. Standard ERG recording should help distinguish between peripheral field loss due to retinal disease and that due to chiasmal dysfunction.

ROLE OF ELECTROPHYSIOLOGY IN CONFIRMED LESIONS

Advances in endocrinological testing now give improved early diagnosis of hormonally active pitu-

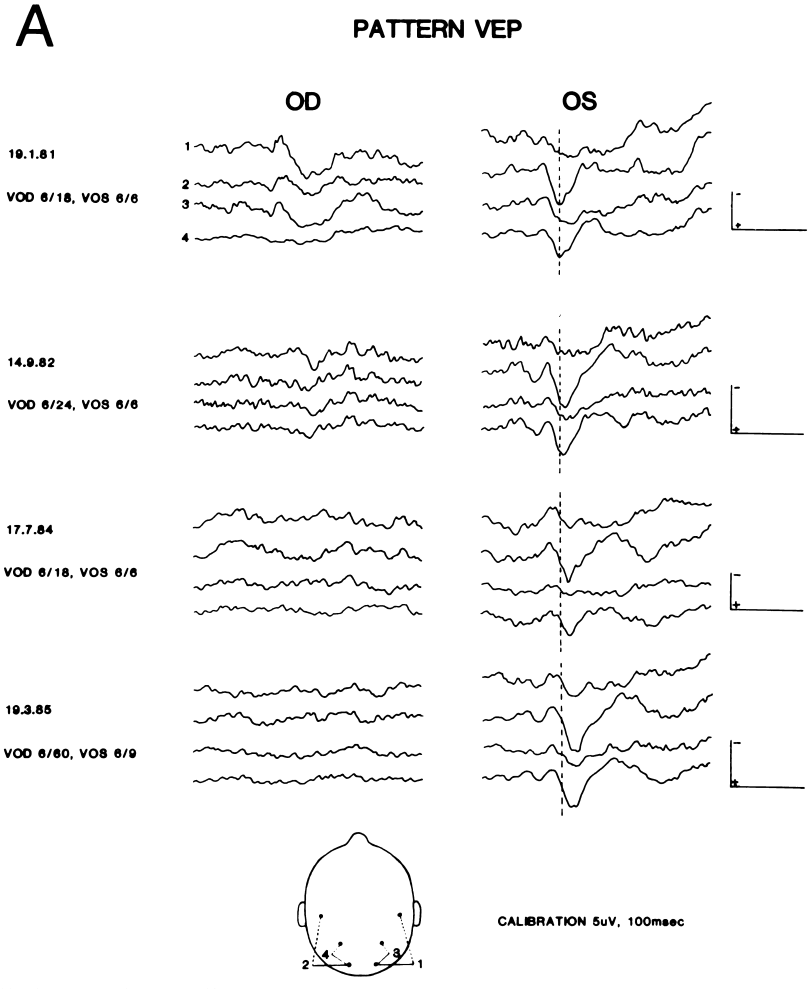
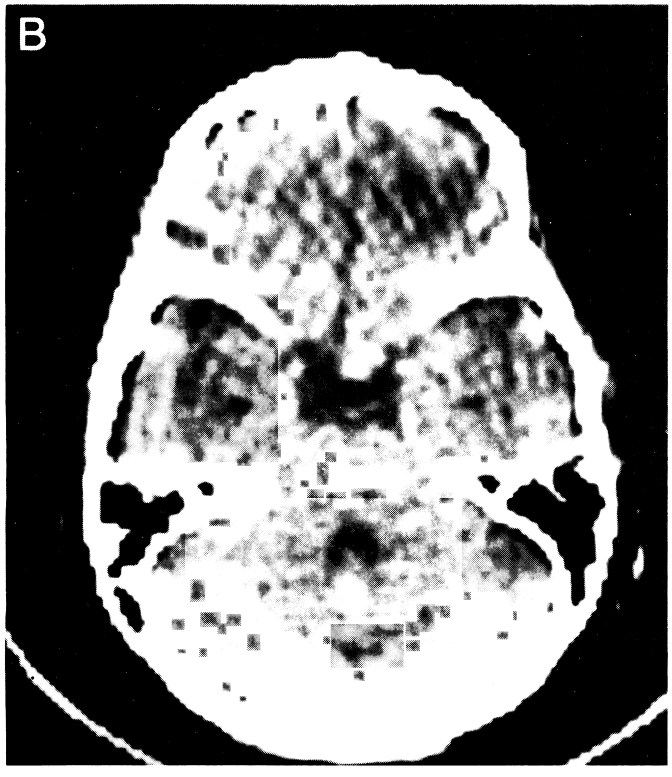
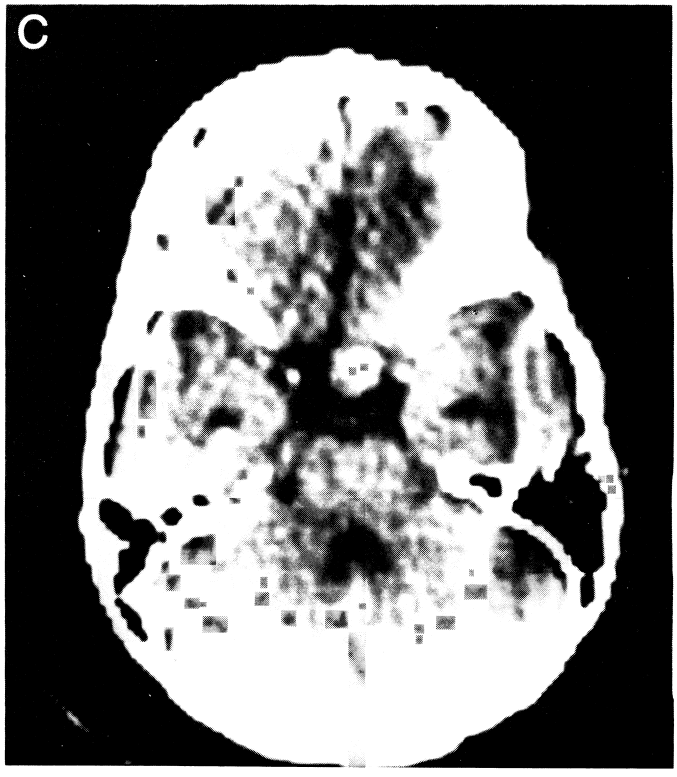


FIG 109–1.

A, Serial PVEP recordings (11-degree full field, 26-minute checks) in a patient with recurrence of a nonfunctioning chromophobe adenoma. The patient declined further surgery during this period. Initial findings from the right eye show a P100 component of markedly abnormal latency that is better seen in the ipsilateral hemisphere traces, which is in keeping with the lateralization expected with a small-field, small-check stimulus (see Chapter 71). The PVEP had become extinguished by March 17, 1984, but no change in visual acuity had occurred. A drop in acuity to 6/60 was noted almost 1 year later. Initial findings from the left eye show a well-formed P100 component in the ipsilateral traces, markedly abnormal in the right hemisphere traces. The latency of the P100 component increases by some 20 ms over the 4-year period with no associated change in acuity. Note the continuing interhemispheric asymmetry. Visual fields were abnormal throughout but showed no significant deterioration. **B** and **C,** CT scans taken in October 1980 and July 1984 show the tumor expansion during the period of PVEP follow-up.





itary tumors; such patients may or may not have visual field defects. Medical management with bromocriptine is the current treatment of choice for prolactinomas, but size reduction in other tumors has also been reported.[9, 14, 15] CT scanning or magnetic resonance imaging (MRI) can indicate suprasellar extension but cannot assess the function of the chiasm. Wass et al.[15] examined the effects of bromocriptine therapy on the PVEP in 13 patients with large pituitary tumors. The PVEPs were improved in 6 patients, deteriorated in 3, and were unchanged in 4. The relationship between the PVEP findings and radiological or visual field change was not examined. Pullan et al.[11] used hemifield PVEP recording to monitor the effects of bromocriptine therapy in 10 patients with radiologically demonstrated suprasellar extension: five with prolactinomas and five with nonfunctioning tumors. VEP improvement occurred in five patients (three with normal fields), only four of whom also showed radiological change. It is our experience (Holder, unpublished observations) that serial VEP recording can also contribute to a change from medical to surgical management by demonstrating (increasing) chiasmal dysfunction in a patient receiving bromocriptine therapy. Serial postoperative VEP recording can also monitor the functional state of the optic nerves and chiasm in a patient following tumor excision (Fig 109–1) and may help detect tumor recurrence prior to deterioration in visual fields or acuity. Similarly, some patients decline surgery when offered, and additional objective evidence of increasing visual pathway dysfunction may help patients reconsider their decision.

A recent study suggests that the PERG may be a useful prognostic indicator for visual outcome in the preoperative assessment of optic nerve compression in pituitary tumor.[8] Personal experience (Holder, unpublished data) confirms this use of the PERG, an abnormal PERG presumably demonstrating significant retrograde degeneration in the retinal ganglion cells and correlating with a lack of postoperative recovery. Expansion of this application of the PERG can be anticipated.

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