Optic nerve evaluation by echography and computerized tomography in patients with optic disc drusen

D. DORO, S. PERRONE, D. FIORE, and F. MORO
Padova, Italy

Abstract

Axial and coronal CT sections of the orbital optic nerve appeared normal in four out of five male patients, aged between 39 and 49 years, who had bilateral ophthalmoscopically visible optic nerve drusen. One patient had no clinical signs of increased intracranial pressure, but CT showed bilateral, symmetrical enlargement of the orbital optic nerves with no change after contrast enhancement. X-rays revealed a large sella and normal optic foramina. Orbital optic nerve thickness was also measured with standardized echography and was found to be greater than in the other four patients whose optic nerves measured within normal values. The usefulness of A- and B-scan echography for the evaluation of the optic nerve and the controversial pathogenesis of optic disc drusen are discussed.

A 39-year-old man who had never undergone ophthalmological examination was admitted to our Clinic with cranial trauma and a large lid tear. Ophthalmoscopical and retinal fluorescein angiographic findings and preinjection autofluorescence evidenced bilateral expsed drusen of the optic nerve head. Both eyes had full vision and inferonasally restricted visual fields.

Skull x-rays revealed a large sella with clear-cut margins and normal optic foramina. Computed axial tomography unexpectedly revealed a bilateral narrow-diffuse symmetrical enlargement of the orbital optic nerve; no change was observed after contrast enhancement (Fig. 1). In the coronal projections, the optic nerve outlines appeared well circumscribed.

No cafe au lait spots were observed at the neurological examination, which was negative. The patient, who complained of moderate transient headache, refused both lumbar puncture and carotid arteriography. During the four-year follow-up, no changes were observed in the optic disc, visual field, visual acuity and CT picture and no proptosis was recorded.

The optic nerves, measured by means of standardized 7200 MA A-scan, were found to be thicker than normal: 6.5 microseconds in the right eye and 6

K.C. Ossoinig (editor), Ophthalmic Echography, ISBN 0-89838-873-2.

Fig. 1. Axial CT-Scan showing narrow-diffuse enlargement of the optic nerves in patient 1.

microseconds in the left eye (Fig. 2). No distension of nerve sheaths by increased subarachnoidal fluid was observed and no differences were observed between the optic nerve obtained in primary-gaze and abduction positions.

Pseudotumor cerebri was excluded on the basis of fluorescein angiographic and A-scan investigations. CT-scans were inconsistent with the diagnosis of optic nerve glioma or meningioma (Jacobiec et al. 1984). A diagnosis of bilateral astroglial proliferation of the optic nerves associated with optic nerve head drusen was suggested (Doro et al. 1982).

This case prompted us to submit four 39 to 49-year-old male patients with bilateral optic nerve drusen to standardized A-scan echography and CT to

Table 1. Visual acuity and field defects in five patients with bilateral optic disc drusen.

Patient	Age	V.A.		F.D.	
		R.E.	L.E.	R.E.	L.E.
1	39	1	1	lower nasal	lower nasal
2	48	0,3	0,4	lower nasal	lower nasal
3	49	1	hm	lower temporal	mainly inferior irregular narrowing
4	40	1	1	severe irregular narrowing	mild upper temporal
5	39	0,8	0,4	lower nasal	central and upper temporal islet

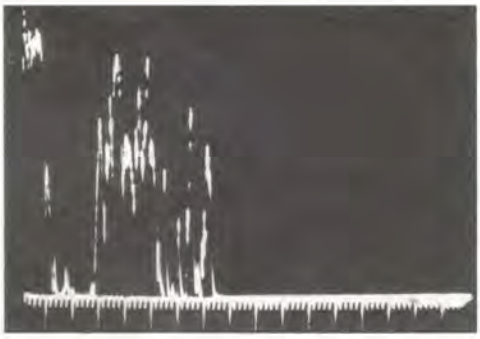

Fig. 2. Standardized A-Scan echogram of thickened right optic nerve in patient 1.

ascertain whether they had optic nerve enlargement.

The visual acuity and field defects of all five patients are summarized in Table 1. The pre-injection autofluorescence and the retinal fluorescein angiograms of the four patients evidenced optic nerve head drusen. Axial and coronal sections of the orbital optic nerves of the four patients appeared normal; in three patients, there were obvious drusen of the optic nerve head. The optic nerve widths measured with standardized A-scan echography, ranged from 4 to 5.5 microseconds (Table 2). In all patients, the optic nerves were higher reflective than in five controls.

Discussion

Retinal fluorescein angiography is necessary for, and usually provides enough evidence to make a diagnosis of drusen of the optic nerve head (Moro et al. 1979). B-scan and CT are useful in the detection of exposed and mostly buried optic nerve head drusen. Standardized A-scan is the most accurate means for

Table 2. Standardized A-scan measurements of optic nerve diameters of five patients with bilateral optic disc drusen.

Patient	Microseconds	
	R.E.	L.E.
1	6,5	6
2	4	4,5
3	5,5	5
4	4,5	5
5	5	5,5

measuring the optic nerve width (Ossoinig et al. 1981); a width of 4.7 ± 0.9 microseconds is considered normal (Guthoff et al. 1982) and the optic nerve widths observed in four of our cases may, therefore, be considered normal. In four of our patients, CT images of the retrobulbar optic nerve appeared normal, as did those of the five patients with optic nerve head drusen reported by Frisen et al. (1978). The diameter of the optic nerve was found to be greater than normal in both eyes of our first patient with drusen of the optic nerve head associated with CT evidence of bilateral optic nerve enlargement.

The pathogenesis of drusen of the optic nerve has long been a controversial subject. Recently Spencer (1978) suggested that an axoplasmic transport alteration may be the basic pathogenetic mechanism for formation of drusen in the optic nerve; the mild axonal swelling and the inconstant moderate gliosis observed histologically by Tso (1981) in patients with optic nerve head drusen may account for the increased optic nerve diameter found in our first patient. Further investigations using standardized A-scan are needed to establish how frequently optic disc drusen are associated with increased optic nerve thickness.

References

Doro D, Perrone S, Cardin P, Pardatscher K, Fiore D. 1982. Bilateral optic nerve enlargement associated with optic disc drusen. A case report. Orbit 1: 181.

Frisen L, Schöldström G, Svendsen P. 1978. Drusen in the Optic Nerve head: verification by computerized tomography. Arch. Ophthalmol. 96: 1611-1614.

Guthoff RF, Schroeder W, Hagemann J. 1982. Examination of the optic nerve by ultrasound and CT Scan. Orbit 1: 152.

Jacobiec FA, Depot MJ, Kennerdell JS, Shults WT, Anderson RL, Alper ME, Citrin CM, Housepian EM, Trokel SL. 1984. Combined Clinical and Computed Tomography Diagnosis of Orbital Glioma and Meningioma. Ophthalmol. 91: 137–155.

Moro F, Saraniti G. 1979. Fluorangiografia della papilla ottica. In Maione M. and Moro F. Le otticopatie. Maccari ed. Parma, Italy.

Ossoinig KC, Cennamo G, Frazier-Byrne S. 1981. Echography differential diagnosis of optic-nerve lesions. Docum. ophthal. proc. Series Vol. 29, ed. by J.M. Thijssen and A.M. Verbeek. Dr. W. Junk Publisher The Hague.

Spencer WH. 1978. Drusen of the optic disc and aberrant axoplasmic transport. Am. J. Ophthalmol. 85: 1–12.

Tso MOM. 1981. Pathology and Pathogenesis of Drusen of the Optic Nervehead. Ophthalmol. 88: 1066–1080.