Glaucoma in Hansen's disease

R C Walton, S F Ball, V C Joffrion

Abstract

Glaucoma is considered to be an uncommon complication of Hansen's disease (leprosy). This study determined the prevalence and characteristics of glaucoma in a large institutionalised leprosy population. All 193 patients currently residing at the Gillis W Long Hansen's Disease Center received a complete ophthalmic examination and review of their records. All had been previously treated with dapsone and/or clofazimine. Based on the strict definition of a recorded intraocular pressure ≥ 22 mm Hg and characteristic optic nerve pathology, 19 patients (10%) were found to have glaucoma. Glaucoma secondary to uveitis was noted in 11 of these patients. These findings suggest that the chronic inflammatory process of Hansen's disease, even when treated, may be followed by secondary glaucoma. We recommend that all patients with Hansen's disease receive regular periodic examinations, including slit-lamp biomicroscopy to detect low-grade iridocyclitis and measurement of intraocular pressure.

Hansen's disease (leprosy) continues to be a leading public health problem in developing countries. Current estimates are that 15 million patients are affected worldwide.¹ Over the past 30 years the number of reported cases in the United States has steadily increased as a result of immigration from regions where it is endemic.¹ In 1988, 184 new cases were reported in the United States, with an average of 250 cases reported each year for the 10 previous years.²

Leprosy is a chronic granulomatous disease which affects the skin, peripheral nerves, and the eye and ocular adnexa. The causative agent, *Mycobacterium leprae*, is an acid-fast bacillus that preferentially grows in tissues cooler than 37°C.³ Because of the long incubation period (five years or greater), the route of transmission remains uncertain, though it is thought that the site of entry is the skin or mucosa of the upper respiratory tract.¹

In accordance with the Madrid classification system the disease exists in three forms: lepromatous, borderline, and tuberculoid.³ Lepromatous leprosy has a higher incidence of intraocular complications, such as uveitis, while tuberculoid leprosy is commonly associated with external ocular problems such as keratitis, lepromas, lid nodules, and lagophthalmos. In the borderline form ocular involvement may include any of the problems seen with the other two forms of the disease.³

Glaucoma is considered an uncommon complication of leprosy, with a reported average prevalence of 3.9%.⁴ It is the result of iris bombé due to pupillary seclusion by posterior synechiae

during episodes of acute iridocyclitis.³ A chronic, low-grade anterior uveitis occurs in 17-41% of Hansen's disease patients, especially those with the lepromatous form of the disease.^{3,5,6} Reports of secondary glaucoma are rare despite the considerable percentage of patients with this type of uveitis. The paucity of secondary disease cases may be the result of atrophy and hyalinisation of the ciliary body leading to a decrease in aqueous production.^{7,8} The purpose of this study was to determine the prevalence and characteristics of glaucoma in a large population of patients with leprosy.

Patients and methods

All 193 patients living at the Gillis W Long Hansen's Disease Center in Carville, Louisiana, were included in the study. The centre is a chronic-care facility; most of the residents have chosen institutional care because of the severe skeletal deformities and/or advanced age. Each patient underwent a complete ophthalmic examination and review of records. Those with a history of glaucoma and all patients with an intraocular pressure (IOP) ≥ 22 mmHg or characteristic optic nerve cupping were re-examined. Characteristic optic nerve findings included a cup-to-disc ratio ≥ 0.5 or a cup-disc ratio difference ≥ 0.2 between the eyes. Visual acuity with appropriate optical correction was measured at 20 feet (6m) by a standard Snellen chart. Slit-lamp examination and gonioscopy were performed. Intraocular pressure was measured with the Goldmann applanation tonometer or the Tono-Pen⁷. With dilated pupils a slit-lamp examination of the lens and a fundus examination, with stereoscopic evaluation of the optic nerve with a +78 dioptre lens, were performed on all patients. Perimetric testing was not available on 10 eyes of 19 patients.

Patients were determined to have glaucoma by the following criteria: (1) IOP ≥ 22 mmHg and red-free slit-lamp examination evidence of nerve fibre layer loss with typical glaucomatous cupping; or (2) visual field defects with typical glaucomatous cupping; or (3) a history of persistent IOP ≥ 35 mmHg on no medications.

Information obtained from each record included the age, sex, race, duration of disease, and type of leprosy (Madrid classification). A history of ocular disease and of ocular operations, visual field abnormalities, and highest recorded intraocular pressure were noted. All current ocular medications were listed. For patients in whom media abnormalities prevented optic nerve visualisation the last recorded cup-to-disc ratio was also noted.

The type of glaucoma was determined by chart review, history, and ocular examination. Patients with less than 180° of peripheral anterior synechiae and a history of multiple episodes of

Department of
Ophthalmology, Ochsner
Clinic and Alton Ochsner
Medical Foundation,
New Orleans, Louisiana,
USA

R C Walton
S F Ball

LSU Eye Center,
Department of
Ophthalmology,
Louisiana State
University Medical
Center School of
Medicine, New Orleans,
Louisiana, USA
S F Ball

Department of
Ophthalmology, Gillis W
Long Hansen's Disease
Center, Carville,
Louisiana, USA
V C Joffrion

Correspondence to:
Dr S F Ball, LSU Eye Center,
2020 Gravier Street, Suite B,
New Orleans, LA 70112-2234,
USA.

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Table 1 Glaucoma in Hansen's disease (n=193)

Diagnosis	Number of patients (%)
Primary open angle	3 (1.6)
Open angle secondary to uveitis*	7 (3.6)
Exfoliation	1 (0.5)
Primary angle closure	2 (1.0)
Chronic angle closure secondary to uveitis†	4 (2.1)
Combined mechanism	2 (1.0)

*Patients with <180° of peripheral anterior synechiae secondary to uveitis.

†Patients with peripheral anterior synechiae secondary to uveitis.

anterior uveitis were considered to have open-angle glaucoma secondary to uveitis.

Results

Of the 193 patients 165 (85%) were classified as lepromatous, 20 (10%) as borderline, and 8 (4%) as tuberculoid. All patients had received systemic chemotherapy with dapsone and/or clofazimine. Using the strict definition of a recorded IOP ≥ 22 mmHg and characteristic glaucomatous optic nerve changes, 19 patients (37 eyes) were found to have glaucoma, a prevalence of 10% (19/193). One patient was monocular following enucleation for postoperative endophthalmitis.

Of the 19 patients with glaucoma 12 (63%) were male and seven (37%) were female. The ages of the patients ranged from 46 to 88 years (mean 67.5 years). Seven (37%) were Caucasian, six (32%) were black, and six (32%) were Hispanic. The mean duration of disease was 42.7 years (range, 7–58 years). Fifteen of the cases were classified as lepromatous, three as borderline, and one as tuberculoid. One patient had diabetes mellitus.

The types of glaucoma in this population are shown in Table 1, while the distribution of the types in the 19 affected patients is displayed in Figure 1. All visual field defects were consistent with the diagnosis of glaucoma (no other aetiology was identified in any of the cases).

A summary of the ophthalmic examinations for the 37 affected eyes is presented in Table 2. In patients with a cataractous lens, no evidence of lens-induced glaucoma was noted. The results of visual acuity measurements are displayed in Figure 2. Of the 16 eyes with visual acuity less than 20/200, 9 had visually significant corneal and/or lenticular opacities. The remaining seven eyes had no significant media opacities; poor

Figure 1 Distribution of types of glaucoma.

Table 2 Summary of ophthalmic examinations (n=37 eyes)

Finding	Number (%)
Cornea	
Superficial keratitis	12 (32)
Interstitial keratitis	6 (16)
Endothelial pigment	4 (11)
Keratic precipitates	5 (14)
Iris	
Segmental atrophy	12 (32)
Pupillary atrophy	1 (3)
Pupillary transillumination	2 (5)
Gonioscopy	
Angle width $\leq$ grade 1	12 (32)
Trabecular pigmentation $>$ grade 3	2 (5)
Peripheral anterior synechiae $>$ 180°	11 (30)
Lens	
Exfoliation	1 (3)
Glaukomflecken	1 (3)
Posterior synechiae	3 (8)
Cataract	6 (16)
Aphakia/pseudophakia	13 (35)
Intraocular pressure (mmHg)	
Range	17–43
Mean (SD)	23.9 (5.6)
Cup-to-disc ratio*	
≤ 0.5	12 (32)
0.6–0.7	12 (32)
≥ 0.8	11 (30)

*Three eyes with media opacities and only description of 'glaucomatous cupping' in records were not included.

vision was probably secondary to glaucomatous optic nerve damage alone.

Discussion

The incidence of Hansen's disease in the United States has shown a steady increase over the past 30 years. The number of cases reported annually has increased from 36 in 1957 to a peak of 361 in 1985.² Most of these cases reflect importation from regions where it is endemic, though a small number are indigenous.¹

Ocular involvement occurs in up to 90% of patients with leprosy.³ In lepromatous patients antigen (or possibly living organisms) may persist in the eye long after completion of standard chemotherapy regimens. These patients may also experience episodes of ocular inflammation without signs of clinical activity in other parts of the body.⁹ Glaucoma has been considered to be an uncommon complication of Hansen's disease despite a considerable number of patients with a chronic low-grade anterior uveitis.

We found a 10% prevalence of glaucoma in this population. This compares with the reported average prevalences of 3.9% in various leprosy populations.⁴ The higher prevalence of glaucoma in our population may be related to the fact that it was biased toward older age and longer duration of disease. Moreover, a larger percentage of patients had the lepromatous form of the disease than other leprosy populations surveyed.⁴ However, since inpatient treatment of leprosy is no longer compulsory, it is possible that patients with the most crippling disease (including blindness from glaucoma) preferentially elect institutional care. This may result in an apparent increase in the prevalence of these ocular diseases in this leprosy population. There was a correspondingly high association of other uveitis-induced ocular conditions, some of which needed surgery (cataracts, corneal clouding, angle closure), but these were incidental conditions and not causative of the chronic glaucoma reported. Nevertheless, our results are compar-

Figure 2 Visual acuity measurements.

able to those of Shields *et al.*,⁵ who found a glaucoma prevalence of 12% in a population with a mean age of 55 years (mean duration of 24 years).

These findings suggest that over time the chronic inflammatory process of Hansen's disease, even when treated, is apt to lead on to secondary glaucoma and severe visual loss. This progression may occur even though the patient has no signs of clinical activity in any other part of the body. Despite these biases we believe that our results should be a useful guide for clinicians treating patients with leprosy – especially those with the lepromatous form, longer duration of

disease, and advanced age. We recommend regular periodic ophthalmic examinations for all patients with Hansen's disease, including those without signs of clinical disease. These examinations should include slit-lamp biomicroscopy to detect low-grade uveitis as well as intraocular pressure measurement. Patients with chronic anterior uveitis should undergo more frequent examination, since they appear to have an increased risk of developing secondary glaucoma.

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