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Eye Disease in the Navajo Indians

RONALD FRIEDERICH, MD

The ocular disease distribution and causes of blindness in the Navajo Indians are discussed. Trauma, usually associated with alcohol ingestion, is the most common cause of monocular blindness. Corneal scars, glaucoma, and retinal detachment are the other leading causes of blindness. Stage IV trachoma is frequently seen in the elderly, but active trachoma is present in only about 1% of Navajo children, a dramatic decline from the past. Pterygium, phlyctenular disease, limbal vernal catarrh, trachoma, pseudoexfoliation of the lens, phakomorphic angle closure glaucoma, iridocyclitis, retinitis pigmentosa, and high corneal astigmatism occur more commonly than in the general US population. Mature cataracts and retinoblastoma may be more prevalent. Acute spontaneous angle-closure glaucoma, unrelated to cataracts, has not been seen. Large pterygia, the most common external problem, frequently cause corneal distortion and visual disturbances.

The purposes of this article are to report the following: (1) the eye diseases that are more common in Navajos than in the general US population, and (2) the causes of blindness in the Navajos. Thygeson and Dawson[1] discussed Indian eye diseases in general terms in 1959. Bettman[2] presented an analysis in 1972.

Several genetic and unique environmental factors are responsible for the types of ocular disease encountered in any population. This tribe is racially distinct because intermarriage with non-Indians is rare. Marriage to relatives and clan members is strongly discouraged, but consanguinity is probably more common than in the general population. The Navajos are rural outdoor people who often live in isolated remote areas of the reservation. Living conditions are sometimes primitive. Many homes do not have running water or electricity. Patients often must drive great distances over poor roads to reach medical care. Many adults do not speak English. Unemployment is high. Cultural customs and fears sometimes cause delays in seeking early medical care. Therefore, many of the pathologic conditions seen are severe and indicate neglect. Their eyes are exposed to intense sunlight due to the usually clear skies, elevation of 5,000 to 7,000 feet, and agricultural lifestyles. Nutrition is generally adequate.

Methods

My comments are based on five years of experience as chief of ophthalmology for the Navajo Area of the Indian Health Service, stationed at Gallup, NM, from 1975 to 1980. My impressions were confirmed by my comprehensive review of the medical records of 1,000 consecutive full-blooded Navajos seen in the eye clinic in 1978.

Results

The records review revealed that 28% of the patients had external eye disease, 22% had trauma, and 22% had no significant pathologic condition. Trauma was by far the leading cause of monocular blindness. Corneal scars, glaucoma, and retinal detachment were the other leading causes.

Comment

Causes of Blindness. Trauma from assaults is the leading cause of monocular blindness. Most of these ruptured globes are inflicted by cowboy boots, fists, or blunt objects. Most are associated with alcohol ingestion. Canalicular avulsions are also common. Nontraumatic corneal scars are usually due to old trachoma, phlyctenular keratitis, and bacterial ulcers. Many patients with glaucoma and retinal detachment seek medical care late in the course of their disease. Hence, many eyes are lost. About half of the patients with glaucoma in the study had at least one blind eye. Obtaining compliance with medical therapy

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The opinions presented do not necessarily reflect those of the Navajo tribe or the US Public Health Service.

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and follow-up visits is especially difficult in this population.

External Disease. Large pterygia are extremely common in the Navajo due to heavy exposure to sunlight, wind, dust, dry air, and outdoor work such as herding sheep. Sunglasses are usually not worn by the traditional Navajos. It is widely appreciated by ophthalmologists that pterygia cause cosmetic and irritation symptoms. In addition, I have identified a large number of patients with distorted or decreased visual acuity due to pterygium-induced corneal astigmatism or encroachment of the visual axis.

Trachoma was the major eye problem among the Navajos in the past. In 1929, Warner[3] reported that 38% of Navajo schoolchildren had trachoma. By 1957 to 1958, the prevalence had fallen to about 20%.[1] In 1969 to 1971, Bettman[4] and staff screened 26,347 Navajo schoolchildren and found only 3.6% positive cases. Large school screenings now show that only about 1% of the children in the Navajo and Phoenix Areas have active trachoma. This dramatic decline is due to (1) an improved standard of living and hygiene conditions, (2) large-scale screening efforts, (3) educational efforts, (4) greater awareness of the disease among patients and health professionals, and (5) effective antibiotic therapy.

Vernal catarrh, especially the limbal form, is very common in children.

Phlyctenular keratoconjunctivitis (PKC) has long been recognized as a serious eye condition among Indians and Alaskan natives.[1] These studies supported the concept that PKC is a manifestation of microbial allergy, usually to the tubercle bacillus. Today, however, tuberculosis is much less common among these groups. Yet we continue to see many PKC cases in children and young adults with negative purified protein derivative skin tests and normal chest roentgenograms. Unlike in the past, only rare cases have extensive corneal involvement.

Iridocyclitis. Anterior idiopathic nongranulomatous iritis is extremely common in Navajos. Laboratory and physical examination results show only a few with associated old tuberculosis, untreated syphilis, juvenile rheumatoid arthritis, and other conditions.

Rate et al performed HLA typing on a random outpatient population of 100 Navajo and 100 Hopi Indians at Keams Canyon, Ariz. These data will be published in the *Journal of Rheumatology.* Thirty-five percent of Navajos had positive tests for HLA-B27 antigen, compared with 9% of the Hopi. The prevalence in white people is 6% to 8%. Rate also reports a very high incidence of Reiter's syndrome and radiographic sacroiliitis in the Navajos but not in the Hopis. These findings support the concept that Navajos have a unique cellular immune system. Navajos may be genetically predisposed to a number of ocular hypersensitivity entities such as iridocyclitis, PKC, and possibly vernal catarrh.

Glaucoma. Primary open angle glaucoma is the type most commonly seen. Bettman[2] and Hoshiwara and Rosenbaum[5] concluded that the prevalence of this type was about the same as that reported for non-Indian populations. Pseudoexfoliation is a common finding, but capsular glaucoma is infrequent. Faulkner[6] found 38% of elderly Navajos had pseudoexfoliation. Phakomorphic angle-closure glaucoma, angle-recession glaucoma, and chronic angle-closure glaucoma, are all common. No cases of acute spontaneous angle-closure or mydriatic-drop–induced glaucoma have occurred in our patients from Gallup, to my knowledge.

Cataract. Many of the cataracts seen are mature, intumescent, or hypermature.[7] These traditional rural people perform daily chores well with visual acuity in the 20/100 range. They are reluctant to seek eye care until blindness or pain intervenes. The causative role of sunlight in these cases is speculative.

Retinitis Pigmentosa. Heckenlively et al[8] have studied 75 Navajos with retinitis pigmentosa. We feel that it is more common in the Navajos, occurring in about one in every 1,800 persons, than is reported in the literature for white people.[9] About half of our patients are from dominant pedigrees, exhibit classic pigmented fundus findings, and maintain useful vision into middle life. The autosomal recessive cases have a grey granular fundus with minimal pigment clumping. They manifest night blindness by the age of 5 years, decreased visual acuity to 20/50 to 20/100 by the age of 10 or 15 years, and blindness by 30 years. Once again, the role of intense ultraviolet light in these patients is speculative.

Retina. Retinal detachment seems to occur with the same frequency as in the general population.[10] Retinal vein occlusion and background diabetic retinopathy are also common.

Tumors. Bettman[2] found five proven retinoblastomas in the five-year period of 1966 to 1971. He concluded that the incidence of retinoblastoma was six times higher than that in the general population. In the five-year period from 1975 to 1980, I have seen three new cases. Only one malignant melanoma of the choroid has been reported (1972).[2] No new cases have been seen. I have seen one proven malignant melanoma of the eyelid and many basal cell carcinomas of the lids.

Optic Nerve. Idiopathic optic neuritis and ischemic optic neuropathy are very rare, with only one case of each seen. Multiple sclerosis, likewise, is rare in the Navajo.

Refractive Error. Corneal astigmatism with the rule of up to 5 or more diopters is commonly seen in children. Garber and staff performed keratometry on 809 randomly selected children. Twenty-six percent had greater than 2 diopters of corneal astigmatism, which is much higher than that reported for non-Indian groups (3% to 4%).[12,13] Interestingly, most of the elderly Navajos have small amounts of astigmatism against the rule.

I wish to emphasize that many of the eye patients seen in Gallup are referred from outlying facilities. Therefore, this report is not a true epidemiologic study of the general Navajo population. Also, my comments are specifically about the Navajos and do not necessarily apply to other Indian tribes.

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