

THE INCIDENCE OF EAR DISEASES IN THE NAVAJO INDIANS.*

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The Navajo Indians comprise the largest tribe of Indians in the U. S., numbering about 105,000 at the present time. The incidence of some ear diseases is very different from that of white or Negro populations in the rest of the United States. It is the purpose of this paper to cite only the variations in disease incidence.

The following facts about the Navajos may explain some of the variations:

The reservation is located in three states covering parts of Arizona, New Mexico, and Utah, and is as large as the combined areas of Connecticut, Massachusetts and New Hampshire. Winter weather is very cold and causes hardship on the reservation. The temperature dipped to -57° F. in the Winter of 1963, and to -28° in 1966. In 1967, seven feet of snow was recorded on the western part of the reservation following a blizzard. The altitude of 6,500 feet converts this part of the "warm Southwest" to typical winter scenes.

About one-third of the Navajos are considered non-traditional, and follow a pattern of life similar to white people; however, two-thirds of the Navajos are truly traditional, and adhere to the customs of their forefathers. Home for the traditional Navajo is an eight-sided building called a hogan which is covered by a dirt roof. Inside there is a dirt floor, a potbellied stove, and simple furniture. The children sleep on a sheep skin mat thrown on the dirt floor. Sheep raising, the primary occupation for many who live on the reservation, serves many functions: the meat becomes mutton stew, the

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wool is used for weaving rugs, the skins become sleeping mats, and a limited income is possible when the sheep are sold at trading posts. Indeed, a man's wealth is determined by the number of sheep he owns.

The poor condition of the roads hinders medical assistance. For example, the dirt ruts are often impassable after a rain-fall or when the snow is melting. Although many Navajos have automobiles, the traditional Navajo must rely on horse-drawn carts equipped with automobile tires. Due to the scarcity of automobiles, it is sometimes a major effort for a mother to bring a sick child to the hospital. A woman may walk five or 10 miles to the hospital with a baby in her arms, or she may make arrangements with a neighbor to drive her to the hospital, perhaps 60 miles away, and then be charged \$10 or a sheep for the ride. This trip is very expensive, since the average yearly income is typically only \$300. To make matters more difficult, she may have six or more children; therefore, a child with a mild earache cannot and does not receive medical care, due to the major problem of transportation, even though the medical treatment is available and free.

This is the setting, and the following categories highlight the variations in disease incidences:

1. *Aural Atresia*. A survey of Navajos with aural atresia was started because an apparently large number of Navajo patients with aural atresia was seen in the ENT. clinic at the PHS. Indian Hospital in Gallup, N. Mex. Of 60,000 Navajos under 21, 58 had aural atresia. The prevalence (or cases present on January 1, 1968) was 58/60,000. The newborn incidence averages 2.5 per 3,000 births per year for the past 21 years, or 1 in 1,200 live births. Almost all cases had an absent external auditory canal, and many had microtia of the pinna. Usually the tympanic membrane was absent, and the middle ear ossicles were abnormal and fused. Hemiatrophy of the face and abnormal cervical vertebrae sometimes occurred. Atresia in siblings occurred in two families. In a third family, multiple anomalies including phocomelia were found, although only the index case had aural atresia.

2. *External Otitis*. The occurrence of external otitis is un-

common. When it does occur, it is usually secondary to chronic suppurative otitis media; however, the second most common cause is from the bite of the spinose ear tick, *Otobius megnini*. This tick is known locally as the "sheep tick." Because the Navajos live in close contact with sheep and because they sleep on untreated sheepskins, the sheep tick can easily change hosts and reside in the external auditory canal of the Navajo. A wide spectrum of disease occurs, ranging from mild inflammation to severe perichondritis involving the pinna. External otitis from swimming, common in the rest of the United States, is uncommon, since there are few swimming sites on the semi-arid desert terrain of the reservation.

3. *Acute Otitis Media*. A clinical impression exists that acute otitis media is more common than in non-reservation populations; however, no statistics are available on incidence. The common age for the first documented episode is three to six months. By the age of one year, an infant may have had two to three episodes of acute otitis media. By the age of one to two years, chronic suppurative otitis media may be well established. This pattern closely parallels the onset and recurrence rate seen in Alaskan Eskimos.¹

4. *Chronic Suppurative Otitis Media*. Chronic suppurative otitis media is a major health problem on the Navajo reservation. It is the most common disease seen in the ENT. Clinic in Gallup. To study the extent of the disease more fully, an otologic screening survey was conducted at three large boarding schools. Two thousand Navajo school children from five to 17 years of age were examined. A central perforation of the tympanic membrane was found in 4.2 percent (84/2,000) of the students, and approximately 30 percent (24/84) of these had suppuration at the time of the examination. Bilateral perforations occurred in 17 percent (14/84) of the students with perforations. A healed central perforation, identified by a thin monomeric membrane, was found in 9.4 percent (188/2,000). At least five students had two or more healed perforations of one tympanic membrane with no history of TB and negative intradermal tests for TB. In non-Indian children, as shown in a study in Pittsburgh, the incidence of chronic otitis media was 0.5 percent² compared to the 4.8 percent in this study. John-

son reported his personal study of 3,000 Navajo children and found 6.4 percent with chronic otitis media, not a dissimilar figure.³

Acute and chronic ear infections are also a major problem in other Indian reservations. Perkins and Church⁴ examined 1,400 children under the age of 12 on the Wind River Reservation in central Wyoming. The biggest problem found on routine physical examination of these children was ear pathology and hearing losses. Ensign, *et al.*,⁵ found 23 percent of the Indians in Montana had draining ears within one year of his study. Cambon, *et al.*,⁶ studied the Indians of the Mount Currie Reservation of British Columbia, Canada, and found 13 percent with perforated tympanic membranes. Approximately 30 percent were bilateral and 75 percent were actively draining pus. Brody, *et al.*,¹ studied the Alaskan Eskimos in the Bethel area in Southwest Alaska and found that 31 percent had a history of drainage from their ears. An earlier study by the Public Health Service Arctic Health Research Center in Anchorage, Alaska, revealed that 38 percent of 323 infants in Eskimo villages had one episode of drainage in the first year of life.

5. *Atelectatic Middle Ears.* Students with atelectatic middle ears, characterized by immobile, retracted tympanic membranes were seldom referred to the ENT. Clinic in Gallup. This disease causes a mild hearing loss and nothing overt attracts the attention of teachers at school or parents at home; however, during the otologic screening examination of four large Navajo boarding schools conducted between September, 1966, and May, 1967, 4.8 percent (96/2,000) of the students were found to have atelectatic middle ears. Atelectasis may be "dry," due to eustachian tube obstruction with absorption of air from the middle ear, or "wet" due to the presence of non-infected fluid in the middle ear (serous otitis media). When myringotomies were performed, either thin serous fluid or thick, gelatinous, glue-like material was found in the middle ear. Cambon, *et al.*,⁶ found no secretory otitis media in their study of the British Columbia Indians of the Mount Currie Reservation; however, Cambon did not mention the use of a pneumatic otoscope, essential in most cases for the diagnosis of serous otitis media.

6. *Cleft Uvula — Relationship to Middle Ear Disease.* It was my clinical impression in the ENT. Clinic in Gallup, that cleft uvulae were common in the Navajos. A cleft uvula has been considered to be a minor form of a cleft palate.⁷ It is known that there is a higher incidence of middle ear disease with cleft palates; therefore, a comparison study was made of cleft uvulae (with no associated cleft soft or hard palate) to middle ear disease. A survey of 944 Navajo children was conducted by me in the Fort Wingate Boarding School in Fort Wingate, N. Mex. The clefts were divided into one-fourth, one-half, three-fourths and total, depending upon the vertical height of the uvula which was cleft. Sixty-five (65) children had one-fourth clefts; 25 had one-half; 10 had three-fourths; and six had total clefts. The total incidence of cleft uvulae was 11 percent. In comparison, the Caucasian population in the United State has a reported incidence of 1.4 percent⁸

The sex incidence revealed 13 percent (57/455) males and 10 percent (49/489) females. Meskin, *et al.*,⁸ also reported a male predominance in their series of 1.53 percent and 1.38 percent females.

Ninety children had a small cleft (*i.e.*, one-fourth and one-half) and 20 percent had ear disease. Of these children, 11 percent had healed central perforations, 3 percent had central perforations, and 6 percent had atelectatic ears. In the 16 children with a major cleft (*i.e.*, three-fourths or total) 36 percent had ear disease. Of these, one had a healed central perforation (6 percent), three had central perforations (18 percent), and two had atelectatic ears (12 percent); therefore, there was twice as much ear disease (36 percent) in the children with a major cleft as in children with a minor cleft or no cleft at all (20 percent).

7. *Cholesteatomas.* In the non-Indian populations, cholesteatomas are commonly seen with attic perforations. Attic perforations are extremely uncommon in Navajo children, although they are more common in Navajo adults. Almost all of the cholesteatomas in Navajo children are associated with total pars tensa perforations. Cholesteatomas have been diagnosed from age 11 to age 70 and 35 percent were under the age of 13. Although cholesteatomas may occur in a small percentage

of patients with central perforations, no cholesteatoma has been seen in over 200 tympanoplasties for central perforations in Navajos, even though careful examination of the middle ear was performed routinely.

8. *Tympanosclerosis.* Tympanosclerotic fixation of the ossicular chain is fairly common. Pre-operatively the diagnosis is suspected when a patient appears with a moderate or large (*i.e.*, subtotal) central perforation, but cannot hear a soft or moderate whisper in the involved ear. The audiogram revealed a bone-air gap over 30 db. The differential diagnosis includes ossicular chain disruption and otosclerosis.

9. *Otosclerosis.* Only three documented cases of otosclerosis in a Navajo occurred in the past three years. Holzhueter⁹ studied skulls of Indians in South Dakota for otosclerosis and found that this disease was very rare. Cambon⁶ also stated that in the Indian group he studied, there were no cases of otosclerosis. The genetic or environmental factors responsible for otosclerosis apparently do not occur in the U. S. and Canadian Indians studied.

10. *Hereditary Deafness.* Hereditary deafness has not been observed in any Navajo families; however, no intensive program was initiated to identify this problem.

11. *Congenital Deafness.* Only two cases of congenital deafness in Navajos are known, and these were probably due to amnionitis. Although congenital deafness may be due to maternal rubella during pregnancy, rubella in pregnant Navajo women has not been seen, according to the Chief of Obstetrics and Gynecology at the Gallup Indian Hospital; indeed, no case of rubella syndrome in neonates has been seen by the pediatrician at this hospital, although it is looked for carefully.

12. *Acoustic Trauma.* Acoustic trauma occurs in association with certain vocations where loud noises are common, and seems no different than in the non-Indian groups. Silversmithing, a traditional Navajo occupation which involves a lot of loud hammering and malleting, may lead to a 4,000 cps dip.

13. *Sudden Sensori-Neural Deafness.* Sudden sensori-neural deafness has occurred in six Navajo patients during the past

year. Studies for hypercoagulation are currently being conducted in these patients. Four have had an increased prothrombin consumption compatible with hypercoagulation.

14. *Presbycusis*. Presbycusis, based on a clinical impression, is uncommon. It is hoped that an audiometric screening survey will be conducted so that this impression can be confirmed or denied. Rosen¹⁰ has shown that in the Maabans, who live in a quiet environment, the hearing loss of old age is minimized. The same environmental quietness is present in most of the isolated Navajo reservation, and confirmation of this thesis is possible here in the United States.

15. *Ménière's Disease*. Ménière's disease has been suspected in only two Navajos.

16. *Acoustic Neuromas*. Acoustic neuromas have never been recorded in a Navajo.

DISCUSSION.

Acute and chronic suppurative otitis media is a major health problem on the Navajo Indian Reservation and the most common problem in the field of ENT. Several factors may be implicated: the crowded hogans lead to increased spread of upper respiratory infection with resultant ear disease; poor transportation prohibits the mildly ill patient from seeing the doctor; and the increased frequency of cleft uvulae possibly associated with anomalies of the eustachian tube contributes to middle ear disease. To combat the frequency of suppurative otitis media, early signs of ear infection will have to be stressed to parents through health educators. Early treatment with antibiotics is essential, and myringotomy and adenoidec-tomy may be needed in some situations.

It is hoped that a screening can be conducted to identify the incidence and types of sensori-neural hearing loss. This would be very valuable in planning for Navajo needs.

Congenital anomalies are high in the Navajo Indians. This may be due to inbreeding since the Navajos rarely marry outside their tribe. (One hundred years ago there were 8,000 Navajos and now there are about 105,000, showing an ex-

tremely fast population growth.) A high incidence of congenital cleft uvulae and congenital aural atresias has been shown. A genetic factor is probably important in explaining the incidence of cleft uvulae which is 10 times more common than in the rest of the United States.

The low incidence of otosclerosis is also probably related to genetic factors. This variation would make an interesting research project in an attempt to understand a disease that occurs histologically in 10 percent of the white United States population, and causes a hearing loss clinically in 1 percent.

SUMMARY.

The incidence of many ear diseases in the Navajo Indians is different from the rest of the United States.

Common problems are congenital aural atresia, ear tick infestation of the external auditory canal, acute and chronic suppurative otitis media, and cleft uvulae.

Diseases that are unusual include presbycusis and otosclerosis.

It is hoped that these variations in disease incidence will serve as focal points for further investigations as to etiology, prevention and treatment.

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COLLEGIUM MEDICORUM THEATRI.

During the Ninth International Congress of Otorhinolaryngology, representative laryngologists from Argentina, Brazil, Czechoslovakia, Denmark, France, Germany, Great Britain, Japan, Mexico, Spain, Switzerland, and the United States, founded an association dedicated to the vocal problems of singers and actors.

The Collegium Medicorum Theatri (or COMET) was formed to encourage the scientific investigation of the physiology and pathology of the voice of singers and actors, and to improve the clinical care of these professional voice users. Membership in this organization is limited to physicians or voice scientists, who are connected with major theatres, operas, or conservatories, or who have demonstrated special dedication to the physiology and pathology of the voice in singers and actors.

An interdisciplinary Seminar on the Voice of Singers and Actors is planned for 1970 in New York in cooperation with the Julliard School of Music. The first meeting of the Collegium is scheduled in Buenos Aires during the summer of 1971. Additional information about the goals and programs of COMET may be obtained from the Secretary-Coordinator, Dr. Hans von Leden, Institute of Laryngology and Voice Disorders, 11600 Wilshire Boulevard, Los Angeles, Calif., U.S.A.