

## CHRONIC OTITIS MEDIA IN SCHOOL AGE NAVAJO INDIANS.\*†

RONALD L. JOHNSON, M.D.,‡

Houston, Texas.

### INTRODUCTION.

There is a clinical impression among physicians caring for Navajo Indians that the prevalence of chronic suppurative otitis media in children and adults is extremely high. This has been, and continues to be, a major medical problem involving considerable effort by physicians, field health nurses, school nurses, teachers, social service and welfare personnel; indeed, a very experienced otologist saw many more children with this problem during a brief visit to the Reservation, than in several years of practice in Chicago.<sup>1</sup>

This study was undertaken to document accurately for the first time, the remarkable incidence of chronic otitis media in the Navajo population of school age, as a basis for increased medical and surgical care as well as for further studies.

### METHOD.

There are approximately 19,000 Navajo children and adolescents attending Federal schools on the Reservation. An additional 18,000 attend public or mission schools. About 8,000 do not at present attend school. To provide a sufficiently large sample population, the entire student bodies of five boarding schools within a 50 mile radius of Gallup, New Mexico, were selected with a total enrollment of 3,318. The majority of these pupils were in the elementary grades, and 600 were in high

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†From the Surgery Section, Otolaryngology, U. S. Public Health Service Indian Hospital, Gallup, New Mexico.

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Request for reprints should be sent to Ronald L. Johnson, M.D., Department of Otolaryngology, Baylor University College of Medicine, Houston, Texas, 77025.

school. These students come from all areas of the Reservation and were considered a representative sample.

A team composed of an otolaryngologist, school nurses, field health nurses, and volunteer clerical staff carried out the survey. Each student was examined by the same otolaryngologist so that variation in the interpretation of physical findings was eliminated. Several sessions were required to complete each school. Children having normal otoscopic findings and those with evidence of completely healed necrotizing otitis media were recorded as such and dismissed. Those with impacted cerumen occluding the ear canals, which could not be removed at the time of initial examination, were appropriately treated and examined again when clean. When a student was found to have chronic otitis media his name was placed in a special file, and he underwent at least one repeat examination, usually in the hospital clinic, and medical care started or continued.

Chronic otitis media was defined as any perforation of the tympanic membrane, whether actively infected or not. Our experience has been that almost all of the perforations were quite large (*i.e.*, over 6 mm x 6 mm.), and only nine were pin-hole size. Atrophic scars over 4 mm. wide and large calcific plaques of tympanosclerosis<sup>2,3</sup> of at least 4 mm. size, were considered good evidence of spontaneous healing of necrotizing otitis media in the past, and were so tabulated. The few cases of severe adhesive otitis media were quite typical in having obliteration of the middle ear space by a tympanic membrane or pseudomembrane adherent to the cochlear promontory. Minor anatomical variations such as slight retractions, increased vascularity, changes in lustre, etc., described in other otoscopic surveys were not considered pertinent to this paper.

#### FINDINGS.

The results of this survey verified the clinical impression of an unusually high incidence of chronic otitis media (see table). Two hundred thirteen children were found to have chronic otitis media and, of these, 50 had bilateral involvement. Only three were found to have clinical evidence of cholesteatoma. Approximately half of the total demonstrated active infection at the time of examination, and half was dry and ready for

surgical reconstruction. Forty-one students had undergone previous tympanoplasty or mastoidectomy. This number by no means reflects the total post operative cases for the area but, rather, the wide dispersal of surgical patients throughout the entire Reservation. Two hundred sixty-two pupils demonstrated definite evidence of past spontaneous healing of necrotizing otitis media by the presence of calcific plaques of tympanosclerosis and atrophic scars singly or in combination. Approximately one-third of this healed group had significant abnormalities in both ears.

TABLE I.  
Tabulation of Results of Otosopic Survey.

Classification	Number	Per Cent
Normal	2786	84.0%
Chronic Otitis Media	213	6.4%
Previous Tympanoplasty or Mastoidectomy	41	1.2%
Healed Necrotizing Otitis Media	262	7.9%
Adhesive Otitis Media	13	0.4%
Congenital Deformity	3	0.1%
Total	3318	100.0%

Severe adhesive otitis media, usually bilateral, was identified in 13 subjects. Three children had unilateral congenital abnormalities consisting of microtia and atresia of the external auditory meatus.

Surprisingly, the incidence of chronic serous otitis media, a well documented common problem in the general population, was relatively quite rare in our subjects. This has also been borne out by our own clinical experience with Navajo Indians.

Our population sample of children and adolescents demonstrated that 6.4 per cent of those surveyed had chronic otitis media. If one includes those already operated upon, the incidence of chronic otitis media in the Navajo approached 7.6 per cent. An additional 7.9 per cent showed past spontaneous healing of severe infections.

At present, there are 1,534 of these children on the active roster of the Crippled Children's Service with chronic otitis media. This number reflects a need for increased case finding.

## DISCUSSION.

An extensive survey<sup>4</sup> of 4,000 elementary school children in Pittsburgh reported the incidence of chronic otitis media to be 0.5 per cent, whereas the frequency in the Navajo Indian is 15 times greater. No single reason for this disparity is apparent. Our clinical experience has failed to reveal any anatomical explanation.

Similar findings have been described throughout the world when studies have been undertaken of specific population groups. South African natives,<sup>5</sup> New Zealand Maoris,<sup>6</sup> and Alaskan natives<sup>7,8,9</sup> have all been reported as having quite prevalent chronic suppurative otitis media. The Navajo has in common with these groups nutritional deficiencies, overcrowding in primitive dwellings, poor sanitation and lack of hygiene. Adequate medical facilities are available to the Navajo, but oftentimes care is not sought in the early stages of disease processes, and follow-up is far from ideal. Wilson<sup>10</sup> attributes the marked difference in frequency of chronic otitis media between clinic and private patients in Dublin to the latter's receiving better general medical care and hygiene. In contrast, Mellbin<sup>11</sup> indicated only about 1 per cent incidence of chronic otitis media in a small series of nomad Lapp children living in the rigorous Arctic Circle region of Sweden.

Chronic otitis media as we see it in the school child is generally accepted as being the end result of a much earlier acute necrotizing otitis media which has not healed completely.<sup>12</sup> The tympanic membrane has a large permanent perforation, the ossicular chain may be partially destroyed, and tympanosclerosis may have been deposited. This process is usually due to a particularly virulent infection with beta hemolytic streptococcus associated with the exanthems of childhood, influenza and pneumonia. This infection in the already quite ill infant or small child causes rapid destruction of the tympanic membrane, mucoperiosteum of the middle ear and bone. It is a distinct process not to be confused with the much more common acute purulent otitis media seen in everyday pediatric practice and which generally heals completely with treatment. We know that Indian children generally have a more severe illness and are more susceptible to the complications of the exanthems of child-

hood influenza and pneumonia than are Caucasian and Negro children. This is a partial explanation, at least, for the remarkably high incidence of this problem. By the time the child enters school, when most of these conditions are discovered, the late sequellae of the acute necrotizing process are all that remain, with or without recurrent infections of external contamination.

No survey of otologic problems should be considered complete without adequate audiological studies accompanying the physical examination. We are unable to include a statistically significant number of audiometric studies in this report due to a lack of available time, trained audiologists and facilities at present. Without audiometric screening, a certain number of children with otologic problems will be missed, particularly those with sensori-neural hearing loss. A limited amount of audiometric screening is done by the school staffs, but the results are not related to this report. We are confident that the great majority of surgical ear problems were identified in the subjects. Jordan<sup>13</sup> has stressed that a number of otoscopically abnormal children will pass audiometric screening as it is usually done, and we feel that there is no substitute for an adequate physical examination.

#### SUMMARY AND CONCLUSION.

An otoscopic survey of over 3,000 Navajo Indian children enrolled in boarding schools demonstrated the incidence of chronic otitis media to be over 7 per cent. One quarter of these children and adolescents have bilateral involvement. Surgical repair is necessary to avoid repeated infections and complications and to restore hearing function.

The high incidence of this problem, which is 15 times greater than in the general population, is attributed to an increased susceptibility to conditions associated with acute necrotizing otitis media, frequent lack of early effective treatment and the general poverty of the Navajo's existence. Until these problems are resolved we will continue to see new patients needing surgery every year. We can reduce this backlog of surgical problems by increasing the otologic surgical staff of the Division of Indian Health, and by increasing the utilization of

contract surgical services and care by otologists specially trained in microsurgery of the ear. When well trained personnel and facilities become available, audiometric screening should be improved and included in any further studies.

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#### BIBLIOGRAPHY.

1. SHAMBAUGH, G. E., JR.: Surgery of the Ear. W. B. Saunders Co., Philadelphia, p. 170, 1959.
2. SHEEHY, J. L., and HOUSE, W. F.: Tympanosclerosis. *Arch. Otol.*, 76: 151-157, 1962.
3. HARRIS, I., and WEISS, L.: Tympanosclerosis: Superficial and Embedded Forms. *Trans. Amer. Acad. of Ophthal. and Otolaryngol.*, 66:683-714, 1962.
4. EAGLES, E. L.; WISHIK, S. M.; DOERFLER, L. G.; MELNICK, W., and LEVINE, H. S.: Hearing Sensitivity and Related Factors in Children. Monograph published by THE LARYNGSCOPE, 1963.
5. MEYRICK, P. S.: The Incidence of Diseases of the Ear, Nose, and Throat. *So. Afr. Med. Jour.*, 25:701-704, 1951.
6. SEDDON, J. H.: Treatment of Neglected Running Ears in School Children. *New Zealand Med. Jour.*, 61:314-316, 1962.
7. HAYMAN, C. R., and KESTER, F. E.: Eye, Ear, Nose and Throat Infections in Natives of Alaska. *Northwest Med.*, 56:423-430, 1957.
8. The McGrath Project: Documentation on Study and Prevention of Upper Respiratory Disease. Anchorage, Alaska, State of Alaska, Department of Health and Welfare, and Children's Bureau, DHEW, 1962.
9. BRODY, J. A.; OVERFIELD, T., and McALISTER, R.: Draining Ears and Deafness Among Alaskan Eskimos. *Arch. Otol.*, 81:29-33, 1965.
10. WILSON, T. G.: The Etiology of Chronic Suppurative Otitis Media. *Acta Otolaryngol.*, Suppl. 183:142-144, 1963.
11. MELLBIN, T.: Children of the Swedish Nomad Lapps: Study of Their Health, Growth and Development. *Acta Paediat.*, 51:1-97, Suppl. 131, 1962.
12. SHAMBAUGH, G. E., JR., op. cit., p. 164-171.
13. JORDAN, R. E., and EAGLES, E. L.: The Relation of Air Conduction Audiometry to Otological Abnormalities. *Ann. Otol.*, 70:819-828, 1961.