Middle-Ear Disease in Indians of the Mount Currie Reservation, British Columbia

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ABSTRACT

Complete otological examinations, including audiograms, were carried out on 504 British Columbia Indians of the Mount Currie Reservation. Of these, 79 were found to have evidence of current middle ear pathology, while 226 were known to have had previous disease. Among 364 subjects who could be formally tested, 112 had a 15-decibel or greater hearing loss in the speech frequencies. Among these Indians, middle-ear disease began early in life and recurrences were frequent. The prevalence of aural disease was related to poor social conditions, family history and presence of nasal discharge. No other relationships could be demonstrated, and there was no evident benefit from adenotonsillectomy. No secretory otitis or otosclerosis and almost no sensorineural high-tone hearing loss were discovered.

SOMMAIRE

Un examen otologique complet, comportant des audiogrammes, a été effectué chez 504 indiens de la Colombie britannique de la Réserve de Mount Currie. Soixante dix-neuf d'entre eux présentaient des signes d'une pathologie récente de l'oreille moyenne, et 226 autres avaient eu des atteintes antérieures. Sur 364 sujets qui ont pu être étudiés sérieusement, 112 accusaient une perte d'au moins 15 décibels à l'audiomètre, à la fréquence de la parole. Le début de ces affections de l'oreille moyenne se situait au début la vie et les récidives étaient fréquentes. La prédominance de ces otopathies a été reliée à de mauvaises conditions sociales, à des antécédents familiaux et à la présence d'un écoulement nasal. On n'a guère pu trouver d'autres relations étiologiques et l'adéno-amygdalectomie n'a pas donné de résultats probants. On n'a découvert ni otite purulente, ni otosclérose, pas plus qu'une perte de perception des sons aigus.

WHEN the Europeans first arrived in Canada, the Indians of the Northwest Pacific Coast were culturally and economically far more advanced than any Indians north of Mexico.[1] It is estimated that prior to the era of European discovery, the British Columbia Amerind§ population may have numbered as high as 125,000 and have made up at least 40% of Canada's native population.[2] Surprisingly little information is available about their health problems at this time, although the story of their decimation from disease and alcohol once they embraced European culture is common knowledge.

Many Indians were killed in intertribal warfare which escalated considerably with the introduction of firearms. Apparently whole tribes were exterminated, but since there was very little actual fighting with the white man, in contrast to other parts of Canada, this story has never been told. In any event, by the end of the 19th century much of the best stock of the Indian population had perished.

Duff[2] has summarized the situation as follows: "A few decades earlier they had been large, proud and well-organized societies, far outnumbering the whites and worthy of respect and even fear. Now, one could say, they had become a sick and demoralized minority, to be pitied, converted and administered."

Yet there now seems to be a renaissance of the Indian numerically and to a lesser extent culturally. It is startling to discover that one-quarter of the population are under 6 years of age, one-half under 16 and three-quarters under 32.[2]

Registered Indians in Canada are those who come under the jurisdiction of the Indian Affairs Branch of the Indian Act. Oddly enough, they need not be Indians at all; *viz.* if a white woman marries a registered Indian, she automatically becomes an "Indian". On the other hand, if an Indian woman marries a white man, she becomes "white". In 1963 there were 40,800 registered Indians in British Columbia. In contrast, the Federal Bureau of Statistics classifies Indians by racial origin without reference to whether or not they are "registered".

Most registered Indians in Canada live on reservations which come under the jurisdiction of the Federal Government. Administratively these reservations are the responsibility of the Indian Affairs Branch of the Department of Citizenship and Immigration. The Indian Affairs Branch is responsible for general administration, welfare and education. An increasing number of Indians are leaving the reservations each year and taking their place in

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white communities where they cease to be a separate Federal Government responsibility. The Department of National Health and Welfare, through its Medical Services Directorate, is responsible for the general public health program among the Indians. If the Indian is not financially able to provide for his own medical needs, the Indian Health Services either obtain this medical treatment for him or provide it themselves.

It is pertinent to record that, so far as British Columbia is concerned, 100 years ago the Indians in this province were still very much in their aboriginal state, their only contact with white people being through Hudson's Bay Company posts and traders. The City of Vancouver was non-existent 100 years ago, so that the B.C. Indian, chronologically, is much closer to his native state than the Indian in Southern Ontario for example, who has been in close contact with white communities for over 200 years.

The Indian Affairs Branch of the Department of Citizenship and Immigration has tried to open all possible avenues for integration, and there are now approximately 5000 Indian children in B.C. white schools. The Indian has had the vote in British Columbia since 1949, a privilege which has not been extended to the reservation Indian in some other provinces.

A SURVEY OF MIDDLE-EAR DISEASE IN A B.C. INDIAN COMMUNITY

As the control of tuberculosis has become increasingly effective, chronic aural disease is being recognized as one of the major health problems among the Indians. This situation is not confined to B.C. Indians but applies in other parts of the continent among native populations as far apart as Alaska[3] and the American West.[4]

Before this problem could be attacked, it was necessary to obtain some idea of its true extent. Other projects of this nature had relied largely on history and subjective interpretations.[3-6] In our experience this approach is of negligible value with Indians, as will be demonstrated later. In the study reported in this communication, we chose a geographically circumscribed group so that we could undertake a thorough otological survey of every member of the community.

Mount Currie reservation lies about 100 miles north of Vancouver and was, at the time of the original assessment (1962), accessible only by train. The population at that time was 750: 716 lived on the reserve and 34 off the reserve. The village lies in a beautiful valley surrounded by snowcapped mountains. In contrast to the scenery, the village itself was and is a depressing sight; it consists of rows of unpainted wooden houses in varying states of disrepair, the environs littered with old tires, wheels, bottles and other symbols of the white man's culture.

A great contrast was noted in the manner in which different families maintained their homes. A few were spotless and snug; the worst, a one-room shack with several broken windows and a leaking roof, housed a family of 12. The bulk of homes lay somewhere in between. Most of the families subsist on welfare payments. At the time of our initial visit only 11 of the men were steadily employed.

The reservation is about half an hour by train from Pemberton, a small white community. This village has no resident physician but a doctor comes by train once a week from Squamish, two and a half hours away, and spends the afternoon seeing patients both Indian and white. Emergency cases are sent down by railroad to Squamish, or to Vancouver if very serious.

A nurse from the Indian Health Service is permanently stationed on Mount Currie. She is familiar with every family and its problems, and without her intimate knowledge, much false information would have been collected, especially in regard to family history and history of previous disease.

The objectives of this survey were:

1. To determine the extent of otitis media in this community by doing a complete ear, nose and throat examination and audiogram on everyone in the reservation.

2. To identify any relationship between aural disease and family history, social conditions and previous medical care.

3. To treat vigorously all new cases of otitis media and establish some simple regimen that could be used to help individuals with long-standing disease.

A great deal of organization was necessary in order to carry out this project. First, several trips were made to study the problem and to establish good relationships with groups within the reservation and with the chief. This was done in order to ensure harmonious co-operation and make the survey as complete as possible.

With the help of the B.C. Department of Vital Statistics, a form was drawn up, on which results could be recorded and later tabulated electronically (Table I).

Screening audiograms were done most competently by a young Indian girl who was trained especially for this. Persons showing abnormal results and young children were re-checked by one of the authors. For recording purposes any hearing loss of 15 decibels or more in either ear involving the speech frequencies was considered significant.

Five hundred and four people were examined, all within a period of two weeks. Almost all the Indians who were present in the reservation at that time were seen. No one objected to the examination. The sexes were evenly represented, 47.8% male and 52.2% female. The age distribution (Table II) is similar to that described by Duff.[2]

TABLE I.—EAR EVALUATION, MOUNT CURRIE, COQUALEETZA ZONE

NAME:..... Male..... Date of Birth:.....
Female Month Year

BAND No.....

HISTORY:.....

Previous ear disease (Yes) (No), Otorrhea (Yes) (No), Otalgia (Yes) (No), Tinnitus (Yes) (No), Vertigo (Yes) (No), Subjective hearing loss (Yes) (No).

Age of first episode:..... Last episode: (1 yr. ago), (2 yrs. ago), (over 2 yrs. ago),

T and A (Yes) (No). If (yes), any improvement in ears after (Yes) (No).

Family history of ear trouble: Parents (Yes) (No), Siblings (Yes) (No).

Social conditions (Good), (Fair), (Bad). General state of health (Good), (Fair), (Bad).

FINDINGS:

NOSE: Airway (Good), (Fair), (Poor). Discharge (Yes) (No).

TONSILS: (Absent), (Large), (Normal).

TEETH: (Good), (Fair), (Bad).

NECK: Adenopathy (Yes) (No).

EARS: Otitis externa (Yes) (No). Evidence of past disease (Yes) (No)

Right: Discharge (Yes) (No), Perforation (No), (Central), (Marginal), (Attic).
Size of perforation (over 75%), (75 - 25%), (under 25%).
Cholesteatoma (Yes), (Maybe), (No)

Left: Discharge (Yes) (No), Perforation (No), (Central), (Marginal), (Attic).
Size of perforation (over 75%), (75 - 25%), (under 25%).
Cholesteatoma (Yes), (Maybe), (No)

AUDIOGRAM

The patients' accounts of previous aural disease were completely inadequate. Time after time when a negative response had been given, the story was changed after it was challenged by the public health nurse. This occurred with all of the questions covered in the preliminary part of the record. The answers to the questions regarding otalgia, tinnitus and vertigo were found to be of little value. Almost everybody had had otalgia at one time or another, and we gained the impression that few of those examined understood the meaning of the terms tinnitus and vertigo.

TABLE II.—AGE DISTRIBUTION: RESIDENTS OF MOUNT CURRIE RESERVATION

Age in years	*Number*	*Percentage*
Under 5	107	21.2
5 - 9	99	19.6
10 - 14	93	18.5
15 - 19	52	10.3
20 - 29	52	10.3
30 - 39	39	7.7
40 - 49	16	3.2
50 - 59	21	4.2
60 - 69	11	2.2
70 and over	12	2.4
Not stated	2	0.4

Of those examined, 226 (44.8%) were known to have had aural disease as manifested by otorrhea, at one time or another. Only 36 (7.1%) admitted to having a hearing loss at the time of the examination. Yet of the 364 whose hearing could be tested on the audiometer, an abnormal audiogram was obtained in 112 (31.3%).

Table III shows the age at the time of the first episode of ear disease. If the group with unknown age of onset is excluded, 48 out of 74 (64%) had the first attack of otitis media before the age of 5. There was no significant relationship between the age of onset of disease in those with current middle-ear pathology and the size of perforation or degree of hearing loss. Since many of those below the age of 5 could not be adequately tested by pure-tone audiometry, analysis of such data in children in this age group was of dubious value.

TABLE III.—AGE AT OCCURRENCE OF FIRST EPISODE OF MIDDLE-EAR DISEASE: RESIDENTS OF MOUNT CURRIE RESERVATION

Age in years	*Number*	*Percentage*
Under 5	48	9.5
5 - 9	12	2.4
10 - 14	5	1.0
15 - 19	2	0.4
20 and over	7	1.4
Not known	152	30.2
Not applicable	278	55.2

It is difficult under the best of circumstances to assess and grade the social conditions under which different families live. In order to have some check on this, two different approaches were taken. First, the public health nurse on the reservation was asked to classify the social conditions of all the families on the simple basis of "good", "fair" and "bad", using local standards only. It was evident that if the standards of an average white B.C. community were used, the social standard of most

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Mount Currie families would be classed as poor. This point is made to emphasize that those who were listed as living under poor social conditions were indeed miserably poor (Table IV).

TABLE IV.—SOCIAL RATING AS EVALUATED BY THE PUBLIC HEALTH NURSE, MOUNT CURRIE RESERVATION

Social conditions	*Number*	*Percentage*
Not known	25	5.0
Good	168	33.3
Fair	200	39.7
Bad	111	22.0

In addition, a trained social worker from the Department of Indian Affairs made a completely independent survey. She devised a complex system of ratings, giving points for housing, housekeeping, income and family functioning. The standards were said to give a three-step scale applicable to this reserve (Table V).

The results of both these surveys of social conditions were analyzed by the B.C. Department of Vital Statistics and were found to be comparable to a degree that was significant.

The relationship between middle-ear pathology and social rating is interesting. Among 168 Indians whose social situation was rated as good, 10 cases of frank aural disease (6%) were found. In 200 with a "fair" rating, there were 11 cases of middle-ear disease (5½%). Among those for whom the social rating was bad, 111 were examined and in 39 (35%) middle-ear disease was discovered. In those living under the most desperate social situations, active ear disease was present in more than one in three.

There was a distinct relationship between a positive family history of aural disease and recurrent otorrhea. Among 144 people with such a history, there were 40 cases of active otitis media, an incidence of 36%. In contrast, when there was no such family history, the incidence was 6%.

This finding is in contradiction to that of previous workers.[5, 6] All previous surveys relied on individual responses for their data. If we had done this, instead of using the records of the public health nurse, our results would have been entirely different.

There appeared to be a significant relationship between nasal discharge and ear disease. Among 170 individuals in whom abnormal discharge was detected, 35 had middle-ear disease (20%). When there was no evidence of nasal pathology, the incidence was 8%. No attempt was made to examine the nasopharynx.

Surprisingly enough, there seemed to be no relationship between poor dental hygiene and ear disease. Suffice it to say that the state of the teeth of most Indians is appalling.

Of the 182 people who had had their tonsils removed, 24 (13%) had active middle-ear disease at the time of the survey. There were 287 who had never had tonsillectomy; of these 29 (10%) had

TABLE V.—SOCIAL RATING AS EVALUATED BY A SOCIAL WORKER, MOUNT CURRIE RESERVATION

Social factors	*Number*	*Percentage*
Housing:		
Poor	173	34.3
Fair	131	26.0
Good	103	20.4
Not done	97	19.2
Housekeeping:		
Poor	56	11.1
Fair	196	38.9
Good	155	30.8
Not done	97	19.2
Income:		
Poor	114	22.6
Fair	106	21.0
Good	187	37.1
Not done	97	19.2
Family functioning:		
Poor	71	14.1
Fair	227	45.0
Good	109	21.6
Not done	97	19.2
Total score:		
Poor	97	19.2
Fair	160	31.7
Good	150	29.8
Not done	97	19.2

otitis media. Most of those who were asked whether adenotonsillectomy had improved their aural health were unable to give any answer. Of the 182 who had tonsillectomy, only nine definitely felt that their ears had improved following surgery, and only nine gave a definitely negative answer.

Eighty-seven (17.3%) of those examined had cervical lymphadenopathy. No relationship was demonstrated between this finding and past or present ear pathology.

Only 15 cases of external otitis were found and these were all related to active middle-ear disease.

Evidence of past middle-ear disease was based on the objective findings of scarred drums, healed perforations or any other objective indication of previous otitis media. Such findings were present in 171 (33.9%). Of this group three could not be tested, 100 had normal audiograms and 68 had hearing loss of 15 decibels or more in either ear involving the speech frequencies.

The objective otoscopic findings, the *raison d'être* for the whole study, are summarized in Table VI. The findings for each ear are listed separately and this conveys the impression that the incidence of middle-ear disease is somewhat lower than it actually is. Unfortunately, the survey sheet did not record bilateral disease when it was present, so that bilateral disease could not be correlated with other findings during the electronic tabulation. In fact 21 people were encountered during the survey who had bilateral middle-ear disease. If the figures are adjusted to allow for these 21 people, this would give the correct prevalence of middle-ear disease among the Mount Currie Indians as 13.7%.

We were unable to demonstrate any significant relationship between the size and type of tympanic

TABLE VI.—PREVALENCE OF MIDDLE EAR PATHOLOGY BY OBJECTIVE EXAMINATION, MOUNT CURRIE RESERVATION

Ears	*Right*	*Left*
Discharge		
Not stated	6 (1.2)*	2 (0.4)*
Yes	36 (7.1)	30 (6.0)
No	462 (91.7)	472 (93.7)
Perforation:		
Not known	4 (0.8)	8 (1.6)
No	449 (89.1)	457 (90.7)
Central	47 (9.3)	38 (7.5)
Marginal	3 (0.6)	1 (0.2)
Attic	1 (0.2)	—
Size of perforation:		
Not applicable (if no perforation)	450 (89.3)	458 (90.9)
Over 75%	8 (1.6)	10 (2.0)
75 - 25%	23 (4.6)	22 (4.4)
Under 25%	19 (3.8)	8 (1.6)
Not known	4 (0.8)	6 (1.2)
Cholesteatoma:		
Not known	34 (6.7)	35 (6.9)
Yes	1 (0.2)	1 (0.2)
Maybe	5 (1.0)	3 (0.6)
No	464 (92.1)	465 (92.3)

*Figures in parentheses are percentages.

perforation and any of the following: age, age at onset of ear disease, family history, or any of the objective findings.

Originally we hoped to conduct a similar survey of the white population in nearby Pemberton as a control group. To date this has not been possible. To the best of our knowledge, no comparable study of a white community is available but, on the basis of personal experience, it seems reasonable to assume that the incidence of middle-ear disease among the Mount Currie Indians is high and constitutes a very real health problem. In the United Kingdom the proportion of children found to be suffering from chronic otitis media at the periodic medical inspections is about nine per 1000.[7]

The natural pattern of chronic middle-ear disease demonstrated in this study is difficult to delineate precisely because of the many variables that exist. However, it is apparent that the age of onset is early, recurrences are frequent and, while spontaneous healing of the tympanum is common, hearing loss is a frequent sequel. The effect of this handicap with all its social implications on the Indian attempting to adjust to modern life is open to speculation.

Other observations and speculations are mentioned briefly:

No Indian children were seen who had secretory otitis media, although this is a most common condition in private practice in Vancouver. We have no explanation for this, but would note that secretory otitis media may be primarily a disease of the antibiotic era.

No persons with otosclerosis were discovered, but in such a small group of adults this is probably of no significance. In the experience of one of the authors (K.C.) who has examined many Indians over the past eight years, otosclerosis is exceedingly rare.

Although some Indians suffered from high-tone hearing losses, remarkably few instances of sensorineural hearing losses were encountered. It is tempt- to ascribe this to the lack of occupational noise in the Indians' environment but, in the absence of an adequate control group, this must remain speculative.

The strong relationship between aural disease and social pathology was not entirely unexpected and accords with the aphorism "The running ear is the heritage of the poor." Clark[8] recently noted that at the turn of the century in Edinburgh the incidence of hearing loss due to otorrhea in school children was in the neighbourhood of 50%. At present, with improved economic conditions, it is estimated at 1% to 3%. Clearly the final solution to this problem among the Indians is to be found only in changing the abysmally poor conditions under which they live. Such changes cannot be expected overnight, and some course of action is necessary for the treatment of existing middle-ear disease and to prevent further disease.

Such a program was developed at Mount Currie and we hope to describe it in a later communication.

SUMMARY

A survey was made of the incidence of middle-ear pathology and hearing loss among the inhabitants of an Indian reservation. The incidence of ear disease is significantly higher where social conditions are poor, where other members of the family are affected and among individuals with nasal discharge. No difference could be demonstrated between the incidence of middle-ear disease among those who had undergone adenotonsillectomy and those who had not.

Otosclerosis, secretory otitis media and sensorineural hearing loss are absent or rare in this population group.

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