

# **BACTERIAL AND SENSITIVITY STUDY OF LOCAL CASES OF CHRONIC SUPPURATIVE OTITIS MEDIA**

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From available records in the dispensary of the Philippine General Hospital, during the period starting from May 1, 1957 and ending in April, 1958, there were 1,026 cases of otitis media seen and treated. Of these, 659 were of the chronic exudative type. There were 9 cases of tympano-mastoiditis with subperiosteal abscess and 2 with intracranial complications admitted in the hospital. In 1957, there were 779 radical mastoidectomies performed in the Philippine General Hospital. These do not include various tympanoplastic procedures done.

According to Dench (1), "We may assume that a discharge from the middle ear, which has failed to yield to proper therapeutic measures at the end of three months, constitutes a symptom of a chronic inflammatory process." Chronic exudative otitis media usually results in impaired hearing and/or grave complications. Various predisposing factors, such as congenital or acquired anatomical barriers to drainage, allergy, systemic disease and low resistance of the patient, play a big role in its production. The exciting factor is usually bacterial in origin. This paper is chiefly concerned with the determination of the kind of organisms, and their sensitivity reactions to various drugs, that may be encountered in cases of chronic exudative otitis media. For this purpose, cultures were made of material taken from the middle ear of patients with chronic otitis media.

## METHOD

The external auditory canal was carefully wiped off with a sterile cotton applicator. The middle ear was then swabbed with a fresh, slender sterile cotton applicator and this was immersed in a tube of sterile nutrient broth. Each of the swabs was immediately streaked on one blood agar plate and one plain agar plate. A tube of thioglycolate medium was also inoculated with each swab. All media were incubated at 37°C and examined after 24 hours. Colonies growing in blood agar and plain agar plates were isolated and identified by microscopic, cultural and biochemical characteristics. Growth in thioglycolate medium was examined microscopically, after 24 hours incubation, and again a week later to determine the presence of anaerobic bacteria.

The sensitivity of each organism isolated and identified was made, using Bacto-sensitivity discs of low, intermediate, and high concentrations. This was done by preparing pour plate cultures of each organism and arranging 6 to 7 discs equidistally on the surface of the medium. The plates were incubated for 24 hours at 37°C, after which the results were read as follows:

- Zone of inhibition of bacterial growth in all concentrations — (low, middle, high) — Very Sensitive.
- Zone of inhibition of bacterial growth in intermediate and high concentrations — Sensitive.
- Zone of inhibition of bacterial growth in high concentration only — Slightly sensitive.
- No zone of inhibition of bacterial growth in any of the three concentrations — Resistant.

## RESULTS

The material was obtained from 98 cases of chronic suppurative otitis media with drum perforations. In two of the cases, no organism was recovered, and in three, the organisms could not be identified specifically by smear and by culture. This left only a total of 93 cases with culture results. The recovered organisms are as follows:

<i>Organism</i>	<i>Number of Cases</i>
Proteus -----	32
Staphylococcus albus -----	16
Staphylococcus aureus -----	14
Pyocyaneus -----	10
Diphtheroides -----	8
Bacillus subtilis -----	5
Alpha Streptococcus -----	2
Yeast -----	2
Escherichia coli -----	1
Sarcina lutea -----	1
Staphylococcus citreus -----	1
Streptococcus hemolyticus -----	1
Total -----	93

In 6 cases, staphylococcus aureus was isolated together with other organisms; namely, with diphtheroides in 3 cases, pyocyaneus in another 2 and staphylococcus albus in the remaining case.

The results of the sensitivity tests are summarized in the table below. The figures in the body of the table represent the number of cases in which each isolated organism gave the indicated reaction to the various drugs.

	AUREOMYCIN	CHLOROMYCETIN	DIHYDROSTREP	ERYTHROMYCIN	PENICILLIN	POLYMIXIN	TERRAMYCIN	TETRACYCLINE	MATROMYCIN	ELKOSINE	ALBAMYCIN	SULFADIAZINE	SULFATHIAZOLE	GANTRISIN	SULFAMERAZINE	THIOSULFA	TRIPLE SULFA
<b>PROTEUS</b>																	
Very sensitive	4	16	11	1	1	4	—	5	1	—	—	—	—	—	—	—	—
Sensitive	1	2	8	—	—	4	3	3	—	—	6	—	—	—	—	—	—
Slightly sensitive	3	4	1	1	—	5	1	4	1	—	—	—	—	—	—	—	—
Resistant	17	3	5	23	24	12	21	13	23	24	2	23	24	24	24	24	24

## STAPHYLOCOCCUS ALBUS

Very sensitive	5	7	3	6	7	1	5	5	2	—	—	—	—	—	—	—	—	—	—
Sensitive	1	—	2	—	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—
Slightly sensitive	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Resistant	2	1	3	1	1	5	2	1	4	8	—	8	8	8	8	8	8	8	8

## STAPHYLOCOCCUS AUREUS

Very sensitive	8	6	5	5	5	1	8	8	1	1	—	1	1	2	2	1	1	—	—
Sensitive	—	2	3	2	—	—	—	—	3	—	2	1	—	—	—	—	1	—	—
Slightly sensitive	—	1	1	—	—	3	—	—	1	—	—	—	1	1	1	—	—	—	—
Resistant	2	1	1	3	5	6	2	2	5	9	1	8	8	7	7	8	9	—	—

## PYOCYANEUS

Very sensitive	3	2	1	—	—	2	3	—	—	—	—	—	—	—	—	—	—	—	—
Sensitive	—	—	4	2	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—
Slightly sensitive	—	—	3	—	1	4	—	—	—	—	—	—	—	—	—	—	—	—	—
Resistant	6	7	1	7	8	2	7	6	8	8	1	8	8	8	8	8	8	8	8

In 1 case with diphtheroides, the organism was found slightly sensitive to chloromycetin, dihydrostreptomycin and polymixin, but resistant to the other drugs.

In 2 cases with alpha streptococcus, the organism was very sensitive to aureomycin, chloromycetin, erythromycin, penicillin, terramycin and tetracycline; and sensitive to dihydrostreptomycin and matromycin.

## DISCUSSION

Walz, Donnelly and Babbit (2) made a bacteriologic survey in chronic middle ear infection. Most of the cases showed mixed infection. The prevailing organisms were Streptococcus hemolyticus and Staphylococcus aureus. However, in those cases where the cultures were made by intratympanic aspirations, the prevailing organisms, in order of frequency were the Hemolytic streptococcus, Staphylococcus aureus and Staphylococcus albus.

Mortimer and Watterson (3), on the basis of their studies, doubt the importance of Staphylococcus as a primary etiologic agent in otitis media. They considered pneumococcus, betahe-

molytic streptococcus and *Hemophilus influenzae* as the chief offending agents. Their study was made on infants and children of the lower age group. Material was taken from cases of acute exudative otitis media without perforation or prior treatment. Mention was made of the 1950 studies of Bjuggren and Tuneval on children 15 years of age and younger, where each patient had a myringotomy or was discharging pus from the ear when seen. The results in 178 children were as follows:

<i>Per cent of Total</i>	
Beta-hemolytic Streptococcus -----	48
Pneumococcus -----	21
Coagulase positive Staphylococcus --	12
<i>Hemophilus influenzae</i> -----	8
No pathogens -----	11
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Total -----	100

Dysart (4) mentions the work of Friedmann (London) who studied experimentally otitis media in guinea pigs to determine whether the principal infecting bacteria had changed in virulence. The animals infected with *Pseudomonas pyocyanea* and *Proteus vulgaris* suffered most consistently. Infection frequently caused bony destruction of the mastoid, and sometimes there was cholesteatoma formation. *Pneumococcus* frequently caused death from meningitis but the clinical symptoms were less frequent. Two strains of *Staphylococcus albus* (Coagulase negative) caused no infection. None of the strains of streptococci produced fatal infections; most of them caused little or no supuration.

One should note that in our series, the cases involved those with perforations of the ear drum. We could not ascertain which were the actual causes of the infection and which were the contaminants. Such organisms as *Bacillus subtilis*, *Sarcina lutea*, *diphtheroides* and very often *Staphylococcus albus* are non-pathogenic and therefore they can hardly be considered as the causal agents in the infection. The mere presence of the others, although they are potentially pathogenic, is no assurance that they are responsible for the infection. No efforts were made to look for acid-fast organisms.

There were only 4 cases in which *Staphylococcus aureus* showed sensitivity to the various sulfa compounds. The rest of the organisms appeared to be resistant to the sulfas. The patients in this series were out-patients and although they were suffering from a chronic disease, this was the first time they were seen in the Philippine General Hospital Dispensary. Most of them denied any previous medication.

It would appear from our series that the most effective drugs for *Staphylococcus albus* infections are Chloromycetin and Tetracycline. For proteus infections, the effective drug appears to be Chloromycetin. For pyocyanus infections, dihydrostreptomycin and polymixin seem to be the drugs of choice. One must bear in mind though that these assumptions are based on *in vitro* studies. However, they may provide clues in the management of chronic suppurative otitis media. Perry (5) mentions that some topical medicament such as ointments containing penicillin, sulfonamides, a local anesthetic or an antihistamine have a high index of skin sensitization. Senturia (6) states that "—in the treatment of ear disease, we have been pouring into the ear canal every variety of antibacterial and anti-inflammatory agents. As a consequence of the bactericidal mania, Lo and behold, we have produced for ourselves a vast number of cases of Otomycosis".

#### SUMMARY

In the order of frequency, the organisms recovered in this series were mostly *Proteus*, *Staphylococcus albus*, *Staphylococcus aureus* and *Pyocyanus*. Although this does not appear to conform with the surveys made abroad, further study is indicated and comparison with the results of other local researchers should be made. The majority of the recovered organisms were resistant to the various sulfa compounds and to some antibiotics.

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