

ODOR FROM HEALING MASTOID WOUNDS SIMULATING THAT FROM NECROSING BONE ASSOCIATED WITH SECONDARY INVASION OF DIPHTHEROIDS.

DR. A. M. DUNLAP, Pekin, China.

All otologists are familiar with a characteristic odor from the discharges frequently met with in chronic purulent otitis media, which is considered to be of bone necrosis either within the middle ear or mastoid cells. The writer has been led to question the correctness of this assumption, after having had three normally healing mastoids following acute mastoiditis which suddenly developed an odor indistinguishable from that of necrosing bone. Diphtheroids were isolated from all of these cases, which, in all probability, were responsible for the production of the odor.

The first case was that of a small boy who had had a double mastoid operation. The healing of both mastoids was very rapid, and early closure seemed assured. There intervened, however, what appeared to be an acute exacerbation of the inflammatory processes, which caused discharge not only from the mastoid wounds but from the middle ears as well. Almost immediately, all the discharges were noticed to be foul, the odor resembling that characteristic of necrosing bone. Considerable apprehension was experienced for fear necrosis had been proceeding in spite of the satisfactory appearance of the wounds. Bacteriological examination of the discharge demonstrated the presence of a diphtheroid in addition to the staphylococcus, which had been isolated as the predominating organism in connection with the mastoid infection. A pure culture of the diphtheroid isolated gave off the same characteristic odor as that from the discharging ears. The secondary infection ran its course within a week and recovery was uneventful.

The cultural characteristics of the diphtheroid isolated from this case were studied by Dr. Johannes Bauer of the Department of Pathology and are as follows: The organism was a gram positive, non-motile and non-spore-bearing diphtheroid rod, measuring about 0.4 by 1.0-1.5 microns and having the following cultural characters: Blood agar: Round, moist, yellowish-red colonies with dark center and light border. Bouillon: Luxuriant diffuse growth with thin, friable pellicle. Loeffler's blood serum: Small, white,

round colonies, very similar to those of streptococci. No liquefaction takes place. 18-20 hour cultures grown on this media and stained by Neisser's method show abundant, but small and imperfect, granules. Gelatine stab: Grows very slowly along the stab. No liquefaction. Potato: white, moist growth. No pigment production. Litmus milk: No change. Carbohydrates: It produces acid but no gas in dextrose and saccharose bouillon. No change in lactose, maltose, mannitol, dextrine, inuline and salicine bouillon. No indol. No H₂S.

Classified into subgroup Bac. Hoagii (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 290).

The second case was that of a young girl who had had her left mastoid drained for the relief of a mastoiditis, from which the streptococcus haemolyticus had been isolated in pure culture two weeks after the operation. The distinctive odor was noticed without apparent change in the course of healing. There was no increases in the inflammatory process during the week that the odor persisted. Bacteriological examination of the discharge by Dr. Bauer demonstrated the presence of a gram positive, non-motile, non-spore-bearing diphtheroid rod, measuring about 0.4 by 1.0-1.5 microns and having all the cultural characteristics of the organism isolated from the first patient. The initial culture gave off the characteristic odor.

In the course of the study of the discharges of still a third patient, who was making a slow recovery from a mastoiditis, which had been infected with the streptococcus haemolyticus, Dr. Bauer isolated a diphtheroid which was probably the cause of an offensive odor which persisted more than a week. The organism as examined was a gram positive, non-motile and non-spore-bearing diphtheroid rod, measuring about 0.5 by 1.0-1.5 microns, no Neisser granules, and having the following characters: Blood agar plate: White, opaque colonies. No hemolysis. Bouillon: Uniformly turbid with yellow, thick pellicles which later sink on the bottom of the tube. Agar slants: Abundant, moist, spreading growth. Loeffler's blood serum: Small, white, round colonies. No liquefaction. Litmus milk: Coagulated within two days. Potato: Moist, thick growth with yellow pigment production. Carbohydrates: Produces acid but no gas in dextrose, lactose, saccharose and maltose bouillon. No change in mannitol, dextrine, inuline and salicine bouillon. No indol. No H₂S.

Classified into subgroup Bac. enzymicus. (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 290).

Conclusions: The writer is of the opinion that the secondary invasion of diphtheroids in the first two cases, and, in all probability, the third, was responsible for the sudden appearance of a foul odor from these normally healing mastoids. The fact that Mellon makes no reference to a characteristic odor from any of his hundred strains, would lead one to conclude that either it is not a frequent occurrence or that cultures quickly lose this peculiarity on being sub-cultured. Dr. Bauer was unable to secure a continuation of the odor from any of the sub-cultures of the strains described above, which were submitted to him for examination. The instability of the members of this group might easily account for this failure.

In speaking of the general pathology of diphtheroid infections, Mellon states (*Journal of Bacteriology*, Vol. 2, 1917, page 476): "That the virulence of this group of organisms is usually not high, is suggested by the fact that some member of it has been isolated repeatedly from almost all organs of the body, whether normal or in a state of disease. When one says that most diphtheroid infections are of the nature of sub-infections, little more comment need be made. However, there sometimes arise acute inflammatory processes which may at times be a serious menace to life." The work of Dr. Hamilton (R. Mellon, *Journal of Bacteriology*, Vol. 2, 1917, page 481), and others suggests that this group may be considerably more pathogenic than we have been accustomed to rate it. The first case reported here was the only one to give any clinical evidence of pathogenicity.

The invasion of normally healing mastoid wounds with odor-producing diphtheroids suggests the possibility of similar occurrences in cases of chronic purulent otitis media. If a bacteriological study of such cases demonstrates that diphtheroids are responsible to any considerable extent for the foul odor so frequently encountered, then we shall need to make a more careful examination before concluding that necrosis of the bone is taking place either within the middle ear or mastoid antrum. A sclerotic mastoid presenting a middle ear partially destroyed with a moderate otorrhea which is offensive, may well be a persistent discharge from the eustachian tube with a diphtheroid acting as a secondary invader. A study is now being carried on to determine whether the diphtheroid does or does not play an important role in these cases.