# SOCIETIES' PROCEEDINGS

## ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

**November 7, 1930**

*President*—Mr. A. R. TWEEDIE, F.R.C.S.

**The Pathogeny of Aural Cholesteatoma.**—DAN MCKENZIE, M.D.—The paper is published in the *Journal of Laryngology and Otology*, Vol. xlvi., p. 163, March 1931.

DISCUSSION.

The PRESIDENT said that he had never been able to accept the theory that cholesteatomata had an embryonic origin, or that they were due to an invasion of the skin from the outer meatus.

In his opinion, the most tenable theory was that the process was dependent on some past sepsis—often not demonstrable—and that the irritant effect of this on the lining of the antral cavity and mastoid cells—which, as Neumann had pointed out, was a peculiar muco-periosteum—led to an accumulation of an abnormal desquamation.

These factors he suggested would be sufficient to account for such formations if associated with the one other factor required, a "bottle-neck" cavity.

Mr. CHARLES HEATH showed two cholesteatomata which he had removed from the external auditory meatus on each side of a patient, Miss R. T., nineteen years ago. There had been no suppuration, and after they were taken out a perforation was visible in Shrapnell's membrane on each side. He (the speaker) removed the patient's adenoids, and then both the perforations healed. He told the mother that he had not dealt directly with the area from which the cells came, and therefore did not feel certain that the end of the trouble had been reached, so that the patient must be seen by her doctor occasionally. Four months later she had acute mastoiditis in one ear; he operated by his conservative method, and the ear became well. Six months later she had a similar condition in the other ear; he operated again and that ear also became well. There was no loss of hearing on either side. He then told her he thought her ears were "safe," and that if she had otitis media again she had two safety-valves—one the drum, the other the membrane which closed the aditus. Only that week he had seen her again, after nineteen years, and she reported that five years ago she had influenza and otitis media on one side, the drum burst, and healed again in two or three days while she was in bed. Thus his forecast was verified.

The specimens which he was showing from this case were reported upon by Dr. Wyatt Wingrave as being true cholesteatomata, almost purely



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squamous cells. That endorsed what Dr. McKenzie had said, that sometimes there was no suppuration.

Miss R. T. Acute Mastoiditis: Material from Mastoid Antrum.

| Material of which the Pathological Specimen was considered to be composed. | Report by Dr. Wingrave (*25th January*, 1912.) |
|---|---|
| *A.* (?) Fragment of bone and muco-periosteum of antrum. | *A.* Bone—acute leucocytic infiltration; muco-periosteum—shows leucocytes, myelocytes, and many phagocytes, staphylococci well marked; indicates acute inflammation. |
| *B.* (?) Polypus blown out through perforation by air-bag and the writer's cannula. | *B.* Simply blood-clot. |
| *C.* Mass of cells and muco-periosteum from antrum. | *C.* Pure cholesteatoma, cells devoid of nuclei, therefore not recent. Staphylococci very numerous. |
| *D.* Muco-periosteum from antrum. | *D.* Leucocytes and myelocytes well marked. Cholesteatomatous squames with active phagocytes containing staphylococci, which are numerous. |
| *E.* Cholesteatoma from meatus. | *E.* Pure cholesteatoma, staphylococci. |
| | Remarks.—It is evidently an acute staphylococcal infection on a pre-existing cholesteatoma. Staphylococci are pure, no other bacteria. The bone is involved slightly, chief effects being apparently in the muco-periosteum, but that bone is active as shown by the large osteoblastic cells or myelocytes. The squames are not recent ones in the antral material, but some from the meatus are nucleated and therefore recent. |

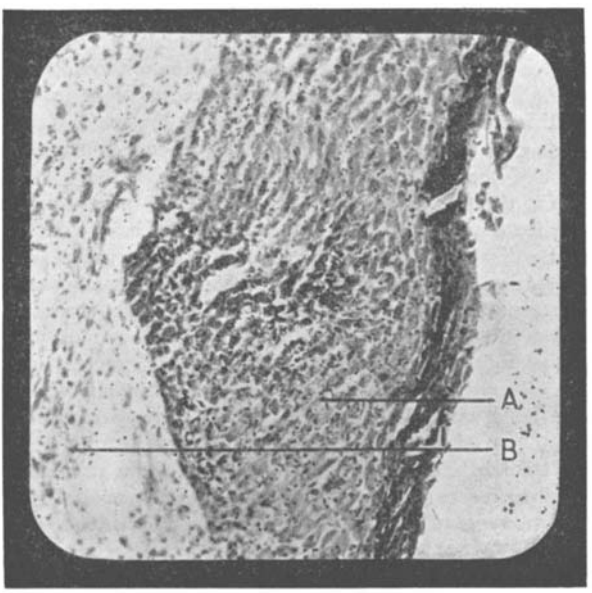
He (Mr. Heath) thought that the question as to where perforation took place had not been sufficiently dealt with by Dr. McKenzie. Perforations occurred where the discharge had access to the drum. In the later, *i.e.*, the *acute* conditions, the two perforations were lower down. The discharge was able to get down to a part of the drum which was more easily penetrated, because the distribution of tympanic swelling allowed of it. Therefore the swelling of the mucosa was largely responsible for what happened to cholesteatomata produced in the antrum. He showed an illustration of a cholesteatoma from a case in which eight days after suppuration had set in, squamous cells began to appear. These rapidly increased in number, and as the deafness was increasing too, owing to increased swelling of the tympanic mucosa, he had operated six days later. The photomicrograph, prepared by Dr. Wingrave, showed the squamous area in the mastoid antrum, which had been stimulated by suppuration from a double layer of squames, to twenty or thirty layers, showing that the process could not have been metaplasia; it was too rapid for that—it was the mere stimulation of an area which already produced squames.

In a large number of people part of the lining of the mastoid antrum was normally covered by squames, which could be stimulated into excessive



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reproduction and which, if the ciliated epithelium of the mucous membrane of the aditus were adequate, were passed along to the attic. In this case they were passing right through the ear to the Eustachian tube for a time; obviously, then, there was no obstruction. Later, obstruction occurred, and acute trouble followed. With such a squamous area in the antrum, and the distribution of the squames, guided by the locality of the attic swelling—which varied the drainage channel—we had the key to a large proportion of the early cases of cholesteatoma. One of his patients (shown) had had suppuration for four days, and cholesteatoma was found. It was washed out through the perforation. Occasionally, when a chole-




steatoma occurred, it was encysted, because the accumulation in the antrum had utilised the muco-periosteum as a cyst-bag to hold it. If there were much pressure, the bony antral irregularities would be smoothed out and the bag of cholesteatoma would approximate to a globular shape. This was not the commonest, or the earliest, form of cholesteatoma.

[Mr. Heath showed two recent cases illustrative of cholesteatoma:—

I. The first is still under treatment. In this case cholesteatoma had been found eighteen days after the onset of suppurative otitis media.

II. In this case I visited the patient at Tooting Bec Hospital, only four days after the onset of otitis media. I immediately had her removed to the Downs Hospital, as I said her hearing was in great jeopardy. At the operation on both ears next morning cholesteatoma was found on both sides. When she was well enough to visit me I douched out the attic with bag and cannula; here in a bottle is the viscid material which I removed; it is cholesteatoma. The specimen shows how rapidly cholesteatoma scales may be developed and thrown off. The pathological report by



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Dr. Russ is as follows: "This material was blood-tinged and showed microscopically a small number of cholesterin crystals, amongst numerous pus cells. The epithelium was chiefly of the squamous type. There was also quite a lot of thick mucus which gave the material a tenacious consistence. Bacteria were not very numerous and appeared to be mainly diplococci of the pneumococcal type."]

Mr. A. LOWNDES YATES said that he had been investigating the question of the cause of cholesteatoma and thought the condition must be divided into two categories, one in which the desquamation was due to the formation of an innocent epithelial tumour in the middle ear or mastoid, and to which the term cholesteatoma might properly be applied, and the other in which the condition was the result of desquamation of the epithelium of the middle ear or mastoid. He thought that the term cholesteatoma was incorrectly applied to this second class, for the ending "oma" suggested that the condition was due to the formation of a tumour.

He and his colleagues had first considered the question as to whether desquamation of the mucous membrane occurred during the process of inflammation of the middle ear and found that even in cases in which there was no cholesteatoma, desquamated cells were not infrequently present in quantity in the discharge, and that a type of inflammation which caused such desquamation was produced more often by micro-organisms of the type of the streptococcus rather than by the staphylococcus. There was thus proof that there was desquamation from the mucous membrane in certain types of inflammation of the middle ear. If there was obstruction to the escape of desquamated cells, this would collect behind the obstruction, and this had been cited by the President as the obstruction termed "a bottle-neck."

Desquamation might not collect in sheets within the ear as a result of inflammation, for in the similar process which occurred after scarlet fever, or in the type of eczema known as "washerwoman's hands," the desquamation did occur in sheets, in the first case as a result of infection with the streptococcus and, in the second, as a result of chronic soaking of the skin, both of which factors might be present in the middle ear. It did not therefore need a high flight of imagination to postulate desquamation in sheets from the infected mucosa, particularly when the inflammation was caused by micro-organisms of the streptococcal group.

The next question was the amount of discharge present in cases of cholesteatoma. He had found no cases in which a discharge from the ear was profuse and in which cholesteatoma was present; on the contrary, cases in which cholesteatoma had been found were almost universally characterised by scantiness of aural discharge.

The fact that dead micro-organisms or the mycelium of fungi were found in cholesteatomatous masses was a factor of importance, since such a collection, if formed of mycelium of fungi, might obstruct the escape of desquamated cells from the middle ear. He had seen cases in which the mass was chiefly formed of the mycelium of fungi in which the desquamated cells were already entangled.

Another factor which might have some bearing on the formation of cholesteatoma had also come out in this investigation, namely, that in the



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large majority of cases of cholesteatoma the pus was strongly alkaline, and that alkalies acting on the skin produced a desquamation. Atrophic rhinitis was another condition in which the pus was alkaline, and in that also there was microscopical evidence of a profuse desquamation from the mucous membrane. The reason of the alkalinity of the pus in these two examples of a somewhat similar inflammation had not yet been determined, and the question was whether it was due to the ferments liberated from the leucocytes when these died, or was elaborated by the micro-organisms? This question had been approached by treating small cholesteatomata, which appeared to be confined to the region of the attic, with dilute acid, when it was found that they rapidly disappeared, although no other treatment was afforded. One per cent. citric acid had been used in many cases for this purpose.

MR. SYDNEY SCOTT said that he was in favour of the term "epidermoid" as used by Dr. Critchley and Dr. Ferguson in *Brain*.

(Mr. Scott described in detail a case met with in a patient who had no perforation of the tympanic membrane. The diagnosis was made by Dr. Jacobsen, of Aarhus, Denmark, when on a visit to St. Bartholomew's Hospital. Shrapnell's membrane was bulging, felt "boggy" and "pitted" when touched with Hunter Tod's probe. A few days later Mr. Scott operated on the mastoid and found the antrum, aditus, and attic occupied by ordinary cholesteatomatous material. There were no granulations and there was no pus.)

Mr. Scott said that this class of case lent support to Dr. McKenzie's contention. He himself, however, was more inclined to the theory of metaplasia, and felt sure that there must be some preceding inflammation to account for the transition to the squamous epithelium. Mr. Lowndes Yates had described the growth of mycelium in cholesteatoma. He (the speaker) presumed that the fungus was a secondary invasion. He had certainly seen small cholesteatomata of the attic disappear after treatment with alcohol drops, and it had not recurred, but he had not ascertained whether there was a fungus in these cases.

(Mr. Scott showed two illustrative cases :—

I. *Cholesteatoma with Destruction of Labyrinth.*—F. W., female, aged 27. Chronic otitis media, left side. First seen at St. Bartholomew's Hospital, 23rd June 1930, when she complained of watering of the left eye (facial paralysis), and was sent to the Ear Department. She had a small perforation of Shrapnell's membrane, occupied by purulent cholesteatomatous material. She was absolutely deaf in the left ear in response to Bezold-Edelmann forks and the monochord—using Bárány's noise machine to control the right ear, which was normal. *Labyrinth tests:* No reaction to caloric or compression tests. No spontaneous or induced nystagmus.

At the operation, 24th June, the whole of the bony labyrinth was found to be destroyed by cholesteatomata, which had accumulated to such an extent that the dura mater of both the middle and posterior cranial fossæ was exposed by the disease over an unbroken area, including the superior petrosal sinus. The cavity formed by the radical mastoid operation and by the removal of the cholesteatoma was much more considerable than a cavity formed by the radical mastoid operation alone. Fluid in the



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cavity transmitted pulsation from the brain. At one stage of the operation cerebrospinal fluid escaped, but the cavity was packed with "bipped" wicks, which were not completely withdrawn for over a week. The patient's recovery was not interrupted.

II. *Cholesteatoma with Fistula of the External Auditory Meatus and of the Labyrinth.*—J. H., male, aged 48. Chronic otitis media, left side. First seen at St. Bartholomew's Hospital in October 1930, complaining of vertigo, which was worse when he inserted his finger into the left ear. He was in a frightened, apprehensive state of mind, which made an examination difficult. An attempt to syringe his ear to remove pus and débris terrified him, causing forced movements, so that he nearly fell off his chair. It was ascertained that nystagmus, with the primary movement of both eyeballs to the right—accompanied by forced turning of the head and face to his right when the left meatus was compressed. The same movements took place during the act of syringing the left ear. After removal of débris the tympanic membrane looked normal, and several observers failed to notice a fistula through the posterior superior wall of the bony meatus, which led into the antrum. A probe could be passed easily and painlessly through the fistula into the antrum without causing vertigo, unless it came into contact with the inner wall of the aditus. The violent forced movements, described above, were evoked every time the probe was applied to the same spot.

The hearing tests indicated only slight middle-ear deafness. The patient could hear Bezold's fork 24 d.v., but not 16 d.v. in the left ear. Two weeks after the extraction of the débris from the ear giddiness could not be produced by meatal compression, only by application of the probe to the region of the external semicircular canal.

The patient has ceased to be nervous and apprehensive, and expresses himself as feeling perfectly well, but will be kept under further observation.

Sir JAMES DUNDAS-GRANT said that Dr. McKenzie's arguments had been very ably marshalled. Still, it was difficult to eradicate impressions and he himself had been influenced by the teaching of Politzer, quoting Habermann and Bezold. The theory of epidermis having the mastery over the cells of the mucous membrane seemed acceptable, especially after what Dr. McKenzie had quoted concerning the extension of epidermis through a fistula communicating with a mucous surface. He showed on the screen an illustration of a frequent mode of formation of cholesteatoma in the attic. There was apparently an acute suppuration in the middle ear, covering almost all the tympanic membrane. On the screen was shown the bulging which had presented itself to him when the patient came to him with pain and evidently suppuration, in the middle ear. He incised that bulging, which obviously was from the attic, and after it had subsided and apparently dried up, it left a distinct dry cavity in the outer attic. This was the way in which, very often, cholesteatoma of the attic began and developed. He showed also a section of a portion of the tympanic membrane; one could see the epithelium of the meatus and outer surface of the membrane extending through the perforation, and a commencing epidermisation of the inner side. A section illustrated showed a Malpighian layer, a nucleated layer, an un-nucleated layer, and



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detached layers of cornified cells, forming the contents and lining of the cholesteatoma. External cholesteatoma pure and simple was a very rare condition. He had had cases which caused him great trouble and anxiety, but in most of his cases he found that the cholesteatoma was continuous with a very deep cavity in the attic, and extending into the mastoid region. He considered that most of these cases were secondary proliferations into a cavity which had already existed.

An interesting case of cholesteatoma was one in which a boy who had acute suppuration was operated upon by Mr. Heath's method. The patient had now a perforation in the posterior meatal wall, and a cholesteatoma internal to it, which seemed to be a definite extension of the epithelium from the skin through the opening into the mastoid cells. The process was similar to that taking place in the healing of a flat ulcer, namely, a gradual epidermisation of the cells extending over the granulations. It was practically necessary for the mucous membrane to have undergone some change, and if the surgeon could only enlarge the opening sufficiently, by chiselling away bone, or removing obstructions such as ossicles, or even a little band, a cure would ensue. He (Sir James) had had a very striking case under his care in which he had had to remove the lower margin of the attic, which formed a hammock by which the epidermic scales were kept from escaping. As soon as that "hammock" was taken away, the scene changed. The bottle-necked cavity was dealt with, and extraordinary improvement resulted.

Sometimes very mild treatment would produce the necessary result, and he thought tetrachloride of carbon formed a distinct addition to the otologist's armamentarium, as it cleansed a cholesteatomatous cavity very efficiently.

Kirchner said that cholesteatoma found its way into the canals of bone, but this was contradicted by Katz, and he (the speaker) thought that view was no longer held. In one case in which he had operated he had found, lying on the floor of the cavity, a white membrane, almost skin-like, as if it had been taken by a clever operator from the thigh and dexterously laid in the cavity. Fortunately, it was an incomplete but very suitable skin; if it had had hair follicles and sebaceous glands these would have caused great inconvenience.

Mr. MUSGRAVE WOODMAN said he would direct attention to two clinical points. Rhinologists knew of a condition in the nose in which ciliated membrane became transformed into a flattened epithelium, a condition which was difficult to get rid of. We had seen the advances which had been made by mild acid treatment, and in view of the leather-bottle shape of the mastoid cavity, the production of a cholesteatoma was easily understood.

The other clinical observation was with regard to the radical mastoid operation; it was a point to which Mr. Jenkins had drawn attention. The surgeon must remove all the ciliated mucous membrane lining the cavity. When he failed to do that, the little red carpet of ciliated mucous membrane travelled outwards to the many islands of squamous epithelium. When there was antagonism, the mucous membrane was the stronger of the two. He therefore subscribed to Dr. McKenzie's theory.



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Mr. T. H. JUST said that within four weeks he had had two cases bearing on Dr. McKenzie's paper. One was in a man aged 26, who attended St. Bartholomew's Hospital, having, apparently, otitis media. He had had earache for sixteen days with a slight discharge, and some tenderness over the mastoid. There was no previous history of ear trouble. The drum was incised, and there was a discharge of sero-sanguineous fluid. The pulse-rate was 50, and there was well-marked papillœdema of 2 or 3 D. The patient became drowsy. The mastoid antrum was opened and a cholesteatoma about the size of a date-stone was found posterior to the antrum, in the tegmen region, and leading to thin bone in the middle fossa. On opening up the middle fossa he had immediately found a temporo-sphenoidal abscess. He did not know whether that was due to a previous suppuration, but the patient had had acute otitis media. The mastoid trouble cleared up after paracentesis, and behind it was the cholesteatoma.

In the second case the patient had come to the National Hospital for the Paralysed, practically unconscious, with pus coming from the right ear, and signs of a temporo-sphenoidal lesion. He was operated upon immediately. He (Mr. Just) did not see the drum. The meatus was filled with foul-smelling pus. When the pinna was pushed forwards the meatus was seen to be filled with cholesteatoma, and on investigation of the anterior wall of the mastoid, the posterior meatal wall, and also the cartilaginous wall, were found to be eroded. There was a large cholesteatoma which went mainly backwards to the posterior fossa. Though this was as large as a crown-piece, the dura was absolutely normal. Upwards in the middle fossa the bone was partially eroded by cholesteatoma, and part of it was adherent to the dura mater. A small temporo-sphenoidal abscess was found, and also a large subdural abscess. The patient died. Dr. Greenfield removed the tympanum, and found an intact drum opposite the foul mass in the meatus. He (the speaker) did not know whether this patient had had previous sepsis or not, but there was a two years' history of intermittent discharge from the ear. He was sure that drum was not perforated during that time, though it might have been perforated previously. He had had a case of lateral sinus infection and septicæmia with a normal drum.

Mr. A. D. SHARP said he understood Dr. McKenzie to state that one did not find a "mushy" external cholesteatoma in the external form; he (the speaker) had seen a mushy cholesteatoma in both child and adult when there had been no perforation of the membrane.

Dr. T. B. JOBSON said that in treating suppurative otitis media by ionization one obtained an idea on this subject. He had tried to treat cases of cholesteatoma many times, but without any success. He had washed out the attic with ether and other substances but had failed to remove the cholesteatomatous mass and cure the sepsis, even when he had followed up this treatment by ionizing the cavity.

Chronicity did not explain this, because an ordinary case of otitis media might last ten or fifteen years and be efficiently treated with toilet measures —washing out and ionization—and success might come with only one ionization. That fact, he thought corroborated Dr. McKenzie's contention that cholesteatoma was not a secondary condition due to suppuration



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but rather a primary condition on to which suppuration was secondarily grafted.

Mr. RITCHIE RODGER suggested that one argument in favour of the secondary origin of cholesteatoma was the fact that the condition was frequently bilateral, and bilateral otitis media and perforation were common, while a bilateral new growth was almost unknown.

Dr. DAN MCKENZIE (in reply) said that he sympathised with those Members who found it difficult to accept the views advanced in his paper; he had himself had to live with them fifteen years before he felt certain about them. The longer one lived with them the better one liked them. What were regarded as original ideas were too often merely resuscitated ones; those he had advanced to-day were the oldest of all.

**Cholesteatoma performing for itself the Radical Mastoid Operation.**—L. GRAHAM BROWN, F.R.C.S.

J. W., female, aged 45 years, complained of otorrhœa and deafness since childhood, following scarlet fever.

The right ear showed a large area of attic disease with the membrana tympani intact below. The left ear showed absence of the membrana tympani, granulations in the middle ear and a large loss of bony substance in the attic and the posterior wall of the meatus.

Operative treatment consisted in removing, through a posterior aural incision, a large mass of cholesteatomatous débris from the mastoid, antral, and middle-ear regions, making a meatal flap, closing the posterior wound and draining through the meatus. The posterior wound healed completely in twelve days, but the cavity has not completely epidermised. The hearing in this ear remains fair.

**Congenital Deformity and Deafness.**—E. BROUGHTON BARNES, F.R.C.S.Ed.

Patient, a boy, aged 9 years, has congenital deformity of pinna on both sides, and apparently some deformity of middle ear and ossicles; handles of both mallei appear scimitar-shaped. Severe middle-ear deafness. Absolute bone-conduction appears to be quite normal. The Eustachian tubes are patent.

Would removal of the membrane and ossicles help this patient?

The PRESIDENT said that this was a very important case. No one, he thought, would suggest immediate operation.



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