

patient. It is considerably poorer in the elderly brain-damaged individual.

The entire process, when begun early, with a useful goal in mind and in a hopeful environment, has a motivating influence.

It is in the broad consideration of the patient's physical, mental, social and vocational problems that rehabilitation makes a contribution to medical practice.

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ASPERGILLOSIS OF THE EAR

A REPORT OF TWENTY-NINE CASES

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THE OBJECT OF THIS PAPER is to point out that otomycosis aspergillina is more common in this region than publications on diseases of the ear would appear to suggest. This opinion is based on the relatively large number of cases recently observed at the Royal Victoria Hospital. In a period of 30 months from January 1952 to June 1954, 29 cases of otomycosis due to various species of the genus *Aspergillus* have been diagnosed and treated by members of the Department of Otolaryngology working in conjunction with the Department of Bacteriology and Immunology at McGill University.

It is interesting to note that this subject was reviewed from this hospital in 1904 by Birkett and Nicholls.¹ They reported two cases from their experience and commented as follows: "The disease otomycosis, or, as it was somewhat more precisely called by Wreden, myringomycosis aspergillina, is decidedly rare in Canada."

Eleven of the 29 cases in the present series had no history of previous ear infection except in one instance where a simple mastoidectomy had been performed many years earlier. Five cases occurred in patients who suffered from chronic eczema of the ears. In seven cases the ears were already affected by chronic suppurative otitis media. Three cases occurred after the use of antibiotic powders in radical mastoid cavities and

three other cases followed the general use of antibiotics. Accordingly the cases have been summarized and reported under these respective groupings.

CLINICAL COURSE

TABLE I.

GROUP ONE WITHOUT PREVIOUS EAR INFECTIONS						
Case	Sex and age	1st examination date	Duration of symptoms prior to first examination	Fungus	Bacteria	Uni or bilateral
1	35 F.	Jan. 1952	5 days	<i>Aspergillus niger</i> v. Tieghem	Light growth of micrococci	Uni.
2	42 F.	Aug. 12/52	4 wks.	<i>Aspergillus niger</i> v. Tieghem	Moderate growth of <i>Staph. pyogenes</i>	Bil.
3	53 F.	Aug. 17/53	10 days	<i>Aspergillus niger</i> v. Tieghem	No cultures made	Uni.
4	40 F.	Jan. 13/53	1 wk.	<i>Aspergillus flavus</i> Link	Light growth of micrococci	Bil.
5	38 F.	June 5/53	3 wks.	<i>Aspergillus niger</i> v. Tieghem	No cultures made	Uni.
6	27 F.	July 26/52	10 mths.	<i>Aspergillus niger</i> v. Tieghem	Heavy growth of enterococci and micrococci	Uni.
7	2 M.	July 29/52	8 days	<i>Aspergillus niger</i> v. Tieghem	No cultures made	
8	42 F.	Jan. 8/53	10 days	<i>Aspergillus niger</i> v. Tieghem	Moderate growth of <i>E. coli neopolitana</i> and <i>Pseudomonas spec.</i>	
9	33 M.	May 3/52	2 wks.	<i>Aspergillus flavus</i> Link	Micrococci, <i>Staph. pyogenes</i>	Bil.
10	39 F.	April 5/54	8 days	<i>Aspergillus niger</i> v. Tieghem	Corynebacteria	Uni.
11	5 M.	Feb. 17/53	2 days	<i>Aspergillus fumigatus</i> Fres.	Light growth of <i>Staph. pyogenes</i> . Moderate growth micrococci.	Uni.

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GROUP ONE—WITHOUT PREVIOUS EAR INFECTIONS

CASE 1.—The history and clinical findings resembled those in a unilateral case of acute suppurative otitis media. The drum was incised but no pus was found. Black debris was recognized in the ear canal on the 10th day. The condition appeared to be aggravated by Neomycin ear drops but responded favourably to local application of Cresatin. The infection lasted five weeks and has not recurred.

CASE 2.—Both ears were involved. A sensation of water in the right ear had been present one month. Pain occurred in both ears for one week. Dark, moist debris was present in each canal. The drums were red and swollen. The case responded readily to local use of Cresatin.

CASE 3.—Discomfort, itchiness and loss of hearing in the right ear had been present for 10 days. Moist, dark debris was present in the canal. The drum was reddened and there was some denuding of the epithelium. The infection subsided after the local use of Cresatin.

CASE 4.—Fullness, itchiness, and discharge in the left ear were complained of in January. The infection appeared to be aggravated by Neomycin ear drops but subsided after one week's treatment with Cresatin. The right ear became similarly infected in April and appeared to recover after a few applications of Cresatin. Three weeks later both ears were involved with furunculosis. By June 1, the patient appeared to be well. On June 22, she had a bilateral otitis externa, and *Aspergillus flavus* was again present in each ear. In July the fungus infection appeared to be controlled but the otitis externa persisted until October, making a total disability of ten months.

CASE 5.—Severe discomfort and itchiness had been present in the left ear for three weeks. Penicillin had failed to relieve the condition. A grey exudate was present in the canal. The drum was inflamed and swollen. Mastoid radiographs were clear. Incision of the ear drum was considered, but was deferred because of the diagnosis. Recovery followed the local use of Cresatin over a period of two weeks.

CASE 6.—Discomfort and discharge had persisted in the right ear for 10 months. The external canal was narrow, as a result of a simple mastoidectomy in childhood. The drum was intact and reddened. Mastoid radiographs were normal. Cresatin therapy was recommended.

CASE 7.—There was pain in the left ear and brownish discharge from the external canal for eight days. Both ear drums were reddened. There was dark debris in the left canal. The patient received Tri-sulpha by mouth for one week, then local applications of Cresatin. The result was satisfactory.

CASE 8.—The right ear felt painful and blocked for 10 days. Waxy debris and pus were present in the canal. The drum was grey and intact. The hearing was good. Mastoid radiographs were normal. The condition appeared to be aggravated by Neomycin ear drops but responded favourably to Cresatin over a period of two weeks. A furunculosis of the external canal occurred at this point and persisted for an additional two weeks.

CASE 9.—Itchiness of the ears had been complained of for two weeks. Wax had been removed five weeks previously. In the right canal there were white, feathery deposits. In the left canal there was fluffy, yellowish debris. The case responded favourably to the local use of Cresatin over a period of two weeks.

CASE 10.—This patient had discomfort and discharge in the left ear resembling acute suppurative otitis media. The drum was inflamed and swollen with a pin-point central perforation. The drum was paracentesed to drain what was considered to be a middle ear infection. No disease was demonstrated by x-ray. There was an initial favourable response to Cresatin but the patient was not entirely well for two months. During this time the ear canal was swabbed occasionally with Cresatin.

CASE 11.—The symptoms suggested an acute otitis media of the left ear which has been treated conservatively for two weeks without improvement. The drum was then paracentesed but no pus was found. Treatment consisted of 1% aqueous acriflavine ear drops. The ear continued to discharge for one month.

TABLE II.

GROUP TWO FOLLOWING ECZEMA						
Case	Sex and age	1st examination date	Duration of symptoms prior to first examination	Fungus	Bacteria	Uni or bilateral
12	47 M.	Mar. 1/54	3 wks.	<i>Aspergillus niger</i> v. Tieghem	Light growth of <i>Staph. pyogenes</i> . Heavy growth of micrococci.	Bil.
13	71 M.	Oct. 5/53	8 mths.	<i>Aspergillus flavipes</i> (Bain. et Sart.) Thom et Church	No cultures made	Bil.
14	44 F.	Mar. 25/54	2 wks.	<i>Aspergillus flavus</i> Link	Micrococci and diphtheroids	Bil.
15	46 M.	Dec. 1/53		<i>Aspergillus nidulans</i> (Eidam) Wint.	<i>Staph. pyogenes</i>	Bil.
16	40 M.	Nov. 6/53		<i>Aspergillus niger</i> v. Tieghem	No cultures made	Uni.

GROUP TWO—FOLLOWING ECZEMA

CASE 12.—There was a history of recurring attacks of itchiness in the ear canals for several years. Itchiness and obstruction in each ear were complained of. Dark, moist debris was present in the external canals. The canal walls were reddened and swollen. The drums were inflamed. The condition responded favourably to Cresatin.

CASE 13.—This patient developed itchiness and discharge from both ears after swimming. He failed to recover on Neomycin ear drops and alcohol ear drops. He responded favourably to Cresatin. He had a long history of recurring eczema of the ears for which he continues to require treatment.

CASE 14.—This patient complained of a feeling of fullness in each ear. Epithelial debris was found in each ear canal. There was a history of recurring eczema of the ears over a period of five years. Tincture of merthiolate was prescribed as ear drops.

CASE 15.—There was a history of itchiness of the ears for several years. The fungus was grown from scrapings of the ear canals. The condition responded favourably to Cresatin.

CASE 16.—This patient was admitted to hospital for investigation of swelling around the eyes, ears, face and finger clefts, associated with itchiness and of several years' duration. There was eczema of both ear canals. The fungus was grown from the debris of the right ear canal and responded favourably to Cresatin.

GROUP THREE—ASSOCIATED WITH CHRONIC SUPPURATIVE OTITIS MEDIA

CASE 17.—This patient complained of pain in his right ear for a few days. He had had bilateral chronic suppurative otitis media since childhood and was at the time being treated in hospital for acute frontal sinusitis. He responded favourably to polymyxin ear drops.

TABLE III.

GROUP THREE ASSOCIATED WITH CHRONIC SUPPURATIVE OTITIS MEDIA						
Case	Sex and age	1st examination date	Duration of symptoms prior to first examination	Fungus	Bacteria	Uni or bilateral
17	25 M.	Apr. 9/54	1 wk.	<i>Aspergillus fumigatus</i> Fres.	No cultures made	Uni.
18	31 F.	Nov. 1953		<i>Aspergillus niger</i> v. Tieghem	No cultures made	Bil.
19	45 F.	June 1/54		<i>Aspergillus flavus</i> Link	Moderate growth of <i>Staph. pyogenes</i>	Uni.
20	21 F.	Mar. 28/52		<i>Aspergillus niger</i> v. Tieghem	Heavy growth of micrococci	Bil.
21	32 F.	Feb. 20/53		<i>Aspergillus niger</i> v. Tieghem	No cultures made	Bil.
22	31 F.	Apr. 1954	2 mths.	<i>Aspergillus flavus</i> Link	No cultures made	Uni.
23	35 F.	Apr. 15/54	1 mth.	<i>Aspergillus niger</i> v. Tieghem	Heavy growth of <i>Staph. pyogenes</i>	Uni.

CASE 18.—This was a case of bilateral chronic suppurative otitis media since childhood. A radical mastoidectomy had been done on each ear. Intermittent aural pain and discharge had occurred for two years. The fungus responded favourably to Cresatin.

CASE 19.—This patient had had a chronic suppurative otitis media in the left ear for 30 years. Radical mastoidectomy was performed and the fungus was found in the routine cultures from the diseased ear. Both ears had recently been itchy.

CASE 20.—This patient was admitted to hospital because of a recent activity of bilateral chronic suppurative otitis media. After two weeks' treatment with 70% alcohol ear drops and chloramphenicol ear drops, used alternately, the fungus appeared to be destroyed.

CASE 21.—This patient had had bilateral chronic suppurative otitis media since childhood, with frequent acute exacerbations in the past year. Both drums were perforated. The right canal was moist and contained debris, which grew the fungus. After one week the fungus was also present in the left ear. Neomycin drops were used in both ears. The condition persisted for three months, during which time Neomycin was used periodically. During this period there was a *Staphylococcus* infection of both antra, which responded to bacitracin. The fungus was finally controlled after the local use of Cresatin.

CASE 22.—This patient had chronic suppurative otitis media of the right ear since childhood. For two months she had had pain as well as discharge in the ear. Because of the pain, marked loss of hearing, and the history of chronic disease, a radical mastoidectomy was performed in June 1954, and the *Aspergillus* was recovered at the time of operation. The disease appeared to be limited to the middle ear. The mastoid was sclerosed.

CASE 23.—This patient had a long history of chronic suppurative otitis media, left. A radical mastoidectomy was performed three years earlier. Pain and discharge in the operated ear was complained of for one month. The fungus responded favourably to Cresatin, but *Staphylococcus* infection of the canal persisted.

TABLE IV.

GROUP FOUR AFTER LOCAL USE OF ANTIBIOTICS						
Case	Sex and age	1st examination date	Duration of symptoms prior to first examination	Fungus	Bacteria	Uni or bilateral
24	24 F.	Oct. 23/53		<i>Aspergillus niger</i> v. Tieghem	No cultures made	Uni.
25	50 F.	Dec. 1951	1 mth.	<i>Aspergillus niger</i> v. Tieghem	Very light growth of micrococci	Uni.
26	36 M.	Apr. 1953	5 days	<i>Aspergillus niger</i> v. Tieghem	No cultures made	Uni.

GROUP FOUR—SUBSEQUENT TO LOCAL USE OF ANTIBIOTICS

CASE 24.—This patient had had a fenestration operation three years earlier. The cavity had discharged continuously, and had been treated on various occasions with antibiotic dusts. The unoperated ear was free from infection.

CASE 25.—This patient had a radical mastoidectomy in April 1951. The cavity had been dusted frequently with chloramphenicol powder. In December 1951 the operated ear became moist and uncomfortable. The mastoid cavity was lined by a heavy growth of fungus. The further use of chloramphenicol and bacitracin locally and generally aggravated the condition but favourable results followed the use of Salzberger's iodine and boracic powder after saline irrigations. In May 1952, the fungus infection recurred and responded to Tincture of Merthiolate.

CASE 26.—This patient had had a left radical mastoidectomy four years previously. In April 1953, the cavity was filled with debris and the lining was mildly inflamed. The cavity was dusted with chloramphenicol powder. In June 1953, the patient again complained of pain and discharge from the ear. He continued to dust the ear with chloramphenicol powder. On July 9, a heavy growth of *Aspergillus niger* was apparent, which responded favourably to the local use of Cresatin.

TABLE V.

GROUP FIVE AFTER GENERAL USE OF ANTIBIOTICS						
Case	Sex and age	1st examination date	Duration of symptoms prior to first examination	Fungus	Bacteria	Uni or bilateral
27	28 M.	June 22/53	4 days	<i>Aspergillus niger</i> v. Tieghem	No growth of bacteria obtained	Bil.
28	26 F.	Feb. 4/52	1 day	<i>Aspergillus niger</i> v. Tieghem	No cultures made	Bil.
29	36 M.	Oct. 27/53		<i>Aspergillus flavus</i> Link	No cultures made	Uni.

GROUP FIVE—FOLLOWING THE GENERAL USE OF ANTIBIOTICS

CASE 27.—This patient had been treated with streptomycin for tuberculosis of knee and lung for one month.

His right ear was discharging and was uncomfortable. The drum was healthy. The ear contained moist, black debris. Two weeks later the left ear became infected with the fungus. Both ears responded to the alternate use of Cresatin and Neomycin ear drops.

CASE 28.—This patient had been treated generally with penicillin for boils in her ears for three weeks prior to the onset of symptoms. Both ears felt blocked. The right canal contained debris, and the drum was inflamed. The left ear was normal. The fungus was found in the right ear, but eventually appeared in the left ear. Infection was not controlled for six months, then the patient developed furuncles in the left ear.

CASE 29.—This patient was admitted to hospital because of a skin reaction due to the use of penicillin for dermatitis. There was a history of recurring otitis externa over a period of seven years, which first developed after swimming. Because of this history the ears were examined. Wax was found in each canal. On the surface of the left ear canal there was a white, feathery growth, which proved to be *Aspergillus flavus*. In June 1954, the fungus was again present in the left ear without any marked reaction and without any symptoms.

COMMENT

In the majority of these cases, large masses of mycelium were removed from the ear canal. Microscopically, a diagnosis of an *Aspergillus* infection was made and was confirmed by culture. There appears to be considerable variation in the incidence of infections with different species of *Aspergillus*. In this regard the incidence of the various species reported by Siebenmann⁸ in his series of 27 cases is compared with the incidence of the various species occurring in our own series (Table VI).

TABLE VI.

INCIDENCE OF ASPERGILLUS INFECTIONS BY SPECIES		
Species	Siebenmann	Stuart and Blank
<i>Aspergillus fumigatus</i>	16	2
<i>Aspergillus niger</i>	7	19
<i>Aspergillus flavus</i>	2	6
<i>Aspergillus nidulans</i>	2	1
<i>Aspergillus flavipes</i>		1
Total	27	29

Microscopic and cultural examinations of the debris were made in all cases, but in 13 cases no bacteriological investigations were carried out. These bacteriological examinations were omitted because the diagnosis of aspergillosis was so strongly suggested clinically. A light to moderate growth of *Staphylococcus pyogenes* was found in six of the remaining 16 cases in which bacteriological studies were made.

The literature on the pathogenicity of the *Aspergillus* species encountered in otomycosis^{2 to 9} is rather confusing and inconclusive. It is im-

possible to draw conclusions from cases following eczema or from cases associated with chronic suppurative otitis media. However, it is interesting to note that in 11 cases of this series, referred to as Group I, there was no history of previous ear disease. Bacteriological studies were carried out in eight of these cases. No bacteria were found in five of the eight cases. In two of these five cases the symptoms were severe and signs suggested otitis media. The respective drums were opened but no pus was found in either middle ear. In our opinion, the symptoms and signs in these cases resulted from the mycotic infection.

In Groups II and III the unhealthy skin and moisture of eczema and chronic suppuration undoubtedly provided a good medium for the growth of the fungus.

The numbers of cases associated with the local and general use of antibiotics (Groups IV and V) are too few to be discussed.

Our findings indicate that mycotic infections of the ear caused by some species of the genus *Aspergillus* are not as uncommon as is frequently suggested. Mycological investigation of the ear canal in addition to the bacteriological examination should be of great assistance in arriving at a proper diagnosis and more effective treatment in otitis externa.

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EYE, EAR, NOSE AND THROAT COURSE

The University of Toronto announces a refresher course in eye, ear, nose and throat surgery to be held from April 11-15, 1955, with guest surgeons from New York, Baltimore, and Iowa City. The course will be given for a maximum of 30 students.