RECENT DEVELOPMENTS IN OTITIS EXTERNA

BY

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The problems of otitis externa still largely remain unsolved despite the frequency of the condition and the ample opportunities available for its study.

Gregson and La Touche (1961) recorded a high incidence of mycotic infections in a series of infected mastoidectomy cavities and external auditory canals. The *British Medical Journal* (1961) suggested that more thorough investigation might reveal mycotic infection in cases previously thought to be of bacterial origin. The antibiotics were condemned as likely to lead to skin sensitization, while the topical application of steroids was said to interfere with normal healing and to prevent proper clinical assessment.

The purpose of this paper is to review these suggestions in the light of recent investigations into the nature of the infection and developments in its treatment.

External otitis is primarily a "dermatitis" of the highly specialized skin lining a tortuous narrow cul-de-sac, with secondary infection by bacteria and/or fungi, and the aim in treatment should be to clear up the secondary infection and to remove those factors likely to lead to a recurrence of the primary disorders.

The commonly occurring bacteria in external otitis are *Staphylococcus aureus*, *Pseudomonas pyocyanea*, and *Proteus vulgaris*. A satisfactory response to treatment can be obtained with antiseptics or antibiotics but not always with the same promptitude as with the broad-spectrum antibiotics.

Chloramphenicol, framycetin sulphate ("soframycin"), neomycin, and streptomycin are the likeliest to be effective in pure or mixed growth of these organisms: but chloramphenicol and streptomycin occasionally give rise to skin sensitization and the development of bacterial resistance. Framycetin and neomycin are less troublesome in this respect.

The importance of the steroids in dermatological practice has been shown beyond dispute by Sulzberger and Baer (1948), Sulzberger *et al.* (1953), Rattner (1955), Welsh and Ede (1955), and Witten (1955). The absence of absorption after topical application together with the effective relief of pruritus (often the most troublesome symptom of the disease) has led to extensive research and to the development of more potent preparations which can be employed in lower concentration and with greater effect. A recent product in this field is dexamethasone, which has been combined with framycetin and gramicidin as the proprietary preparation "sofradex" in the following clinical trial.

Framycetin, a water-soluble white powder, is obtained from *Streptomyces decaris*. It is stable in the presence of serum and blood. Both bactericidal and bacteriostatic, it is active against Gram-positive and Gram-negative bacteria, including *Staph. aureus*, *Ps. pyocyanea*, and *Pr. vulgaris*. Unsuitable for parenteral use on account of its toxic action on the kidney and the auditory nerve, it is all the more satisfactory for local application. Church (1954) thought that the antibiotics

most suitable for topical application were those that were not used systemically and caused no sensitization and only a low incidence of bacterial resistance. Burrows (1958) and Peterkin (1959) demonstrated that no skin sensitization followed the use of framycetin in dermatology. Maccabe (1959) thought it particularly suitable for dermatological practice. Peterkin (1959) thought it more suitable for topical application than penicillin, streptomycin, or chloramphenicol, while Keogh and Russell (1956) believed it to have a promising future in dermatology.

Collins (1959) recommended that the antibiotic of choice for topical application in external otitis should (1) not provoke insensitivity of the organisms concerned, (2) not readily sensitize the skin, and (3) have a slightly acid pH to meet the requirements of healthy skin, as shown by Fabricant and Perlstein (1949). Framycetin meets these requirements.

The value of broad-spectrum antibiotics as local applications in otitis externa has been demonstrated by Kile *et al.* (1950), Stewart (1951), Farrar (1954), Akroyd (1958, 1959), and Stride (1959, 1960).

The combination of corticosteroids and broad-spectrum antibiotics in the treatment of external otitis has received attention from Senturia and Alford (1954), Bihari (1957), Akroyd (1958, 1959), and Stride (1959, 1960).

The value of dexamethasone in external otitis has been investigated below.

Design and Conduct of the Trial

Fifty unselected cases of external otitis in consecutive groups of 25 were swabbed for bacteriological and mycological assessment. The age incidence of the patients is given in Table I. Of the ichthyol group, infection occurred on the right in 13, on the left in 10, and bilaterally in 2. In the sofradex group infection

TABLE I.—Age Incidence

Group	Age in Years							Total
	-10	11-	21-	31-	41-	51-	61+	
Sofradex	0	5	0	8	3	5	4	25
Ichthyol 10% in glycerin	0	6	4	3	4	4	4	25

was on the right in 11, on the left in 12, and bilateral in 2. The infected external auditory canals were carefully cleansed and then packed with $\frac{1}{2}$ -in. (1.3-cm.) ribbon gauze saturated with the medicament. At intervals of two days the treatment was repeated until resolution appeared to have been achieved. Thereafter cases were kept under close observation for a week and reviewed periodically for three months.

Medicaments.—Group 1 (25 cases—15 males, 10 females), ichthyol 10% in glycerin. Group 2 (25 cases—9 males, 16 females), framycetin sulphate 0.5%, gramicidin 0.005%, dexamethasone 0.05%, in an ointment base (sofradex).

Results

In the group treated with sofradex the average duration of treatment was 4.1 days, while in the group receiving ichthyol in glycerin it was 10.5 days (Table II). In no case was treatment with sofradex necessary after 14 days, and 88% of this group were cured within 7 days; in the group treated with ichthyol in glycerin,

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treatment was much more protracted and at the end of 14 days only 76% of the cases were cured.

The bacteriological data revealed that *Staph. aureus* was present in 28% of cases (in pure or mixed growths), *Pr. vulgaris* in 24%, *E. coli* in 16%, and *Ps. pyocyanea* in only 8% (Table III). No fungi were isolated or cultured. The predominant organisms are similar to those reported by Keogh and Russell (1956) and Stride (1959, 1960).

The table of sensitivities (Table IV) is incomplete, but with no other antibiotic did the ratio of sensitive to resistant organisms approach that of framycetin: 14 to 1.

There was no significant difference in the recurrence rates of the two groups. Further investigation in every case of recurrence failed to reveal the presence of fungi, and response to further treatment was rapid.

No cases of skin sensitization were encountered in this series of 50 cases; this is in agreement with the work of Burrows (1958) and of Peterkin (1959).

TABLE II.—Duration of Treatment

Duration in Days	Ichthiol 10% in Glycerin Group 1	Sofradex Group 2
0-7	13	22
8-14	6	3
15-21	2	0
22-28	4	0
Total	25	25
Average	10.5 days	4.1 days
Recurrence	7 (28%)	6 (24%)

TABLE III.—Bacteriology

Organism	Ichthiol 10% in Glycerin		Sofradex		Total	
	No.	%	No.	%	No.	%
Pure growth:						
<i>Ps. pyocyanea</i>	0	—	1	4	1	2
<i>Pr. vulgaris</i>	2	8	2	8	4	8
<i>E. coli</i>	1	4	0	—	1	2
<i>Staph. aureus</i>	4	16	1	4	5	10
<i>Staph. albus</i>	1	4	4	16	5	10
<i>β haem. streptococcus</i> ..	0	—	1	4	1	2
Mixed growths:						
<i>Ps. pyocyanea</i> and <i>Staph. aureus</i>	1	4	0	—	1	2
<i>Ps. pyocyanea</i> and <i>Pr. vulgaris</i> ..	0	—	1	4	1	2
"theroids"	0	—	1	4	1	2
<i>Pr. vulgaris</i> and <i>E. coli</i>	1	4	0	—	1	2
" <i>Ps. morganii</i>	1	4	0	—	1	2
" diphtheroids	4	16	1	4	5	10
<i>E. coli</i> and <i>Staph. aureus</i>	1	4	1	4	2	4
" diphtheroids	1	4	3	12	4	8
<i>Staph. aureus</i> and <i>β haem. streptococcus</i>	1	4	1	4	2	4
<i>Staph. aureus</i> and diphtheroids ..	2	8	2	8	4	8
<i>Staph. albus</i> and diphtheroids ..	3	12	3	12	6	12
<i>β haem. streptococcus</i> and diphtheroids ..	0	—	1	4	1	2
Anthraxoids and diphtheroids ..	2	8	1	4	3	6
No growth	0	—	1	4	1	2
Total	25		25		50	

TABLE IV.—Sensitivities of Organisms (Incomplete)

	Bacitracin	Chloramphenicol	Erythromycin	Nitrofurantoin	Sulphafurazole	Neomycin	Penicillin	Polymyxin	Framycetin	Streptomycin	Sulphonamides	Tetracycline
Sensitive ..	6	42	10	7	0	26	14	16	14	28	10	24
Resistant ..	9	4	10	5	8	6	28	15	1	18	9	31

Although this table includes the sensitivities for the bacteria cultured from all 50 cases of otitis externa, the sensitivities are in themselves incomplete and comparison may not be made across the column. The ratios of sensitive to resistant organisms are, however, of great interest.

Discussion

It has been suggested (*Brit. med. J.*, 1961) that many cases of infection of the external ear at present regarded as being of bacteriological origin may in fact be due to mycotic infections which might be discovered by more thorough investigation; it has also been stated that resistance to treatment and possibly the frequent tendency to recurrence might be related to the previously unrecognized presence of fungi.

The absence of any fungi in this series of 50 cases is not unexpected, as previous studies by Daggett (1942), Conley (1948), Akroyd (1959), Collins (1959), Stride (1959, 1960), and Jenkins (1961) have all reported a very low incidence. Syverton *et al.* (1946) thought the role of fungi had been exaggerated, while Lumsden (1951) reported the only two cases of otomycosis seen in a Scottish centre over a period of 10 years. The report from Gregson and La Touche (1961) of an incidence of over 40% in a series in the North of England is very much at variance with previous work. Either their more refined technique has revealed what has been overlooked elsewhere or in their series there was an unusually high incidence of otomycosis. The other writers reported gaining satisfactory results without employing fungicides, and it may therefore be presumed that if unrecognized mycosis was present it was not responsible for the disease and its presence did not prevent healing or give rise to relapse or recurrence. The conclusion might be drawn that the fungi were incidental and not responsible for the disease.

The figures for the duration of treatment reveal clearly the value of framycetin, gramicidin, and dexamethasone mixture (sofradex) over glycerin and ichthiol. This result, of course, would not be anticipated if unrecognized mycotic infections were a factor in this series of cases. Further support is given to this supposition by the fact that all recurrences in the sofradex-treated group responded rapidly to a further course of treatment.

Previous studies by Farrar (1954), Keogh and Russell (1956), Bihari (1957), and Akroyd (1958, 1959) have produced less satisfactory results.

Insufficient attention to the deep anterior meatal recess (Daggett, 1942), premature hair-washing, and overconscientious ablation were undoubtedly operative factors in some cases of recurrence.

A study of the incidence figures shows a fairly even distribution from the second to sixth decades of life and between the sexes. No preponderance in laterality was noted, as might have been expected if the aetiology was entirely traumatic in a predominantly right-handed community.

Summary and Conclusion

Fifty cases of otitis externa, in two groups, were subjected to treatment with ichthiol 10% in glycerin or a mixture of framycetin, gramicidin, and dexamethasone (sofradex). More rapid resolution was noted with the antibiotic steroid mixture. Complications were notable for their absence. Bacteriological studies were in agreement with those of previous reports. No fungi were isolated.

The treatment of choice in otitis externa should be effective in a high proportion of cases and bring about resolution in the shortest possible time and yet be uncomplicated by skin sensitization or a high rate of recurrence. The treatment should be simple and

should require the minimum number of attendances ; in addition the cost should not be high. The combination of framycetin, gramicidin, and dexamethasone meets these requirements.

The concept of otomycosis as a commonly occurring disease has been examined. Further evidence must be awaited before conclusions can be drawn, but the weight of evidence is not at the moment in its favour.

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"Never, I suppose, in the history of medical education has so much thought been given to the question of the content and form of medical teaching," said Professor E. G. Sayers, Dean of the Otago Medical School, in the course of his George Adlington Syme Oration at the conference of the Royal Australasian College of Surgeons in Wellington on January 30. New concepts were current about the whole philosophy of undergraduate teaching in medicine ; there was a revaluation of what sort of graduate a medical school should aim to produce and a recognition of the real problems of the medical student. Professor Sayers proceeded to define the aims of medical education which he believed would be generally acceptable. In addition to acquiring the indispensable basic skills and attitudes he said that the student should be helped to learn to regard patients not as "cases" but as persons, and to give due consideration to their personal and social background ; habits of self-education should be established so that the student would continue to educate himself after graduation and realize that he would for the rest of his life have to be a student, continually revising his knowledge and opinions ; the student should be helped to learn and practise the traditional ethical principles of his profession in reference to patients, his colleagues, and the community ; he should be encouraged to develop interests outside medicine and to build his medical knowledge on a basis of wide general reading and an acquaintance with the liberal arts and general science.

GALACTORRHOEA

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Oestrogens, progesterone, adrenocortical steroids, and growth hormone are necessary for normal mammary gland development, and lactation follows the action of prolactin (luteotrophin) on the hormonally prepared breast. Milk ejection is brought about by oxytocin, which is liberated from the posterior lobe of the pituitary in response to a neurohumoral reflex initiated in the nipple. The factors which regulate the output of prolactin from the alpha (eosinophil) cells of the pituitary are obscure ; Everett (1956) concluded that this was largely independent of hypothalamic control, but recent experimental work suggests that the hypothalamic centres are involved in both milk secretion and milk ejection (McCann, Mack, and Gale, 1959 ; Linzell, 1959). Oxytocin may also cause prolactin liberation (Benson and Folley, 1956).

Galactorrhoea, or lactation which is not a physiological concomitant of pregnancy, is uncommon and may be associated with amenorrhoea as in the syndromes described by Chiari, Braun, and Spaeth (1852-5), Frommel (1882), and Forbes, Henneman, Griswold, and Albright (1954). This report describes three cases which presented some unusual features.

Case 1

A woman aged 38 was admitted to hospital in August, 1960, for the treatment of galactorrhoea. Menstruation lasting three days every 28 days began when she was aged 14 years. Her first pregnancy in 1943 resulted in a normal full-term male child which she breast-fed for nine months, and lactation persisted thereafter virtually unchanged. She was delivered of a second normal boy in 1944. This child was also breast-fed for nine months, after which lactation continued. Early in 1945 she miscarried at the tenth week of pregnancy, but later that year gave birth to a normal full-term girl whom she breast-fed for nine months. Lactation continued, and her weight which had remained basically steady at about 98 lb. (44.5 kg.) began to rise progressively. A fifth pregnancy ended in a breech still-birth in 1946. After this she was given tablets, the nature of which is unknown, for several weeks ; lactation decreased temporarily in association with this but never stopped completely. Regular menstruation was always re-established "within a few months" of delivery.

In June, 1953, when the patient was 31, menstruation ceased, although she continued to be aware of monthly abdominal discomfort. Regular sexual intercourse continued, no contraceptives were used, but pregnancy did not result. She first complained of tender lumps in the breasts and was seen by one of us in May, 1958 ; manipulation caused the discharge of milk and made the lumps disappear.

When she was admitted to hospital in 1960 the lactation was sufficient to saturate her clothes and cause social embarrassment, and milk was forcibly ejected during bathing or if the breasts were handled. On examination she was obese, weight 187 lb. (84.8 kg.) ; height 60 in. (152.5 cm.) ; the body proportions were normal—half-span 30½ in.