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ACUTE MASTOIDITIS IN CHILDREN TREATED WITH PENICILLIN AND SULPHADIAZINE

BY

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It has been said that penicillin places a premium on good surgery, but is no substitute for it. While not preparing to dispute the former, the series of 17 cases recorded below would largely appear to disprove the latter.

It has been the practice at one ear-and-throat clinic at the Children's Hospital to treat as out-patients large numbers of cases of mastoiditis, early or subacute, by the extensive use of the sulphonamides and penicillin in the form of an oil emulsion, reserving for admission those cases which hitherto had appeared to demand immediate operation. While the possible risks attached to this procedure laid it open to criticism, the difficulties of obtaining adequate facilities for in-patient treatment within this or any other hospital in the vicinity were so great that it was considered a justifiable expedient.

The results, however, were so satisfactory that it was resolved to apply this method of treatment to those cases of mastoiditis which by all previous standards demanded immediate operation. The cases in this series, seen within a period of three months, are consecutive ones in which there could be no shadow of doubt of a clinical diagnosis of acute mastoiditis, and were treated by conservative methods. Cases were selected on admission and none was excluded on the grounds of its severity. Only those in which the disease had progressed so far as to produce, in addition to systemic disturbances, tenderness, swelling, oedema, and in some cases a fluctuating abscess over the mastoid process were included in the series. All showed, to a greater or lesser degree, the typical forwards and downwards displacement of the ear so well shown in the accompanying photographs. This, coupled with the appearance of the drum and meatus, left no doubt of the diagnosis nor, by the usual standards, of the necessity for operation. X-ray examinations were made only in the later cases in the series, and bacteriological examinations not at all. The latter is unfortunate, because it may be that the prevalent invading organisms at the time the cases were admitted were particularly penicillin- or sulphonamide-sensitive. All cases originally selected are recorded. A

careful watch was kept throughout for signs of intracranial complications, but none occurred.

Treatment

On admission to hospital the following routine treatment was adopted: *Myringotomy* was performed in those cases in which the drum was intact and distended. *Intramuscular penicillin* was given in watery solution, 50,000 units six-hourly, in most cases. In the more severe cases 100,000 units were given six-hourly, and in one case 50,000 units three-hourly. *Sulphonamides* were given either four- or six-hourly, according to convenience in dosage, up to a total dose varying from 10 g. in infants to 30 g. in children of 10 years and over. No sulphonamide was given in one case in which there was acute glomerulonephritis. Sulphadiazine was used in most cases; and mist. sulphonamide co. (consisting of sulphadiazine 37%, sulphathiazole 37%, and sulphamerazine 26%) in younger children. Great attention was paid to a large fluid intake.

Local treatment consisted in careful cleaning of the meatus thrice daily and instillation of penicillin aural drops, 10,000 units per ml. As most of the children were drawn from the working-class districts of the city, one of the most important factors in the recovery of these cases was undoubtedly the excellent nursing care and attention to general health which they received.

The following is a summary of the notes of one of the most striking cases.

Case 1

Admitted April 13, 1948, aged 4 years, under the care of one of us (A. J. M.). Five weeks previously this child developed measles with otalgia and bilateral otorrhoea. The left otorrhoea ceased four weeks later, but the right otorrhoea had continued and right otalgia had been severe for the last three days. A right post-aural swelling was noticed three days before admission. It had since become worse.

On examination the child looked pale and ill. Temperature 100° F. (37.8° C.). From the right ear came a profuse muco-purulent discharge, the exact source of which was obscured by deep meatal oedema. There was considerable diffuse periostitis over the mastoid process, which was extremely tender. The pinna was pushed down, forwards, and outwards (see Fig. 1). The left drum was wrinkled but without active inflammation. Treatment consisted of systemic penicillin, mist. sulphonamide co., and penicillin aural drops.

FIG. 1.—Photograph of Case 1 taken on admission.

FIG. 2.—Condition of Case 1 ten days after admission.

Details of Remaining Cases

Case	Age	Duration of Symptoms	Physical Signs	Progress	Duration as In-patient	Follow-up
2	7 years	2 weeks	Right mastoid tenderness. Periostitis, especially over lateral sinus. Profuse discharge from posterior perforation	3 days after admission: otorrhoea ceased. 8 days: periostitis gone. 12 days: drum scarred; not inflamed	12 days	3 weeks after discharge: no complaints. Drum scarred; otherwise normal. Mastoid process normal. Hearing excellent. Circularized after 11 months: no further ear trouble
3	6 years	5 days	Right ear: swelling over Macewen's triangle and down post-aural groove. Copious pulsatile serous discharge from myringotomy (performed day before admission). Hearing: whispered voice at right ear	4 days after admission: otorrhoea ceased. 5 days: periostitis gone. 7 days: drum normal. Hearing: whispered voice from 5 ft. (1.5 m.) distance	7 days	6 weeks after discharge: no complaints. Right drum slightly retracted. Freely mobile. Hearing: W.V., right 10 ft. (3 m.), left 12 ft. (3.66 m.). Circularized after 9 months: no further ear trouble
4	19 months	3-4 weeks	Right ear: large post-aural swelling, pushing pinna down and out. Thick creamy discharge from posterior perforation in drum. Drum deeply injected	3 days after admission: swelling smaller but fluctuant. 8 days: swelling gone; otorrhoea ceased. 11 days: perforation healed	11 days	2 weeks after discharge: no complaints. General condition excellent. Mastoid process normal. Drum thickened but flat and white. Circularized after 10 months: no ear trouble of any sort
5	2 months	1 day	Left pinna pushed downwards and forwards by periauricular oedema. Meatus oedematous. Purulent discharge	3 days after admission: condition unchanged. 4 days: mastoidectomy decided on for next day unless much improved. 5 days: discharge ceased; meatal oedema subsiding. 11 days: postauricular and meatal swelling gone. Drum injected. 19 days: ear appears normal in all respects	19 days	10 weeks after discharge: "perfectly healthy baby"; taking feeds and sleeping well; mastoid process and zygoma normal; drum grey and normal in every respect. Circularized after 12 months: no ear trouble of any sort
6	7 years	5 days	Left drum bulging. Mastoid tenderness. Periostitis over Macewen's triangle and mastoid tip	On admission: myringotomy performed. 2 days after admission: tenderness gone. 4 days: otorrhoea ceased; swelling gone. 8 days: drum quite normal	12 days	9 weeks after discharge: "no complaints whatsoever"; mastoid processes normal; both drums quite normal and mobile. Hearing: whispered voice—right and left, 14 ft. (4.26 m.). Circularized after 11 months: had one attack of right otalgia; no trouble with left ear
7	5½ years	2 weeks	Right pinna displaced down and out. Mastoid process red and tender. Deep meatal oedema. Purulent otorrhoea	7 days after admission: periosteal thickening gone. 9 days: otorrhoea ceased. 12 days: drum thickened; otherwise normal	12 days	6 weeks after discharge: "no complaints at all. Better in every way"; mastoid process normal; drum retracted and poorly mobile; malleus prominent. Hearing: W.V., right 10 ft. (3 m.), left 12 ft. (3.6 m.). Circularized after 8 months: no ear trouble
8	6 years	5 weeks	Left ear: profuse muco-purulent discharge. Periostitis over Macewen's triangle. Drum not seen owing to difficulty in examining child	6 days after admission: periostitis gone. 7 days: otorrhoea ceased. 8 days: drum white and flat	8 days	7 weeks after discharge—both drums quite normal and mobile. Mastoid processes normal. Hearing: W.V., right 12 ft. (3.6 m.); left 14 ft. (4.26 m.). Circularized after 11 months: no ear trouble of any sort
9	2½ years	4-5 weeks	Right ear: profuse purulent discharge from antero-inferior perforation. Drum deeply injected. Severe periostitis over whole of mastoid process extending above pinna along zygomatic root. No fluctuation	2 days after admission: swelling gone except for small area of thickening over centre of mastoid process. 4 days: otorrhoea ceased. 5 days: perforation healed. 9 days: mastoid process clinically normal	9 days	Circularized after 10 months: no further ear trouble
10	3½ years	1 month	Right otalgia for one month and right otorrhoea for one week. Post-aural swelling for one day. Continuous haematuria for one week. Right ear: large discoloured swelling over mastoid process, with fluctuation, maximal over Macewen's triangle; thick discharge from macerated drum. Urine: red cells and granular casts; albumin. Blood urea 31 mg./100 ml. Blood pressure 100/70. Abdomen: nil abnormal. Diagnosis: acute glomerular nephritis, complicating acute mastoiditis	3 days after admission: otorrhoea ceased. 5 days: swelling gone; meatus much less oedematous. Urine contains R.B.C.s and no casts. 11 days: meatus normal; drum scarred, otherwise appears normal	12 days	T. and A. 3 months later. Circularized after 10 months: no ear trouble since original attack; nephritis cleared up in 3 months
11	7 years	1 week	Previous history of severe right otalgia, 4 years and 18 months. Temperature 100.2° F. (37.9° C.). Right ear: meatal oedema, especially posteriorly; drum red and bulging; 3-point tenderness of mastoid, especially over tip	On admission: right paracentesis performed. 3 days after admission: tenderness gone. 5 days: incision healed. 7 days: drum scarred; otherwise normal	8 days	9 weeks after discharge: no complaint of ear at all; 2 head colds since discharge, but no otalgia. Right mastoid process feels normal; drum slightly retracted anteriorly, and scarred posteriorly by myringotomy incision, but freely mobile. Hearing: W.V., right 12 ft., left 12 ft. Circularized after 9 months: no further ear trouble
12	3 years	3 weeks	Left ear: fluctuant tender swelling in post-aural groove; meatal wall sagging postero-superiorly; drum macerated (mostly obscured by meatal swelling). Radiograph: "infected left mastoid"	2 days after admission: swelling much smaller. 3 days: profuse left otorrhoea started. 9 days: mastoid process normal; attack of haematuria lasting a few hours; urine contained red cells but no other abnormality; sulphadiazine stopped. 10 days: otorrhoea ceased. 11 days: meatal swelling gone; drum landmarks visible	14 days	2½ months later: no further ear trouble; drums grey and retracted
13	4 years	4 weeks	Right ear: red tender swelling over Macewen's triangle; mastoid tip tender; deep meatus oedematous; drum obscured by hard wax. Radiograph: "infected right mastoid"	4 days after admission: swelling gone except for slight periostitis over upper part of mastoid process. 8 days: mastoid process normal. 10 days: meatus normal; still not possible to remove hard wax. 15 days: drum normal	15 days	Circularized after 10 months: child well; no ear trouble of any sort
14	12 years	3 weeks	History of 3 weeks' right otorrhoea following occasional otalgia for 6 months. Right ear: severe post-aural swelling. Radiograph: "infected right mastoid." Hears whispered voice at ear	4 days after admission: swelling gone; otorrhoea ceased. 8 days: drum normal; mastoid process normal; hears whispered voice from 6 ft. (1.8 m.) both sides	9 days	1 month: right ear: drum retracted; hears whispered voice at 5 ft. (1.5 m.) right, 8 ft. (2.4 m.) left

Details of Remaining Cases (continued)

Case	Age	Duration of Symptoms	Physical Signs	Progress	Duration as In-patient	Follow-up
15	4½ months	8 days	Right ear: swelling above and in front of pinna, pushing it down and out; no fluctuation; slight discharge from myringotomy incision, performed 2 days before admission. Radiograph: "A few infected zygomatic cells on the right side"	2 days after admission: otorrhoea ceased. 5 days: swelling gone; drum appears normal. 8 days: diarrhoea. 9 days: vomiting also. 10 days: temperature and pulse rates raised; right zygoma feels warmer, and is slightly reddened and more prominent than the opposite side; right cortical mastoidectomy performed; the major part of mastoid process normal, but a chain of infected zygomatic cells found. 12 days: general condition much improved. Steady uneventful recovery	29 days	Right mastoid abscess 4 months later. Right otitis media 6 months later. Bilateral otitis media 8 months and again 11 months
16	8 years	7 weeks	Left ear: tender over lateral sinus; drum bulging postero-superiorly; purulent discharge from antero-inferior perforation	2 days: tenderness gone. 3 days: otorrhoea ceased. 10 days: drum retracted. 11 days: home	11 days	Circularized after 9 months: no further ear trouble
17	6 years	2 weeks	Right ear: profuse purulent discharge from anterior perforation. Tender mastoid tip	2 days: tenderness gone. 11 days: otorrhoea ceased	13 days	Circularized after 10 months: one attack of acute R.O.M. 4 months after discharge. Cleared up in a few days on sulphonamide and penicillin drops, given in O.P.

Progress.—April 17: Right ear dry; perforation seen to be antero-inferior; no palpable periostitis now, but ear still lower than opposite side. April 19: Perforation healed. April 23: Pinna back in normal position (Fig. 2). April 25: Could hear the whispered voice at 15 ft. (4.57 m.) both sides. Right drum normal except for the antero-inferior scar. May 5: Transferred to convalescent home.

Subsequent History.—June 17: T. and A. July 15: Both ears dry; no ear trouble since May 3. Circularized after nine months (February, 1949): No further ear trouble.

The remaining cases are described above in tabular form.

Response to treatment was immediately noticeable in the general condition of the children. This in our opinion is the most important criterion of improvement in all acute mastoid cases. If the child looks as if it were making progress it is making progress, the constitutional condition reflecting the improvement in the ear. The slightly yellowish appearance of the complexion reminiscent of the tint of a telegram envelope, easy with practice to recognize but difficult to describe, rapidly gives way to a healthy pink. This alteration in appearance is often discernible within a few hours after treatment has begun, and precedes any obvious local change. The temperature and pulse rate fall rapidly at first and then move gradually to normal. Local changes in the ear quickly follow. The redness and tenderness rapidly disappear, the oedema subsides first, and is followed by the disappearance of fluctuation as the abscess, where the infection has burst through the bone, absorbs. The ear returns to its normal position, discharge ceases, the drum regains its colour and lustre, and hearing is restored. Many of these changes are accomplished in 48 hours, and are usually complete within a week.

We consider that the end-results of this method of treatment, as shown by examination or replies to questions several months afterwards, are at least as satisfactory as if the cases had been operated on; and that after such a lapse of time any further ear trouble is more likely to be a reinfection than a "lighting-up" of the old one, and would be equally likely to occur in children upon whom mastoidectomy had been performed.

Dr. T. M. Montford, M.O.H. of Castle Donington and deputy chairman of the Leicestershire and Rutland Executive Council, was re-elected a member of the Management Committee of the Association of Executive Councils (National Health Service) at the Annual Conference held at Bournemouth recently.

ELECTROCARDIOGRAPHIC INVESTIGATION OF 264 CASES OF HYPERTENSION

BY

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Improvement in the electrocardiogram is an objective criterion to which the utmost importance has been attached in estimating the effect of treatment of essential hypertension. It has long been known that confinement to bed may in itself produce temporary improvement in the electrocardiogram. It is a matter of great interest that more comprehensive investigations carried out within recent years have revealed considerable and lasting improvement in the electrocardiograms of patients with hypertension, notably in the T-waves, as a result of dietetic treatment (Bryant and Blecha, 1947; Kempner, 1948; and others) and of sympathectomy (Canabal *et al.*, 1945; Peet and Isberg, 1946; Hammarström, 1947; and others).

There are few comparative records of electrocardiograms of untreated patients with hypertension followed up over a fairly long period. Canabal *et al.* (1945) recorded the electrocardiograms of 56 patients under 55 years of age through five years and found improvement in five cases only, all of them women under 50. They concluded that the electrocardiographic changes in hypertension tend to show that improvement occurs in few cases only, and then chiefly after acute conditions such as myocarditis and infarction. Rasmussen and Bøe (1945), after six years' observation of 39 hypertensive patients, found that the electrocardiogram showed deterioration in 14 cases, while it was unchanged in 22 (of which 15 were normal) and improved in only three.

In a previous follow-up of 1,000 out-patients with hypertension (Bechgaard, 1946) with a blood pressure on the first examination of 160/100, or 180 mm. systolic or more, I had not given sufficient attention to the importance of this fact and had not followed the electrocardiograms of the individual patients with this in mind. The electrocardiograms have therefore since been revised. On the first examination 890 patients had been submitted to electrocardiography. As appears from Table I, and from a statement by Aastrup (1937), the prognosis was considerably