

ingly important it may be. One laugh without the strapping may undo weeks of treatment, and to leave it off for several days just when recovery is beginning will almost certainly result in partial failure.

The Mouth Hook.—From what has already been said it will be obvious that if the point of decussation of the orbicularis oris muscle on the paralysed side is made a fixed point, then, when the overacting sound fibres contract, the effect on the paralysed fibres will be to stretch them still more—much more than if there were no hook. If the hook is so adjusted that it actually pulls the angle of the mouth back, not only will the stretching be more severe but the fasciculi radiating from it, the depressor and levator anguli oris muscles will be stretched too. The only muscles which the hook really rests are the zygomatics, and in cases in which the hook has been used we often see that these are the only muscles which have recovered, the orbicularis being particularly flaccid. The rule should be, "Look after the sound side—leave the paralysed side alone; it is the sound side which does the damage."

Other Methods of Treatment

Nerve grafting in traumatic (mastoid) cases is obviously the method of choice and, equally obviously, should be employed

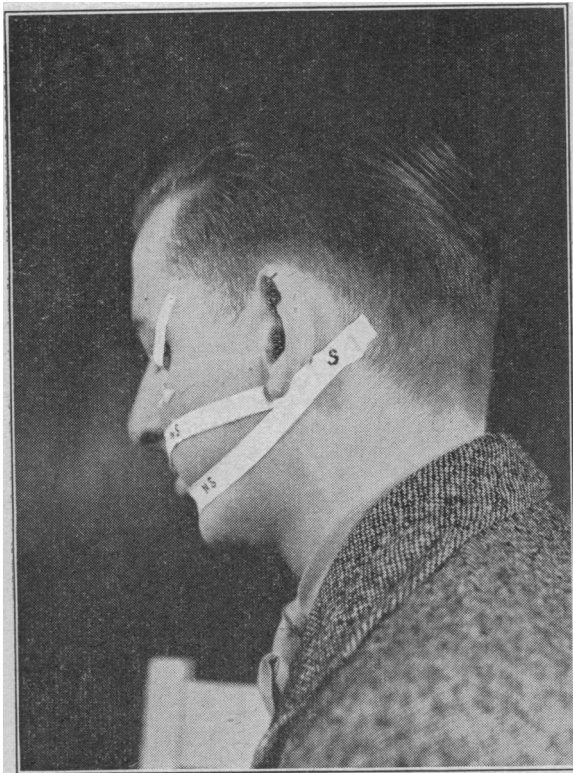


FIG. 3.—Showing method of strapping on the paralysed side. N.S.=Not stuck. S=Stuck very firmly to the mastoid process and a little way beyond the hair line.

early if it is to be successful, as also should decompression of the aquaeductus fallopii if thought necessary; these operations, however, fall within the sphere of otolaryngology and will not be discussed here.

Fascia Lata and Muscle Grafts.—These are the plastic surgeon's methods of dealing with facial paralysis in cases usually referred in the later stages, when R.D. is complete. We would, however, like to advance a plea that all traumatic cases (even those few for which nerve grafting is chosen) should be referred to the plastic surgeon as early as possible after the injury. Slings of fascia lata to take the weight of the paralysed cheek, to restrain the overacting muscles of the opposite side, are ideal for the purpose; they are permanent and invisible, and should be used instead of strapping, which can be regarded as only a "tide-over" method in this class of facial paralysis, but which should nevertheless be adopted *immediately after the trauma*,

and replaced as soon as possible by fascia lata. For instance, if the facial nerve is implicated in a parotid tumour and the surgeon judges that it is better to sacrifice the facial nerve and save the patient's life, the strapping described above should be applied at the end of the operation, and the case referred to the plastic surgeon in three weeks' time. There is nothing to be gained by waiting, but much to lose. It is surprising how little tone the muscles seem to lose when they receive early and permanent support in this way. Here as elsewhere it is easier, and the result is infinitely better, when deformity is forestalled than when reliance is placed on correcting it after it is well established. The difference between the results of the same operation (fascia lata grafts) done three weeks after total facial paralysis and three years after, is almost incredible to those who have not had the opportunity of such comparison. There is some strange persistent urge to "wait and see" if recovery will take place or whether the paralysis will become bad enough to need operation. The answers to this are: (1) recovery will be hastened and not retarded by the fascia lata operation, which may make recovery possible in some cases where it would otherwise be impossible; (2) if nothing is done in the case of total paralysis it is *certain* to become bad enough to require operation, and the golden opportunity of obtaining the best result has been lost.

In well-established long-standing cases (which in future we think should not be permitted to exist) the choice lies between (1) fascia lata slings for the orbicular muscles, and perhaps temporal and masseter muscle slips to give some voluntary movement after re-education, and (2) anastomosis with the hypoglossal nerve. The former methods give balance to the face, with a little muscular movement of the angle of the mouth and full closure of the eye; while the latter method, when successful, provides mass movements only, and facial balance in repose is not often so good as in the sling method.

OSTEOMYELITIS OF THE SKULL DUE TO SALMONELLA TYPHI

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Cases of osteomyelitis due to the typhoid bacillus are uncommon; the following case is also of interest owing to the great length of time that elapsed between the initial infection and the occurrence of osteomyelitis, the site of infection, and mode of onset of the condition.

Case History

A man aged 40, a linesman on the L.P.T.B., was admitted to this hospital with a history of headaches for two years. These had occurred almost daily, and were of a stabbing character lasting varying times from one hour to a whole day. They did not interfere with his work; he had accepted them as part of his life and did not seek medical advice.

For the three months before admission they had been getting steadily worse; he had been losing sleep and was beginning to feel weak and exhausted. On Dec. 24, 1944, he was sitting in his kitchen when he felt a tingling sensation in his right hand. He rose from his chair and found that he had lost control of his right leg, which was useless. This attack lasted one hour and then passed off, leaving him apparently normal in every respect. He consulted his doctor and was admitted to hospital, where he had a similar attack. Investigations proved negative and he was discharged. He still lacked energy, however, and the headaches had increased in severity. Shortly after this he had a severe pain in the back of the head, agonizing in nature; he consulted his doctor, who found a soft fluctuant swelling in the occipital region, and he was again admitted to hospital.

During the next four days the swelling increased steadily in size, but the severe pain passed off, to be replaced by a dull ache. On admission to us, 10 days later, he had a soft, diffuse, smooth, very tender, hot swelling 2½ in. in diameter over his occipital region, mainly on the right side, and considerable oedema of the surround-

ing overlying scalp. This was a typical Pott's puffy tumour, and in addition he showed early papilloedema, a slight facial palsy of upper motor neurone type, and increased reflexes in the right arm and leg.

Radiographs of the skull showed definite osteomyelitis, with a roughly circular defect $1\frac{1}{2}$ cm. in diameter lying over the midline in the occipital region and extending to the left in the post-parietal area. In addition there were a number of other small scattered areas of rarefaction on the right side in the mid-parietal region, and a number of small sequestra could be seen. The pineal lay in the midline and the accessory sinuses and mastoids were clear.

Operation.—On turning back skin flaps over the swelling a large quantity of thin brownish pus escaped. On exposing the bone thick areas of granulation tissue were seen, particularly on the left side, and just to the left of the midline was a small opening in the bone through which pus was pouring. The infected bone was nibbled away, to reveal a large extradural abscess and the dura covered with thick granulation tissue. All infected bone was removed and the granulation tissue scraped off; the dura was not opened. The wound was filled with hydrogen peroxide, powdered with sulphanimide, lined with gutta-percha, and packed. The patient's condition deteriorated slightly during operation, but not appreciably.

He was put on a post-operative course of succinyl sulphathiazole 2 g. four-hourly, and blood estimations next day showed a sulphonamide level of total 3.38 and free 2.02 mg. per 100 c.cm. His further course was smooth and uneventful.

The following bacteriological investigations were carried out:

March 21.—Pus aspirated from swelling; direct smear—no organisms seen; culture (horse-blood agar) yielded growth of "coliform bacilli" only. Urine: test for Bence-Jones's protein, negative; no albumin present.

March 26.—Swab (operation) culture (blood agar), pure growth of "coliform bacilli"; a penicillin-sensitivity test (cylinder-plate method) gave no inhibition of growth. At the request of Mr. McKissock further investigations were carried out to identify the organism, and the usual routine sugar tests gave the following results: Production of acid only with glucose, mannitol, and dulcitol; no fermentation of lactose or saccharose. The organism was a Gram-negative motile bacillus, did not give a positive indole reaction, and did not liquefy gelatin. This pointed to *B. typhosus*. An agglutination test of the suspension of the organism with standard agglutination sera of *B. typhosus* H and *B. typhosus* O did not give definite agglutination to standard titre. It was therefore decided to send a culture to the Lister Institute at Elstree for confirmation.

March 27.—Patient's serum agglutinated with standard suspensions of *B. typhosus* H and O. Agglutination with *B. typhosus* H to titre of 1 in 80. *B. typhosus* O no agglutination. B.S.R.: 1st hour, 65 mm.; 2nd hour, 105 mm. Hb, 54%; R.B.C., 3,400,000; W.B.C., 1,400 (polys 90%, lymphs 8%, monos 2%).

March 31.—Swab taken from wound at the first dressing showed no organisms in direct smear and no growth on culture. The wound was granulating slowly and the condition of the patient was excellent.

April 9.—Wound swab yielded on culture a few colonies which in suspension now gave positive agglutination with standard agglutinating serum: *B. typhosus* H, *B. typhosus* (Vi). No agglutination with serum *B. typhosus* O.

April 11.—Report from the Curator of the National Collection of Type Cultures, Lister Institute, confirms the biochemical findings, with these additions: "It gives acid but not clot in litmus milk and does not give a positive carbinol reaction; it also gives a positive O agglutination with typhoid antiserum. Taking these findings as a whole, I think there is little doubt that this *Salmonella* is indeed *Salmonella typhi*."

Subsequent investigations on samples of duodenal contents, urine, and faeces failed to isolate *B. typhosus* on three occasions, and cholecystography showed a normal gall-bladder.

Discussion

In view of the very great rarity of osteomyelitis due to *B. typhosus* (Murphy (1916) quotes three instances in 700 cases) the true nature of the "coliform bacilli" isolated from the aspirated pus and from the field of the operation was not suspected. "Coliforms" are a frequent causative organism of osteomyelitis either alone or in conjunction with other organisms, and no significance was at first attached to this. The request for fuller identification with the resultant biochemical reactions opened up further inquiry into the patient's history. He then disclosed an attack of enteric fever at the age of 7—he is now in his 41st year. He had previously not mentioned this illness, nor had it been recorded; though, even so, after

the very long interval of time it most probably would have been considered of no significance. On inquiry at the hospital concerned no documentary corroboration could be obtained—all the papers of so remote a period had been consigned to "war" salvage—but it was stated that at that period routine bacteriological and serological tests would most certainly have been done to confirm the clinical diagnosis.

His subsequent illnesses were malaria in 1927 and a further relapse in 1929 during military service. There is a record in his pay-book of two injections of T.A.B., on Nov. 23 and 30, 1927: no dosage was mentioned. These do not appear to have succeeded in completely ridding him of his carrier state. He had been entirely free from illness from 1929 until his attacks of headaches two years ago as described above. There can be no doubt that he has harboured *B. typhosus* for 33 years.

Of great significance is the history given by the patient of repeated injuries to his head sustained while working in a low room. He had definite recollection of such injury, over approximately the site of the subsequent abscess, on at least six occasions during the past few years, although on no occasion was the injury severe enough to render him unconscious.

This association of localized injury and subsequent typhoid abscess formation is a very frequent feature in cases in which an acute focus of infection has appeared after a long interval of time in the typhoid carrier. This is borne out by the following cases reported in the literature. Van Dyke (1933) described a case of typhoid osteomyelitis of the femur occurring 24 years after the original attack of typhoid fever—the precipitating cause being a kick on the thigh from a horse. Wardle (1935) describes a case of Brodie's abscess of the tibia occurring 10 years after an attack of typhoid fever. Here again there is a definite history of injury to the shin. There is also quoted from Keen's *Surgical Complications and Sequelae of Typhoid* a case reported by Buschke in which a pure culture of *B. typhosus* was obtained from a tibial abscess 7 years after the fever, the condition having been precipitated by injury. The points of interest in these cases are the length of time elapsing between the attack of typhoid fever and the formation of localized osteomyelitis from which *B. typhosus* was recovered in pure culture—in our case 33 years. It is interesting to speculate as to the precise lair wherein the organisms are lying in wait during these years. A search of the faeces, urine, and duodenal contents failed to isolate them. And what particular part does trauma play in initiating the morbid processes leading to local settlement of *B. typhosus*, resulting in the formation of a localized abscess? A further point of interest is that we have been unable to find in the literature any previous cases of osteomyelitis of the skull giving pure culture of *B. typhosus*.

Summary

A case of osteomyelitis of the skull is described with full bacteriological investigations, in which the infecting organism was found to be *B. typhosus* occurring 33 years after the original infection.

This case demonstrates the importance of not omitting any illness of childhood from the records of previous illnesses, the very long interval of time after the original fever that can elapse in pyogenic conditions due to *B. typhosus*, and the surprising results which may on occasion arise from more intimate identification of "coliform bacilli" isolated from localized septic conditions.

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