It is apparent from the serial results that in some cases fading was taking place on the sixth day; and there was a fall on the seventh day in the number which, seen for the first time, could be called positive.

The fifth day would therefore seem to be the optimum for reading O.T. jelly tests. The few who may be missed will not be of significance from the clinical point of view, as those with active disease are likely to become positive before this day. It may be a minor disadvantage in the field to test prior to B.C.G. inoculation, but this must be offset against the disadvantage of the non-specific reaction to the 100 T.U. Mantoux test. A considerable number of false-negative results will be obtained if readings are made only on the third day.

Consistency of Serial Positive Tests with O.T. Jelly.—It is of importance that the increasing number of positive results up to the sixth day should include *all* those previously positive in the serial readings. Among the 746 individuals whose tests were read from the third to sixth days (Table IIIA) there was, in fact, one discrepant result—a negative on the fourth day, the remaining three readings being positive; this is interpreted as a false positive on the third day. One case positive on days three, four, and five was negative on the sixth day. Of the 510 persons tested from the fourth to seventh days (Table IIIB) only one who was positive on the fourth day became negative before the seventh day, although 13 who were previously positive were negative on that day. This one case was positive on the fourth and seventh days and was recorded as negative on the fifth and sixth, and does demonstrate an error in technique—of testing, reading, or recording. In referring to false positive results, Dick's advice that a control be used until one is thoroughly conversant with the method is very sound. It is not only plaster reactions which may cause doubtful results (although these are avoided by reading on the fifth day); I have heard of some physicians who accept the mother's word for the result. With regard to false-negative results, it is important that the same piece of flourpaper shall not be used on more than one individual.

Summary and Conclusions

Simultaneous tests on 999 children using O.T. jelly stored in a refrigerator and at room temperature for a period of from 11 to 15 months show only four differences in results on the fifth day. The jelly may therefore be kept at room temperature without loss of potency.

A series of tests using O.T. jelly and P.P.D. jelly simultaneously and read serially confirms the previously reported findings that O.T. jelly gives a higher proportion of positive results on the third day than does P.P.D. jelly, the differences between the two being 3.6% on the third day, 1.3% on the fifth day, and 0.8% on the sixth day. Thus the previously unsatisfactory results with P.P.D. jelly are seen to be due to the fact that it is later in giving positive reactions.

A series of tests using O.T. jelly only and read serially shows a progressive rise in positive results up to the sixth day; on the sixth day one test previously three times positive became negative and reactions tended to fade. On the seventh day 13 reactions previously positive on three occasions had become negative. The optimum day for the reading of O.T. jelly tests is therefore the fifth day, but this may be extended to early on the sixth day. Tests should not be read as early as the third day, as there may be a significant number of so-called false-positive tests due to plaster reaction and other factors, and as there will be an appreciable proportion of false-negative reactions. The seventh day shows a fall in the number of positive reactions.

Serial readings in a series of 746 individuals show that only once did a positive result become negative before the sixth day; this is regarded as a false-positive result on the third day, which should not be used for reading. In another series of 510 individuals one case was recorded as positive on the fourth and seventh days and negative on the fifth and sixth. This is admitted to be an error of technique, and stresses the need for controls. Thus, in a total of 1,256 individuals, only one case read on the fifth day gave a result possibly inconsistent with the true tuberculin state as shown by other serial readings; these have been shown previously to give results between those found with the 10 T.U. and the 100 T.U. Mantoux test.

I wish to thank Dr. J. Knowelden, of the Department of Medical Statistics, London School of Hygiene, for his advice and assistance.

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Medical Memorandum

Ununited Fractures of the Clavicle

There are few reports of ununited fractures of the clavicle in the literature. The two largest series are those of Berkheiser (1937) (nine cases) and Ghormley *et al.* (1941) (20 cases). These latter were collected from the records of the Mayo Clinic between 1913 and 1939, and the authors could find no previous references in the literature other than that of Berkheiser. Amongst their 20 cases 3 were classified as possibly being congenital pseudoarthroses. One was in a female child of 2 years with a fracture of the outer third of the left clavicle in whom no previous treatment had been given. There were no symptoms, no operation was carried out, and there was excellent function. The second case was that of a man aged 33 in whom a fracture was apparently detected in infancy; a congenital origin was suggested but not proved. The fracture was in the middle third of the left clavicle and there had been no previous treatment. The only symptom was mobility at the fracture site. A bone graft was inserted and union resulted. The third case was that of a girl of 18 months; again a congenital origin was suggested but not proved. The fracture was in the middle third of the right clavicle. No previous treatment had been given, and again the only symptom was mobility at the site of fracture. Despite the youthful age of the patient a bone graft was inserted and union resulted.

The fourth case in their series was that of a girl aged 8 years who fell in her bath when 2½ years old. The right clavicle was fractured in the middle third. No record of any previous treatment was obtained. Once again the only symptom was the movement at the fracture site. Open reduction was carried out with the insertion of catgut sutures, but the follow-up was insufficient for observation of the final result. All the other cases recorded in the papers consulted were in adults. The case here recorded occurred in a young child.

CASE REPORT

A female child aged 20 months was first seen in the out-patient department on April 23, 1951. She was referred from a welfare clinic because of deformity of the right clavicle (? as a result of birth injury or as a case of cleidocranial dysostosis). The patient was a healthy child, the firstborn, and her mother was in her twenties. There were no

complications during pregnancy and the presentation was occipital. Forceps had not been necessary, but, after delivery of the head and while the shoulders were engaged, contractions ceased for some minutes. Contractions then started again and the delivery was completed. The child was bottle-fed and she walked at about 1 year. Her grandmother was the first to notice swelling of the right clavicle, when she was about 7 weeks old; at about this time she was seen in a welfare clinic and the mother was advised to leave it alone. A radiograph was not taken.

On examination in the out-patient department a swelling was obvious in the middle third of the right clavicle. On holding the inner and outer sides of the clavicle definite movement was evident in the swelling and a diagnosis of ununited fracture was made. This was confirmed on radiographic examination (Fig. 1). There was no drooping of

FIG. 1.—Radiograph of Case 1.

the right shoulder, the left clavicle was normal, and there was no scoliosis; no other abnormality was detected on clinical examination.

Owing to the absence of any abnormal symptoms or signs except the presence of mobility at the fracture site, it was debated whether any treatment was necessary. However, it was thought there was a danger that the right shoulder might droop at a later date and that a secondary scoliosis might develop (Professor H. J. Seddon and Mr. St. J. D. Buxton, in personal communications with Mr. Metcalfe). It was therefore decided to insert a bone graft at a later date. Meanwhile the child will be seen for periodical review in the out-patient department.

DISCUSSION

All nine cases recorded by Berkheiser from Chicago in 1937 were in adults and of long standing. Six had brachial plexus involvement and all were caused by very severe trauma. Operative treatment included the use of kangaroo tendon, bone grafts, wire, and heavy braided silk, together with a plaster-of-Paris shoulder spica worn for 12 weeks. Ghormley *et al.* state that in most infants with a fracture of the clavicle the fracture is of the greenstick variety with little or no displacement, and that this is true also of obstetric fractures of the clavicle. Because of the elasticity of this bone, complete transverse fracture with displacement is the exception rather than the rule. None of their cases were of cleidocranial dysostosis. They state emphatically that, despite the aetiology, treatment must be as for the adult, and they recommend massive bone grafting and a period of complete rest in bed for four to six weeks after operation. They add that plaster-of-Paris immobilization does not mean complete local rest unless the patient lies flat.

Annersten (1948), in a review of 350 cases of clavicular fractures seen between 1938 and 1947, records an incidence of 1.3% pseudoarthrosis. All five were adult cases and all followed injuries. He recommends the use of bone chips and wiring, and an aeroplane splint for four weeks after operation. Thorndike (1938) states that the clavicle is the bone most often fractured in obstetric delivery, and adds that birth fractures are not always simple incomplete fractures; this view differs from that put forward by Ghormley *et al.*

Le Cocq and Gilman (1944) record four cases, all in adults and all following injury; they recommend the inser-

tion of a four-screw vitallium plate and subsequently neither rest in bed nor plaster-of-Paris immobilization. Støren (1946) quotes Bohler, on clavicular pseudoarthrosis, as having seen six cases after early instituted energetic passive movements or following operative treatment. This latter view is also suggested by Watson-Jones (1943), who agrees with other writers in advising the use of a bone graft. Støren records the case of a woman aged 39 who had had a left-sided clavicular pseudoarthrosis for 29 years, for 26 of which she had been without pain. Basom *et al.* (1947) recommend dual grafts for non-union. Novotny (1949) states that cases without fibrous or bony union do occur, and he uses his own plaster-of-Paris splint for these cases.

McMurray (1949) states that non-union is comparatively rare, especially when fractures are simple. He says they are seen only when treatment is neglected or when part of the bone has been removed in a compound fracture. He recommends bone grafting, or the removal of a section of the clavicle on each side of the fracture or complete removal of the affected clavicle. It is suggested that in the case recorded here the fracture was probably sustained during delivery and that it may be classed as a birth fracture.

FIG. 2.—Case 2, showing a swelling in the right clavicle.

ADDENDUM.—Since this paper was submitted for publication a further case has been seen at St. James's Hospital. A boy aged 9 presented with a swelling over the middle third of the right clavicle, without any history of injury (see Fig. 2). Clinically there was mobility at the site of the swelling, and the diagnosis was confirmed by a radiograph.

I wish to acknowledge my thanks to Mr. R. H. Metcalfe for his permission to publish this case, to Mr. G. P. Arden for kindly reading this paper for me, to Dr. R. L. Quilliam for his radiographic report, and to Miss E. Mason for the x-ray photograph.

H. D. W. POWELL, M.B., Ch.B.,
Orthopaedic Registrar,
St. James' Hospital, London, S.W.12.

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The arrival of autumn has been marked by a meeting in Geneva of World Health Organization experts on influenza. British delegates were Dr. C. H. Andrewes, who directs the W.H.O. Influenza Centre at the National Institute for Medical Research, Mill Hill, and Professor C. H. Stuart-Harris, of Sheffield. The main subjects of discussion were the identification of influenza strains, standard methods of diagnosis, vaccines, the collection and dissemination of epidemiological information, treatment, control measures in severe epidemics (including the place of vaccines and antibiotics), and the training of workers in laboratory methods.