the face due to the local trauma was subsiding, and the gross neck retraction present in the later stages was out of proportion to the severity of the meningitis, and was becoming worse, although the cell content of the cerebrospinal fluid was diminishing and the culture had become sterile.

As to the origin of the tetanus, it seems that spores must have been present in the wood splinter which had come off the control panel. Instances of tetanus arising from dirt carried in by splinters are well known, but in this case a careful check of the accident showed that at no time was there any ground contamination, and the wood when removed at operation was quite free from dirt. In this connexion it is interesting to note that von Eiselsberg (1888) reported a case of tetanus arising from a wood splinter, and that two years later virulent organisms could still be grown from it. Pulvertaft (1937) investigated a fatal case of tetanus developing after hysterectomy, and drew attention to the frequency of virulent tetanus spores in cellulose wadding manufactured from wood and used for dressings. From his experiments, however, he concluded that the contamination occurred after the cellulose had been made, and was presumably due to the physical characteristics of the material. Fildes (1929) in a comprehensive account of the tetanus bacillus mentions unsterilized felt used in orthopaedic work and the wads from blank cartridges as other sources of infection. It is clear, therefore, that the spores can live in wood and wood fibre for a long time and constitute a potential danger.

Immunization.—From all recent reports the value of active immunization combined with prophylactic A.T.S. at the time of wounding seems established. Bensted (1941) recorded not a single case in the immunized subject at the time of the Dunkirk evacuation, although 8 cases occurred among unprotected personnel. In the Middle East, Boyd and MacLennan's 18 cases contained 5 which had had previous immunization, but none of these received prophylactic A.T.S. These authors pointed out that the protection afforded by active immunization had its limitations. There were two special groups of cases to be considered: the odd cases that did not seem to respond to the routine two-dose method formerly employed in the Army; and the cases of overwhelming infection with excessive toxin production usually attributable to inadequate surgical treatment of the wound. They concluded that a third dose of toxoid should be given, and a routine dose of antitoxin after wounding, and they stressed the importance of adequate surgical treatment of the wound. Radley Smith's cases afford interesting collateral evidence. Both Service and civilian casualties were treated in this sector, and of the 7 cases reported six were civilians, and the one Service casualty had not received active immunization. All the cases, however, had received the customary 3,000 units of A.T.S. after injury, and Radley Smith concluded that one dose of A.T.S. did not prevent tetanus and that, following the E.M.S. recommendation, the dose should be repeated at weekly intervals for three weeks. McGill (1943), in reporting the case mentioned by Boyd and MacLennan illustrating the lack of response to active immunization, advised the giving of A.T.S. after wounding, to cover such a contingency. Norman's (1943) case affords further evidence of the necessity for regular maintenance doses of toxoid after the routine two doses at the beginning.

Conclusion

In the case here reported there is a very likely explanation for the development of tetanus. The type of wound was ideally suited for the growth of the organism, and its nature and situation prevented a proper surgical cleansing of the wound. As shown at post-mortem examination, some necrotic material and blood-clot were present along the track. The 3,000 units of A.T.S. given were presumably inadequate to combat the toxin production, and no maintenance dose of toxoid had been received since the initial immunization in 1940.

Considering all these cases together, the evidence strongly favours the present Army recommendation that active immunization be produced by two initial doses at a six-weekly interval, followed by yearly maintenance doses; and that, after wounding, 3,000 units of A.T.S. be given. Proper surgical treatment of wounds, whenever possible, is an essential factor in the prevention of tetanus.

I wish to thank Dr. Dorothy S. Russell for the necropsy report, and Lieut.-Col. C. W. Greenway, R.A.M.C., for permission to publish this case.

REFERENCES

- Ascroft, P. B. (1943). *Lancet*, 2, 211.
Bensted, H. J. (1941). *J. roy. Inst. publ. Hlth.*, 4, 7.
Boyd, J. S. K., and MacLennan, J. D. (1942). *Lancet*, 2, 745.
Eden, K. (1943). *Ibid.*, 2, 689.
Fildes, P. (1929). *System of Bacteriology*, 3, 298, Medical Research Council, London.
McGill, R. J. (1943). *British Medical Journal*, 1, 40.
Norman, H. B. (1943). *Lancet*, 1, 557.
Pulvertaft, R. J. V. (1937). *British Medical Journal*, 1, 441.
Smith, E. J. R. (1942). *Proc. roy. Soc. Med.*, 35, 340.
von Eiselsberg, A. (1888). *Wien. klin. Wschr.*, 1, 232.

Medical Memoranda

Locked Twins

As *Eden and Holland* gives a history of locked twins as occurring in 1 in 90,000 deliveries, the following case seems worth recording.

CASE RECORD

The patient was a primipara aged 36. Twins had been diagnosed, and confirmed by radiograph; the first was lying as a breech, the second as a vertex. The patient was admitted to the maternity home on the afternoon of Feb. 22, 1944, with a history of pains since midday. These were good, and she was fully dilated at 8 p.m. Half an hour later a strong pain pushed the breech out as far as the umbilicus, and must at the same time have driven the head of the second baby through the brim and on to the neck of the breech baby. During the next half-hour pains were few and poor, then started to improve. Even with the poor pains the nursing staff had expected some advance, as the babies were 3 to 6 weeks premature and small (subsequent weighing showed that they were both 3 lb.); and as this did not occur they sent for medical aid.

On arrival I found that the breech baby had advanced as far as the axillae, but was dead. Per abdomen, one foetal head was found in the left iliac fossa, and the other could be felt to be engaged from the right. Manipulation of either head moved the breech. To obtain maximum relaxation for further examination, a general anaesthetic was given.

The diagnosis of locked twins was confirmed per vaginam. The arms of the breech were easily delivered; the head of the second baby and the neck of the first were then found filling the upper part of the pelvic cavity, and in spite of the small size of the babies normal delivery would have been impossible. Per vaginam, the head was levered out of the pelvic brim while expert help pulled from the abdomen, manipulating the head into the right iliac fossa. The first twin was then easily delivered. The membranes of the second foetus were ruptured and the patient was allowed to come out of the anaesthetic. After a few good pains a living male child was born. The subsequent course of the delivery was normal; the twins were found to have been uniovular.

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An Unusual Dislocation of the Foot

The following is an account of a simple tarso-metatarsal dislocation of the foot. According to Wilson and Cochrane (1928), pure dislocation at this joint without a fracture is very rare. The cause is most commonly direct violence from a run-over accident. It can be caused also by the fall of a heavy object or by forcible flexion of the forefoot. The dislocation may involve all the metatarsal bones, and may be anterior or divergent—e.g., lateral bones laterally, and vice versa. Böhrer (1935), describing the injury, states that the dislocations of this joint are of many varieties. All the metatarsal bones may be dislocated inwards, upwards, outwards, or downwards—upwards and downwards being the most common. Single metatarsals—usually the first and fifth—may be displaced separately. Dislocation of all the metatarsals plus the first cuneiform has also been described in the older literature.

CASE REPORT

The actual method of trauma in this case is interesting. The patient, a Royal Marine aged 38, was assisting to push a four-wheeled gun-trailer weighing 10 tons, and was standing on the right side, facing forwards, between the two wheels. The trailer was being pushed up a slight gradient, when it began to slip backwards, and the front wheel rolled slowly over his left foot, from the medial to the lateral side. The wheels had rubber tyres. He was seen within half an hour of the accident; the foot was already somewhat swollen, and a superficial wound, through the skin only, was present on the antero-medial part, as though the skin had been split open. A radiograph showed, not the multiple fractures of the metatarsal shafts that were expected, but the picture seen in the accompanying figure. The cuboid and cuneiforms appear to have been squashed together, and the base of the second metatarsal forced out of its mortise. The metatarsals have been forced laterally, the fifth completely dislocated, the second, third, and fourth being subluxated laterally to a lesser degree. The relation between the base of the first metatarsal and the first cuneiform is certainly abnormal, and it appears as though the metatarsal had been displaced below the