and the graft and the two thicknesses of paper are cut, but this time at right angles to the first series of strips (Fig. 2). The result is to obtain strips of paper with square grafts, well spread and evenly spaced (Fig. 3). The strips may, of course, be cut narrow or wide, and triangular or any shape desired. Ten cuts in one direction and ten in the other will give 100 grafts, which can be arranged in chessboard fashion, or in a square, a cross, or any desired shape. The chessboard pattern is easy to arrange and is very even in distribution.

Up to now we have employed this type of graft only when the usual graft has failed, when the condition of the raw area made it unsafe to use an ordinary graft, or when there was much limitation of the donor area. Some of the cases were clinically poor.

It is too early to draw final conclusions, but up to the present the results have been striking. The grafts took completely on the following types of raw areas: old burns with bad granulating tissue, after several entire failures of grafts and after recent infection; old lacerations at the heel, also after several failures; a burn five weeks old—one area all round the protruding stump of a humerus; a five-weeks-old laceration of the leg, with much sloughed tissue; 14-days granulation tissue, on recently cut parietal bone; the *bare bleeding bone* of the skull after removal of the necrosed outer wall.

FIG. 4.—Seven days after the grafting operation.

FIG. 5.—Seventeen days after the grafting operation.

The photographs here reproduced (Figs. 4 and 5) are taken from the following case. The main points of the case history are as follows:

Illustrative Case

An engine-driver aged 42 was pinned under a locomotive on Sept. 5, 1942, for 2½ hours while steam blew down upon him. His injuries were third-degree burns of the right arm and the inner aspect of both thighs. His condition on admission to hospital on Oct. 14 was as follows:

Right Arm.—Guillotine amputation had been performed elsewhere. The skin of the stump was retracted for 1½ in. and the humerus covered by fairly clean granulations. Outside the stump there was a granulating area of about 3 in. by 3 in.

Right Leg.—Granulating surface at the buttock, clean, about 7 in. by 4 in. Granulating surface with some adherent slough at the inner surface of the thigh, about 15 in. by 2 in.

Left Leg.—Granulating surface, clean, at the inner side of the thigh, about 12 in. by 4 in.

Oct. 21: Operation (Mr. P. Gabarro).—Local anaesthesia to the donor area; chessboard grafts on burnt areas. A Thiersch graft about 5 in. by 2 in. was cut from the inner side of the left arm with the Blair knife. Following the technique described this graft was divided into 160 square grafts and distributed to the above-mentioned areas. Dressing was carried out with tulle-gras, flavine-paraffin wool, and bandaging with some pressure. Time taken, 2½ hours. Each dressing took a long while.

Oct. 28.—First dressing. All grafts had taken on arm and both thighs; on the buttock only 30% (defect of fixation?).

Oct. 30.—On arm and both thighs apparently no grafts were lost. They looked healthy, were spreading well, and in several parts had already united, bridging the gaps. On the left thigh there was almost a complete bridge across the whole area.

Nov. 5.—Right arm: All grafts were united, leaving only very small raw spots. Right thigh: Almost completely epithelized. Left thigh: The majority of the grafts were united by epithelium, and only very small raw areas were left.

Nov. 8.—Arm and both thighs completely healed.

Nov. 16.—The patient now up and walking inside the ward.

Nov. 18: Operation.—Local anaesthesia to the donor area. Gabarro's grafts to the buttock. A Thiersch graft was cut with the Blair knife from the area which was used about a month previously. The graft was divided into 24 squares and placed on the remaining raw area of the buttock, with some pressure by means of elastoplast. Time taken, half an hour.

Remarks

The time from the operation to the complete epithelization in three areas was 17 days. The first dressing was done on Oct. 28, the seventh day after the operation. The grafts had all taken, but there were still no signs of epithelium growing from the edges. Ten days later, on Nov. 7, the whole area was covered with epithelium.

The surface area of the graft was less than one-tenth of the grafted area, which means—astonishing though it may seem—that during 10 days the epithelium had grown at a daily average of 100% of the original graft. This is not so surprising when one considers that in the three areas in which complete success was obtained there were 120 grafts, each having 26 mm. of edges (6½ mm. × 4), making a total of 312 cm.—much more than 3 yards of growing epithelium edge. That was the position on the first day: once the grafts started to spread the growing area increased. In fact, we obtained in this case a culture of epithelium on the living body.

Conclusion

I think it has been shown that the six conditions which I consider essential for a good graft, in the type of cases mentioned, have been obtained, because in the above case: (1) there was plenty of room between the grafts for possible discharge; (2) the donor area was not spoiled, and was already in use again in less than a month; (3) the grafts took easily; (4) the procedure was fairly quick, considering that it was carried out under local anaesthesia and that the grafts amounted to 160; (5) there was no contact at all between donor and recipient areas; (6) the grafts were placed as close as the possibilities of their growth demanded: in 17 days the raw area was closed.

I wish to express my thanks to Prof. F. Wilkinson for his interest and encouragement; to Mr. A. W. Moule, the dental surgeon of the plastic unit, who was kind enough to take the photographs; and to the staff of the plastic unit, who by their enthusiasm, care in handling the patients, and patience made possible the results obtained.

TREATMENT OF THE FRACTURED GREAT TOE

BY

G. N. TAYLOR, M.B., M.Ch.

Fracture of the great toe is in itself of minor significance in traumatic work; it is, however, the commonest fracture in industry. In the past, many hours, days, and even weeks of disability have followed its occurrence. Its treatment—e.g., splints manufactured from spatulae, or collodion dressings—has been almost beneath the dignity of overworked casualty officers, and many cases are not even referred to the fracture clinic.

Under present conditions the great effort which is being made by both combatants and civilians often means less care in the handling of war weapons and other commodities, so that these articles frequently drop on the not too carefully placed feet, and thus the incidence of this fracture must be greatly increased. It was Mr. Griffiths (1935) of the Albert Dock Fracture Clinic who pointed out the lengthy off-work period that some of these cases demanded—the average duration of incapacity being 18 weeks—and under him a system of treatment has been evolved which reduces this period often to less than 10 days.

Method

The subungual haematoma which forms, more especially with fracture of the distal phalanx, is not large. However, owing to the firmness with which the nail is attached to its bed and the bed in turn attached to the periosteum of the phalanx, the tension developed is great and the pain sometimes excruciating. The nail has on occasion been avulsed in the treat-

ment of such a case, a procedure which is little less than a crime. Such a sacrifice deprives the broken phalanx of an ideal splint and exposes a singularly tender area which will not permit of a return to work for some weeks. In order to save the nail and at the same time to relieve the tension and therefore the pain, it is a simple matter to trephine the nail: a little patience and a sharp operating knife are all that is required. The trephine opening need not be more than 2 mm. in diameter, and should be placed over the most prominent point of the haematoma. With this simple manoeuvre the relief is dramatic as soon as the free blood is released. Vaseline ribbon gauze 3/4 in. wide is applied to the toe, and when the fracture is confined to the distal phalanx a plaster-of-Paris thimble enclosing the whole toe provides adequate immobilization. When, however, the proximal phalanx is fractured a plaster toe-splint is fashioned to enclose the sides and plantar surface of the toe; this extends along the medial surface of the foot to about the tubercle of the navicular bone and across the sole of the foot for about half its breadth. The splint is either bandaged or strapped in place. The vaselined gauze lubricates the inside of the plaster and allows an easy and painless removal of the splint. Failure to do this can result in the most tedious and painful task, especially when the blood has leaked under the plaster.

It was always our custom to admit these cases to hospital for 48 hours, with immediate elevation of the limb, and we found that the comfort in each and every case was great. It may be argued that admission to hospital is quite unnecessary. This may be so providing the patient goes home by ambulance and assumes a recumbent attitude with elevation of the limb. Owing to the comfort induced by plaster immobilization and the trephining, these instructions are not always carried out, and treatment in hospital, when space permits, we found more desirable.

The patient is allowed up on the third day, when, by borrowing a boot about two sizes larger than his own, he can accommodate a thimble; the stout leather sole, being unyielding, prevents movement of the toe. The larger plaster sole-splint cannot be accommodated inside an ordinary boot, but it can almost invariably be abandoned for the plaster thimble. The patient is encouraged to use heavy working boots, and by the eighth to the tenth day he may return to work. This date is, of course, variable; sometimes a fracture causes so little incapacity that a return to work on the following day is possible. On the other hand, severely comminuted fractures or grossly lacerated soft tissues will demand a longer incapacity period. This short period of immobilization will not cause any stiffness of the metatarso-phalangeal joint, mobility of which is so essential for comfortable walking.

As with compound injuries of fingers and thumb, conservation of tissue is the great aim. Such aim is no less applicable in the case of the great toe. Excision and débridement are carried out in the same manner as in other compound fractures. When the great toe is severely mutilated and amputation is deemed advisable, preservation of the metatarso-phalangeal joint must always be the goal. The importance of this joint is not always realized, and the simple operation of disarticulation is too often undertaken. Following this procedure, the late result of pain while walking forward on the tread, which entails pressure on the antero-inferior aspect of the metatarsal head, causes many weeks of disability. Where possible a small portion of the proximal phalanx should be left to maintain the integrity of this very important joint. It is almost unnecessary to state that the head of the first metatarsal must be preserved at all costs, because it, together with the remaining metatarsals and the os calcis, forms the tripod on which the weight of the body is borne.

Conclusion

To summarize, the points I wish to make are: (1) trephine and save the nail; (2) plaster-splint, with elevation, for 48 hours; (3) encourage use of a heavy boot during convalescence; (4) condemn disarticulation at the metatarso-phalangeal joint.

Again my thanks are due to Mr. H. Ernest Griffiths for his guidance and encouragement in this and many other matters relating to traumatic surgery.

REFERENCE

Griffiths, H. Ernest (1935). *Injury and Incapacity*, London.

Medical Memoranda

Bilateral Fracture of the Patella

The following case of fracture of both patellae, treatment of which had an interesting sequel, may be thought worthy of record.

CASE HISTORY

Private A. was admitted to a general military hospital on Aug. 21, 1942, complaining of pain in both knees. At 2 a.m. he had been returning from a dance, travelling as a "passenger" on the crossbar of a bicycle. While descending a steep hill his "pilot" attempted to take a sharp right-hand bend at speed, but at the crucial moment the brakes failed and the bicycle crashed into a stone wall. Private A., by reason of his posture, took the brunt of the impact on his flexed knees.

I examined him at 9.30 a.m. I found a well-developed intelligent youth of some 18 years. He had several abrasions on the knees, both of which were much swollen. The legs were held in extension and any attempt at flexion of either caused severe pain. He volunteered the information that his legs "wouldn't hold him up" after the accident. Shock was entirely absent.

Operation.—Radiographs revealed fractures of both patellae; the right was grossly comminuted, and displacement was severe; the left was a "cruciate" fracture, and displacement was not marked. I decided to remove the right patella. Owing to the multiplicity of dirty abrasions great caution was exercised in preparing the skin, and operation was finally fixed for Aug. 27. Under general anaesthesia the fracture was approached through a midline vertical incision. On separating the fragments an enormous haematoma under pressure was evacuated. Loose fragments were removed and the upper and lower fragments dissected free from the quadriceps tendon. The free ends of the latter were then bunched together with mattress sutures of No. 3 catgut in the manner described by Watson-Jones (1941). The wound was closed and a compression bandage applied. Attention was then directed to the left knee, and it was found that the displacement was easily corrected by direct pressure against the femoral condyles. A mid-thigh plaster cast was applied.

Post-operative Measures.—During the immediate post-operative phase severe pain in the right knee required the frequent use of sedatives, and on the third day transient swelling of the right ankle necessitated slight relaxation of the compression bandage and elevation of the limb, with immediate benefit. The left limb was trouble-free. Stitches were removed on Sept. 5, the wound being soundly healed. Active exercises were begun cautiously on Sept. 7, and the following day the patient was allowed out of bed in a wheelchair. From this time onwards he showed excellent co-operation, and persisted tenaciously at his exercises. The plaster was removed from his left leg on Sept. 21 and he was allowed to bear weight. Radiographs taken on Sept. 28 showed firm union of the left patella in good position; the right knee was clear of fragments and there was no new bone formation. He was discharged on 14 days' convalescent leave.

End-result.—The patient was readmitted on Oct. 15 for a course of physiotherapy, and was finally discharged to duty on Dec. 2. I made a "follow-up" examination on March 19, 1943. He was then in excellent health and spirits. Examination of the right knee showed the wound firmly healed, with painless flexion up to 140 degrees. The left patella was firmly united; the articular surface was smooth, and flexion was possible up to 150 degrees. The patient then volunteered the interesting information that, although naturally left-footed, he now found the right knee not only stronger than the left but also stronger than it had ever been previously. He added that he had no trouble whatsoever with the right knee, but that he got occasional twinges of "rheumatism" in the left knee, especially in frosty weather or after prolonged marching. He referred this pain to the ligamentum patellae. Both quadriceps were equally re-developed, but tests revealed that the right was undeniably now the more powerful. The efficacy of the "bunching" method of suturing the quadriceps tendon was strikingly demonstrated by the fact that the contours of both knees were indistinguishable.

I have to thank the Director of Medical Services and the Command Medical Officer, Southern Command, for permission to publish this case.

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Cork, Eire.

REFERENCE

Watson-Jones, R. (1941). *Fractures and Other Bone and Joint Injuries*, p. 547, Edinburgh.

Unusual Case of Obstruction by Worms

The following case may be considered interesting enough to merit publication.

CASE HISTORY

On March 4, about 1.30 a.m., I was called to a child aged 5 years who had become ill on the previous morning. She then complained of abdominal pain and vomiting. This got worse towards night, and she was sent to Nenagh General Hospital. Appendicitis was a suggested diagnosis. On examination the child was restless; her temperature was normal, pulse 100, and respirations 26. She had general abdominal discomfort, most marked about the umbilicus. There was no definite rigidity. Restlessness was the most pronounced feature.