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A NEW METHOD OF GRAFTING

BY

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In order that the principles of the new method may be understood it will be useful first to give a short review of the usual types of skin graft. According to the thickness of the graft four types will here be considered: (1) the thin Ollier-Thiersch graft, which has been described—not quite accurately—as only epidermic; (2) the intermediate or split graft, which contains the whole epidermis and a portion of the dermis; (3) a thicker graft of about three-quarters of the skin, which leaves just enough epithelial elements from the sweat and sebaceous glands for the epithelization of the donor area; (4) the whole-thickness skin, or Wolfe, graft.

In the main, two considerations regulate the choice of graft: the thicker the graft the better the quality of the skin obtained; and the thinner the graft the easier it "takes." The area from which the graft is taken should epithelize in less than 15 days if the graft is thin. In thick grafts epithelization may be retarded, and subsequently some scar reaction may spoil the site for further use as a donor area. In the Wolfe graft there is a complete loss of skin, which must be replaced. It will be seen, therefore, that the donor area has its limitations. The kind of graft to be used depends, too, on the local condition of the area to be grafted and on the general condition of the patient, and is not an easy matter to decide upon. One of the chief problems arises when the area to be grafted is very big and the donor area is limited. When the donor area available is small, or the local and general condition of the patient is poor and none of the above-mentioned grafts is considered advisable, use is often made of small rounded grafts, of which there are two types: the thin or Reverdin graft, and the thick or deep graft devised by Davies and commonly called the "pinch" graft. Both are obtained by the same technique. The latter is the one generally adopted in England.

The Pinch Graft

It is necessary to review the pinch graft for the better understanding of this article. It is usually a small graft (3 to 5 mm. in diameter), rounded, deep, and containing all the layers of the skin. To obtain it a needle is used to pick up a cone of skin, which is cut at its base with a knife. The same needle carries the graft to the recipient area. Usually the pinch graft "takes" in raw areas in which no other graft will properly do so. This is why it is so useful. Moreover, it is easy to carry out. Many reasons are given to explain why the pinch graft takes so easily. In my opinion, the main reason is that the grafts are so placed that enough room is left between them to allow of free discharge, and nothing intervenes between the graft and the recipient area. This is an application of the

well-known principle of general surgery that no infected area will heal unless there is ample room for the discharge to escape.

From this consideration there arises a conclusion that is one of the main supports of the new method of grafting: *any graft will take more easily, and in poor raw areas, if there is enough room for discharge inside the whole area grafted.* Certainly, then, pinch grafts have many advantages, yet they have several very important disadvantages.

Disadvantages of the Pinch Graft.—(a) The donor area of a pinch graft is practically always spoiled as a further donor area for other types of graft. Numerous small scars or keloids are very common. (b) A big donor area is necessary if the pinch grafts are placed very close together—sometimes as big as the area to be grafted. (c) It is necessary to employ a large number of them, which may prove to be a very long and tedious job. (d) Because, through the instruments, contact is established between donor and recipient areas—very often slightly infected—infection may develop in the donor area. (e) Usually the site covered by pinch grafts consists of the good skin of the original pinch grafts surrounded by an area of fairly good skin: the rest is more or less keloidal tissue, in many cases with all the disadvantages of scar tissue.

The Ideal Graft.—It seems to me that if the pinch grafts were placed so close together that the distance between them was less than the possible easy spread of the grafts (from 6 to 9 times the original size of the pinch graft), the likelihood of the formation of good skin and quick epithelization would be much greater. Only experience can confirm this. If I am correct in my assumption, therefore, the ideal graft for the type of case mentioned must conform to the following rules:

1. Plenty of room must be left between the grafts for possible discharge.
2. The donor area must not be spoiled, so that it could be used again and again.
3. The graft should take easily—as well as or better than any other graft.
4. The technique must be fairly rapid in use and the number of grafts unlimited.
5. Contact, direct or indirect, must be avoided between donor and recipient areas.
6. The space between the grafts must be less than the possible easy and early spread of the epithelium.

Technique of the New Method

A graft of the desired thickness and from one-sixth to one-ninth of the raw area to be covered is cut from the donor area. It is placed on stiff sticky paper (I have been using the greasy and sterile paper supplied with boxes of "tulle-gras") or any other material of similar qualities, and skin and paper are cut in strips as thin as convenient (Fig. 1). The strips are again placed on the same type of paper, at the distances desired,

FIG. 1.—The graft, raw side up, is placed on sterile, stiff, sticky paper and cut into strips.

FIG. 2.—The strips, placed on another piece of paper, are cut horizontally.

FIG. 3.—Small squares of graft on two thicknesses of paper (only one thickness shown here). The grafts, which retract somewhat, are ready to be placed in position, with the paper.

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

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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-