British Journal of Plastic Surgery (1980), **33**, 350–352
0007-1226/80/0078-0350 $02.00

EARLIEST FREE MUSCLE GRAFT?

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In an animal experiment in 1874, Zielonko unsuccessfully grafted striated muscle from the frog into the same animal's lymph sac. Ever since Peer (1959) drew attention to this remarkable experiment, Zielonko is often quoted as being the first to perform a free muscle transplant (Hakelius, 1974, 1977; Mazzola and Antonelli, 1975; Miller and Wheeler, 1978; Thompson, 1971, 1974).

It is the purpose of this short communication to correct this twenty-year-old mistake and give credit to the American surgeon who deserves it. Some three years earlier, Professor Benjamin Howard (1871) of the Long Island College Hospital, New York, had described free muscle grafting in man to accelerate the closure of ulcers or slow healing wounds. His fascinating account of two of his patients reads as follows:

"Major K. came to me about the middle of February, 1871, on his return from Europe, where he had been under treatment for a large wound of the left leg. In July, 1863, while leading his command at Gettysburg, a cannonball, passing through his horse, carried away the major's calf to the bones. The resulting wound had been ever since under treatment and had been reduced at last to about four inches in length by about an inch in width. At first I used skin grafts which for a time had an excellent effect upon the callous edges, but again they halted, causing me to propose a repetition of skin-grafting. The major, sharing my enthusiasm on the subject, consented to any other experiment of the kind I might desire, and so I proceeded as follows:

Three cleanly-cut excavations were made, about equidistant, in the base of the ulcer, large enough to receive respectively the first, a flax-seed; the second, a barley-corn; and the third, a pea. The bleeding having ceased, my friend Dr Hinton pinched up the skin over the belly of the biceps of the patient's right arm, transfixed it, cut outward, turned up the traingular flap, and, seizing with bull-dog forceps the cleanly-exposed muscle beneath, exsected a piece of it more than a quarter of an inch square. This was divided into three pieces, corresponding to the sizes of the excavations, and they were then deposited respectively so that their surfaces were level with the base of the ulcer. They were then strapped over with isinglass plaster, and treated in the same manner as skin-grafts. The next day the grafts were so firmly united that none of them could be detached with the point of a scalpel.

On the second day the pale surface of the ulcer had become so vascular as to vie with the florid muscle-grafts. To my surprise, this quickening was shared also by a distant part of the original wound, separated from the main body and the muscle-grafts by a wide bridge of cicatricial tissue. The margins

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of the wound were equally improved and made such progress that the patient insisted he could see a new advance every day. This centripetal cicatrization proceeded most rapidly from a point nearest to the largest muscle-graft, over and beyond which new skin was quickly thrown, the site of the graft being afterward marked by a circular elevation in the newly-formed promontory. The other grafts acted with less vigor; the second in size was reached and covered with skin by approaches from the margin in about eighteen days. The smallest became too luxuriant, remained elevated above the surface, and was the last point to become completely cicatrized.

I thought it possible that the previous use of skin-grafts in the Major's case might in some way modify the result. I therefore obtained the consent of another of my patients to the same operation upon an extensive burn for which I had been treating him for more than three months. The wound on the arm of Mr L. was still about four or five inches long by about two inches in width and covered with very prominent but pale granulations, which overhung the edges. The treatment by pressure had previously been suspended, the patient having complained of the pain it caused him. With the assistance of my friends Dr Hinton and Mr Goodrich, I proceeded just as in the former case, inserting three muscle-grafts from the biceps of the opposite arm about equidistant from each other in the wound. The next day they were all adherent, two firmly, the third loosely. This was not surprising, as it was difficult to make clean-cut beds for them in granulations so prominent and flabby. The third muscle-graft gradually disintegrated and by the third day was completely discharged. The others remained healthy and permanent.

The first day after the operation the granulations assumed a brighter appearance, those overlapping the edges of the wound after the second day began to subside, when simultaneously the edges became typical in shape and color, and crept forward at a pleasing rate. After the first week I was prevented again seeing the case for ten days, when I found the patient had voluntarily discontinued the dressings two days before; a narrow, hard scab was all that remained".

It should be recalled that this paper was written in the days of Thiersch and Reverdin, and Howard concludes his account by stating "that it could but be unwise to propose muscle-grafting as a substitute for skin-grafting. Besides the greater ease with which one can obtain the skin-graft it may act not only as does the muscle-graft, but also by its germination, as the muscle-graft cannot; the centrifugal and the centripetal extension of new skin both combining to complete the cure".

We would like to thank Mrs W. Fisken and Miss M. van der Maas for preparing the manuscript.

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