

## METHODS OF CLOSURE OF DECUBITUS ULCERS IN THE PARALYZED PATIENT\*

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DURING THE PAST 12 MONTHS, it has been the authors' privilege to study a group of 80 cases of paraplegia due to war injuries of the spine. One of the most difficult of the many problems presented by this group of patients was the care of decubital ulcers which were present in a high percentage of the group. In consideration of the problem, a review of the information available in regard to decubital ulcers was carried out.

The factors responsible for the healing process of a decubital ulcer are the relief of pressure from the involved area, control of extraneous moisture,<sup>1</sup> a positive nitrogen balance,<sup>2</sup> and adequate vitamin intake.<sup>3, 4</sup> If these variables are considered and appropriate measures taken to correct deficiencies, it is recognized that healing will take place over a long period of time but at the expense of a considerable amount of nursing care to a slowly granulating and epithelizing surface. It is believed, however, that the presence of a large healing ulcer may, in itself, contribute to the patient's general debility and thus may be a factor in the slowness of healing. Mulholland, Co Tui, *et al.*,<sup>2</sup> studied the nitrogen balance in 35 cases with decubital ulcers, and concluded that the ulcers began to heal only when the blood serum protein began to rise and the nitrogen balance changed from negative to positive. They measured the protein output of one ulcer over a 24-hour period and found that during that period the patient lost 5.56 Gm. of protein from the ulcer. We, likewise, measured the protein output of decubital ulcers by collecting the débris and secretions for 24 hours on a nitrogen-free cellulose pad and then determining the nitrogen content by the Kjeldahl method. In one of our patients, with five ulcers of varying sizes, the 24-hour protein loss from these ulcers was 50 Gm. Thus, it may be seen that there is an appreciable loss of protein from decubital ulcers.

Because of these facts, we determined to attempt surgical closure of decubital ulcers. As a basis of experience, a search of the literature revealed that Lamon and Alexander<sup>5</sup> had reported one case of decubital ulcer treated by excision and closure. Furthermore, we became acquainted with the successful work of Major W. B. Scoville, at Cushing General Hospital, utilizing a method of secondary closure of large ulcers.<sup>6</sup> Foman, in 1939, states that small decubital ulcers could be excised and closed after becoming surgically clean. He also

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stated that larger ulcers should be closed by skin grafting but no references were given and no cases cited in which this method was employed.<sup>7</sup>

In our series are included 70 cases of decubital ulcers which have been surgically closed by one of three methods. Twenty-four cases in this series were supervised by Captain Barker, at Nichols General Hospital, Louisville, Ky., and Ashford General Hospital, White Sulphur Springs, W. Va. The staffs of both hospitals gave unlimited coöperation. Excision and suture was employed in small ulcers, rotation flaps were utilized in large ulcers over the trochanters, and split-thickness skin grafts employed on large ulcers over the sacrum.

#### PREOPERATIVE MANAGEMENT

The preoperative management of a patient with a decubital ulcer consists of attempts to remove the patient from a debilitated state by means of adequate protein, vitamin and caloric intake. The preoperative care of a decubital ulcer consisted of attempts to acquire a clean granulating base. No attempt has

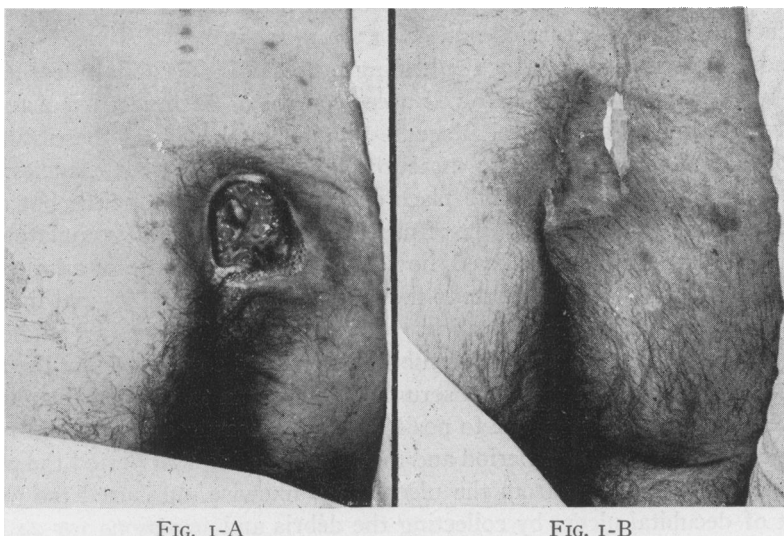


FIG. 1-A

FIG. 1-B

FIG. 1.—(A) Preoperative small sacral ulcer.

FIG. 1.—(B) Nine months postoperative.

been made to make an ulcerated area bacteria free. Various preparations were used to apply locally on the ulcer, as seemed indicated by the amount of slough and degree of reaction around the affected area.

#### OPERATIVE MANAGEMENT

In the main, we were confronted by three different types of ulcers. The small ulcers over the sacrum and trochanters were closed secondarily (Fig. 1 A and B). The large ulcers of the trochanteric region were closed by means of rotation flaps with undermining (Figs 2 A, B and C). The most difficult problems were the large ulcers of the sacrum in which closure was attempted by means of split-thickness skin grafts. Typical results of this procedure are demonstrated in Figures 3, 4 and 5.

## DECUBITUS ULCERS

In closure of the small ulcers an attempt was made to remove all the devitalized tissue and all of the scarred tissue surrounding the ulcer by surgical excision. In all these cases, a good five-minute cleansing of the ulcer area was done with white soap and water. The area surrounding the ulcer was undermined

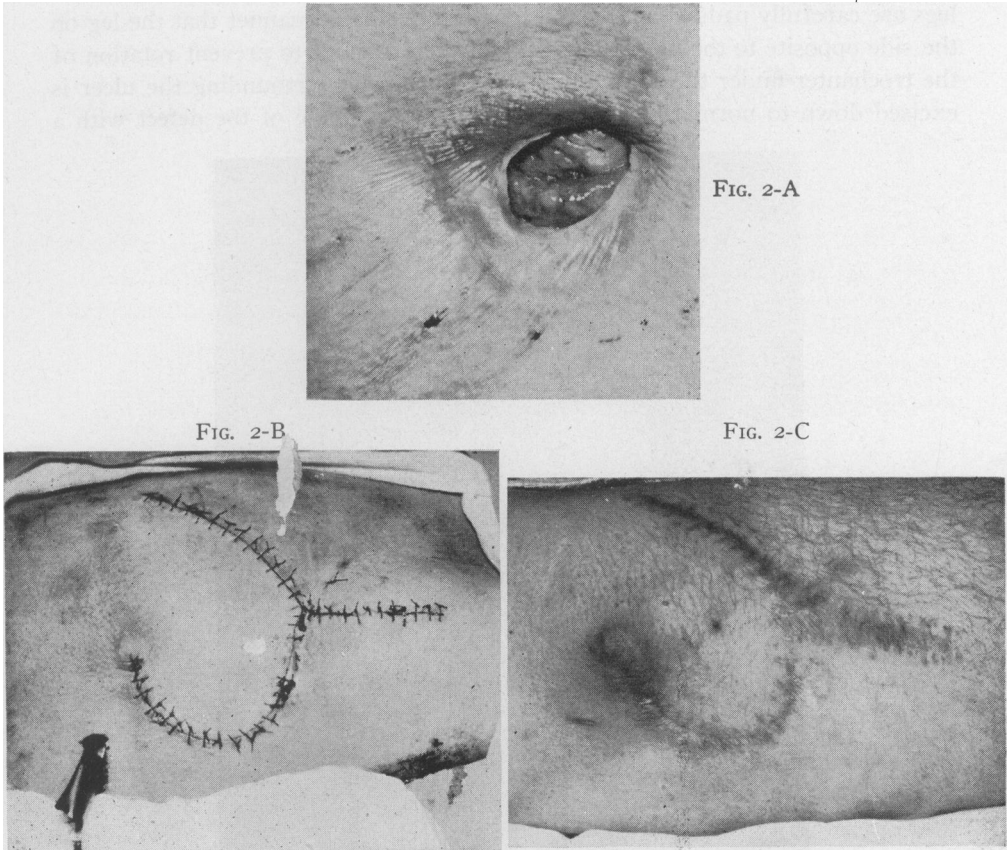


FIG. 2—(A) Preoperative trochanteric ulcer.  
FIG. 2—(B) Ulcer at time of operation  
FIG. 2—(C) Two months postoperative.

for several inches in all directions in a normal cleavage plane so that the edges of the defect could be brought together without undue tension. At this time, a stab wound is made at the periphery of the undermined area and a small flat rubber drain is inserted down to the base of the former ulcer. The deep tissues are then closed with multiple, interrupted sutures of No. 00 chromic catgut and the skin edges closed with multiple interrupted sutures of No. 000 silk. A layer of white gauze is applied, followed by a large pressure dressing of mechanic's waste. It was observed that when pressure dressings were not used, sinus formation was frequent beneath the closure.

In dealing with the large ulcers of the trochanteric area, the method of rotation flap was used. It was early recognized that the movement of the greater trochanter caused a constant tearing and sinus formation in the region of the ulcer and contributed largely to the wide undermining process which is common with this type of ulcer. For this reason, during the operation, the patient's legs are carefully padded and bound together in such a manner that the leg on the side opposite to the ulcer in question acts as a splint to prevent rotation of the trochanter under the area. All of the scar tissue surrounding the ulcer is excised down to normal tissue. A pattern is then made of the defect with a



FIG. 3.—Grafted sacral ulcer nine months postoperative.

piece of oiled silk and this pattern transferred to an area adjacent to the ulcer. It has been observed that flaps taken from an area ventral to the ulcer are preferable, because in several dorsally acquired flaps, circulation became jeopardized as the result of skin stretching when the thigh was flexed. The area surrounding the ulcer is now undermined for a distance of several inches and bleeding carefully controlled. The flap is outlined and raised on a normal cleavage plane of the thigh. This entire area is then undermined and bleeding controlled. A stab wound is made in a dependent portion of the undermined area and the flap sutured in place with multiple interrupted subcutaneous sutures of No. 00 chromic catgut. It has been our experience that with adequate undermining the donor area could usually be closed without undue

tension. However, in a number of cases, the donor defect was so large that a split-thickness skin graft was required to close a portion of the donor area. The skin edges are then closed with multiple interrupted sutures of No. 000 silk and a rubber drain placed in the stab wound to reach the base of the previous ulcer. It should be noted that in none of the cases was the drain placed through the line of suture. This was considered important, because the area along the suture line is usually somewhat scarred and the line of greatest tension exists at this point. The area of the suture line is the area of previous abnormality and carries the added danger of potential infection. The healing of the stab wound has occurred readily following removal of the drain. Oint-

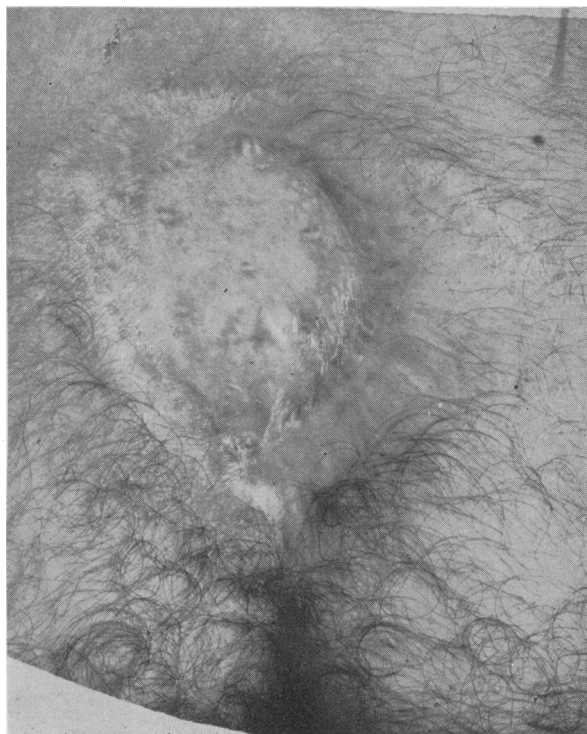


FIG. 4.—Grafted sacral ulcer ten months postoperative.

ment gauze dressing is applied, followed with pressure dressing of sterile mechanic's waste. Following closure of this particular type of ulcer by this technic it is deemed important that a large amount of adhesive tape be applied to prevent undue tension on the suture line by taking up skin slack. It must be remembered that in this group of patients, most without pain sensation, the normal protective mechanism has been lost.

The technic in skin grafting of the large ulcers is as follows: After the ulcer has been débrided down to a fair base, bleeding is controlled with hot saline packs. In a number of cases, local adrenalin has been employed to aid in hemostasis. The grafts are usually taken from the posterior portion of the

thigh, and are of approximately 12/1,000-inch in thickness. Before the graft is placed into position, the granulating area is sprinkled with sulfanilamide crystals. The graft is now laid into position and sutured with a continuous stitch of No. 000 silk around the periphery of the ulcer. Perforation of the graft with multiple small holes allows drainage of serum from beneath the graft. Ointment gauze is applied followed by a pressure dressing with mechanic's waste. This step is considered important to prevent collection of serum or an hematoma underneath the graft. It has been our experience that no difficulties have arisen in healing of the donor area in any of our cases. This is probably due to the fact that the donor skin is acquired from over a fleshy portion of the body which is subjected neither to periods of local ischemia from pressure nor to excessive moisture.

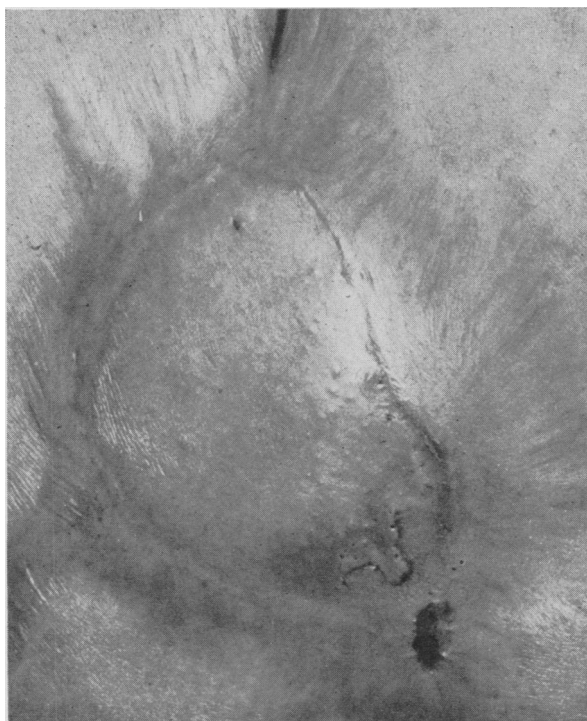


FIG. 5.—Grafted sacral ulcer two months postoperative.

#### POSTOPERATIVE CARE

The postoperative care of small ulcers, both in the trochanteric and sacral regions, has presented no particular problem. A standard postoperative treatment is being employed in all cases. On the third day postoperatively, the dressings are removed and the area of closure or graft is cleaned with hydrogen peroxide to remove the serous discharge. The area is dried with ether and sulfanilamide powder dusted along the line of closure. A dry pressure dressing of mechanic's waste is then applied. Hereafter, this procedure is done daily

using the same technic, until on the tenth or twelfth day the sutures are removed. At one time in our experiences, ointment dressings were applied following the removal of the original dressing. It was discovered, however, that ointment dressings over a period of several days resulted in maceration at the suture line. The drain is partially pulled out on the third day and totally removed on the fifth day in those cases in which a drain had been employed. There is a considerable amount of serous discharge for the first five days, which is gradually decreased until on the eighth day it should be minimal. The cases in this series received parenteral penicillin for several days postoperatively.

Early in our experience, wet dressings were applied immediately postoperatively in the skin graft cases. This was found to be inadvisable because of maceration of the graft resulting in loss of parts of the graft.

There has been little or no tendency for these surgically closed ulcers to break down. Most cases in the series have been kept under observation for a year and each patient is instructed in the care of his healed graft or closure. The same factors responsible for the occurrence of a decubital ulcer would contribute to recurrence or break-down. These factors are prolonged pressure with resulting local ischemia, excessive moisture and general debility. Training this type of patient to frequently change his position is not difficult, particularly as he is most interested in not having his ulcer recur. We have observed that following successful closure of a large ulcer, the patient's appetite increases and with this increased appetite a sense of well-being occurs. Serum proteins rise and on several occasions negative albumin-globulin ratios have become positive. These phenomena occur too quickly following closure to be considered unrelated to the closure. Local care of the healed closure or graft consists of daily massage with a light oil containing lanolin, frequent position changes and careful avoidance of prolonged contact with body excretions.

DISCUSSION.—The operative results in a series of 70 cases of decubital ulcers have been observed over a period of 12 months and, on the whole, have been satisfactory. Thirty-two ulcers were small in type and were closed by excision and suture. Twenty-eight healed *per primam* and there were four failures. One of these has been reoperated and has healed. Another healed by epithelization. The final results of the remaining two are unknown as the procedures were performed at another hospital.

Nineteen rotation flaps were performed and there were no complete failures. In several cases, a superficial separation of the suture line occurred in a small area which readily healed by secondary intention.

Nineteen skin grafts to large sacral ulcers were performed and 11 healed *per primam*. Six healed partially, and two were total failures. Of the six partially healed grafts, two were reoperated successfully. It is our opinion that a partial take is followed by more rapid epithelization than would occur in a surgically untreated ulcer. This has been observed in those remaining cases classified as total failures.

## CONCLUSIONS

Decubital ulcers in paralyzed patients have been treated with primary closure, rotation flaps and split-thickness skin grafts. Donor sites heal readily in those cases in which skin grafts are employed. The closure of a large decubital ulcer is related to an increase in appetite and sense of well-being in the patient. In addition several months of nursing care to a slowing granulating and epithelizing area are avoided. End-results after one year's observation have been satisfactory and the tendency to break-down or recurrence has been minimal in this series.

## REFERENCES

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DISCUSSION.—DR. JOSEPH E. J. KING, New York, N. Y.: This most remarkable work done by the young medical officers of the Service and presented to us tonight is truly epoch-making.

At Ashford General Hospital yesterday the young Captain who showed us the paraplegias appeared to be so kindly disposed to his patients, so cordial and encouraging, and he tried to make the boys feel as happy as possible; I was deeply impressed by his attitude. Then we were rather surprised and very much pleased to see the splendid work which had been accomplished in the curing of bedsores, *i.e.*, the skin grafts and flaps.

In our service during the last War most of the paraplegias resulting from gunshot wounds slowly died of an ascending infection after lingering on the wards for a considerable period of time. It goes without saying we did not have the advantage of the new drugs and Munro's tidal drainage was unknown. Treatment of paraplegias has vastly improved at the present time. Even so, many of these young men will be invalids for life and will be unable to marry and have children. They do not present the hopefulness shown by most of the other wounded men, although they may be amputees, or may have sustained other serious or disabling injuries of the chest, abdomen, peripheral nerves, *etc.* This latter group may go home in good fettle and happy, and continue so through life. It is my belief that the paraplegias, for the most part, will not be able to do this; many of them will sit or lie around in invalid state.

After the last War I was connected with the Veterans Bureau for about 13 years and, in a number of instances, have seen the men's compensation cut down from \$150 per month to as little as \$8 a month in claimants who had not improved in the interval. I feel that an especial effort should be made on our part to see that this particular group of patients receives full and just compensation for their injuries. At the present time our government is spending a great sum of money for all sorts of things, and I know of no better use to which to put it than for the care and welfare of these unfortunate soldiers.

COL. R. GLEN SPURLING, Washington, D. C.: I feel that I should say a few words about the program for the future being planned for these patients. I am sorry that