

EARLY FUNCTION AFTER WAR
WOUNDS OF THE EXTREM-
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In injury or disease of the extremities, surgery is dealing with a motor. When a man injures an arm or a leg, what he is chiefly concerned about is the restoration of that motor to its previous functional capacity, or as near the original as possible. The patient is not interested in the methods employed, but in the recovery of a valuable motor. Theoretically, the surgeon is supposed to have the same point of view; but he has devoted more time to the methods of immediate surgical relief, and has not been thinking always in the terms of motor function. This is quite natural, because in surgery of the head and trunk the services of the surgeon are usually at an end after the completion of the operation. After the wound has healed he is more or less powerless in his attempts to exercise control over the function of the deep-seated, stationary, internal organs.

The conditions are very different in surgery of the motor-skeleton, where skeletal, joint and muscle function are so much under the direct control of the surgeon, and where delay, neglect, and failure in the after-treatment count for so much in the ultimate result. Just as the delay in hours in beginning motion after orthotomy for septic arthritis by the Willems method means so much for the success or failure of the treatment, so also does delay often affect other injuries of the limbs. Instead of the labors of the surgeon being chiefly operative, they involve exacting and time-consuming service outside of the operating room.

It is not too much of an exaggeration to say that there has been little comprehensive effort up to the present time to salvage the potential cripple. What has been done to limit the disability in unavoidable deformities and to prevent unnecessary disability in avoidable deformities? Who will venture an estimate of the number of avoidable deformities among the 700,000 war cripples in France, or among the army of industrial cripples produced in this country every year?

In civil surgery it is still more or less the custom to treat a fracture as a broken bone, and not as a motor with a broken part. It is not uncommon in many excellent hospitals for much, if not all, of the treatment in these cases to be carried on by members of the junior staff. The interest of the surgeons and all concerned is frequently limited to the early immediate surgical treatment, and, as every one knows, many patients are sent to their homes to work out their own salvation as best they may. In civil surgery there has been no real compulsion to obtain complete and early recovery in extremity injuries. No agency exists to compel the profession, the hospitals or industry to effect an intelligent salvage of the potential cripple.

In this respect, civil surgery has much to learn from military surgery. Theoretically, in military surgery the army organization demands that the wounded or injured soldier be treated primarily with the object that he be returned to active military duty in the shortest

time, or eventually discharged with the least degree of permanent disability. Unfortunately, however, no machinery existed in the military service to accomplish what military necessity required, and none had been developed in civil practice. It was necessary to create the organization and develop the technic of execution. Such an organization was created in the United States Army, and the process of fitting it into the general scheme has been in operation during the past year.

While the problem of the restoration of the function of the damaged motor-skeleton is not a new one, no one has fully understood the importance of early motion, or the evil results of delay. In civil practice, nearly every one has been more or less conscious of the unfortunate results of failure to begin motion early, and every one is familiar with the convalescent stiff joint; but only among war cripples can one appreciate the appalling results of neglect, in wounds not only of the bones and joints, but also of the soft parts.

To Depage is due the credit for demonstrating the value of early active motion in the treatment of war wounds, and to Willems for his mobilization treatment of joints. To those who have had occasion to observe and direct the efforts to reestablish early function in recent wounds of the extremities, it is no exaggeration to say that the results have been, on the whole, little short of marvelous; but much has yet to be learned and a great deal of care must be exercised in the application of motion to recent injuries of the motor-skeleton.

ABSTRACT OF DISCUSSION

DR. WILLIAM W. PLUMMER, Buffalo: The subject of Dr. Hawley's presentation reduces itself practically to agreement and confirmation. In the matter of after-results from the secondary closures, the results as shown by him are obvious; and those who had the opportunity to be at General Hospital No. 9 last summer and see some of this work know that there is no short cut to happiness in the matter of getting such results. What impressed itself on me was the necessity for close study of detail in the treatment of these cases. Any of the results obtained in any of the hospitals in France, if comparable to these, were only attained after the case had been carefully and industriously followed by the men in charge of the various wards; and with all the advantages of the various treatments that we found useful and standardized, it boils itself down to the man doing the work. There was opportunity to see, a short time ago, in sharp contrast, a large group of men undergoing physical therapy in which this group was being developed by the purely mechanical method of supervised passive exercise, and another group in which the men were doing the exercise, as the British say, "on their own." There was no comparison in the results. Those that were supervised were getting good results quickly; and the others, who were depending on apparatus and that sort of thing, were not.

DR. JOEL GOLDTHWAIT, Boston: One or two points should be remembered in the treatment of these badly infected wounds and in the use of the Carrel-Dakin method of treatment. Without any question, it is the best method of sterilization for septic wounds, provided that the technic can be carried out satisfactorily. There is, however, a difference of only 0.5 per cent. between the strength that possibly gives a harmful effect and that of an inert solution; and any so-called solutions of this kind that are stable are undesirable, because it is the instability of the solution and the rapid giving off of chlorin that make it desirable. In the military stress at the front, you cannot often get the technic demanded, and if you cannot, do not fuss with this method. Give it up and use a dressing made of plain yellow soap and water, which is practical and scientific, and is one of the best dressings for septic wounds that you can put on, if you cannot con-

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trol the Carrel-Daken technic. In the British hospitals, in 1918, where they could not control the Carrel-Dakin standard dressing, they used a solution of yellow soap on the wound. It did not dry, and harmful organisms cannot grow in a strongly alkaline solution. The mucus will be softened, and will come off easily; and such a dressing can be put on in the field. Other solutions can be used in the same way. Another point: In the latter part of these infections, the sepsis is chronic; we used to call it chronic pyemia; and in the lists of our battle casualties for the last six months, almost all the seriously sick had chronic pyemia, which means that the temperature ran up within a day or two, and an abscess formed in some part of the body. When this condition declares itself, the abscess is inert and practically sterile. All that you need to do, then, is to put the knife in and drain it. You do not need to use the surgical solution of chlorinated soda. Those who are old enough to know about surgery in pre-antiseptic days will remember that the things we have seen in France are exactly the things that we saw in those days.

DR. REGINALD H. SAYRE, New York: I have found that a combination pulley by which the patient can pull on a chain and raise himself, when immobilized and suspended in bed, is handier and more useful than the ordinary compound pulley with a rope which has to be belayed. He can pull himself up and down, and by means of the sprocket which articulates with the chain, fix himself in any position desired.

DR. WILLIS C. CAMPBELL, Memphis, Tenn.: I should like to ask Dr. Hawley whether he has had any experience with gonorrheal arthritis or other types of acute infectious arthritis treated by the mobilization method.

DR. H. WINNETT ORR, Lincoln, Neb.: No discussion of this subject should be considered complete until a word of caution has been given regarding the danger of rendering apparatus ineffective by attempting to provide motional treatment. It works out in a great many cases that attempts to provide knee or elbow motion render the apparatus ineffective between the times when the motion is given. Apparatus for fixation and traction must be kept in position during the entire time of treatment, if results are to be obtained from its use.

DR. JOSEPH BYRNE, New York: I have always admired the enthusiasm of the orthopedists in the problem of restoration of function, and for many years have collaborated in this neurosurgical orthopedic work with Drs. Alfred S. Taylor and Samuel W. Boorstein. Secondary suture and early restoration bear an intimate and essential relation to the mechanism of degeneration and regeneration not only of nerve trunks, but also of the finer nerve branches supplying the injured parts. Integrated function of all kinds has a close dependence on the integrity of the neural arcs, both afferent and efferent, as well as on their related correlating and coordinating mechanisms. Hence, what takes place within the neural mechanisms during the stages of degeneration and regeneration after nerve injuries is of vital importance. After injury of a nerve the related neuron bodies in the dorsal root ganglions may undergo complete degeneration or merely exhibit axonal reaction phenomena. In the latter case, function is suspended temporarily in the related axons for a period of from fourteen to twenty-one days, and for a much longer period where infection complicates the injury. It is obvious, therefore, that where infection is present, as in war injuries it usually is, no benefit is to be gained by primary suture, as nerve regeneration cannot take place until after the tissues have become sterilized. Connective tissue, however, forms much more readily in the presence of a waning infection and offers an impenetrable barrier to the axon branches when these begin to sprout from the central segment. Where, however, a period is allowed to elapse after sterilization of the wound, the neuron bodies take on hypermetabolic activity, which aids remarkably the outgrowth of the new axon branches after a secondary operation. Add to this the preparation already completed in the distal segments of the injured nerves by the formation of the tubulized protoplasmic bands for the reception of the outgrowing axon branches, and the conditions are ideal for rapid neural restoration after a secondary operation. Where very small nerve branches have been torn across, in

infected or sterile tissues, early movement of the parts aids greatly regeneration in the torn nerve by breaking up the connective tissue barriers, thereby throwing the connective tissue itself into an embryonal state which favors penetration by the axons.

DR. GEORGE W. HAWLEY, Bridgeport, Conn.: I should like to emphasize a point brought out by Dr. Orr, that of the extreme care that must be exercised when using motion, early motion, in injuries of the extremities. It is really a new field, and we have a great deal to learn yet. It is a matter, largely, of combining effective fixation with motion. In answer to Dr. Campbell's question, unfortunately we had very little experience in the treatment of infected joints. For some reason we had comparatively few joint wounds; so I really can say very little, almost nothing, regarding the mobilization treatment as applied to the arthritis of the type that we see in civil practice. The next few years will present to us the problem of trying to adapt the best that war surgery has developed during the last four years, especially to the treatment of injuries of the extremities.

RESULTS IN THE MODERN TREATMENT OF DIABETES*

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It seems appropriate at this time, after four years or more of trial, to review the therapeutic results that have been obtained with the Allen treatment for diabetes, which has received such universal adoption by the medical profession. With this in view I am going to discuss certain aspects of the treatment of diabetes, and with the help of charts illustrate some of the results obtained during the past four years, during which time we have treated patients according to the general principles laid down by Dr. Allen.

It is not necessary to go into a detailed description of the modern treatment, as it has received a great deal of attention in medical literature during the past four years and the reader, doubtless, is familiar with it. I have been much impressed, however, by the fact that, while many practitioners who have employed the fasting treatment have quite generally appreciated the use of the preliminary fasting period to abolish glycosuria and acidosis, they have not fully appreciated the great importance of the subsequent method of regulating the diet and the importance of keeping the patient free from sugar and ketone bodies. Probably the most important feature of the after fasting treatment is the proper regulation of the relative proportions in the amount of protein, carbohydrate and fat in the diet and the appropriate distribution of half days and fast days. Under the older methods of treatment it was the common practice to keep the carbohydrate intake very low and make up for its absence by feeding large amounts of protein and fat, particularly fat. The object was to keep up the patient's nutrition and body weight. How injurious to the diabetic process the high fat feeding can be has been well shown by Allen on dogs, and can be readily demonstrated in our diabetic patients.

The high fat feeding of former years has probably led to more fatal outcomes in diabetes than any other one factor. This has been so forcibly impressed on me in the past four years that I am inclined to say that

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