PERIPHERAL NERVE SURGERY—TECHNICAL
CONSIDERATIONS*

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(Received for publication February 26, 1944)

IT IS ESTIMATED that 70 per cent of all battle casualties suffer from extremity wounds. It is further estimated that 15 per cent of the extremity wounds (i.e., 10.5 per cent of all casualties) are complicated by injuries to large nerve trunks. Peripheral nerve surgery, therefore, in point of numbers, is the most important military neurosurgical problem.

Every soldier with a serious injury to one of the major nerves is unfit for active combat duty for several months, and in many instances, forever. When anatomical continuity is disrupted, regeneration, under the most favorable circumstances, progresses at not more than 2 inches each month. As an example, a sciatic nerve, severed in the midthigh, requires a minimum of 15 months for regeneration of fibers to their distant terminations. After anatomical restoration of the nerves, comes the long period of reeducation and strengthening of muscles so necessary to full functional activity. Deformities can be prevented by properly applied braces, and, in many instances, the patient can do productive work during the convalescent period. However, care of the paralyzed muscles complicates the problem. It is useless to have nearly perfect regeneration of nerve fibers if the muscles are allowed to atrophy and fibrose so they are no longer capable of responding to motor stimuli. If soldiers with nerve injuries are to be salvaged for further military service and from veteran pension lists of the future, they must receive prolonged expert care under favorable conditions.

Since most nerve casualties will not be fit for combat duty again, the Army had three choices for their disposition: First, give them the best possible surgical repair of the lesion and then discharge them to veteran facilities for care. Second, keep them in Army hospitals under continuous physical and occupational therapy until maximum recovery has been achieved. Third, teach them the principles of physical therapy, especially the care of their muscles and joints, fit them with proper splints and appliances to prevent deformity, return them to a duty status commensurate with their disability, and require them to return for observation to the hospitals where they received surgical treatment at regular intervals not exceeding 90 days.

The Surgeon General of the United States Army, after careful consideration, has elected to pursue the third course. It is still too early to be sure of the wisdom of the decision. From the patient’s point of view, it is the best

* Presented at the meeting of the American Academy of Orthopaedic Surgeons, Chicago, Illinois, January 22 to 26, 1944.
solution, for it restores him to a productive status without seriously jeopardizing the perfection of his recovery.

GENERAL PRINCIPLES OF NERVE REPAIR

The Wound. Experience in our own Army, as well as in the Armies of our Allies, indicates that battle wounds should not be closed primarily even though débridement can be accomplished under favorable conditions. As a result of this policy, many peripheral nerve casualties arrive in the zone of the interior with open granulating wounds—most of them mildly infected. Before the days of chemotherapy, it was considered the best surgical practice to wait at least 3 months after healing before performing elective operations.

During this war considerable modification of these practices had slowly evolved. Now at the Walter Reed General Hospital, the mildly infected wound is closed by secondary suture as soon as the granulating surface is reasonably clean—sometimes a few days after admission. Two weeks after secondary suture, if healing has been satisfactory, repair of the nerve is attempted keeping the new incision as far removed as possible from the recently infected field. This practice is making possible repair of severed nerves earlier than ever attempted before in war time.

Chemotherapy. Sulfadiazine in sufficient amounts to produce a blood level of approximately 5 mgms. per cent is given to all patients with recently infected wounds for 48 hours prior to operation. This level is maintained for a minimum of 10 days postoperative. The operative wound is frosted lightly with sulfanilamide crystals, care being taken to prevent an accumulation of crystals around the nerve trunks. Not more than 5 grams of sulfanilamide are used in any case.

Condition of Joints. In all cases where end-to-end suture is contemplated, it is desirable to have complete mobility of contiguous joints, for it is only by positioning them that extensive defects can be overcome. A high percentage of extremity wounds with nerve injuries have also bone and joint injuries and, in most instances, casts will have been applied. A favorable position for the injured joint or bone may be an unfavorable one for nerve repair; therefore, before operation is attempted, joint mobilization by all means available should be undertaken.

Hemostasis. Careful hemostasis is especially important in peripheral nerve surgery. A wet field with the inevitable swelling that accompanies it is incompatible with consistently good results. It should be unnecessary to state that a tourniquet is seldom necessary or justifiable in operations upon peripheral nerves unless there is an associated lesion of one of the major blood vessels.

Freedom from Tension. When large gaps are to be overcome, excessive tension at the suture line is by far the most difficult problem; yet, to compromise with this principle means inevitable failure. Freedom from tension in many cases can be accomplished only by extensive dissection of the proxi-