

GUNSHOT WOUNDS

AND OTHER

INJURIES OF NERVES.

GUNSHOT WOUNDS

AND OTHER

INJURIES OF NERVES.

BY

S. WEIR MITCHELL, M.D.

GEORGE R. MOREHOUSE, M.D.

AND

WILLIAM W. KEEN, M.D.

ACTING ASSISTANT SURGEONS U.S.A.,

IN CHARGE OF U.S.A. WARDS FOR DISEASES OF THE NERVOUS SYSTEM, TURNER'S LANE
HOSPITAL, PHILADELPHIA.

392

PHILADELPHIA :

J. B. LIPPINCOTT & CO.

1864.

Mon. Med.

W L

100

M 682g

1864

C 2

Entered, according to Act of Congress, in the year 1864, by

J. B. LIPPINCOTT & CO.,

In the Clerk's Office of the District Court of the United States for the Eastern
District of Pennsylvania.

CH 4044 MNT

P R E F A C E.

THE cases upon which this little volume is founded were studied during about fifteen months, beginning in May, 1863. At that date, Dr. Wm. A. Hammond, then the Surgeon-General, ordered that certain wards should be set apart for the treatment of Diseases of the Nervous System in the U. S. Army Hospital, Christian Street, Philadelphia. Two of the authors of this volume were placed in charge of these wards; and the third, Dr. Keen, was subsequently added as resident surgeon. Many difficulties and embarrassments naturally arose at the outset of an undertaking so novel as that of a special hospital meant to receive only a limited class of cases. As the Surgeon-General increased the number of such hospitals, creating distinct wards for various classes of diseases, these obstacles soon disappeared, and the good results of the system became apparent.

The authors of this essay desire to thank Dr. Hammond for the steady interest with which he regarded their inquiries, and to acknowledge the watchful care with

which he fostered the interests of scientific medicine, while organizing and perfecting that vast system of hospitals for which the country owes a debt of gratitude to a genius alike enterprising, intelligent, and laborious.

For constant and courteous attention to their special requisitions, they are also much indebted to Surgeon-General Barnes, M.D., U. S. A.; and for the unfailing zeal with which he has aided their purposes, and forwarded the scientific and benevolent objects of their wards, they are glad of the opportunity to thank the able and assiduous Inspector of this Department, Lieutenant-Colonel Le Conte, M.D., U. S. A.

OCTOBER, 1864.

CONTENTS.

CHAPTER I.

Division of Subject.....	PAGE 9
--------------------------	-----------

CHAPTER II.

Primary Effects of Wounds or other Injuries of Large Nerves...	13
--	----

CHAPTER III.

Wounds of Nerve Centres.....	21
------------------------------	----

CHAPTER IV.

Wounds of Special Nerves—Wound of the Sympathetic Nerve...	39
Wound involving the Fifth Pair of Cerebral Nerves.....	44
Wounds involving the Portio Dura Nerve (Seventh Pair).....	47

CHAPTER V.

Wounds and other Injuries of Nerve Trunks.....	55
--	----

CHAPTER VI.

Wounds of Nerve Trunks—Continued.....	68
---------------------------------------	----

CHAPTER VII.

Lesions of Sensation.....	95
---------------------------	----

CHAPTER VIII.

Of the Influence of Wounds of Nerves upon Muscular Movement..	119
---	-----

CHAPTER IX.

PAGE

Of the Condition of Calorification in Injuries of Nerves..... 134

CHAPTER X.

Treatment—Of the use of Electricity in the Diagnosis, Prognosis,
and Treatment of Injuries of Nerves..... 136

CHAPTER XI.

Diagnosis, Prognosis, and Treatment of Nerve Wounds and their
Consequences 143

CHAPTER I.

DIVISION OF SUBJECT.

WHEN the U. S. A. Hospital for Diseases of the Nervous System was organized in May, 1863, it was at first proposed to limit its usefulness so that only those cases should be received. It soon became plain that it would be advisable to include also wounds and other injuries of nerves, and accordingly an order to that effect was issued.

No sooner did this class of patients begin to fill our wards, than we perceived that a new and interesting field of observation was here opened to view. Before long, so many of these cases were collected that, for a time, they formed the majority of our patients. Among them were representatives of every conceivable form of nerve injury,—from shot and shell, from sabre cuts, contusions, and dislocations. So complete was the field of study, that it was not uncommon to find at one time in the wards four or five cases of gunshot injuries of any single large nerve. It thus happened that phenomena which one day seemed rare and curious, were seen anew in other cases the next day, and grew commonplace as our patients became numerous.

Whatever may be wanting in this essay is, therefore, due alone to its authors, since never before in

medical history has there been collected for study and treatment so remarkable a series of nerve injuries.

To this general remark there are but two exceptions. In a year of this vast experience of wounds of nerves, paralyses, and epilepsies, we have not witnessed a single death, so that thus far no opportunity for the study of pathological anatomy has been presented.

The great bulk of our patients has consisted of men who have been shifted from one hospital to another, and whose cases have been the despair of their surgical attendants. As the wounded of each period of the war have been cured, discharged, invalided, or died, every large hospital has had left among the wards two or three or more strange instances of wounds of nerves. Most of them presented phenomena which are rarely seen, and which were naturally foreign to the observation even of those surgeons whose experience was the most extensive and complete. Nowhere were these cases described at length in the text-books, and, except in a single untranslated French book, their treatment was passed over in silence; while even in the volume in question but a limited class of nerve lesions was discussed. In the great monographs on military surgery, this defect is still so complete, that wounds of nerves are there related rather as curiosities and as matters for despair, than with any view to their full clinical study and systematic treatment.

When a number of cases were collected in our own wards, the want of some guide to treatment became manifest, and it was only after a long

and large experience that the indications for treatment grew to be well defined. Even then, there were certain obstacles to a successful system of therapeutics, obstacles which are purely technical in their nature, and which affect only the inmates of military hospitals so burdened and crowded as ours have sometimes been; for it must be borne in mind that it is not always possible with propriety to retain all cases which might need for cure or relief a treatment extending over many months, and, perhaps, even years. In fact, we have but too often had to lament the loss of sufferers, whom we felt we could no longer hold as pensioners upon the bounty of the government, even with the prospect of affording them a larger but too distant relief. Every surgeon will recognize the antagonistic workings of these military and medical needs, and will charitably interpret their effects upon the results of our hospital record.

The mode of considering so wide a subject has been the occasion of much reflection. It was finally resolved to treat of Nerve Injuries under the following heads, some of which will find or have found fuller consideration in our papers upon Reflex Paralysis, Epilepsy, Malingering, Muscular Hyperæsthesia, and Choreal Affections.

Primary effects of wounds and other injuries of nerves.

Injuries of nerve centres.

Injuries of the sympathetic nerve.

Wounds of fifth and seventh nerves.

Injuries of nerve trunks or branches, and their results, including—

Alterations of nutrition.

Lesions of sensation.

Lesions of motion.

Alterations of calorification.

Electric condition of the parts.

Treatment of nerve lesions.

Keeping in view the divisions here laid down, we shall treat each head of our subject in turn, illustrating every important detail with such cases as represent it in the most striking manner.

Our materials for this study consist of about one hundred and twenty cases, all of which have been carefully reported in our note books during the past year. No labor has been spared in making these clinical histories as perfect and full as possible. Those only who have devoted themselves to similar studies will be able to appreciate the amount of time and care which have been thus expended. We indulge the hope that we shall leave on record a very faithful clinical study of nerve injuries, and that we shall have done something at least toward lessening the inevitable calamities of warfare.

CHAPTER II.

PRIMARY EFFECTS OF WOUNDS OR OTHER INJURIES OF LARGE NERVES.

It has unfortunately been impossible accurately to determine the amount of nerve lesion in most individual cases. A ball passing above the brachial plexus, or just over any large nerve, will sometimes inflict injuries as severe and lasting, with reference to the destruction of functions, as the bullet which severs the nerve fibres themselves. For this reason we have been unable to classify nerve wounds so as to study the relation between the extent of the nervous injury and the amount of the consequent shock.

When, therefore, we state a case as one of injury to a nerve, we intend to assert merely that this nerve was the principal one whose distribution finally remained affected.

We have selected for this especial study, forty-eight cases of severe gunshot wounds of nerves. We propose to examine these statistically, with reference to the immediate effects of injuries of nerves. We desire to ascertain what are the first impressions of an individual so injured; the nerves wounded; the amount of shock, and the extent of the primary derangement of the functions of motion and of sensation.

Of the forty-eight cases before us, thirteen were lesions of the brachial plexus or axillary nerves.

One was a wound of the spine in the cervical region.

Two were injuries of the portio dura nerve.

One involved the inferior maxillary branch of the fifth pair, and one the cervical sympathetic nerve.

Eighteen affected the nerves of the arms, below the axilla, and twelve those of the lower limbs.

Of these by far the larger number felt, when shot, as though some one had struck them sharply with a stick, and one or two were so possessed with this idea at the time, that they turned to accuse a comrade of the act, and were unpleasantly surprised to discover, from the flow of blood, that they had been wounded. About one-third experienced no pain nor local shock when the ball entered. A few felt as though stung by a whip at the point injured. More rarely, the pain of the wound was dagger-like and intense; while a few, one in ten, were convinced for a moment that the injured limb had been shot away.

In wounds of the neck, involving directly or not the brachial plexus, the wounded man sometimes feels pain which is distinctly referred to the elbow or to some other portion of the arm. In two instances of neck wounds, the pain at the moment of wounding was intense, and was referred to the insertion of the deltoid muscle. Captain Stembel, U. S. N., whose case we have elsewhere related, (*Reflex Paralysis*, Circ. No. 6, U. S. A. Med. Dept., March 10th, 1864,) was shot in the right neck, and felt instant pain in both elbows. Lieutenant G., 14th Infantry, never felt any pain of moment in the

wounded limb, and so vivid was his impression of a wound in the other leg, that he found it difficult at first to get rid of the erroneous idea.

Shock.—In determining questions connected with the constitutional disturbance caused by bullet wounds, it is necessary to observe the proportion of those who fall with or without loss of consciousness, the feeling of general weakness, and the amount of blood lost.

What proportion then of men who receive severe nerve injuries—and all here were of this class—fall when struck, and how many lose consciousness from other causes than hemorrhage? To answer this, we will consider, first, the instances of wounds of the lower limbs, and then, excluding these, study the rest; for, as every man who is badly hurt in the legs falls, we can in these cases rely only upon the loss of consciousness and the feeling of weakness to tell us of the amount of general disturbance. The question of bleeding, as influencing the fall, or the subsequent feebleness, need not trouble us here or elsewhere, because the symptoms now being studied are of instant occurrence, and could not be due to any hemorrhage except from the great vessels.

Every case of wound of nerve trunks in the legs fell instantly, and not one of the whole twelve lost consciousness; yet in gravity and in the size of the nerves injured, these were among our worst cases.

Of the remaining thirty-one, seven fell instantly, unconscious: one only of these bled very largely. All of the seven were wounded in the neck, face, or arms.

Of the total number of arm cases, (eighteen in all,) two were of the class described above as falling senseless. Of the remainder, two only fell, but with entire consciousness and in full possession of their senses; fourteen continued standing, or walked away, falling, it might be, after a time, from loss of blood.

Of the wounds of the lower neck and axilla, brachial plexus, or axillary nerves, one fell senseless, four fell conscious, and the remaining eight suffered no immediate fall.

Finally, we may add that in nearly every case of severe nerve wound which did or did not fall, there was more or less general and nearly instantaneous weakness. If, then, we regard the fall with loss of consciousness as the most marked expression of the condition known as shock, we shall have some right to infer that it is most likely to be severely felt in wounds about the upper third of the body. At the same time we may add, that it has chanced to us to see a considerable number of cases of gunshot wounds of the upper regions of the chest which recovered, and in which the phenomena of shock seemed to have been unusually slight, considering the supposed gravity of such wounds.

Thus far we have studied the set of symptoms known as shock, from a purely clinical point of view, without discussing their causes. For the authors' views on this latter subject, and for the relation between states of shock and the more permanent condition of reflex paralysis, we beg to refer the reader to our paper on Reflex Paralysis, which was issued March 10th, 1864, from the Surgeon-General's office, as Circular No. 6.

As the result of further and considerably larger experience, we have seen good reason to abide by the conclusions therein stated.

As regards the relative extent of "shock" which occurs in wounds of nerves and in flesh wounds, we are unable to speak from any extensive observation. The whole subject, however, requires, and would well repay, a more careful clinical study on the field and in the operating room.

Paralysis of Motion and Sensation.—Next in order among the immediate symptoms, are the losses of voluntary control and of sensation which follow instantly upon all grave wounds of nerves.

To study these phenomena, we reject five cases, namely, the wounds of nerves of single function, as of motion or sensation alone; the wounds of a nerve centre; and that of the sympathetic. We have remaining forty-three. In many of these there were direct nerve wounds, in a large proportion there was probably injury due alone to the near neighborhood of the ball in its passage through the part; and here again we would state that, although it is easy in some cases to say whether a ball touched a nerve or not, in the mass of cases it is impossible so to do. This point becomes of moment here, because, when we examine the cases under study, with reference to the amount of immediate paralysis of sensation and motion, we find among them many in which there was instant annihilation of the functions of the part, with the utmost certainty that there could have been no direct wounding of a large nerve. Thus, of forty-three cases, thirty-two exhibited total loss of

motion with defective sensation, or entire loss of that function. In the remaining eleven, there were partial loss of motion, and usually slight loss of sensation.

When we define a case as one of total loss of motion, it is to be understood that the whole limb became powerless at once. Sometimes the volitional control was regained very rapidly, and in a few cases very completely.

This condition of local shock is very curious. A man is shot in the thigh, the ball passes near the sciatic nerve, and instantly the limb is paralyzed; within a few minutes, or at the close of a day or a week, the volitional control in part returns, but finally there may be left some single group of muscles permanently paralyzed. Where we speak of the primary motor or sensory palsy as slight, it is meant either that it was slight in degree, or limited in extent.

The most difficult fact to explain in this connection, is the great frequency with which a gunshot injury of a nerve causes total loss of motion and very little of sensation. It would be natural to suppose that a ball striking a nerve, or passing near it, would equally damage its motor and sensory fibres. Practically, it is the motor filaments which suffer most severely, most often, and most extensively. Nor is this less true of the case in all stages, for we find that the lesions of motion are always the least readily relieved and the last to improve. As yet no plausible explanation of these facts has occurred to us. Nor can we conceive why, as sometimes happens, a ball should seem to have respected altogether the