

A CASE OF FRACTURE OF THE FIFTH CERVICAL VERTEBRA, IN WHICH AN OPERATION WAS DONE. DEATH ON THE EIGHTH DAY AFTER THE OPERATION.<sup>1</sup>

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**B.** L. WHITE, age nineteen years, had been strong and healthy. He was in bathing in a shallow pond and jumped from a spring-board head foremost into the water; his head struck the ground and he fell to the bottom. Remaining longer than usual under water, his companions became alarmed and went to his rescue. He was paralyzed from the neck down, with the exception of slight motion in the shoulders and elbows.

I saw him first three weeks after the injury. He had been treated by electricity and drugs and an operation had been discussed with the patient and his family.

He was brought to me, a distance of fifteen miles, in an express wagon, and placed under my care for an operation, if it offered any hope of relief.

I found a fairly well-nourished, muscular young man, lying in bed with his head held slightly backward, palpebral fissures somewhat smaller than natural, pupils slightly contracted and not active to light; the arms abducted and rotated outward, the elbows flexed, the forearms pronated, with fingers falling over deltoid regions. In the left arm there was paralysis of all the muscles except the biceps, brachialis anticus, supinator longus and deltoid. In the right arm there was some motion still in the extensors of the wrist and elbow, with some power of pronation of the forearm, this, however, did not affect the characteristic position of the arms, the right and left maintaining the same position. All forms of sensation were absent below the second rib in front and the second dorsal spine behind. (See Fig. I.).

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<sup>1</sup>Read before the Chambers County Medical Society, Sep., 1893.

There was no demonstrable zone of hyperalgesia above the line at which sensation began, although the patient complained when sharply touched at any point about the face and neck.

His breathing was entirely diaphragmatic and varied

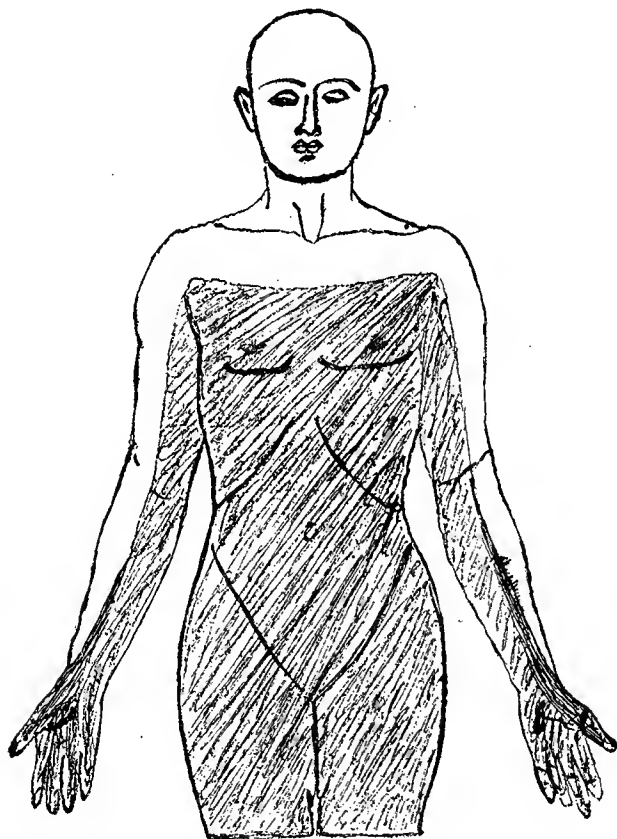


FIG I.

between twenty and twenty-six respirations per minute; his pulse was regular and strong, though increased to about ninety-five per minute. His skin, over the paralyzed area, was dry, glossy and felt warm; there had been no perceptible perspiration over this area since the accident. Above the line of paralysis the skin was reddish and, more

especially over the face and neck, the perspiration was constant and sometimes well marked. There was a large bed-sore extending from the sacrum to near the tip of the coccyx, and further out on either side were other sores, somewhat larger but not so deep; there was yet another under the right shoulder which extended from the third dorsal spine to the angle of the right scapula; there were also reddened patches over both outer malleoli; below the umbilicus, near the median line, were four peculiar abscesses, each presenting a slightly rounded contour about the size of a silver dollar; the skin over them was not reddened, but in the centre of each was a small scab which was easily removed, leaving a round hole through the skin which had the appearance of having been cut out with a shoemaker's punch. Each of these abscesses contained

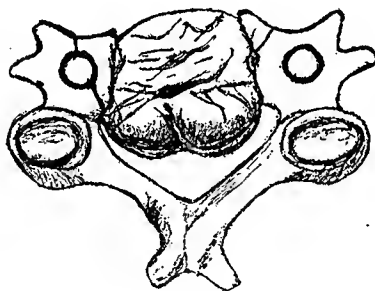


FIG. II.

from two to three drachms of pus and, after drainage and antiseptic cleaning, healed readily.

The bowels were moved mostly by enemata, although at times there was incontinence of fæces. The abdomen was generally distended, and flatus was passed at all times unconsciously. There was no priapism, but the penis was turgid and a glairy mucus was present at the meatus. There was incontinence of urine, and it dribbled away more or less constantly. The urine was highly ammoniacal, and there was a considerable degree of cystitis.

All the deep and superficial reflexes were totally absent.

When inserting the catheter to wash the bladder, no contraction of the muscles was found. Frequent careful examination with the finger of the anal sphincter showed

*a total absence of contraction in that muscle.* This is the first case recorded, of which I have any knowledge, in which this observation has been made. Examination of the spine posteriorly, and of the neck and throat, showed no abnormality. The temperature, which had varied from just a little above normal to 102, soon became more fixed, remaining most of the time less than 100. At two different periods his temperature rapidly rose to 104; but an enema reduced the fever each time, almost instantly.

The patient's appetite was good; his strength at times seemingly well preserved, at others appearing to decline.

He and his family were very anxious for an operation, if it offered any hope whatsoever.

Everything pointed to a total transverse destruction of the spinal cord, with probable degeneration from myelitis; but with all the facts placed before the patient, he yet urged an operation.

I decided, with very little hope of accomplishing any good, to operate as soon as the bed sore over the upper dorsal region had sufficiently healed.

The characteristic position of the arms and the limit of anæsthesia made it plain that the fifth cervical nerves were still intact; and that also on the right side there were fibres of the sixth motor nerve which were not destroyed.

Five weeks after the injury the operation was performed. I had decided to remove the laminae of the fifth and sixth cervical vertebrae.

All antiseptic and aseptic methods were strictly adhered to; the patient was placed on the operating table with a pillow under the abdomen and with the shoulders turned at an angle of about 45° and firmly held there by an assistant. Ether was given with satisfactory result; an incision was made six inches long over the vertebral spines, extending at the bones from the fourth cervical to the first dorsal. The tissues were cut rapidly away from the spinous processes and laminae of one side, the wound being packed with hot sponges while the other side was being operated upon. Hot sponges controlled the hemorrhage on this side; the sponges on both sides were held under the retractors while the canal was being opened. The hemorrhage throughout the operation was very satisfactorily controlled.

The spinous processes from the seventh and sixth cer-

vical vertebræ were removed close to the laminæ with curved bone forceps, and the lamina of the sixth cervical was removed with a ronguer. The dura-mater was slightly reddened and did not pulsate. There was no hemorrhage in the spinal canal nor within the dura. A curved probe was introduced under the lamina of the fifth cervical vertebra and revealed nothing abnormal, but when the body of the fifth was examined it was found to project backward and closed almost completely the spinal canal. See Fig. II.

The dura mater within this vertebra was lacerated on both sides at the point of exit of the nerves.

The spinal cord had unquestionably sustained a total transverse lesion and the operation was abandoned at this point.

The wound was united to its depths with silk worm gut sutures, and a small drainage was placed to the bottom and a careful protective dressing applied.

The operation lasted about one hour and produced no marked effect upon the patient's condition; hypodermic injections of strychnine had been given before and during the operation. After the effects of the anæsthetic had passed off the patient appeared little changed from the condition before the operation. He grew gradually weaker, however, and on the fourth day after the operation became delirious, and died on the eighth day.

His breathing was carefully noted and at no time did it assume the Cheyne-Stoke's character.

An examination of the wound only was allowed after death, and about six inches of the cord and the fractured vertebræ were removed. The drawing, Fig. II., was made from the fractured vertebræ with the assistance of the cut in Gray's Anatomy.

In jumping into the water, the patient's head must have been thrown violently forward, the fourth vertebra fracturing and forcing the body of the fifth backward into the spinal canal. The dura mater of the portion of the spinal cord removed showed a laceration about half an inch long on both sides. Further than this, it presented no marked change.

The spinal cord was firm at the lower part, but softer towards the injured portion and at the upper part; the upper portion appeared somewhat swollen. The crushed

part was very soft, being held together by the membranes. It was hardened in Müller's fluid and stained mostly with osmic acid.

The crushed portion was carefully examined in longitudinal sections and no nerve fibre found intact.

It is not to the credit of surgery to operate on any case when there is no chance for improvement.

In spinal injuries, the great question is, when should we operate and when should we not? It is clear that the operation in itself is not a dangerous one, and the danger of the operation should not be held, therefore, as a bar against its performance.

One thing is very evident, that injuries involving the cauda-equina are those which are most favorable for operation, and it is also evident that these are the cases in which delays are longest permissible. But as we approach the cervical region the injuries become more serious and operative relief less encouraging. What shall we do when the knee-jerks are abolished? We are led to believe that this indicates a total transverse lesion of the spinal cord, and in such a case, if any operation whatever should be done, it should be as soon as possible after the injury, in the hope that as many nerve fibres as possible may be saved from the inflammatory destruction produced by the pressure.

In those cases in which the reflexes yet exist we may wait (but I doubt the wisdom of such a course) the six or ten weeks which have been advised.

But in those cases *in which the reflexes are absent*, the earlier an operation is done the better.

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#### STRONTIUM BROMIDE IN EPILEPSY.

Roche (Lancet, September 26, 1896) warmly commends bromide of strontium and reports in detail or summary 16 cases. All had been previously treated with other bromides and all showed better results from the strontium. In some instances the improvement was not marked, in others very striking. None could be considered cured, but 8 of them at the time of the report had been free from fits for periods of from 4 to 16 months. The ordinary plan was to give 20 grains of bromide of strontium and 5 to 10 grains of one of the other bromides three times a day. The strontium salt was increased to 1 dram when necessary to control the fits and acne was prevented by the addition of arsenic.

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