

ART. VIII.—*Report of Three Cases of Gunshot Wound in which the Balls lodged in the Vertebral Canal, two Patients still Living; with Remarks on Division of the Spinal Cord without Immediate Death.* By PAUL F. EVE, M.D., Prof. of Surgery in Med. Depart. Univ. Nashville. (Read before the Tennessee Medical Society, April, 1868, and ordered to be published.)

A FEW months ago our worthy President notified me, that as every one selected to write an essay on "Injuries of the Spine" had declined, he hoped I would consent to do so. In reply it was stated that my library of thirty-six years' collection having been lost during the war, I had not the materials for the work. Apprehending, however, that there might be no paper presented on this interesting subject, the following cases with remarks have been prepared for presentation on this occasion.

CASE I. *Pistol-ball lodged in the spinal column; Paraplegia; Death in sixteen hours.*—F. W., of Morgan's cavalry, was shot by a six inch Derringer pistol about 10 P. M., October, 1863, in the Trout House, Atlanta, Georgia. He was seen by several surgeons that night, before being taken at 2 A. M. to the Gate City Hospital, then under my charge, and where he died at 2 P. M. the same day, making a period of sixteen hours after the reception of the wound. When first seen by me, some forty minutes from the occurrence, there were great prostration from shock, though the patient was drinking at the time; a small round opening an inch to the left of nipple, and a little below its horizontal level; its circumference blackened by burnt powder; dyspnoea; no cough or hæmoptysis, but free hæmatemesis; and partial paralysis of the inferior extremities. His sufferings soon became intense, manifested by continual restlessness and constant spasmodic startlings of the pelvis, thighs, and legs, which were best relieved by the inhalation of chloroform. The bladder being paralyzed, the urine had to be drawn off by a catheter. He took the unfavourable prognosis of his case quite calmly; referred with feeling to his family; and spoke of his recent raid into Kentucky. He sank evidently from exhaustion of both nervous and vascular systems, as his wounded stomach would tolerate little else than cold water in small quantities.

By careful *post-mortem* examination, we ascertained that the ball had fractured the left fifth rib about its middle; passing downwards and inwards, it traversed the left chest, perforated the lower portion of the upper lobe of the left lung, pericardium, cut the apex of the heart, then through the diaphragm and central portion of the stomach, and was found lodged in the body of the ninth or tenth dorsal vertebra, a portion of it projecting into the vertebral canal. We were surprised to find so little blood in the pleural cavity, and attempted to account for it from the facts that the ball was small in size compared to the *minié*, and had perforated the lung quite near its fissure into two lobes.

A notice of this interesting case was forwarded to Richmond soon after its occurrence, but I think never published. To make this report as accurate as possible, my efficient assistants in the hospital at the time of the casualty, viz., Dr. R. C. Thomas, now of Bowling Green, Ky., and Dr.

W. M. Wright, of Huntingdon, Tennessee, have each been recently consulted in regard to the above particulars. I can but regret not having secured the specimen and added it to my collection.

CASE II. Large pistol-ball lodged in the spine, followed by partial paralysis; Pirogoff's operation, then amputation of the leg; patient now in good health.—This also is a case of much interest, and its history extends through several years. I was first consulted by this patient in Atlanta, 1862, a short time after the retreat from Fishing Creek, but it was not until my return to Nashville, June, 1865, that the amputation of the foot was performed.

A. G. E., an enlisted soldier of General Forrest's cavalry, who served through several of his wonderful campaigns. Early in April, 1859, during a street encounter in Texas, he was severely wounded in the spine. He states that Captain T. came into town the 23d of April of that year, when a fight ensued, each being armed with Colt's dragoon six shooters of the old pattern, at a distance of about twelve paces, which resulted in the death of Captain T. and the maiming of my patient for life. One ball struck the latter's left temple, injuring the left eye and external ear; a second passed through the left thigh just above the knee-joint; and a third entered near the lower rib of the right side, ranging inwards towards the spine. He instantly fell upon the ground. In falling his pistol was involuntarily discharged, as he was in the act of firing it at that moment. Feeling no pain whatever, only a slight dizziness for a few seconds, he attempted to rise, but found he had no control of his legs. In a few more seconds, he picked up his pistol, found his hand perfectly steady, and at this final shot killed his antagonist. Each had fired six times, emptying their pistols.

At this time my patient was 24 years of age, weighed 140 pounds, was nearly six feet high, and in full vigorous health. He possessed great powers of endurance, and was noted while in the army for his resistance to the effects of hunger, fatigue, and with the exception of his right lower extremity, to cold or exposure of any kind.

The wound, which certainly involved the spinal cord, produced the following symptoms: The instant the ball penetrated the body, he experienced the sensation of numerous rays of heat apparently radiating from the spine, causing no definite pain, but quite a disagreeable sensation. He was taken up, carried into a store, laid on a counter, and as his pulse was feeble, whiskey given him with much benefit. His breathing became rapid and difficult. The wound was now probed, and the cavity of the abdomen found to have been penetrated. Consciousness was unimpaired, and he conversed freely with his friends. At 5 P. M., three hours after being wounded, he vomited his dinner; his extremities then became cold, and it was thought he was sinking. Brandy was now freely administered; heated rocks and hot water were applied, when reaction took place. The patient complained that his right foot was burning, and its sole was found blistered. He now became better, breathed easier, and believes to this day, that the hot rocks to his feet saved his life. At midnight, a catheter drew off bloody urine. He slept some during the night, and in the morning it was observed that his skin had become of a deep yellow colour, which continued two weeks. These symptoms certainly indicated disturbance in the functions of the kidneys and liver, if not lesion in the texture of these organs. He took at 4 P. M. a dose of castor oil, with a few drops of spirits of turpentine, which acted at 3 next morning, and on

the 24th he was decidedly better. He suffered no pain until about the first of May, when he was annoyed by distress in the region of the kidneys for six hours. Up to this date the use of catheters was necessitated, but he now commenced to urinate naturally; there was still little sensibility in the inferior extremities, and none in the right foot. He thinks it was about the 20th of this month he first experienced spasms in the right lower extremity, which continued at irregular intervals to the time of the removal of the foot by amputation. These twitches continued to harass him, sometimes for two hours, and were controlled by opiates and alcoholic stimulants. By the 10th of June, he commenced to walk around the bed, then with crutches, swinging the right foot by a suspensory from the shoulder. His general health now improved, the attacks simulating neuralgia in the thigh, leg, and most frequently in the foot of the right side, became less frequent and less severe. He was able in 1860 to raise the knee of that side, though the foot still hung downwards. He suffered chiefly from cold, and during the winter, while on a visit to Tennessee, it was frost-bitten, and an ulcer formed on the sole of it which was very difficult to heal.

In the spring of 1861, when Texas seceded, he volunteered in a cavalry company, hoping that an active soldier's life would prove beneficial, and so it did; until the disaster, and exposure to cold after the defeat at Fishing Creek. He was now transported to Atlanta, where I prescribed balsam of copaiva for his frost-bitten, half paralyzed right foot. He subsequently joined his regiment near Corinth, and continued with it until the winter of 1863-64, which he spent at Lauderdale Springs, Mississippi, as purveyor to a hospital. The spring of 1864 found him again in the saddle riding to Paducah, then at the capture of Fort Pillow and Memphis, at which latter place he was slightly wounded in his lame foot, and rendered unfit for duty ever since. The ulceration in the sole of the foot now extended, reaching the dorsum and ankle, and never healed. The deep structures became involved, the ulcers enlarged, the pain at times was very great, the discharge profuse, the toes pointing downwards, hanging useless and tripping at almost every step.

In consultation now held, it was decided to remove this useless, disorganized, and painful appendage to the leg. Pirogoff's amputation was performed August, 1865. The result he reported in these words: "The advantages derived from it no one can see as I do; none can know the sufferings endured, or the sense of relief I now enjoy."

This condition continued for some months, without the stump ever becoming perfectly sound. His irregular pains in this leg then recurring, he had the limb amputated about its middle, in November, 1866. Mr. E. is now a night watchman in one of our banks, and in good health except occasional recurrences of irregular nervous movements in the remaining portion of his right lower extremity. This account of his case, he pronounces correct.

CASE III. Ball in the dorsal vertebral cavity; Paraplegia; Trepanning without benefit.—In July, 1866, Mr. H. was brought from Kentucky to consult me for a wound he had received during the war. In General Wilson's raid through Alabama, in the winter of 1864-65, his regiment was charged, defeated, and pursued. Refusing to surrender, and being closely followed by the Federal cavalry, while holding the bridle in the left hand, the right being armed with a pistol, in the act of turning his body

to the left side to fire back, he was himself shot, falling instantly into a mud-puddle, his horse passing from under him. The pistol-ball entered to the left of the spinal column, about an inch from the spinous process of the sixth dorsal vertebra, in the cavity of which, or that of the seventh, it is supposed to be lodged. He immediately became paralyzed, except his arms and neck, and was taken to a house near by to die, as was supposed by two or three Federal surgeons, who, be it said to their honor, and that of our humane profession, treated him as kindly as they did their own wounded men.

During 1865, he managed to reach home in southern Kentucky, and would there, seated in a small chair, aided by his hands in slipping it from side to side, wander into the woods to spend the day alone, for, poor fellow, it is said he found little sympathy in his own family.

In consultation with several friends, members of our city Society as well as this one, it was determined to make an attempt to remove the ball, still compressing the spinal marrow, as the patient was to this time so paralytic that he was accompanied by a friend to wait upon him. He had even now no control of his left inferior extremity, and the right, which he moved a little, or when aided in doing so by others, would frequently take on violent contractions, tonic and clonic spasms, and become forcibly flexed on the buttocks. He had only imperfect sensibility in either of them. He could urinate but with difficulty, and the bowels acted only from drastic purgatives. Half a grain of the extract of *nux vomica*, with a grain of the extract of rhubarb and half a drop of croton oil, proved to be a good combination in his case.

After due preparation, a free incision was made through the cicatrix and an attempt made to follow this into the vertebral cavity; but so deep was the vertebral groove down to the transverse processes, so indistinct the track of this missile, indeed, we could not trace it; so deceptive the intervertebral foramina, &c.; but above all, so great the dread of exciting inflammation by wounding the sheath of the spinal cord, that we concluded, after using one crown of the trephine, of medium size, over what all believed to be the hole made by the bullet, to desist from further application of it. I am satisfied that this operation in the dorsal vertebræ, if not almost impracticable, is certainly one of the most difficult in surgery. It vividly recalls the case mentioned by the late Mr. Guthrie, in his *Commentaries on the Surgery of the Peninsular War*, of a patient who had received a pistol shot in the last dorsal or upper lumbar vertebra, who had searched London and Paris, in vain, for a surgeon willing to operate on him.

Velpéau states that Cline first, then Tyrrell, each tried to remove either splinters of bone, or blood compressing the cord, but their patients died in a short time after; and adds, "I can scarcely believe that a surgeon can meet with indications sufficiently precise to justify the repetition of these attempts with any expectation of success." We have the authority of Surgeon Thomas Longmore, of the British army, for the fact, that the late distinguished military surgeon of France, J. B. L. Baudens, extracted a ball lodged in the eleventh dorsal vertebra, which had caused compression and complete paraplegia. The paralysis at once ceased, but unfortunately tetanus supervened, and speedily proved fatal. In the *New York Journal of Medicine* for 1854, vol. iv., is the account of a very extensive operation on the vertebræ, performed by Dr. H. A. Potter, then of New York State, but who moved soon after to Michigan. The patient was severely wounded

by the limb of a tree falling sixty feet and striking him on the cervico-dorsal region, producing symptoms of compression on the medulla spinalis, so that, for three months, he could not move a finger or a toe, or tell when he was handled. Dr. P. made an incision from the second cervical to the third dorsal, and removed parts of the four inferior and two superior dorsal vertebræ. The patient was evidently improved by this operation, and his life prolonged from it, but died eighteen days after it from apparent suppuration from the lungs.

It may be that operative procedure for persisting compression of the spinal cord may hereafter be wisely limited to the removal, or attempt to remove, foreign bodies producing the pressure. Surgeon Alexander Shaw, the author, in *Holmes' Surgery*, of the article on Injuries to the Back, is decidedly opposed to all operative interference in these cases.

The incision, in my case, was about eight inches in length; its edges could, with difficulty, be retained in apposition, and required time to heal by granulation. Of course he derived no benefit from his visit to Nashville, and is now as he was when he came to me. My last intelligence from him is to the 30th of March, only a week ago, and from his family physician, Dr. J. P. McClendon.

It will be observed that this report embraces only *injuries of the spine* produced by gunshot wounds. Those arising from other sources are omitted to prevent prolixity, hence no allusion in this paper has been made to the recently suggested treatment of spinal irritation by bromide of potassium, or the valuable relief in chronic cases obtained by the use of India-rubber water beds.

Remarks on the question, Does a Division of the Spinal Cord necessarily induce Death?—We find in vol. ii. of the *Medical and Surgical History of the British Army*, which served in the Crimea and Turkey during the war against Russia, in 1854–55–56, presented to Parliament, under the head of gunshot wounds of the back and spine, with fracture of the vertebræ, and with lesion of the spinal cord, a total of 22 cases of officers and privates thus injured, every one of which proved fatal.

In Circular No. 6, War Department, Surgeon General's Office, U. S. Army, issued November, 1865, of 187 cases of gunshot fractures of the vertebræ, all died but seven. In six of these it is supposed that either the spinous or transverse processes only were involved, and in the seventh case, wounded on September 20th, 1863, at Chickamauga, Ga., the ball drove in the spinous process of the fourth lumbar vertebra, and lodged in the vertebral canal. The patient was brought to this city (Nashville) where the missile, with fragments of bone, was extracted. He was subsequently sent to Louisville; then to Jefferson Barracks, Missouri; thence to Indiana; and finally to Quincy, Illinois. When last heard from, he was reported to be recovering. I propose to add another case, making two of this nature, which occurred in the Federal service.

In the Army Medical Museum of the United States, located in Washington City, are 66 specimens of fatal vertebral gunshot wounds. In the catalogue there are 75 cases reported fatal, some of them beautifully illustrated in a volume of over 1000 pages. In one, occurring June 3d, 1864,

a conical ball shattered the transverse and articular processes of the eighth and ninth dorsal vertebrae. The patient immediately lost all sensation and motion below the wound. After lingering for sixteen days, gastritis supervened and he died on the 2d of July. The autopsy revealed the *spinal cord completely severed* at the seat of injury, and it was also found to be disorganized below and above it. The possibility of a patient surviving the complete division of the spinal marrow, has never, to our recollection, been discussed, and yet it is of interest to the profession. The opinion prevails that a "broken back man" must die, though this ultimate result will depend much upon the position of the wound in relation to the regions of the spine. The most fatal point of the cerebro-spinal axis is unquestionably the medulla oblongata, the conjunction of the brain and spinal cord. Its central vesicular neurine presides over respiration and deglutition, and is therefore properly considered the *centrum vitale*. The act of pithing by thrusting an awl between the occiput and atlas, kills an animal outright; so, too, will hanging destroy life instantly, when the odontoid process of the second vertebra is dislocated. Now, experience has taught us that lesions, either of the brain or spinal marrow, are fatal just in proportion as they approach the medulla oblongata. In the museum of the Middlesex Hospital is the specimen of an axis with a pistol ball imbedded in the base of the odontoid process. The man was shot from behind, horizontally, between the arches of the atlas and axis. His mistress, awake at the time of the shooting, dwelt upon the fact that the loud report of the pistol did not startle him, and says he never moved a limb, in other words was instantly killed.

A wound or compression to the cord in the cervical vertebrae is more mortal than in the dorsal, and this again more serious than in the lumbar region. When the latter is injured, the paraplegia is partial, and if near the *cauda equina*, the patient may linger for months, and even years; but if in the dorsal, few survive beyond three or four weeks; while in the cervical, if above the third vertebra, death is inevitable and sudden; and below this point, there is paralysis of all the limbs, and death is apt to occur in a few days or weeks at most. And as it is by these varying symptoms developed in a case after injury to the spine, that its diagnosis and prognosis are ascertained, and the best treatment to be pursued, the importance of the proposed question may well be inferred: Can life be preserved when the cord is divided?

The great English military surgeon of the close of the last and the first quarter of the present century, John Hennen, published the account of a sergeant in the Enniskillen Dragoons, who was struck at Waterloo by a piece of a Polish lance, which stuck fast between the spinous processes of the two last dorsal vertebrae. The patient was completely paralyzed until this was removed. He refers also to the case of Dr. Boutel, in the *Parisian Chirurgical Journal*, of a gunshot wound which com-

pletely divided the *medulla spinalis* at the tenth dorsal vertebra, after which the man lived twenty-six hours, could urinate but not defecate, and who, moreover, as in my own case at Atlanta, was affected with constant agitative movements of the pelvis and lower extremities.

Sir Astley Cooper, in his work on fractures and dislocations, says that the symptoms and results of injuries to the spinal cord differ relatively to the situation of the wound, whether this be above or below the third cervical vertebra, or origin of the phrenic nerve. He mentions a case in which the *medulla spinalis* was almost entirely divided; another wherein it was, for a considerable distance, completely softened, so that there was nothing remaining but the *empty sheath* in the canal; and he farther declares that when the patient survives this injury, viz., division of the cord, for some time, bulbs are organized at each end of it.

In September, 1849, surgeon Hutin, of the French army, presented to the Academy of Sciences, in Paris, a pathological preparation taken from a soldier dying of Bright's disease, who, in 1835, in Algeria, was struck by a ball in the right lateral surface of the spinous processes of the first two lumbar vertebrae. Paraplegia was the immediate result, and the wound, after suppurating three months, healed without the removal of the foreign body. The specimen exhibits the ball firmly implanted in the vertebral canal for the last fourteen years, and by it the right half of the end of the spinal cord, or rather commencement of the *cauda equina*, had been divided, the left half displaced by it, and the medullary substance much disorganized.

In the *American Journal of Medical Sciences*, vol. xxv., 1853, Dr. Parkman, of Boston, is said to have presented to the society for medical improvement of that city, an extensive fracture of the spinal column, with *complete division of the cord*, the patient surviving two months. The injury sustained in this case was a fracture through the body of the fifth dorsal vertebra, and the bodies of the third and fourth being separated from their laminae, were pushed in front of the sixth and seventh. The *division of the cord was complete, yet the patient lived two months.*

We next give a synopsis of a case reported by Dr. Eli Hurd, in the *New York Journal of Medicine* for 1845. Its title is—

“*Division of the spinal marrow; recovery of patient five years afterwards.*”
—In jumping from a wagon his feet slipped from under and he fell on his back. In attempting to rise he found his lower extremities paralyzed. Calling for assistance he stated that a chisel was sticking in his back, which he recollected was in his coat-tail pocket. It measured five inches in length to the shoulders, seven-eighths of an inch in width, and from a quarter of an inch at the shoulder, tapered to one-eighth of an inch in thickness at the cutting extremity. It required the united effort of several men to extricate this foreign body; and during the operation the patient suffered very little, but said he saw apparently vivid flashes of light, which were followed by total darkness. The wound was opposite the spinous process of the lower dorsal vertebrae. Total insensibility of the surface below it, with paralysis of the inferior extremities, bladder, and rectum, were the immediate consequences. He was prostrated for forty hours, and then reaction was followed by fever for several days. The wound healed

rapidly, the urine was drawn off by a catheter for eight days, and cathartics failed to move his bowels until aided by enemata. Sensibility returned in the skin on the fifth day, and imperfect use of the limbs about the fifteenth. Four years and seven months after the injury, so defective was sensation over the left knee, that without being conscious of it, he was so severely burnt that months were required to heal it. The reporter of this case entertains no doubt whatever but that the *spinal marrow was completely divided and afterwards united*. He thinks the cord may be considered no more than a bundle of nerves contained within a common sheath, and, like a nerve, might reunite after division as in tic douloureux.

A very curious case resulting from an extensive injury to the head and spine occurred to a young man in Virginia, 1845, who while cutting down a tree was struck by a large falling limb. Besides laying bare the occipital bone, and contusing his shoulders, there was also a supposed dislocation of the fifth and sixth cervical vertebræ, followed by total paralysis of all that portion of the body below the point injured. He had perfect paraplegia. A thread would define the sensitive parts from those not so, thus evident was the line of demarcation. The vital functions, respiration, secretion, assimilation, were normal, but the nerves of motion and sensation below the seat of injury never in the slightest degree resumed their offices. His mental vigour became unusually developed. He dragged himself, lying on his back in his little carriage, to places of excitement: the circus, parades, etc., were what he most enjoyed. In 1851, six years after date of the injury, he presented himself before the Greene County Medical Society, New York, and requested that his lower limbs should be amputated, as they were useless appendages to him, and retarded his roving peddling propensities. He said they took up too much room in his travelling vehicle. Being advised against the operation there, he sought advice elsewhere, and had both thighs amputated close to the hip-joint, *without the slightest pain or tremor of a muscle*. The stumps healed almost by the first intention, and the patient resumed his former course of bacchanalian life. He died suddenly in May, 1852. Singular as it may be, there was no doubt that the energy of this man was increased and his character changed by the spinal injury. (See *N. Y. Journ. of Med.*, 1853.)

Dr. Gross, in his *System of Surgery*, states that Dr. W. W. Keen furnished him a case proving how much injury the spine may sustain without fatal consequences.

A soldier was wounded at Gettysburg, July, 1863, and is the second instance already alluded to, in which death did not ensue in the U. S. Army, after the *medulla spinalis* was implicated by a gunshot wound; and we are surprised to find it has escaped the notice of the Surgeon General. A soldier was struck by a ball on the upper lip, which was found lodged in the body of the third cervical vertebra. *Sixteen fragments of bone* were removed at intervals, including the anterior half of the vertebral foramen, yet no hemorrhage followed. Paralysis of the extremities occurred, but subsided soon after the ball was removed, and the patient so fully recovered and without deformity, that he actually re-entered the service. This is certainly a most remarkable case.

The same author refers to another instance, the particulars of which he had obtained, but did not see the case, in which a ball passed between the fourth and fifth ribs, *cut the spinal cord in two*, except a mere thread, and lodged in the body of the seventh dorsal vertebra. Immediate loss of

motion and sensation ensued, and the patient, a man aged 30, died on the eighth day. He also gives an account of a case he attended with Dr. Thompson in Louisville, Kentucky, 1854, wherein a patient, intoxicated, aged 29, was wounded by a pistol shot, and after death, which transpired in three days and a half, the ball was found lying loose in the vertebral canal, between the last cervical and first dorsal vertebræ, and had disorganized (penetrating and pulpifying are the words used) the cord, and *cutting it in two* by projecting across it a fragment of bone. When shot, this patient fell as if struck upon the head, and for a moment it was thought life had fled. After reaction took place, he was found to be paralyzed from near the top of the sternum to the soles of his feet; the pulse was feeble and slow, respiration laborious, bowels torpid, and the bladder had to be relieved by a catheter, yet *he lived over three days*.

I recollect well the case of Captain Searle, of the U. S. Army, who was shot by the Indians during the last Seminole campaign in Florida. This occurred on November 25th, 1839, while that officer was seated in a common baggage wagon, through one side of which the ball passed, entered on the line of the last dorsal with the first lumbar vertebra on the right side, and where lodged was never ascertained. The immediate symptoms were loss of motion and sensation in the lower extremities, bladder and rectum paralyzed, and no feeling in the skin below Poupart's ligament. The catheter, castor oil, and enemata were resorted to, for about two years. In 1841, he found that the bladder would act by *tickling the side of the penis, behind the corona glandis*, and afterwards this would also induce the rectum to discharge its contents. This manipulation, however, did not communicate with the sensorium. The captain was still alive in Rhode Island, when I left Augusta, Georgia, in 1852, since which time I have lost sight of the case, but have an indistinct recollection of having heard that he had died.

Mr. Page, of Carlisle, England, attended a patient a few years ago, who was also seen by Mr. Syme and Dr. Duncan, of Edinburgh, who received an injury by a fall from a high terrace. From that moment complete paralysis of every part of the body followed, except of the head and the power to rotate it. He lived nearly fifteen months. An examination, after death, exposed a fractured cervical vertebra, either the fourth or fifth, with such displacement that the cord was nearly divided, it being reduced in size to less than a crow-quill for about three-eighths of an inch, and above and below it was a softened pulp. It is added, by the reporter of the case, that "there could be no doubt but that the *severance of the cord*, and the damage in the immediate neighbourhood of that point, were inflicted at the moment of the accident."

To Mr. Alexander Shaw, already referred to, we are indebted for our last case now given, which he says came under his care May, 1849, in Middlesex Hospital, London. The patient fell from a window, and was taken up in an insensible condition, recovering consciousness the next day. He was told he had fractured his spine. The pain in his back corresponded to an irregular projection over the fifth and sixth dorsal vertebræ. He was hemiplegic, and catheters were used for months, when he had so improved that he voided his urine naturally, and began to walk a little. He had now an interval of seven years, during which he enjoyed health, and led an active life. He then had a relapse, attributed to taking cold from riding on a diligence in France, but recovering from this, he followed again his usual pursuits for five years more. Thirteen years after the

injury, he began to drag his legs, which felt unusually heavy to him. He now became paraplegic again, entered the hospital, and died at the end of twenty-two years after his fall. In the vertebral canal was found an apparent collapse or *vacuity in the place of the cord*. *For two inches the substance of the cord had disappeared*, and there was a confused structure of the arachnoid and pia mater, the dura mater having undergone a less destructive change. Each end was soft and diffuent, and it was difficult to decide whether there was any nervous substance intervening between these, nothing being recognized as the remains of the spinal marrow; and yet, notwithstanding this pathological condition of it for inches, this man, a shoemaker, had pursued his trade and travelled extensively for nearly a quarter of a century.

In the review now of these cases here collected in a week or two, we have three in which the medulla spinalis was nearly divided, in one probably it was so divided, this patient having recovered, and in seven the division was known to have been complete. The authorities for these cases are Sir Astley Cooper; Surgeon Hntin, of the French army in Algiers, whose patient lived fourteen years; and Prof. Gross, in whose case all the cord was cut save a mere thread, death occurring in eight days. Dr. Eli Hurd reports the case of supposed division and reunion of the cord. The seven cases of its complete severance, without extinction of life, are:

1st. United States soldier, lived a month, see catalogue, Army Medical Museum, War Department.

2d. Surgeon Boutel, soldier in the French army, lived twenty-six days.

3d. Sir Astley Cooper.

4th. Dr. Parkman, of Boston, lived two months.

5th. Prof. Gross, lived three-and-a-half days.

6th. Surgeon Page, Carlisle, England, lived fifteen months.

7th. Surgeon Alexander Shaw, Middlesex Hospital, London, lived twenty-two years.

The conclusion, therefore, is indisputable, that death does not necessarily follow a division of the spinal cord.

ART. IX.—*Four Cases of Aneurism treated by Ligation*. By ROBERT REYBURN, M. D., Associate Professor of Anatomy and Professor of Clinical Surgery, Med. Dep. Georgetown College, D. C.

THE following cases of aneurism have been treated at the Freedmen's Hospital, Washington, D. C., during the past sixteen months, and are deemed sufficiently interesting to be placed on record:—

CASE I. *Aneurism of right primitive carotid*.—George W., aged 25, admitted Dec. 2, 1866, with hemiplegia of left side, the result, he states,