CASE IN WHICH THE OPERATION
OF
TREPHINING OF THE SPINE WAS
PERFORMED.

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Michael C—, a slight and well-made, although rather pallid and wasted man, 31 years of age, was admitted into the Whitworth Hospital, under Dr. Gordon's care, on May 27th, 1865. For some years he had been employed as an engineer on railways in the United States, and describes himself as having been a person of sober steady habits, active and healthy, up to the 27th of March last, when he met with an accident, of which he gives the following account :

Whilst hunting, his horse shied at a fence, and he was flung off into a gripe on his back, which came in contact with some stones. Immediately his lower limbs were paralysed ; he made an effort to get up, but found that he was completely powerless from the waist downwards. He was carried home in great pain ; for four or five days he had retention of

urine, requiring the introduction of the catheter; at this period the distension of the bladder caused acute pain.

After this the urine began to dribble away; it became, as he says, "very offensive and full of corruption-like matter."

From the first he had paralysis of the sphincter ani, with involuntary passage of fæces. For five weeks after the accident he was not conscious of sensation in the lower limbs; he had occasional priapism.

After admission to hospital he was carefully examined; his condition was as follows:

In the lower limbs muscular power was entirely lost as far up as the knees; except the sartorius, the muscles of the thigh had little or no power; he had no power over either the bladder or rectum. Sensation was lost in both feet; from the ankle to the knee he felt obscurely, the left leg being almost devoid of sensibility. There was hyperæsthesia of each thigh on the right side to so great an extent that he was distressed by rubbing the hand across the surface of it. Below the knee he could appreciate the difference between heat and cold—a vessel of warm water which, applied to the left thigh, was of an agreeable temperature, when applied to the right caused him to cry out that he was burned. He could tell without seeing them the position in which the lower limbs were placed. No reflex movements could be excited in any of the muscles below the knees; in each thigh reflex motion was readily aroused; on the right side the slightest touch of a hair, or even blowing on the surface, caused vigorous contractions, especially of the sartorius muscle. The lower limbs were considerably wasted; there was no œdema of the feet or ankles, which were bedewed with perspiration; the penis and scrotum were large and flabby, but not ulcerated; the orifice of the urethra was inflamed so that it was not possible to introduce a double-channelled silver catheter (size No. 10); a bed-sore about the size of half-a-crown had formed on the back. The urine was alkaline, very muddy and fœtid, containing a copious muco-purulent deposit; it was tinged with blood, and constantly dribbled away.

Upon examining the spinal column, the spinous process of one of the lower vertebræ was found to project to the extent shown in the accompanying cast; this projection was at a distance of four inches above a circle made round the body at the level of the umbilicus, and was not movable. The last dorsal or first lumbar vertebra was thus indicated as probably the seat of the injury.

The nature of his case and of the proposed operative procedure having been explained to the patient, the operation of trephining the spine was undertaken at his request. June 3rd.—Chloroform was given to the patient without his being removed from the bed on which he lay; the bed was then lifted opposite to a window, with the foot of it towards the light, and the patient was turned over on his face. An incision four inches long was made over the projecting spinous process of the vertebra already indicated; the tendinous origins of the spinal muscles were divided on each side close to the bone, and the muscular mass drawn aside by means of broad retractors; ice was then applied for a time until the venous hæmorrhage, which was not alarming, had entirely ceased. After ascertaining with the finger the extent of inequality which existed along the groove on each side of the spinous processes, it was resolved to remove the posterior arch of that vertebra the spinous process of which projected. This was accordingly done by cutting through the laminæ with bone forceps, and dividing the interspinous ligaments. The necrosis forceps which were used to grasp the spinous process of the portion about to be removed unfortunately nipped off this process near to its root, and thus caused some delay in removing the remaining part, of which it was now difficult to get a secure hold. After this was effected, however, the theca of the cord was brought into view at the bottom of the wound; there was no tension of it, neither was there any evidence of blood having been effused within it—it was therefore not opened.

As soon as all bleeding had ceased the wound was lightly dressed with water-dressing (a small piece of sponge having been put into the bottom of it), and the patient placed on his

side. The operation lasted fifty minutes; the amount of blood lost was not considerable.

The chloroform administered had produced sickness of stomach, which continued all day, and distressed the patient greatly.

He was ordered $\frac{1}{2}$ a grain of atropine in 6 ounces of water—dose, 1 drachm three times a day.

His exact condition, for some days after the operation, was reported as follows by Mr. Harman, clinical clerk.

June 4th (day succeeding operation).—Had not slept; stomach still irritable; felt great pain about the wound; has some sensation in the soles of the feet; had some wine; pulse fell during the day, but rose to 128 in the evening.

5th (second day after operation).—Looks uneasy and feverish, but talks cheerfully; ropy mucus in urine diminished; no signs of returning voluntary power over the bladder; reflex movements in the thighs not so readily excited as before the operation; the hyperæsthesia in the thighs diminished; no evidence of improved motor power in the lower limbs.

6th (third day).—Slept well; looks much better, and has regained his good temper; bowels confined; pulse 112; urine alkaline, and in appearance as it has been; a poultice was applied to the wound in the back, which is discharging freely; appetite good; complains of his vision being affected by the atropine.

7th (fourth day).—Pulse 110, good; complains of uneasiness in the back; the wound not looking so well as yesterday; warm dressing ordered to be applied underneath the poultice. Urine acid, and, although high coloured, depositing little sediment.

8th (fifth day).—Slept tolerably well; urine alkaline, copious, containing less deposit; sp. gr. 1011; an enema, which was administered to relieve flatulence, was not retained, the sphincter ani being completely paralysed; wound looks much better, its edges clean, the vertebral theca visible at the bottom of it. No appreciable difference as regards the functions of motion and sensation since the report of the

5th; bed-sore healing. Atropine continued; ordered also iodide of potassium.

14th (eleventh day).—Had a motion from the bowels, of the passage of which he was perfectly conscious; urine still alkaline, requiring to be drawn off by catheter. Bladder carefully washed out with tepid water every day.

17th (fourteenth day).—Urine acid and free from blood; bed-sore quite healed. The wound has made such good progress that he can lie on his back, and from this change of position he finds great relief; sensation in the thighs is now quite normal, both as to touch and temperature; sensation in the right leg and dorsum of the foot nearly normal, less perfect in the left leg. The power of the muscles of the thighs is so much increased that on flexing the knee he can straighten it; there is no sign of movement, however, in the muscles of the calf or toes.

23rd.—Urine continues acid since last report; the condition of the urethra is so much improved since the operation, that the double-channelled catheter, which could not be introduced before, now enters the orifice of the urethra readily, and is used accordingly for washing out the bladder.

29th.—Bladder daily regaining power; he can make water so as to empty it completely; urine still acid, free from blood and mucus.

July 12th.—For the last eight or nine days he has not required the introduction of the catheter at all, the power over the bladder being such as to force the water to a considerable distance (two feet). He complains much of pain in the lower limbs, which disturbs his rest. These are relieved by shampooing and rubbing in a liniment containing extract of belladonna and tinct. of aconite; has no startings in the legs; the accompanying portions of bone (weighing 1 grain) came this day from wound, which is closing in fast.

July 26th (in less than eight weeks from the operation).—Was able to go out to-day for an hour in a basket carriage, reclining on his back, and enjoyed it greatly; feels the back so strong that he wished to be allowed to sit up. He can turn himself from side to side readily, and with confidence.

From this time the patient went out into the open air daily when the weather permitted; he gained flesh and strength, his only complaints arising from the torpid state of his bowels and pains in the lower limbs.

During the month of August he had an attack attended with diarrhoea, sickness, and headache; at this time the urine became neutral, and on two or three occasions alkaline.

On August 24th he was carefully examined, and the following report noted.

His general health is excellent, and he is gaining flesh; urine acid, and free from any deposit, and ejected with force in a good stream; there is no hyperæsthesia of the lower limbs; sensation normal so far as the knees, but below the normal standard from this point downwards; voluntary motion is increased, most so in the left leg, which he can raise off the bed when he lies on his back, and which he can move across the other leg; but these movements are performed by the muscles of the thigh only, those of the calf and toes having no power; he can now sit upright.

He is taking small doses of strychnine, and electricity is used, which latter, although causing lively contractions in the muscles of the thighs, has no effect on those of the calf or toes.

He went out constantly during September and October when the weather permitted, until prevented by a smart feverish cold, with which he was attacked in the latter part of October.

At present he sits upright without the least discomfort or feeling of weakness in the back. He makes water, he says, as well as ever he did; he cannot stand or, of course, make attempt at walking, and although by forcing he can evacuate the bowels, yet the sphincter ani has not regained its power.¹

I was present at the time when my friend Doctor Gordon

¹ July 25th, 1866.—More than twelve months have now elapsed since the operation. As regards the use of the lower limbs, the patient's state has not improved since last report. Being unable to stand or walk, he moves about in an invalid chair. He has sought employment as a worker at a steam lathe at some iron works in the neighbourhood of Dublin.

operated upon this case, and through his kindness I have had an opportunity of watching it all along. I purpose limiting my observations to a few points connected with the case, and do not mean to enter upon the general question (which I have discussed at some length elsewhere¹) as to the propriety of trephining in cases of fractured spine.

The case just detailed proves that there is not anything in the operation in question which leads necessarily to a fatal issue, neither is it followed of necessity by very grave consequences in the way of exfoliation of bone, formation of matter, &c., making convalescence from it very tedious if not impossible. The patient was able to go out within eight weeks after the operation.

I do not think that any impartial person, even though differing from the view which I have advocated with regard to this operation, will deny that the operative procedure and the improvement which took place in C—'s case were related to each other as cause and effect.

The diminution of hyperæsthesia and exalted reflex action, the improvement in the urine and in the bed-sore and bladder, the increase of sensibility below the knees as well as of motor power in the thighs, followed the operation in such a way as to leave little doubt that they were due to it. It is possible, and even probable, that the subsidence of the hyperæsthesia and exalted reflex action in the right thigh may have been due, not to the removal of the portion of bone causing pressure or irritation of the cord, but to the counter-irritation produced by the wound beginning to suppurate.

This was the earliest sign of amendment—in consequence of it the patient got great relief from a distressing symptom, but possibly active counter-irritation by blisters or issues might have produced this result, which may also be supposed to have arisen from the internal administration of atropine. But this cannot be said for the disappearance of all mucopurulent deposit and blood from the urine, and the healing of the bed-sore, with, by degrees, the returning acidity of the urine. The improvement in sensation and motor power,

¹ 'Dublin Quarterly Journal of Medical Science,' August, 1865.

although considerable, has not been greater than is sometimes observed in cases not operated on, and which ultimately go to the bad ; but the perfect power which he now has over the bladder must, I conceive, in fairness be attributed to the operation. It is interesting to observe that this power became restored by steps just reversing the order in which it is lost in such cases ; the water, instead of constantly dribbling away, became retained, so that the use of the catheter was necessary, and it gradually became possible to dispense with it.

I sincerely hope the amount of success which has attended the operation in this case will encourage others to follow Doctor Gordon's example.

When we call to mind Sir Astley Cooper's words, that " if the operation saves only a life in one hundred, it is more than I have yet seen accomplished by surgery," the fact of this patient being in the state he now is must be looked upon as a triumphant result ; but may we not expect to profit by the experience of such cases ? C—'s case teaches at least two lessons of value with reference to future operations.

1st. The necessity of operating early, before pressure has produced more or less structural change in the cord, and prolonged paralysis has caused atrophy of the muscles.

2nd. The desirability of removing the posterior arch of more than one vertebra ; such a proceeding would add little to the difficulty or severity of the operation, and nothing to its danger ; it would obviously give a much better chance of the patient's recovery so far as standing and walking are concerned.