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MECHANICAL SUPPORT IN FRACTURE AND DISLOCATION OF THE SIXTH CERVICAL VERTEBRA.*

BY H. AUGUSTUS WILSON, M.D.†

Gentlemen:—I have the pleasure of bringing before you to-day a profound mechanical problem, which is, in addition, a thoroughly unique one. I venture to say that this is the first time such a case has been presented before a clinic. Dr. H. E. Hadra, of Galveston, Texas, who had charge of the man, read the report of the case at a meeting of the Texas Medical Association. In order that you may understand the case perfectly, I shall read you a brief abstract of his history, as presented at that time.

"To give a short history of the case, it may be stated that a man thirty years of age, working as a waiter in a restaurant, fell to the floor, striking with great force on his buttock. Immediately after, he felt intense pain in his neck, and was unable to move it. On examination, the sixth cervical vertebra

*A clinical lecture delivered at the Jefferson Medical College Hospital.

†Clinical Lecturer on Orthopedic Surgery.

was found pushed forward and turned around its vertical axis to the right, whilst the spinous process of the seventh vertebra appeared unusually prominent. Patient could not open his mouth more than an inch; from what cause I could never understand.

"Extension was made by the head, and, as the parts seemingly returned to their normal position, the neck was put in a firm cravat.

"Patient, from reasons of no medical interest, left the St. Mary's Hospital (Galveston, Texas) a few days after his admission, and returned to his former occupation, wearing constantly his apparatus, getting along well enough with an occasional hypodermatic injection of morphine. But once, when he imprudently bent his neck in a rapid and forcible way, the cravat having been left away, he fainted, and on recovering could not stand upright. His head and neck were turned to the right and kept perfectly stiff; right hand became numb, right arm weak; girdle pains around his upper abdomen; bladder not fnlly under control; slight priapism. In such a condition he came to the John Scaly Hospital on November 1, 1890, ten months after the first accident. His face flushed up on the slightest provoca-

tion; his mouth could not be opened over an inch; the left portion of the trapezius muscle was hard and protruding, forming a tumor; his right hand colder than the left; extreme hyperæsthesia on the right side; head was rolled around to the right, and the vertebræ in same position as on the first observation; muscles, though, reacted alike on both sides of the body to either current. Patient was put under chloroform, not being able to stand any manipulation without an anæsthetic. Head and upper portion of neck very movable, and crepitation distinctly heard. Reduction was easy, and the stiff cravat was applied again. In spite of frequent adjustment and modification of the retaining apparatus, patient grew speedily worse. Pains in back, arms, and around abdomen became unbearable, and walking impossible. He was in such a pitiful condition that he insisted upon any operation which would give the faintest hope of relief. I finally consented to cut down on the place of injury, which I did on December 22, 1890 (thirteen months after injury). My plan was to remove loose bones, if present; to sever the posterior ligaments, if they should be thickened and contracted; and finally, to

wire the spinous processes, in order to steady the vertebral column.

"From the improvement setting in every time the bones were well adjusted, I inferred that there was no serious change within the vertebral canal, nor in the cord itself. I therefore did not consider the opening of the canal called for. Not finding loose bones, I severed the ligamentum nuchæ and the interspinous ligaments transversely in several places, so as to expose the spinous processes fully, and also in order to remove the interference of the perhaps thickened and contracted ligaments which could have acted as an impediment to the replacement and retention of the dislocated parts, exactly as in other fractures or dislocations.

"I am satisfied that this part of the operation was not only unnecessary, but that it caused all the following inflammatory symptoms, as a good deal of laceration was unavoidable. The main aim of the operation, the wiring of the sixth and seventh spinous processes, was done with silver wire, carrying it four or five times around in a figure-of-8. The wound, which extended from the occiput down to the first dorsal vertebra, was then closed, a small drainage tube inserted right

over the place of wiring, and the stiff cravat reapplied. Patient did not improve for several days, but then gradually got better. After come weeks I thought that the wire had become loose, because he began to exhibit some of his former symptoms. He was put under chloroform again, and the wire removed and a new one fixed on. On this occasion it was easily seen that the lower end of the fractured spine slipped away from the upper for about one and a half inches to the right.

"From now on, improvement went on more rapidly. Patient was able three weeks ago (that is, twelve weeks after the operation) to move his head in a normal way in every direction without pain. He could open his mouth fully, walk as well as anybody else; no headache; no trouble with bladder or bowels. The right arm remained somewhat weaker, but was otherwise normal in all its functions and of normal sensation.

"The favorable condition, though, made me, I fear, too careless. I allowed him to be without the bandage occasionally, and removed the wire, as it kept a fistulous ulcer from closing. He became worse again, and has now considerable pain in his right arm

and shoulder. The spinous process of the sixth cervical vertebra is very tender on pressure, and requires further attention as the probable cause of the new trouble. Otherwise patient is well and can make use of his neck without any difficulty.

"This is my case, which shows that the operation (wiring fractured vertebræ) is feasible and effective. But I would be a poor surgeon if I had felt satisfied with my method and the course of my case."

This, gentlemen, is the early history of our case. The history subsequent to this, and since he came into the hospital on September 21st, has been made by Dr. E. W. Egan, our resident physician.

The patient is a widower. At the age of 16 years, he says, he had chancre, with secondary syphilis manifesting itself three weeks later. Five months later had lumps on his head, and severe pains in arms and legs which were always relieved by potassium iodide.

Since his admission to the wards of Jefferson Hospital, on September 21, 1891, he has suffered from pain in cervical region, with dull, numb sensations in occipital region.

He on one occasion, while walking across the floor at night, fainted and fell. On

several occasions the spinous process of the seventh cervical vertebra has been noticed to be unduly prominent, and at this time there is more severe pain diffused over the entire body. The reduction of this undue prominence by a peculiar manipulation is always followed by a cessation of his pain and discomfort.

Professor John H. Brinton, M.D., the surgeon on duty, has referred the case to the Orthopædic Department for mechanical support, as he does not faver further surgical procedure.

I candidly tell you that we have been unable to explain his present condition, but accept the statements of Dr. Hadra, and we will to-day consider him solely as a mechanical problem—that is, we are required to prevent the motion of the fractured and misplaced cervical vertebræ.

I wish to show you first the condition posteriorly, where you may see the cicatrix produced by the sloughing after the operation described in the history. By this spinal column you will notice how the spinous processes of the cerebral vertebræ are held in position; and you can see how impossible it would be, without cutting away the inter-

spinous ligaments, to pass a wire around the spinous processes (as was so ingeniously done by Dr. Hadra) so as to render them immobile; therefore the necessity for the operation to which Dr. Hadra resorted in order to secure the vertebræ. As to the method he adopted, it may be made clear by this model. Fastening the wire to the spinous process of the seventh vertebra, he wound it around the spinous process of the sixth cervical vertebra in the form of a figure 8. This was an extremely ingenious process, and the operation a very successful one, as is proved by the fact that the man lives in the comparatively comfortable state in which you see him. That he is not entirely well is not due to any failure in the operation, but to the intense gravity of his case and to unfortunate subsequent injury. You will remember that there are no wires attached to the fractured vertebræ now, for the history says that the first wire slipped off, and the second was removed because it kept up a fistulous opening. The man now comes to us because of severe pain in the cervical region, and danger of the slipping of the movable sixth vertebra, which has, I believe, occurred three times in six weeks since he came into this hospital.

Here is an apparatus, such as is ordinarily used in Potts' disease, which permits of the movement of the jaws and of the entire head, and as well lateral and rotary motion of the head to a limited extent, but it allows the head to be flexed and extended. These very movements of the head, which are desirable in certain cases of Potts' disease, in this case will give rise to all of the man's symptoms for which he now seeks relief. The apparatus I have devised especially for this case has been constructed by our apparatus-maker, A. Gustaf Gefoert. It has a firm foundation, resting upon his pelvis, and upon this four upright bands are arranged connecting the minerva or collar. The head rests in this, and not on the cervical vertebræ, and the weight of the head is carried to the pelvis. These bands are arranged with screws so that their length may be adjusted to suit the requirements of any changes that may occur.

As the apparatus is now applied, it will be perceived that he cannot move his jaws, for if he did he would move the occipital region and cause a movement of the vertebræ. Hence we have applied this strap over the forehead, which will hold the head immova-

ble and relieve the chin of all necessity of support. The chin portion is so arranged that it can be dropped out of the way when the strap is in use over the forehead. The chin can move without disturbing the position of the head. He can eat and manage his food, while wearing this apparatus, with the greatest ease. Therein lies the novelty of the apparatus, which is thoroughly original in design, and I bring the case before you chiefly to impress upon you the necessity of adapting all our apparatus to the peculiarities of the case. The man has entire relief from all his symptoms while wearing his apparatus, clearly indicating the benefit which he derives from its use.

One week later the patient was taken before the class, when the following remarks were made:

He has worn his apparatus constantly during the day, wearing at night a simpler form of collar merely to prevent dislocation and a sudden termination to his existence. He moves about the house at will, and we have put him to work at easy tasks simply to satisfy ourselves of his ability to be dismissed from the hospital. The ap-

paratus has answered every requirement; it has prevented separation of the portions of the broken sixth vertebra; it has caused his pains and other symptoms to entirely disappear; it has enabled him to eat by the application of the head band; and, as I have said, I wish to show you that it has met all the indications of the case. There is one problem, however, which has presented itself. The application of the steel brace from the hips has rendered it impossible for him to stoop. The only way that he can do so is by lowering the whole body, and this, as you see, is attended with considerable muscular tremor. To avoid this, the instrument-maker has constructed for him an elongated finger on the plan of the extension ladder. By means of this he can pick up any object from the floor without bending his body, and when folded he can readily carry it in his pocket.

The prognosis is decidedly unfavorable, and the best that I can hope for is ankylosis of all the cervical vertebræ, and this may occur to prevent his constantly recurring mishaps when he is not on his guard.

Philadelphia, Pa.