

CHISLEHURST, SIDCUP AND CRAY VALLEY
COTTAGE HOSPITAL.A CASE OF FRACTURE WITH DISLOCATION IN THE
CERVICAL REGION; NECROPSY.

(Under the care of Dr. G. W. DAVIS.)

THE following is an interesting account of a case of damage to the spinal cord in the cervical region, with fracture and displacement of parts of the fourth, fifth and six cervical vertebrae. It is probable that the cord was completely crushed by the injury, for from the first the deep reflexes were absent, and it is the absence of these which indicates the extent of the injury. There can be no doubt that the decision not to operate in the case of this patient was the correct one. The statistics of operation for paraplegia dependent on injury to the cervical spine are decidedly against any interference, especially in recent cases.

W. G. H.—, a sawyer aged twenty-one, was in a boat-swing on May 7th, 1892, with a companion. The swing was descending, and W. G. H.—, in the higher seat, let go the propelling rope to save his hat. In the act of leaning over the side to again secure the rope he was struck on the forehead by the first of the swing shores; this blow threw him across the swing, which then carried him to the further support, by which he was hurled to the ground, alighting on his head. The accident happened at 2.30 P.M. He was unconscious for an hour; his nose bled. He was thought to be drunk by the bystanders and was carried twenty feet and laid on the grass. A medical man who was present had him conveyed to the hospital. Dr. Davis was sent for at 5 P.M. and saw him at 5.20 P.M., about three hours after the accident. On admission the man was found to be very muscular and heavily built, with fair complexion. He was very collapsed but conscious. The pulse was heaving and slow (48); the head and face were markedly cyanosed; the smell, taste and hearing were good; the tongue could be protruded straightly; deglutition was good; the pupils were equal, they were contracted and did not react to light. No lesion was discovered on the head, except the bruise over the right frontal protuberance; there was partial abduction of the arms, which were externally rotated, and the forearms and wrists were so flexed that the fingers touched the upper part of the deltoid on the same side; this position of the arms was involuntary. There was impairment of sensation throughout both upper extremities; localisation of feeling was most marked over the region of the deltoid. There was much pain over the lower cervical region; over the right scapular region, and down the right arm; there was a feeling as of a weight on the right arm and the patient continually reiterated his request that the weight might be removed; there was complete motor and sensory paralysis from and below a line drawn on a level with the lower border of the second costal cartilage; bordering and above this line was a hyper-æsthetic zone of about one inch in breadth, but extending, so far as it was possible to test, all around the body. The skin reflexes were absent, with the exception of the plantar reflex; slight stimulation elicited no response, but if the finger nail was drawn sharply and firmly across the sole of the foot the great toe was, after a distinct interval, momentarily abducted to the extent of about one-eighth of an inch. The conjunctival reflex was normal. The knee-jerk and ankle-clonus were not obtainable. Faeces had been passed involuntarily between the time of accident and admission. There was partial priapism. His temperature was 96°. Four ounces of dark-coloured urine were drawn off and found to contain a trace of albumen. The respiration was altogether diaphragmatic. At 11 P.M. some vomiting occurred; besides much food-stuff, which contained a teaspoonful of blood-clot. The patient asked frequently to have his head raised—that is, that the head might be so extended as to tilt the chin and arch the neck. A cervical cushion, as suggested by Hilton, was tried, but could not be endured.

May 8th.—The shock seemed to have passed off. Cyanosis was much less marked. The zone of hyper-æsthesia was not so well defined. Pain was complained of in the abdomen when the urine was drawn off. The urine was normal. Bullæ had developed over the phalangeal end of the left index metacarpal and over the inner side of the left gastrocnemius. Towards evening he said, "The pain at the right arm is better and comes and goes, but the pain in the neck keeps jumping." Temperature at 8 A.M., 100°; at 8 P.M., 98.4°.

9th.—An enema of gruel and oil was administered without effect until followed by gentle massage over the course of the

colon. Towards evening the susceptibility to noises increased. Temperature at 8 A.M., 99° F.; at 8 P.M., 98.4° F.

10th.—Since the previous night he had been wandering at times. The sensitiveness to sound was increased; the discomfort and pain in the neck were such that no position of the head was bearable; an icebag was applied to the head; an enema followed by massage led to a motion of the bowels. Temperature at 8 A.M., 97.4° F.; at 8 P.M., 99° F.

11th.—Deep pressure over the trunk was distinctly felt, but could not be localised; he asked for the bedpan, but passed nothing but flatus, as on all previous days. A consultation of the medical officers of the hospital was held with a view to decide as to whether it would be desirable to interfere either by extension or by operation, or to place the patient in a fixed apparatus, and it was decided that it would be rather to the patient's interest to follow an expectant line of treatment, placing him in a fixed apparatus. Temperature at 8 A.M., 99° F.; at 8 P.M., 101° F.

12th.—A cushion under the neck was now well borne. There was a feeling over the trunk as of the pattering of mice running over it. There was some redness of the right elbow. Temperature at 8 A.M., 96.4°; at 8 P.M., 101°.

13th.—Towards the evening he complained of being "short of wind," and occasionally moved the muscles of the neck in laboured inspiration. Slight cyanosis was present about the lips and the ears. Temperature at midday, 100.2°; at 8 P.M., 102°.

14th.—Inspiration was laboured all day, the difficulty increasing as the day advanced, accompanied by a perpetual nodding of the head from the traction of the neck muscles at each inspiration. To the rhythm of this nodding he imagined that he heard the ringing of church bells (he was one of the ringers of the church bells in his parish). Several times in his delirium he threatened to commit suicide. Temperature at 8 A.M., 98°; at 8 P.M., 96°. There was some difficulty in swallowing late in the evening.

15th.—Died quietly at 2.30 A.M.

Necropsy.—Rigor mortis was well marked; there was much post-mortem hypostasis. Palpation with care over each separate spinous process failed to discover the site of the lesion. On reflecting the muscular flaps from the neural arches infiltration with extravasation into tissues hardened by coagulated inflammatory exudation was remarked opposite the left lamina of the fifth cervical vertebra, which was seen to be fractured about its centre in such a manner as to leave a gap of a quarter of an inch on the left side of the fifth arch. The neural arches of all the vertebrae were uncovered, but no further fracture was found, and the vertebrae from the atlas to the sixth cervical were removed for further examination. On reflection of the scalp a large discoloured patch was found just behind the right parietal eminence. On removal of the vertex the dura mater was found glued to the bone opposite the site of the bruised scalp and also at the corresponding part on the inner surface of the cerebrum, the medium of connexion being fresh lymph. The brain itself appeared to be healthy, but there was some fluid of a carmine tinge in the lateral ventricles. Further examination of the removed vertebrae showed the following: A longitudinal conjugate section through the vertebrae and included cord showed that the spinal canal was diminished by two-thirds of its extent through the projection backwards of the body of the fifth cervical vertebra, which was wedge-shaped and detached from the anterior common ligament. The cord opposite the site of pressure was greatly diminished in bulk and diffuent. Examination of the dry bones disclosed the following fractures:—Fourth vertebra: fracture of the right transverse process. Fifth vertebra: fracture of the left lamina and crushing and starring of the vertebral body. Sixth vertebra: fracture of the projecting lip on the superior surface of the vertebral body on the left side; detachment of the superior posterior edge of the body. No visceral lesion was discovered. The remainder of the spinal canal was not opened for lack of time.

Remarks by Dr. DAVIS.—Most of the symptoms in the case above reported have already been accounted for and their significance recognised: the contraction of the pupils in lesions above the second dorsal nerves; the fall of blood pressure from disconnexion of the vaso-motor nerves from the higher centres; the position of the arms in lesions involving the sixth cervical nerves.¹ Every case may, however, be the means of bringing about a more exact knowledge of some or more particular symptoms. The case reported would seem to assist in the elucidation of three points: 1. Although

¹ Wm. Thorburn in Brit. Med. Jour., vol. ii. 1888.

the deep reflexes and most of the skin reflexes are lost in complete transverse lesions of the cervical cord, yet that the plantar reflexes may and often do persist is shown by the case just narrated, and by two cases in St. Thomas's Hospital Reports, vol. xx., in one of which the cord was actually divided. The remaining points I would put as questions. 2. Would not the retention of urine occurring in these cases be perfectly well accounted for if it were understood that the proper muscles of the bladder were paralysed, an atony of the bladder resulting? "The nerves to the bladder (and vagina) [from the pelvic plexuses] contain a larger proportion of spinal nerves than those furnished to the other pelvic viscera."² 3. Would the retention of fæces be accounted for by the failure on the part of the colon to pass the fæces on to the rectum, such failure being brought about by paralysis of the intestinal muscles and the automatic plexuses from continual stimulation by the excess of carbonic acid always present in the blood?

Medical Societies.

ROYAL MEDICAL AND CHIRURGICAL SOCIETY.

The Absence of Sugar from Normal Human Urine.—Two Cases of Knee-trouble with difficulty in Locomotion depending upon an Elongation of the Ligamentum Patellæ, treated by Transplantation of the Tubercle of the Tibia.

AN ordinary meeting of this Society was held on Feb. 14th, the President, Sir Andrew Clark, in the chair.

Sir GEORGE JOHNSON communicated a paper by Mr. G. STILLINGFLEET JOHNSON on the Absence of Sugar from Normal Human Urine. Mr. Johnson stated that all the tests for sugar in common use depended upon its reducing action; thus in Fehling's test the quantity of sugar was gauged by the amount of cupric oxide reduced by a known volume of the solution. All human urine—normal as well as pathological—exerted some reducing action upon cupric salts in boiling alkaline solutions. Insufficient familiarity with this fact not infrequently led to the conclusion that sugar was present in a sample of urine simply because a certain amount of cupric oxide had been reduced thereby. Non-saccharine urines of high specific gravity were especially liable to be pronounced saccharine, because such urines, being highly concentrated, were richer than usual in the normal reducing agents. The object of the author of the paper was to indicate the nature of these "normal reducing agents." A full account of the chemical details of his experiments in connexion with this subject will be found in the Royal Society's Proceedings, vol. xliii., pp. 493 to 534. He agreed with Dr. Pavy in attributing one-fourth of the reducing action of normal human urine to the uric acid which it contained. He was, however, of opinion that normal human urines were absolutely non-saccharine; and in proof of this he described his method of separating the kreatinin of urine from that secretion, which differed from all methods hitherto described in effecting a complete removal of that base from the unconcentrated secretion by fractional precipitation with mercuric chloride. The properties of the kreatinin thus isolated were different from those of any base hitherto described, and this difference was especially remarkable when its reducing action was compared with that of other kreatinins. These differences in properties between bases having the same empirical formula were attributed to differences in atomic arrangement—isomerism. Although the method adopted—precipitation by mercuric chloride—could not remove sugar from solution in the urine, the filtrate from the mercurial salt of kreatinin was found in normal urines to be destitute of reducing action; and the determination of the quantity of kreatinin present (by weighing its mercury salt), conjoined with a careful estimation of the reducing action of the kreatinin itself, proved that the entire reducing action of a normal urine might be accounted for by the uric acid and kreatinin which it contained, one-fourth of the whole reduction being due to uric acid, and the remaining three-fourths to the kreatinin. A beautifully crystallised specimen of the reducing kreatinin of urine was exhibited. In confirmation of Mr. Johnson's conclusion that normal human urine was non-saccharine, C. Schwartz has described a very

delicate test for sugar which gives negative results with normal human urine.¹ This test was exhibited during the evening. It was performed as follows:—The urine was completely precipitated with lead acetate and filtered. The filtrate was rendered alkaline with potash and a solution of phenylhydrazine added. The mixture was well shaken and boiled. An orange colour developed, which was followed by an orange precipitate, when excess of acetic acid was added if sugar were present. Schwarz states, and Mr. Johnson had confirmed his statement, that normal urines give a negative result with this test. The conclusion was that sugar was absent from normal urine.—Dr. WILLIAM HUNTER differed from Mr. Johnson in regard to the limitation of reducing action to the uric acid and kreatinin, believing that there were other matters allied to hydrocarbons which effected the same change. He referred to a test with benzoyl chloride which threw down a compound of itself with carbohydrates. It was performed by adding to urine a mixture of 40 c.c. liquor potassæ and 5-10 c.c. benzoyl chloride. He considered that all normal urines contained carbohydrates more or less allied to glucose. One constituent, glycuronic acid, derived from certain articles of diet and drugs such as Borneo camphor, acted as a strong reducing agent. The second, known as the furfural test, consisted in adding to a sample of urine a 15 per cent. solution of α -naphthol with 0.5 cc. of sulphuric acid, the presence of carbo-hydrates being indicated by a delicate violet colour. He thought that Mr. Johnson's conclusions were only applicable to quantities of sugar sufficient to have a pathological significance, and he did not interpret them as proving the complete absence of this substance in healthy urine. Too much importance should not be attributed to the negative indications of the phenylhydrazine test, as he considered that the reducing capacity of the healthy urine could not be wholly accounted for by kreatinin and uric acid. He commented on the brilliant appearance of the crystals and contrasted their aspect with that of ordinary commercial kreatinin.—Dr. CURNOW stated that he had been able, by means of the phenyl-hydrazine test, to detect so small a quantity of sugar as one-tenth of a grain in an ounce of urine. The test was, he thought, sufficiently simple to be used for clinical purposes. He adverted to the peculiar globular form assumed by the particles of the precipitate under high powers of the microscope. He had also added to non-saccharine urine solutions of urate of potass and of kreatinin in large quantities, and had found that these bodies did not in the slightest degree interfere with the efficiency of the test. It was on this account that he strongly recommended it for ordinary clinical uses.—Dr. HAIG welcomed the new test, and quoted a case in which Fehling's solution continued to be reduced by the urine while the patient adhered to a nitrogenous diet, but disappeared on his returning to a mixed diet; and inferred that the reduction of copper was not produced by sugar but by the excess of the nitrogenous extractives.—Dr. GEORGE HARLEY referred to the statement made about thirty years ago by Bence Jones that all normal urines contained a trace of sugar, which had been vigorously disputed by other observers, some attributing the reducing power to uric acid, some to kreatinin, and others to undetermined hydrocarbons. Udranzky first precipitated the reducing agents by means of benzoyl chloride; Widenksi later separated this precipitate into starchy matters and a trace of grape sugar. He said that Fischer anticipated Schwartz in publishing the phenylhydrazine test. He still adhered to the idea that normal urines were not always free from traces of sugar, its presence depending on the individual and the diet.—Sir G. JOHNSON, in reply, said that he had not denied the presence of carbo-hydrates but only of sugar in normal urine. He had separated the reducing agents after measuring the reducing power of the urine and had found that the uric acid and kreatinin exactly accounted for this, leaving no room for any other reducing agents. He accounted for the purity and excellence of the kreatinin crystals exhibited by his methods of separating them, which allowed the substance to precipitate gradually from the filtrate after various impurities, such as uric acid, had been brought down immediately by the addition of the mercuric chloride.

Mr. WALSHAM described two cases of Knee Trouble depending upon an Elongation of the Ligamentum Patellæ. The first case occurred in a young woman twenty-one years old. She complained of pain and difficulty in walking and that she was liable to fall suddenly without warning, from the patella slipping over one or other condyle. The falls were so frequent and unexpected that she was incapacitated for her duties as

² Quain, p. 665, vol. i.

¹ Pharm. Zeit., xxxiii., 465.