ON THE USE
OF THE
SUBCARBONATE OF IRON
IN
TETANUS;

BY JOHN ELLIOTSON, M.D. CANTAB., F.R.S.,
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, AND
PHYSICIAN TO AND LECTURER ON THE PRACTICE OF MEDICINE IN
ST. THOMAS'S HOSPITAL.

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IN a paper which the Society did me the honour of publishing, upon the Subcarbonate of Iron, in the first part of the thirteenth volume of our Transactions, my object was to show that this medicine *might* be given in doses of several drams every few hours,—probably in any quantity that does not mechanically disturb the alimentary canal *, and

* “ When the medicine is proper, I believe there is generally no limit to the quantity which may be taken, except the unwillingness of the patient to swallow it, and the inability of the stomach to manage so heavy a mass. Neither head-ache, thirst, heat, foulness of tongue, griping, nor constipation, has occurred, nor been increased if already present. Nay, pain, and

frequently even where head-ache, vertigo, &c., would have appeared to forbid its use ; and that it was one of the best remedies of chorea.

In a postscript to my paper upon the use of the sulphate of copper in chronic diarrhœa, published in the second part of the same volume, I stated that, although ignorant, at the time of my first communication upon the medicine, whether large doses were at all superior to those in common use, I had since met with several instances of diseases yielding rapidly to them, after resisting the latter, and with nine more cases of chorea, all of which were treated with it and all cured*.

heat of the head, and giddiness, existed already in some cases, and ceased during its employment." "I wish not to assert that such inconveniences will never occur ; but the absence of them in all my trials justifies me in believing that they will not prove common occurrences with even half-ounce doses." "I believe that when it excites and disturbs, this arises from a peculiar susceptibility to its influence."—P. 236. It must be remembered, that I always give it in treacle ; and that where the bowels are *already* costive, as it greatly augments the mass of the fæces, it may easily accumulate, unless the costiveness is regularly obviated.

* "I have since attended nine cases of the disease, *every one* of which yielded to the remedy. Some, like the former cases, were attended by head-ache ; some had resisted other means. The time usually required varied from six to ten weeks,—one was cured in four, and one in not fewer than twelve. I could not then satisfy myself that large doses were at all superior to small ones in any disease, but I have now met with several instances of disease yielding at once to large doses, after resisting those in common use."—P. 466.

I also mentioned having “treated a genuine case of traumatic tetanus with it, in doses of half an ounce every two hours, taken with treacle diffused in beef tea, and that the mitigation of the disease, upon its exhibition, was too obvious for me not to ascribe the cure to the remedy.” The following are the particulars of the case.

Charles Frazier, a middle-aged man, met with a compound dislocation of the great toe, by the fall of a heavy weight upon it, December 10, 1825, and was taken to St. Thomas’s Hospital.

On the 24th, in the evening, the lower jaw began to be stiff, and the mouth could not be completely opened. I saw him the following morning, when the utmost separation of the jaws barely allowed the tongue to protrude; and I ordered the bowels to be cleared by $\mathfrak{z}$ ij. of the oleum terebinthinæ, and then $\mathfrak{z}$ ss. of the subcarbonate of iron to be taken every two hours. As he had but one stool from the oil, the apothecary repeated the dose in the evening, and procured six evacuations, and finding the man unable to swallow the subcarbonate made, as is customary with me, into an electuary with twice its weight of treacle, he substituted musk. The man took one dose only of the iron, and four doses of musk.

25th. The next morning, the mouth was more closed, and the pulse was 136, about which I under-

stood it had been before the trismus began. By directing each dose of the electuary to be diffused in a cup of beef tea, I enabled the man to swallow it very well, and from this time it was taken regularly. I allowed him ℥ssij. of strong beef tea daily.

26th. I found the trismus rather increased, the abdominal muscles growing hard, and deglutition difficult; pain had been felt at the epigastrium, and the tongue had been bitten in his sleep. The countenance was anxious. There had been two stools, with a little tenesmus, and the pulse was still 136. In addition to his beef tea, I ordered ℥ss. of wine daily.

27th. The trismus was a little diminished, and his countenance and spirits improved; but there had been no stool, nor any sleep. A common clyster was prescribed. A small quantity of pus was evacuated from the foot.

28th. To-day, also, the symptoms were a little improved. There was rather less trismus, and the abdominal muscles were much less hard. He had slept somewhat, and the pulse was 112. More matter was let out from the foot. Two common clysters had been given, but had produced only scanty and fluid evacuations. An injection of colocynth was therefore substituted.

29th. He now felt much better,—had slept

three hours,—had rather less trismus, and swallowed with much less difficulty,—the abdomen was tolerably soft,—the pulse about 120, but variable. There had been three stools. The allowance of strong beef tea was increased to *ibiv*.

30th. The tetanic symptoms were still more diminished. The dorsum of the foot was very much inflamed, and the bowels had not been relieved. Castor oil was ordered.

31st. He opened his mouth so wide, and swallowed so well, that, at his own request, he was allowed mutton chops, in addition to his half pint of wine and strong beef tea. Had had several watery stools, with some *scybal*a. The pulse was 108.

1st Jan. So much improvement was visible, and he had slept so well, that I ordered the subcarbonate to be taken only every four hours, and, on account of diarrhœa, to be no longer mixed with treacle preparatorily to its diffusion in beef tea.

2d and 3d. He continued to mend rapidly, *though the foot was so painful as to deprive him of rest*. From the subcarbonate being no longer taken in treacle, and the original costiveness not having been carefully obviated by the regular use of clysters night and morning, some accumulation had taken place in the large intestines, and the dry subcarbonate in the rectum gave him considerable

uneasiness. His pulse was only ninety-six ; he ate his mutton-chops well ; was to drink a pot of porter instead of his half pint of wine, and the medicine was to be given only every six hours.

7th. To-day he was quite well, with the exception of his foot, and ceased to be under my care.

The foot afterwards healed perfectly, and the man left the hospital full of gratitude, convinced that his life had been saved.

The result of this case was highly gratifying, but did not surprise me. I had not given the remedy at random, but according to what I conceived a fair analogy. Neuralgia, paralysis agitans, chorea, and tetanus appear all to be affections of the nerves, or those parts of the brain and spinal marrow which are immediately connected with them. These affections are evidently not of necessity structural, because in all, the disease often rather suddenly ceases, and because after death nothing is generally to be discovered. Neither are they of necessity inflammatory, both because also of the latter circumstance, and because antiphlogistic measures with mercury *generally* fail to remove them. The affection in each of these diseases has also this peculiarity,—that narcotics are of very uncertain utility in subduing it; so that I was convinced, as stated in my last paper, “that we are upon a wrong scent in our attempts to

cure tetanus and hydrophobia by narcotics, and that we should employ other remedies which exert peculiar actions upon the nervous system”*. The power of subcarbonate of iron over neuralgia, unconnected with inflammation or structural change, thus led me to employ it in paralysis agitans, and in the first case I succeeded†. I was then encouraged to exhibit it in chorea, and my success is already before the Society. My resolution was now taken to treat the first case of tetanus with it that should fall under my care.

But, besides having employed it by analogy, I could not doubt that the remedy had cured the disease, because this gradually increased till it was taken, and even during the first and second day of its exhibition; after which the symptoms declined in severity, and ceased altogether in about twelve days. Instances of traumatic tetanus are generally fatal, and, when they are not, they usually decline in a very gradual manner, and terminate at the end of some weeks. So inefficacious are opium, venesection, hot and cold bathing, mercury, bark, wine, and all the remedies ordinarily tried, that Dr. Parry concludes that “the cure of acute tetanus still remains to be sought, and since we have so little analogy to direct our search, it will, he fears, not readily be found”‡: and Sir James Mac-

* Vol. XIII. p. 467.

† Vol. XIII. pp. 240 et seq.

‡ Cases of Tetanus and Rabies Contagiosa, p. 24.

grigor states, that, after some hundreds of cases, during the peninsular war, affording room for extensive trials of the same remedies, as well as of potass, purgatives, digitalis, and local means, he is "obliged to confess, that little or no dependence is to be placed in any of the remedies, and that the method of cure is yet to be discovered."*

Lastly, the medicine was given in such doses, and so perseveringly, that, if it possessed any virtues, these were brought in full force against the disease; and it was not combined with other means. Still, the case was solitary, and I could not prove that, if left to itself, it would not have run through an equally mild course. I therefore did not detail it to the Profession, but determined to wait patiently for another opportunity of putting the remedy to the test. Nearly three years elapsed before such an opportunity occurred; but upon the 6th of last month a case fell under my care at St. Thomas's, also traumatic and infinitely more severe, but which, under the same treatment, ceased after a few days to increase in violence, began in a few more to subside, and terminated favourably in little more than another week.

Thursday, Nov. 6, 1828. Bryan Macguire, aged 44, a labourer, was admitted into George's

* Medico-Chirurgical Transactions. Vol. VI. p. 459.

Ward, labouring under trismus and opisthotonos. The mouth could be only half opened, and the tongue had been severely bitten in his sleep. The muscles of the back and abdomen were rigid, the body arched considerably, and, during the spasms, the pain at the epigastrium was described as dreadful. The forehead was wrinkled, and the angles of the mouth drawn up, giving an expression of extreme agony. The pulse was seventy-six, regular, soft, and rather full.

On the preceding Friday he first felt a little stiffness on each side of the lower jaw, and this had increased ever since. On the Tuesday he first experienced a tightness with catchings at the epigastrium, and at night could not sleep on account of his tongue being frequently bitten; and he sweated profusely. On the Wednesday all these symptoms increased, and opisthotonos began. During the whole of the last week he had been very chilly.

Exactly a fortnight previously to his admission, his right thumb was jammed between two pieces of logwood. The skin at the root of the nail was slightly torn, and a little matter formed under the nail, and escaped on one side. I found the thumb slightly swollen and tender; a small dry crust was observable at the root of the nail, and the nail was evidently separating, but without any pus below it.

The bowels not having been relieved for four days, I ordered him instantly $\mathfrak{z}\text{ij}$ of oleum terebinthinæ, followed by $\mathfrak{z}\text{ss.}$ of oleum ricini every hour till a motion was procured; after which he was to take $\mathfrak{z}\text{ij}$ of the subcarbonate of iron formed into an electuary with treacle, diffused in strong beef tea, every two hours. He was allowed lbij . of strong beef tea daily.

Friday, 7th. There had been seven stools, the first dark, the rest yellow and healthy. The pulse was sixty, but rose during the spasms to eighty-eight. The temperature in the axilla was 99° . The symptoms were rather increased. The dose of the iron was augmented to $\mathfrak{z}\text{ij}$, and a common injection of gruel, salt, and oil prescribed.

8th. There had been four liquid stools from the injection. The trunk was more arched, the abdominal muscles harder, the pain at the epigastrium more severe and frequent. The pulse was eighty-eight, and weaker.

The dose of the iron was increased to $\mathfrak{z}\text{ss.}$ and a common injection ordered.

9th. The injection had produced two or three rather lumpy stools. The body was still more arched, and the muscles of the thigh felt hard. The slightest thing excited an exacerbation, so that I was compelled to request the pupils not to

visit him, except in company with myself. The mouth could only be opened a quarter of an inch less even than at his admission. The pulse was sixty-four and weak: the respirations twenty-two.

A pint of milk, and of porter, were added to his diet, and the injection ordered to be administered twice a day.

10th. Each injection had come away exactly in the state it was administered, and been followed by several large dark red balls, without any pain. This continued to be the case every day till the dose of the medicine was diminished. To ensure the facility of their discharge, the injection was from this time employed three times a day. The symptoms remained much at the same point from the 9th to the 13th. I discovered that above double the dose of the medicine was given that I intended, but as it produced no inconvenience, and the progress of the disease was evidently arrested, I made no alteration.

13th. He was somewhat better. 14th. Decidedly better—the abdomen less arched and hard; the paroxysms less severe and frequent. I noticed, by means of the stethoscope, that, during the attack of spasm, inspiration was made with a strong sonorous rattle, and, immediately when the spasm was over, with no more than the healthy murmur.

I could not repeat the observation, as he never afterwards experienced an exacerbation at my visits. From this time the medicine was not taken in the night.

16th. The paroxysms were far less severe and frequent.

17th. The abdomen was soft, and the trunk very little arched, and he had suffered but four paroxysms in the last forty-eight hours. The medicine was now given only every four hours. From this time he rapidly improved, had but one exacerbation in the twenty-four hours, and that at night and gradually slighter; and was so well on the 25th that I discontinued his medicine.

I am ignorant whether, if even the cure was effected by the remedy, a smaller quantity would not have been sufficient. I believe that in most cases of disease, doses of $\mathfrak{z}\text{i}$ or $\mathfrak{z}\text{ij}$, two or three times a day, answer every purpose. But knowing as I did, that indefinite quantities are generally borne without inconvenience, and that large doses sometimes succeed after small ones have failed, and having a terrible disease to treat, which renders the system callous to many agents, and requires the full force of remedies to subdue it, I did not feel justified in trying whether less would accomplish the end. Among the large number of

cases of tetanus upon record, I have read one only in which iron was exhibited, and then, together with many other means, the sulphate was given in doses of five grains every two hours, to a negress twelve years of age, for four days. She recovered *.

Should iron prove a remedy in tetanus, I am aware that some cases will be too rapid for its action to be exerted, and that in others the degree of trismus will prevent its sufficient exhibition.

But I dare not assert that these two cases were cured by the medicine, and I never before published upon the powers of a remedy, till long and careful experience had satisfied me that my results would be confirmed by all those who employed the remedy in the *same manner*, and under the *same circumstances* of the *same diseases* in which I had employed it. Yet when the facts formerly mentioned, of my having originally employed iron in tetanus from analogy; of the usual fatality of the

* Memoirs of the Medical Society of London. Vol. VI. 1805. p. 77 et seq. The case was written in 1796, and the author does not lay any stress upon the iron. Oxyde of zinc, bark, opium, brandy, oleum succinatum, the hot bath, a clyster of tartarized antimony, and incision of a cicatrized burn followed by the application of caustic, were all simultaneously employed. But three exacerbations of spasm occurred after the application of the caustic.

disease, and the inefficacy of ordinary measures; of the gradual decline of the symptoms, in both my cases, soon after the commencement of the treatment; and of the magnitude of the quantities taken, are considered; together with the fact that these two successful cases are the only ones treated by me either in this way or in the Hospital at all, and the probability of a length of time elapsing before I meet with the disease again, I trust I shall be pardoned for communicating them to the Society.

P.S. Feb. 4, 1829. I lose no time in communicating the following case to the Society.

James Goodall, aged 15, was admitted into St. Thomas's Hospital, on February 17th, labouring under tetanus. The jaws were all but completely closed; the brow was corrugated, the angles of the mouth drawn up, the body greatly arched backwards, and rather bent to the right side. The pain of the loins was incessant and dreadful, and the spasms most severe and frequent. A few hours after his admission, they actually raised him from his bed, while his arms were extended and his countenance livid and expressive of the utmost agony. The surface was hot and bedewed with sweat, and the pulse 140.

A chilblain had existed over the right tendo Achillis for about a fortnight, and had broken on the 8th. It looked well. He had been working in the cold.

The trismus had begun upon the 14th, and the opisthotonos on the 16th.

I cleared his bowels with an injection of oil of turpentine, and commenced the exhibition of the subcarbonate of iron in doses of half an ounce every two hours, at two o'clock in the afternoon.

The following day he continued much the same, and at eight o'clock in the evening, another dreadful spasm took place, and lasted half an hour, when he died. I was not present at the inspection, but the brain and spinal marrow were found perfectly healthy, as in so many other cases of this disease. Several white spots were seen in the lining membrane of the descending aorta; the lungs were gorged with blood, and the urinary bladder very much contracted. Nothing else unusual was observable.

I have felt it my duty to make this case known to the Society, but do not consider that it affords any argument against the use of iron in the disease, any more than that the former cases prove the efficacy of the medicine. The subcarbonate

does not appear to me to exert any influence, even if it be efficacious, in less than two or three days ; and I stated that I had no doubt some cases of tetanus would be too rapid to be influenced by it. In this instance the exhibition was not begun before the afternoon of the fourth day, and the patient died on the fifth. I trust therefore that the Profession will pursue the enquiry into the powers of iron in the disease.