ORIGINAL COMMUNICATIONS.

CASE OF TETANUS OCCURRING TEN DAYS AFTER PARTURITION.

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[Read before the Pathological Society of Reading, December 6th, 1854.]

Mrs. J., aged 41 years, was the wife of a coal-merchant, who was also a dealer in marine stores—otherwise bones, rags, and old iron; as well as a vendor of butter, bacon, and cheese. She had borne seven children previous to the present accouchement; all of her labours had been more or less difficult, and some of them attended with profuse hæmorrhage. In October 1850, she was confined with her sixth child, when she was attended by a midwife. Hæmorrhage to an almost extreme degree having followed, Mr. Muggeridge was called in (to whom I am indebted for these details, but whose knowledge of the patient does not extend anterior to this date). He succeeded in arresting the loss of blood by pressure, cold applications, cool air, stimulants, and tincture of ergot. She had a favourable recovery, and nursed her infant, although her aspect for a long time told the serious loss of blood she had sustained.

In May 1852, she was again confined, but two months prior to the expected time. The labour began in the morning with hæmorrhage; and, although directed to go to bed, she persisted in remaining in attendance in her shop till 9 o'clock in the evening, when Mr. Muggeridge was again sent for. The loss of blood had continued all day, as was to be expected from her exertions in her business, notwithstanding the astringent medicines prescribed. At half-past twelve at midnight, the child was born. The placenta was adherent to the upper part of the womb, requiring the introduction of the hand for its extraction; after which, there was considerable flooding, producing fainting and retching. Under the use of brandy and secale, she again recovered; but was further exhausted by diarrhoea. Her convalescence was slow; no milk was secreted; and the infant expired at the age of two months, the time at which, according to calculation, it ought to have been born.

Mr. Muggeridge was again engaged to attend her in November of 1854. He appears not to have seen her in the interval; but he states that she had completely recovered her health. He was informed that for the last two months she had suffered much from swelling of the legs and feet; that a vein had ruptured on one occasion, from which she had lost from half a pint to a pint of blood, which she succeeded in arresting by a bandage. Her husband stated that she had rheumatism. Labour began about half-past ten on the evening of the 11th November, and the infant was expelled at five o'clock on the following morning, without other assistance than a dose of tincture of ergot, with very little hæmorrhage. The placenta was left to the efforts of nature for half an hour, when gentle traction of the funis was tried; but finding it did not advance, the abdominal bandage was tightened; and as there was no hæmorrhage, it was left till the expiration of an hour from the birth of the child. Ergot was again given, friction over the uterus was employed, and more forcible traction applied to the cord, which gave way at its insertion into the placenta. Mr. Muggeridge then attempted to introduce his hand for its extraction, when he found it opposed by an hour-glass contraction. The restlessness of the patient, and the ineffectual cooperation received from her mother and husband, who were the only nurses, compelled him to request the assistance of Mr. Harrison, who brought the placenta away with its membranes complete, a little after seven o'clock. There was no hæmorrhage to alarm; the pulse was 90; there was no syncope nor retching. She was

ordered to be kept quiet for three hours: at the end of this time the pulse was 80. In the evening she passed a pint or more of urine.

Second day. She complained of pains in the legs, for which friction, with an anodyne liniment, and five grains of Dover's powder every four hours, and saline mixture every five or six hours, were prescribed.

Third day. She had passed a good night; the pains in her legs were gone; milk had formed in the mammae; the infant sucked; her pulse was 80; her skin was moist; and the lochia were natural. The powders were now directed to be taken every six hours, and the mixture every three or four hours, and castor oil to regulate the bowels.

Fifth day. All was going on well, and she took a mutton chop and a quarter of a pint of porter. From this date her convalescence continued without interruption; and on the *ninth day*, she expressed a wish to resume her duties in the shop in a few days, which her medical attendant strenuously recommended her not to do; though he had reason to believe she had been down stairs on the eighth, the preceding day.

Eleventh day. Mr. Muggeridge was sent for at half-past nine o'clock A.M., when he found her complaining of stiffness about the neck, which she supposed to proceed from yawning or talking too much. She had passed a good night; her bowels had acted twice on the preceding day without medicine. There was no redness or enlargement of the fauces; but, under the impression that these symptoms proceeded from cold taken while sitting up, rest in bed, fomentations, and sinapisms, were ordered to the neck and throat; and five grains of Dover's powder with saline mixture every four hours were again had recourse to.

Twelfth day. She was found to have passed a bad night. One powder only had been taken at two efforts, and no nourishment swallowed since the visit of yesterday. The jaws were spasmodically closed; and she complained of great difficulty of swallowing, the attempt at which brought on severe spasm. The masseters, sterno-cleido-mastoidei, and all the other muscles of the neck, were contracted and rigid. Trismus with all its horrors had now clearly manifested itself, and for which no excentric cause could be assigned. There was neither external wound, abrasion, or contusion, to account for it, nor had any injury been inflicted by the hand of the operator, or laceration of the perineum during the labour. It may not be unworthy of notice here to insert a remark of the husband, in reference to or in the absence of any other visible or assignable cause, "that he had recently lost a horse by lock-jaw, which his wife was very partial to, and that another was still suffering from that malady, and that this had preyed much on her mind." Although the age is past when this mode of accounting for pathological phenomena obtained credence, I thought it worth while to mention it among the coincidences related in medical histories.

At noon on this the twelfth day, I was requested to see her in consultation with Mr. Muggeridge. I found the patient in a room about twelve feet square, partially filled with litter of the husband's trade, filthy, and neglected. The foot of the bed on a line about three feet from the fireplace, opposite the window, and the head close to the door on the right side, which opened from the stairs, at the foot of which was the hall door; on the right, the entrance to the shop; on the left, that of an equally slovenly and ill-ventilated parlour. I am thus particular in these topographical details, as they may assist in our conjectures as to the predisposing or exciting causes of this obscure malady; especially when it is remembered that at this period the air was chilly, damp, and foggy, with slight frost at night.

The sufferer was lying on her back, with flushed cheeks, freely perspiring skin, pulse 100, full, soft, regular; the teeth were firmly clenched; the muscles of the neck perfectly rigid; the intellect was clear. She could articulate feebly through her teeth, and complained much of pain in the nape of the neck; and employed a handkerchief under the occiput, by which she pulled with her hands when she wished to change her position. Her husband now informed

us that, before the difficulty of swallowing had become so great, he had given her a good deal of rum in gruel, of his own accord, as he knew it was "softening to the throat and chest". On requesting her to sit up and try to swallow a teaspoonful of liquid, a few drops of which only were admitted between the teeth, a violent spasm of the cervical muscles ensued, with a sense of suffocation, which proved her perfect incapacity for deglutition. A blister was ordered to the back of the neck and down the spine, to be afterwards dressed with strong mercurial ointment; and a drachm of the same unguent to be rubbed inside each thigh night and morning. Five grains of calomel rolled in a little honey were ordered to be pushed in between the teeth, in the hope that it might be carried down the pharynx; a quarter of a pint of beef-tea to be thrown up the bowel every four hours; and in the afternoon an enema of turpentine and castor oil; and an anodyne liniment to be applied to the neck and throat.

Thirteenth day. At our first visit, 10 A.M., we found that the blister had risen well. She had had several injections of beef-tea; but the terebinthinate enema had returned unaccompanied by feces. She could open her mouth partially, and her mother informed us she had swallowed at intervals during the night about half a pint of beef-tea; but, on her making the attempt in our presence, violent spasm was induced. She still complained of the same pain in the back of her neck, and experienced the like difficulty in moving her head. As the bowels had not been moved, the turpentine enema was ordered to be repeated, and the mercurial inunction continued: and as much beef-tea as possible to be given by the mouth, or injected *per anum*, if necessary.

At 9 P.M. Mr. Muggeridge called on me to report that two purgative enemata had been given, but without any evacuation of fecal matters; that the spasms continued with increased frequency and violence, extending to the arms; and causing slight opisthotonos. The skin was still perspiring; the pulse 90. Under these circumstances, I suggested a drop of croton oil, with five grains of calomel, to be placed on the tongue; and chloroform to be used if the spasm continued. At half-past eleven, Mr. Muggeridge was again sent for, the spasms having returned with excruciating agony. They, however, had ceased before his arrival. He found her much exhausted, with feeble pulse, perfectly sensible, and able to open her mouth. She sank exhausted at a quarter past twelve o'clock, at the end of the third day from the commencement of the attack, and the thirteenth after delivery.

A *post mortem* examination could not be obtained.

REMARKS. That this was a case of true tetanus will, I believe, be admitted by all who have favoured me with attention to these details. Was it traumatic or idiopathic? I believe it to have been the latter; for there was no reason to suppose that any injury had been done to the perineum during labour, or to the uterus or its passages in the attempts to extract the secundines. Fortunately, this is a rare disease in obstetric practice, and is not noticed in the systemic works on midwifery. It has been known to follow injuries or disease of the unimpregnated womb; more frequently to follow abortion; but very rarely parturition at the full period. The older writers, Aretæus and others, believed that females were more liable to lock-jaw than males; but modern statistics give a widely opposite conclusion. In an admirable paper by Professor Simpson, of Edinburgh, in the *Monthly Journal* for February last (who has been at great pains to collect all the cases on record of tetanus connected with the puerperal state), it is proved from the tables of the Registrar-General that, out of 1069 fatal cases of tetanus, 829 were males, 240 females; or, in other words, 77 per cent. were males, 23 females, or in the proportion of four to one. How many out of these 240 cases in the female sex were connected with traumatic irritation, or injury of the uterus, there is no means of judging.

In examining the history of the case before us, as far as my data extend, let us see if there is anything in it predisposing to this disease; and the only point seems to be (ex-

cepting the unhealthy air of the apartment in which she lived) *hæmorrhage*, of which she had several attacks. Dr. Simpson, in the paper above referred to, speaks of this complication having occurred in his fourth, fifth, seventh, eleventh, and twelfth cases; and, although he does not allude in these instances to this special symptom as having anything to do in the causation of the subsequent attack of tetanus, yet I thought it just, in our scrutiny of the cause of this obscure disease, not to let it pass unheeded.

Among the other causes assigned for lock-jaw are cold and damp, whether applied by currents of cold air, or otherwise. Dr. Simpson relates some interesting examples of this, in his xii (*bis*), xiii, xiv, xv, and xvi cases. Hennen, in his *Military Surgery*, as quoted by Romberg, says that the sudden impression of a current of cold air or a draught may be shewn to act as an exciting cause. And Dupuytren observed that tetanus was most apt to occur in hospitals that were badly ventilated, and when cold draughts impinged on the patients. Was this the cause in our patient? In the description I have already given of the position of her bed and the room, I had this object in view: as she sat up in bed with the door open at her right shoulder in the line of the draught of the fire-place, she might have experienced the baneful influence of a cold current; for be it remembered that her skin had been kept constantly perspiring, which would render her more susceptible; and the weather, as before stated, was chilly and damp.

The late Dr. Duncan, jun., used to relate in his lectures, when I was at Edinburgh, the case of a student who, having over-heated himself by exercise, took off his coat, and sat with his back to an open window: he was shortly after seized with acute tetanus, of which he died. On examination after death, the membranes of the spinal cord were found highly inflamed. Is it not possible the same state of the membranes might have ensued in this instance also?

Instances of traumatic tetanus, occurring after surgical operations in child-birth, are also given by Dr. Simpson. One followed the operation of turning; another, the Cæsaræan operation. That tetanus is not a more frequent sequence of mechanical or surgical injuries to the uterine organs, relatively to other operations, is explained by the fact that, as the female organ is chiefly supplied by nerves from the great sympathetic; and this disease, as stated by Mr. Curling and other pathologists, is more easily excited in parts supplied by the cerebro-spinal system.

Having thus cursorily reviewed the predisposing and exciting causes of tetanus generally, and pointed out as far as we could their existence in the history before us, let us now inquire how far they explain or bear upon the occurrence of the disease in this unfortunate instance. Lock-jaw is now admitted to consist essentially when fully developed, in an exalted or superexcited condition of the reflex spinal system, or of some segment or portion of this system. Was this excitement produced by irritation of a centripetal nerve from an irritated or abraded surface of the uterine organs? or was it a poison generated there, and taken into the blood; and thus, like strychnine or brucine, exciting the motor discharges which produce the clonic spasms? or was it meningitis of the cord? On these points, Dr. Simpson offers some very ingenious hypothetical remarks, which I will beg leave here to transcribe:—

"1. We have in obstetric pathology evidence, almost amounting to certainty, that the analogous super-excitable state of the cerebro-spinal system of nerves, which gives rise to eclampsia or puerperal convulsions, is generally produced by the existence of a morbid poison in the blood. And it seems not improbable that the generation of a special blood-poison, at the site of the wound or elsewhere, may sometimes, in the same way, give rise to obstetrical or surgical tetanus. We know indeed that the introduction into the blood of particular vegetable poisons is capable of exciting an artificial disease quite analogous to tetanus: strychnine and brucine have both of them, as is well known, this effect.

"2. We know further, with regard to the tetanising

effects of these agents, that they do not necessarily require to circulate in the blood in order to produce their special effect. In the lower animals, when strychnine or brucine is applied directly to the spinal cord, tetanic effects instantly follow; and in all probability, when they are introduced into the blood, they produce their tetanising consequences by being carried in the current of the circulation to the cord; thus toxicologically influencing it as if they had been primarily applied to it. Centric irritation or centric morbid conditions of the cord (and, it may be, of the cerebro-spinal system) may lead on, according to these experiments, to tetanic disease, independently of any morbid condition of the blood. . . .

"3. The appropriate and specific affection of the spinal cord, or cerebro-spinal system, constituting traumatic tetanus, would appear to be sometimes, if not always, a condition excited by some influence propagated upwards along the nerves, from the seat of the injury or wound to the central portions of the nervous system. In proof of this, we have the fact that occasionally (as in cases published by Hicks, Murray, Larrey, etc.), but not often, the artificial division of the nervous communication between the seat of the wound and the nervous centres has arrested the disease, when performed in a very early stage of the attack. What the nature of the transmitted influence may be, we have no means at present of judging. But we have analogies for the transmission itself in some of the phenomena of electrical induction and propagation. And let me further add, that the symptoms of tetanus assimilate themselves very greatly to a rapid succession of electrical or galvanic currents, transmitted peripherally from a nervous trunk or centre to the sets of muscles affected.

"At the present time, various physiologists are busy with recondite inquiries into the laws pertaining to the electromotive powers of the nervous and muscular systems of the body. When our knowledge of these laws is more advanced, physicians will perhaps be able to deduce from them a truer and a juster pathology of tetanus and other convulsive diseases."

Which of these hypotheses explains most clearly the case I have just related, it is difficult to decide; but I am inclined to think that the draughts of cold air to which she was exposed may have excited inflammation of the cord and its membranes, and produced the disease, in a constitution highly predisposed both by the puerperal state and the circumstances by which she was surrounded; and this view of the case directed the treatment adopted. Perhaps chloroform ought to have been employed at the commencement; but the want of adequate attendants, and officious interference of a self-willed husband, prevented it.

Reading, January 1855.

ON THE CAUSE OF THE EMPTINESS OF THE ARTERIES AFTER DEATH.

By I. L. W. THUDICHUM, M.D.

[Read before the Physiological Section of the Medical Society of London, January 9th, 1855.]

THE remarkable phenomenon of the emptiness of the arteries after death, which retarded the discovery of the circulation, and reserved it for more modern times, was urged by the opponents of Harvey as their principal and insuperable objection to the new doctrine; and this source of difficulty the discoverer naturally was most anxious to overcome, and to make it harmonise with the general principles of the circulation, which he had just promulgated. He devoted to this object the second part of his exposition; and, after having in the first part established the fact of the circulation, he entered in the second into an explanation of the causes by which the blood is moved in its course; and these causes he vested exclusively in the heart, the propulsive power of which, he maintained, drives the blood through

the whole of the arterial and venous canals. But here again arose the conflict with the fact of the vacuity of the arteries after death; and unfortunately, as if the clearness and simplicity of his genius had failed to support him in that contest, he was led, we think, into a labyrinth of elaborate deductions and of ingenious but somewhat evasive arguments, which leaves an unpleasant impression that his attempt to give an explanation of the powers by the operation of which one half of the channels of the blood are emptied of that fluid after death, would ultimately be found to be admissible only so long as investigation remained imperfect. This was tacitly admitted by the followers of Harvey, who brought the arteries to the aid of the heart; and, dividing the labour of the circulation, invested these tubes with an active propulsive force. It is, therefore, not a little surprising, after this admission of the insufficiency of the heart to perform the functions attributed solely to it by Harvey, to find his doctrine advanced again and supported in a paper, recently the subject of an animated discussion before this Society. The fallacy in Harvey's explanation, as quoted by Dr. Richardson, so ably elucidated by many of the earlier writers, so completely pointed out by Carson as early as 1820, and again adverted to in the late discussion before this Society by Drs. Snow and Pavy, is, that the heart is supposed to drive blood through the remote portion of the arterial system without some impinging medium, without pushing something before it, which of course is blood again, and which at last would still have to remain in the arteries. This fallacious conjecture was supported by statements altogether, as I believe, destitute of proof; such as, that in animals which have been killed by processes which make the suspension of the heart's action the proximate cause of death (such as suffocation by drowning, asphyxia by irrespirable gases), the arteries contain blood as well as the veins—a statement which has been described as the exact reverse of the fact.

The followers of Harvey, by investing the arteries with a heart-like force, by no means removed the difficulty. With Carson, we find the difficulty only placed a little further on in the system. The very disciples of Harvey show, by their numerous attempts to strengthen their position, that they are not satisfied with their explanation, which is indeed only a combination of their own, based upon too conservative a principle. With all respect due to this feeling of veneration, we regret to see the similarity which the bequests of Harvey have to the relics of Hunter in the College Museum: they must not be touched, even if they could be improved tenfold.

The causes which retard the improvement of the doctrine of the circulation did certainly not originate with the illustrious discoverer himself. If any man knew that no physiological knowledge could be final for times to come, Harvey did. But we behold in the history of our own science the remarkable fact so often observed in the world's history, that a master has propounded a reformed doctrine, which he himself declared open to improvement in the course of the progress of science; and that his disciples have made the doctrine an orthodox article of faith, declaring it, against the will of its originator, unaccessible to improvement. But surely the days of Dr. Hales have passed; and we no longer think the laws of hydrostatics inapplicable to the circulation—an opinion, however, to which even Hunter inclined, and in which he was joined by a generation adorned with such names as Charles Bell and Lawrence.

In the course of the analysis of the fact to the consideration of which we have devoted these lines, there are several questions to be answered, of which the most important are, Are the arteries, or part of them, found devoid of blood always, or only in a majority of cases; what is their condition if devoid of blood? and what if they contain blood? and under what circumstances do they contain blood?

In cases where they are devoid of blood, they contain—

1. A very small quantity of gas, viz., oxygen, with an exceedingly small proportion of nitrogen and vapour of