Original Articles.

A CASE OF TETANUS FOLLOWING ABORTION,
TREATED BY ANTITOXIN; RECOVERY.¹

BY CHARLES F. WITHINGTON, M.D.,
Visiting Physician, Boston City Hospital.

Mrs. A. L., aged thirty. The patient is of Scottish descent, was born in Nova Scotia, has lived in the States for the last six years, is by trade a dressmaker. Her father, mother, seven brothers and one sister are all alive and well. With the exception of measles and scarlet fever in childhood, has had no sickness. Catamenia began at seventeen, regular. Drinks three to five cups of tea daily; no alcohol. She entered the hospital September 16, 1895, with the following history:

Her last menstruation was the latter part of June. She was married July 1st. August 25th, having done a hard day's work the previous day cleaning house, she was taken with cramps, pain and flowing, and miscarried of a fetus about the "size of a chestnut." She is persistent in her statement that neither instruments nor medicines were employed to bring on the miscarriage. She had had coitus from once to twice daily from the time of her marriage till the miscarriage.

The above statements of the patient regarding the date of marriage, etc., were in part contradicted later by friends, who asserted that the marriage was a forced one, the patient being already pregnant, and that the fetus expelled was of a size corresponding to more than two and a half months. But no cross-examination could elicit evidence of criminal abortion. Of the incidents connected with the labor we have no definite history. Dr. H. S. Rowen, of Brighton, was called to the patient two days after her miscarriage, and in response to my request has kindly written out a statement of the case beginning at that date. He says:

On August 28th I was sent for, and found the patient in bed, with a temperature of 101°. Slight abdominal tenderness; uterus enlarged and tender; considerable odor to flow, and quite a white deposit on the cervix. I thoroughly curetted and douched, and one week later patient was able to sit up, dressed.

Three days later I was again sent for, and found her up and about but complaining of stiffness in the neck and lower jaw. Temperature normal. Within three days this stiffness spread throughout the entire body, but seemed to be more central in the jaws, neck, back and legs. At the end of a week patient began to have cramps in legs and jaw. These cramps varied in intensity and in number according to the attention and number of sympathetic friends present in the room.

The patient ran along this way for about nine days, when I sent her to the hospital. During her stay at home there was an absence of fever up to within three days of her leaving home, when it ranged between 100° and 102°. Repeated examinations of the abdomen and uterus failed to show any signs of remaining sepsis; no tenderness, and a complete involution of the uterus. Large quantities of liquid nourishment (mainly milk) were given and retained. I endeavored to get her to partake of a little bread and butter on one occasion, and succeeded in getting her to take a fairly generous bite; but on my leaving the room together with the attendant, she was observed to deliberately spit it out. The next day she succeeded in opening her jaws and eating a pear.

A common occurrence with her was to get her tongue

out between her teeth, have a contraction (a mild opisthotonos), bite the tongue (but never drawing blood), and then proceed to force her tongue back between her teeth with the aid of a split clothes-pin. Urination and defecation were normal. Heart and lungs the same. No ankle-clonus; knee-jerks normal; sensation unimpaired.

Further history from patient and friends indicates that from the first seizure, about September 7th, to September 16th, when she came to the hospital, there were several of these attacks.

She once asked a friend to bend her legs, saying that she felt a choking spell coming on. She made a moaning sound with the lips closed; then the arms were alternately extended and flexed; then followed general rigidity, frothing at the mouth, the eyeballs rolled up, the face blue. She remained convulsed for about ten minutes, and was sleepy afterwards. There was no involuntary discharge. There were several friends in the room at the time of this convulsion, and she afterward accused one of having choked her. One attack at least occurred when the patient was alone. At times there were involuntary discharges of feces and urine.

During the whole ten days between the first attack and her admission to the hospital she has avowed that she could not open her mouth. During sleep the jaw drops a little and the tongue falls forward. It has been caught and bitten several times; and for a while she was kept with a clothes-pin in her mouth. Incessant drooling. Has had some delusions of sight and hearing, and has addressed remarks to persons who were not present. Has lain in bed continuously, but has slept little.

Physical examination on September 17th, showed a well-developed and well-nourished young woman; red hair, good color. The tongue protruded slowly between half-open jaws, was moist, slight coat, marks of biting. Pulse regular, rapid, good strength and volume. Organs of chest and abdomen apparently normal, but attempts at palpation of abdomen brought on rigidity of muscles. Patellar and plantar reflexes both increased. Marked ankle clonus, right side. Eye muscles normal and pupils equal. No uterine discharge.

There was, when she was first seen, a general tonic rigidity of all the muscles which yielded slightly to continuous pressure. After a short time, the muscles became relaxed, but at intervals of a few minutes she gave a start, and a cry of pain, the body stiffened, the arms were flexed (the left arm more than the right), the legs straightened, the feet extended. Trismus, marked. Risus sardonicus; opisthotonos, so that one's arm could pass easily under the lumbar spine, the body resting entirely on the cervical and sacral vertebrae. Eyes fixed and staring. Face cyanosed.

During the attacks, sensation seemed suspended, but was good in the intervals, in which she was able to swallow liquids, and to open the jaws a half-inch or more. It was at first thought that the seizures were rather more frequent when she was watched. An attempt to move the legs or arms, or even to feed her sometimes brought on an attack, but the seizures came also without such a cause. The severest of the attacks lasted from three to five minutes. They affected the jaw first and afterwards the back and limbs.

After the attacks she seemed rather apathetic and was bathed in perspiration. Is thirsty, and calls often

¹ Read, by invitation, before the Obstetrical Society of Boston, December 14, 1895.

creased about the middle of October. There was no localization of it corresponding to any nerve distribution however, and soon an attack of rheumatism, affecting chiefly the hands, declared itself. This yielded, however, to treatment after a few days, and by early November she complained of nothing but a soreness and stiffness of her muscles generally. She could stand but not walk. The reflexes remained increased, and there was some tenderness along the nerve trunks in both legs, and also over the muscles of arms, neck and shoulders. She had a bromide eruption on the face which slowly disappeared.

In the third week of November she improved rapidly and walked about freely. Menstruation reappeared for the first time November 21st, on which day she was discharged, well.

The following table is made up from the nurses' night reports and shows for the night of each date indicated the number of spasms which occurred between 8 P. M. and 7 A. M., and also indicates the days on which antitoxin was administered.

Sept. 18		120*
19	(22 c. c. antitox., left thigh, 6 P. M.)	115
20	(23 c. c. antitox., right thigh, 11 A. M. Slept 4 hrs.)	80
21	(23 c. c. antitox., left thigh, 12.30 P. M.)	35
22	(Threw herself out of bed; no spasms after 2 A. M.)	?
23	(Less after 2 A. M. Slept 4 hrs.)	40
24		45
25		70
26	(22 c. c. antitox., right thigh, 9 P. M.)	45
28		20
29		15
30		25
Oct. 1		12
3		12
4		15
5		20

* These spasms occurred in nine hours; all those below in eleven hours.

The points of interest in the above case are these: First, its relation to the miscarriage. The order of events, as has been seen, is this: Abortion, August 25th; sepsis and curetting, August 28th; trismus, September 7th; later, general spasms. The first question that occurs is as to the diagnosis of tetanus. The gentleman who had charge of the case outside of the hospital considered it, I judge, at least at first, as a case of hysteria. The diagnosis of the graver affection seems to me clear, however, in view of the following facts: (1) The initial prominence of trismus, and its persistence in the intervals of general spasms; (2) the absence of all sensory disturbance and of other stigmata of hysteria; (3) the fair preservation of consciousness; (4) the character of the temperature chart; (5) the etiological relation. It is worthy of note, in this connection, that several of the cases of puerperal tetanus have been at first looked upon as hysteria. Dr. W. N. Bullard, who kindly saw this patient with me, fully concurred in the diagnosis.

While many of the leading obstetrical writers fail to mention tetanus as a sequel of abortion, a considerable number of cases have now been reported, and Dr. J. H. Lloyd, of Philadelphia, in "Hirst's System of Obstetrics," devotes considerable space to the subject. This writer says that about 100 cases in all have been reported, and that the affection is much rarer in temperate than in tropic countries. It has been observed, moreover, in the lower animals. The general ignorance of the possible relation between tetanus and labor is illustrated by the fact that at a trial of an abortionist for the murder of a woman who

died of tetanus after instrumental abortion, a physician testified that the operation could not have caused the patient's death as tetanus never resulted from abortion.

A second point of interest in this case is the recovery of the patient. The puerperal variety of the disease has an equally gloomy prognosis with other traumatic forms. The general mortality of tetanus is usually given as from 80 to 90 per cent. Gowers names the latter figure and Dean states that in the London Hospital for the last sixteen years it was exactly 80 per cent. According to Richter in 715 cases following battle wounds it was 88 per cent. Garrigues' figures as quoted by Lloyd in the article above referred to, indicate a mortality of 92 per cent. in tetanus following abortion, and 84 per cent. following parturition.

The third point of interest is one which may or may not be connected with the one just mentioned, namely, the treatment used. It is now more than three years since Professor Behring, of Berlin, published his first results in the immunization of animals against certain diseases by the injection into them of the serum of another animal, that by progressively increasing injections of the particular species of bacterium or of its toxin had been rendered immune against that special disease. His first researches were in diphtheria and tetanus. From the greater prevalence of diphtheria, the first attempts to translate the results of laboratory experiment into the domain of therapeutics were made in that disease, with what result is now familiar to all. The attempts to apply sero-therapy to the treatment of tetanus were more slowly made, but a certain number of cases in which it has been tried are now on record. One of the first, so far as I know, was that of Dr. Ritter in July, 1892.² The patient, a man aged twenty-five, was wounded in the hand on July 6th. Trismus appeared in fifteen days, spasms of the belly and back on the sixteenth day, extending to the legs on the eighteenth. Injections of serum from a horse immunized against tetanus by Behring in the Veterinary Institute were begun July 28th (seven days after the appearance of the trismus), and were given daily for five days, in the following amounts: 66, 50, 45, 50 and 50 grammes, in all 250 grammes. No ill effects from this large amount of fluid were experienced other than a slight urticaria. All spasms ceased August 8th, and the patient sat up the following day. A slight stiffness of one hand lasted till August 22d, when he was quite well.

As has been already intimated, I feel quite unable to say from this single case whether the cure was due to this treatment. A distinction is to be made between acute and subacute forms of the disease as to prognosis. The acute form has a short period of incubation and a short stage of development, and the shorter these are, the higher the mortality. The figures of Richter, as quoted in Behring's monograph, illustrate this:

Incubation period	1-10 days, 91 cases, cured	4%
Incubation period	11-15 days, 54 cases, cured	27%
Incubation period	15-20 days, 20 cases, cured	45%
Incubation period	over 20 days, 15 cases, cured	20%

My case developed trismus thirteen days after the abortion and ten days after the curetting. If we date it from the abortion, it was not a particularly short incubation period, and had from the above table one chance in four of recovering anyway. Looking at the

² Behring: Tetanus Heilserum, Leipzig, 1892.

duration of the "development stage," it can also not be considered a very acute case.

The material used was Gibier's, which is claimed to have an immunizing ratio of 1:1,000,000; that is, to be able to protect an animal of 1,000,000 its weight against what would otherwise be a fatal tetanus inoculation. The curative value of such a strength of serum would be not more than 1:1,000, possibly less, in proportion to the duration of the symptoms when the injection was received. This patient received in all 90 grammes of serum and if she weighed 65 kilogrammes, as she probably did, her dose was not far from one seven-hundredth of her weight. The injections were made in the thighs in the usual way and require no further remarks. On the occasion of the last injection an attempt was made to see what temperature reaction there was.

Sept. 26, 3 P. M.	Temp. 100.8°
26, 9 P. M., injection 22 c.c. antitoxin.	
26, 10.20 P. M.	100.6°
27, 12.30 A. M.	102°
27, 2.30 A. M.	102.4°
27, 4.35 A. M.	103°
27, 8 A. M.	102°
27, (evening)	100.8°

Among the first to apply practically to tetanus the principles announced by Behring regarding the immunizing power of serum derived from animals rendered immune by progressively increasing inoculations of the toxin of a given disease, were Professors Tizzoni and Catani of Bologna, in the laboratory of the Italian Ministry of Agriculture, Industry and Commerce. Their product, consisting of the dried serum of the horse thus treated with tetanus toxin, was the first preparation of this sort, so far as I am aware, put upon the market. It was furnished to the medical profession in tubes containing 4.5 grammes of the dried powder at a cost of about five dollars a gramme. Naturally it required considerable faith to induce men to embark in so expensive a therapeutical venture, as the dose advised was 2.25 grammes at the outset for a mild case and the whole bottle for a severe case, with subsequent doses *pro re nata*. This dried serum was to be diluted with ten volumes of sterile water for injection.

A vigorous controversy was waged between Tizzoni and Hübner⁸ regarding the immunizing strength of Tizzoni's product, in which Hübner claimed that the antitoxin was so weak that the cures referred to it were not in fact due to it and that the solid form in which it was dispensed laid it open to serious objection on the score of positive sepsis.

From the cases, now not very rare, which have been reported as having been treated by this remedy, I select the following somewhat at random, but including unfavorable as well as favorable results:

Drs. Giusti and Bonaisati⁴ had a cure of tetanus by this serum in a soldier of twenty-two years. He developed tetanus twenty-three days after receiving multiple injuries. Two days later he received his first injection which was repeated twice daily for eight days, when the patient became convalescent.

Dr. Marriott⁶ had a patient, a butcher, age twenty-eight, who was wounded in the jaw September 24th. Symptoms of tetanus appeared September 30th. Six days later he received his first dose of antitoxin (2.5 grammes Tizzoni's solution). He had in all about 12 grammes in multiple

doses, covering a period of fourteen days. He was convalescent four weeks after the first appearance of his symptoms.

Dr. Firth⁶ treated a case of tetanus neonatorum, developing five days after birth, with antitoxin injections, the first being given on the eighth day. Four injections were made, aggregating two grammes, no relief was experienced and the child died on the tenth day of its life shortly after receiving its last injection.

Evans⁷ reports the case of a boy of fourteen, cut on the right knee June 8th. Tetanic symptoms first appeared July 16th. Treatment by serum injections (Tizzoni's material) was begun July 26th. He received a number of injections between that date and August 9th, aggregating less than four and a half grammes and was well soon after August 15th.

Dr. Henry Percy Dean⁸ reports a case of traumatic tetanus, developing twenty-four days after a wound (but not necessarily so long after the infection, as the patient had been working in the ground with the wound insufficiently protected). The patient, sixteen years old, was given his first injection of 2.25 of tetanus antitoxin July 27th, five days after his first symptoms; and between that day and August 7th he received altogether more than twenty-four injections aggregating 15.75 grammes of the antitoxin. Recovery was completely established about September 1st.

Von Hacker⁹ had two cases of tetanus which recovered under the use of Tizzoni's serum. The first, a groom, age twenty-two, developed tetanus three days after a wound of his hand. On the fourth day injections of serum to arm began, and continued till 8.88 grammes had been used. He was well eighteen days after the first injection. A boy, age fifteen years, developed lock-jaw five weeks and two days after a wound of his thumb. Five days later he received antitoxin for the first time and after 4.05 grammes had been given and sixteen days after treatment was begun, he was quite well.

Bauer,¹⁰ reports an unsuccessful case of tetanus treated by antitoxin. It was, as he points out, an exceptionally acute and fulminant case, therein differing from the subacute or chronic cases which had been generally reported by others as cured. His patient, age twenty-six, had his first symptoms of tetanus July 11th, seven days after a punctured wound of his sole. The next day, July 12th, he was admitted to the hospital and at 5 P. M. received an injection of 2.25 grammes of Tizzoni's material. Seven and a half hours later he died in a severe convulsion, probably from spasm of the diaphragm.

Another unfavorable result is that reported by Schwartz.¹¹ The patient was admitted to the hospital July 29th, after only two days' illness. On the 30th he received two and one-quarter grammes of Tizzoni's antitoxin, and five grammes at each of the three subsequent doses. Although he came in with severe convulsions, these gradually diminished and finally ceased altogether. But he died suddenly of cardiac paralysis. The curious thing about this case was that with the diminution and cessation of the spasms there was yet a constant increase of the temperature till it reached 40.3° C. just before death, and 41.1° C. one hour after death. This writer remarks that there are two types of death in tetanus: the one occurring at the height of the convulsive paroxysm, the other in which the convulsions decrease, with rapid rise of the temperature and pulse just before death. He considers tetanus to be properly an afebrile or at most a subfebrile affection, except at this prelethal stage. In his own antitoxin case he queries if the abnormality of a high and continuously rising temperature is not referable in some way to the antitoxin used.

In the last number of the *Archives of Pediatrics* (December, 1895), in an article by Dr. J. Lewis Smith on "Tetanus Neonatorum," he refers to four cases of this affection treated

⁶ Loc. cit., 1895, i, p. 133.

⁷ Loc. cit., 1894, ii, p. 581.

⁸ Loc. cit., 1894, ii, p. 579.

⁹ Medical Press and Circular, 1891, lviii, p. 31.

¹⁰ Volner. klin. Woch., 1894, vii, p. 846.

¹¹ Loc. cit., 1894, vii, p. 852.

³ Deutsch med. Woch., vol. xx, passim.

⁴ Berliner. klin. Woch., 1894, xxxi, p. 818.

⁵ British Medical Journal, 1895, i, p. 132.

by Tizzoni's antitoxin, with incubation periods after birth respectively of two, nine, one and seven days, of which the last only recovered. At to the general statistics of tetanus sero-therapy, he quotes a letter of Mr. Hewlett, which is perhaps, the latest summary of the statistics, and in which he says: "I have been able to collect records of 42 cases of tetanus treated with antitoxin, nearly all traumatic, and of these, 15 died and 27 recovered, giving a mortality of about 36 per cent."

TWO CASES OF TUMOR OF THE BRAIN, WITH AUTOPSY.¹

BY EDWARD WYLLYS TAYLOR, M.D.,

Assistant in Pathology, Harvard Medical School; Assistant in Neurology, Massachusetts General Hospital.

THE literature on the subject of brain tumor has grown to such proportions within the last few years that a mere narration of more cases is no longer justified, unless they offer certain points of new and peculiar interest. The two following cases, in certain respects, fulfil both these requirements, and therefore seem worthy of being added to the constantly-growing list. They both occurred in the services of Drs. Putnam and Elliot at the Massachusetts General Hospital, to whom I am indebted for the privilege of reporting them.

The histories which follow are taken, in great part, from the out-patient and house records of the hospital.

CASE I. J. M., thirty, married. First seen February 13, 1895, at the neurological out-patient department of the Massachusetts General Hospital.

Family history negative.

Personal history negative, except that three years ago he was struck on the head by a bucket of refuse falling about twenty feet. His scalp was severely cut. Headache persisted from that time on, localized chiefly on the top and left side of the head. Two years after the injury a small lump appeared in the median line, in front of the coronal suture, about as large as the tip of the thumb. This growth constantly increased until it had reached the size of a hen's egg. Six months later his eyesight became impaired, the disturbance of vision beginning in the right eye. Double optic neuritis was found as its cause. Following this he began to be unsteady in his gait, without having definite paralyses. There was at times vomiting and constant severe headache. The combination of symptoms forced him to give up his work, and in June, at Dr. Putnam's advice, he was admitted to the hospital with a view to operation. Dr. Putnam had thought it possible that the growth was a simple hyperostosis.²

The hope in advising operation was that a bony growth extending inward was causing pressure on the brain, which its removal might entirely relieve.

Examination at the time of entrance showed a rugged, healthy-looking man, with symptoms already noted. He was unable to stand firmly with closed eyes, and, in general, was suffering acutely. The tumor at the vertex was tender on deep pressure, somewhat spongy in consistence, and with an enormous blood-supply, as shown when the head was prepared for operation — facts of importance in view of later developments. There was no ridge nor depression between it and the skull.

The operation was done by Dr. J. W. Elliot, July

¹ Read before the Clinical Section of the Suffolk District Medical Society, October 16, 1895.

² The case was shown by Dr. Putnam at the recent meeting of the American Neurological Association, in connection with a discussion on Hyperostosis Cranii.

2d. An incision with long left and short right arm was made to left of median line. Periosteum removed with the flap. At left border of tumor a one and one-half inch trephine hole was made and enlarged with rongeur forceps. The bone was half an inch thick, looked porous, and bled so freely that the hemorrhage could only be checked with wax. A purple tumor crowded up into the opening, which was enlarged until normal dura was found, distinguishable from the darker tumor area. There was no apparent connection between the tumor of the bone and that of the brain. Much blood had been lost during the operation, and the patient was put to bed after hastily drawing the flaps together with silkworm-gut, leaving gauze drains at the four corners. Late at night the patient recovered consciousness, but was stupid and drowsy.

July 4th. Takes liquids well; rejects enemata. Too stupid to chew solid food. Tongue coated. Pupils react sluggishly. Can with difficulty be made to talk, and never intelligently. Passes urine and feces involuntarily.

July 5th. Wound dressed. Wicks started. Bled considerably. Fresh dressing and firm bandage.

July 7th. Wicks out; no bleeding. Stitches out; some bits of wax oozing from the wound.

July 11th. Eats soft solids and liquids; cannot chew meat. Is able to retain feces and urine. Gradually increasing paresis of right arm and hand. Talks incoherently on various subjects. Visitors say he is not intelligent in his allusions to people and events.

July 19th. Face not so much flushed as heretofore. Bandage off. Seems to be somewhat clearer mentally. Tongue protruded slightly toward the right. Paresis of right arm. Cannot move eyes to the left. Legs unaffected. A bulging, pulsating mass appears through the wound.

Patient again prepared for operation, which was done by Dr. Elliot, July 23d; chloroform anesthesia. The wound was opened in line of old scars. Bleeding fairly controlled in the usual way. The tumor bulged through the opening in the skull. Bone bitten off with rongeur forceps, and bleeding points plugged with wax. The loss of blood was great. A large area of bone was removed by the chisel, hammer and bone forceps, until the tumor was exposed. Tumor shelled out with the fingers, leaving pieces here and there adherent. The new growth was found mostly to the left of the median line. A ligature had been passed through the dura in front of and back of incision to secure the longitudinal sinus in case it was patent. Patient very weak. In spite of every effort he died a few hours later.

Autopsy. — Skull cap only removed. Site of tumor brought into view, involving the superior longitudinal sinus and both hemispheres on the mesial surfaces.

Microscopic Examination of Bone and Tumor. — Examination of the bone showed it to be partially solid, apparently a simple hyperostosis, but for the most part infiltrated by an extremely cellular new growth.³ Examination of the brain tumor showed it to be an endothelioma, with origin from the membranes.

In this case there are a number of points of unusual interest, to which I shall rather briefly allude, in the hope that the following discussion may bring them forward in greater detail:

³ Microscopic sections of the bone were carefully prepared by Dr. E. H. Nichols.