double cyanide gauze. Chloral was ordered, but hardly any could be swallowed.

On October 4th pain and stiffness had increased. Slight spasmodic twitchings of the muscles of the face and back were observed. There was no pyrexia.

On October 5th the body was rigid with the exception of the arms and hands. There was slight opisthotonos. Dr. Buszard kindly saw the case with me, and by his suggestion a supply of Tizzoni's antitoxin was telegraphed for to Messrs. Allen and Hanburys. In the evening $\frac{1}{10}$ grain of physostigmine was given hypodermically.

On October 6th the symptoms were more pronounced; there were frequent jerky spasms in the muscles of the back; those at the back of the neck were rigidly contracted, throwing the head backwards. At 4 p.m. 2.5 grammes of antitoxin were given in sterilised distilled water by punctures in the abdominal walls. Each puncture caused considerable pain, and was accompanied by a strong opisthotonic spasm. The punctures were covered with a small piece of waterproof plaster. He was fed with nutrient suppositories.

On October 7th antitoxin 1 gramme was injected. There was some improvement in swallowing, teaspoonfuls of milk being given frequently and swallowed after several efforts. There was great trouble in ejecting mucus, which was secreted in considerable quantities, from the throat. Sharp but short spasms in the back and legs were frequent.

On October 8th antitoxin $\frac{1}{2}$ gramme was injected. Swallowing was easier. Speech was unintelligible, but the patient could make himself understood by writing in large jerky scrawls.

On October 9th he swallowed liquid much better. The suppositories were discontinued. He complained of constant thirst, and was able to gratify it. Spasms in the back were still frequent, and sometimes violent, especially when he was moved or tried to expectorate mucus. The jaws were still tightly closed. Antitoxin $\frac{1}{2}$ gramme was injected. Later in the evening stronger opisthotonic spasms came on, with much distress, cyanosis, and difficulty of breathing. One-third of a grain of morphine with one-fiftieth of a grain of physostigmine was given hypodermically, followed by marked relief about two minutes later. In a short time the patient was asleep. He passed a fairly quiet night. There was some difficulty in urination temporarily, but catheterisation not required.

The wound had cicatrised on October 10th, when antitoxin 1 gramme was injected. The spasms were less frequent. The improvement continued on October 11th, when 1 gramme of antitoxin was given. As the bowels had not acted since the beginning of the attack, 5 grains of compound powder of elaterium were given, and on the following day a castor oil enema; a copious evacuation followed. One gramme of antitoxin was administered. He took fluid nourishment well. The jaws were still immovable, but the opisthotonic spasms were much less strong. On October 13th 1 gramme of antitoxin was injected, but on October 14th only 0.2 gramme. Towards evening the muscular twitchings were slightly more numerous, but only very feeble. On October 15th no antitoxin was given. He passed a comfortable day. The jaws were still clenched.

Early on the morning of October 16th, during sound sleep, the jaws opened sufficiently wide for the tongue to be protruded, and the patient waking up, it was caught between the teeth and firmly held. The pain brought on violent spasms all over the body, respiration being much embarrassed and the face cyanosed. Every effort was made by the two nurses to release the tongue, but unsuccessfully. When I arrived, some time after, his condition appeared alarming, violent spasms affecting the whole trunk, succeeding one another with hardly any interval, and the breathing was extremely laboured. The tongue was severely lacerated. Chloroform was given, but immediately caused such aggravation of the spasms and difficulty of breathing that it had to be abandoned, and, although the patient appeared to be dying, $\frac{1}{10}$ grain of physostigmine with $\frac{1}{2}$ grain of morphine was hastily injected. The effect was wonderfully rapid, as in less than a minute the jaw opened sufficiently to allow of the tongue being released, and immediately this was done the breathing became quiet, the lividity passed off, and the violent opisthotonic spasms ceased for a short time, being, however, fol-

lowed by numerous less severe ones later in the day. In fact, the unfortunate accident appeared to give rise to a complete relapse of the symptoms, and it was resolved to again resort to antitoxin, of which 1 gramme was given. An elastic band was fixed round the jaw to prevent its opening during sleep.

On October 17th 1 gramme of antitoxin was given. The patient was more comfortable, but spasms were frequent, though not severe, and the tongue, which could not be seen, was very sore.

On October 18th 1 gramme of antitoxin was given, and repeated on October 19th, when a rather strong spasm was caused by the procedure.

On October 20th half a gramme of antitoxin was given (completing the third bottle used). He took plenty of liquid nourishment through an infant's feeding bottle, the tube of which was passed into the buccal sac outside the teeth. From this date steady improvement took place, the jaws opening, and the stiffness passing away from the back and neck, so that by October 28th he was able to sit out of bed for an hour, and to take soft food, such as bread and butter, eggs, and even fish.

REMARKS.

Antitoxin, with the exception of the three injections of physostigmine and morphine, was the only remedy used in this case, as, though chloral was at first prescribed, only a very small quantity was swallowed. The patient certainly seemed to be much relieved by the treatment, and it is to be remarked that the severe and nearly fatal relapse occurred after the diminution of the dose on October 14th, and its suspension on October 15th.

On the two occasions on which physostigmine and morphine were given together, the effect in quieting the spasms was most marked and speedy, and on both occasions it appeared to me that the patient's life was saved thereby.

The temperature has remained subnormal since the tetanic symptoms have disappeared.

A CASE OF TETANUS NEONATORUM UNSUCCESSFULLY TREATED WITH TETANUS ANTITOXIN.

By J. LACY FIRTH, M.D., M.S.LOND., F.R.C.S.,
House-Surgeon to the General Hospital, Bristol.

I HAVE in the first place to thank Mr. Barclay, Surgeon to the Bristol General Hospital, for permission to publish the above case, the treatment of which was undertaken with his concurrence.

The infant was born on Tuesday, September 18th, 1894, at noon. A midwife was in attendance at the confinement. The navel was dressed, after ligature of the cord, in the usual way, with cotton wool and a clean piece of linen. This dressing was not disturbed until six days had elapsed. It was then replaced by a scorched piece of linen soaked in castor oil. On the eighth day of life the child became fretful and ceased to take the breast satisfactorily. The eighth day of life appears, therefore, to have been the first day upon which signs of the disease appeared. On the fourth day of the disease and the eleventh of life the patient was admitted to the Bristol General Hospital.

On the fifth day of the disease the child was jaundiced. The eyes were tightly closed, and the conjunctive could not be exposed. The face was wrinkled, but risus sardonius was not present. The masseter muscles were hard and the lower jaw rigidly fixed, but there remained a slight interval between the upper and lower jaws which it was impossible to enlarge with justifiable force. The head was slightly retracted, and the neck and spine were very rigid. The arms and forearms were rigid in the adducted position, with the elbows slightly flexed. The fingers were firmly flexed into the palm, and the thumbs adducted and flexed over them. The lower limbs were rigid in the extended position. The abdominal wall was hard. The tension of the limb muscles could only be overcome by the exertion of considerable force. The child could be held up in the vertical position by holding the legs only. When milk was placed in

the mouth a large part of it was returned in bubbles and the rest swallowed with delay and difficulty, and the attempt produced cyanosis and short feeble cries. Examination or disturbance of the child by feeding or touching caused an increase of rigidity in the trunk and limbs with slight cyanosis. The spasm so produced was of three or four minutes' duration, and the beginning and the end were gradual, so that the time of commencement and termination could not be definitely fixed. There were no short or sharp attacks of spasm. The temperature was normal or slightly subnormal all the day; the pulse was 128, the respiration 36. Chloral hydrate gr. $\frac{1}{2}$ and potassium bromide gr. 1 were prescribed every four hours and nutrient enemata. Milk was given by the mouth at regular intervals.

On the sixth day the patient was weaker; the enemata had been for the most part retained. Chloral hydrate gr. $\frac{1}{2}$ and potassium bromide gr. 2 ordered every two hours and more nourishment.

On the seventh day the jaw was sometimes found less fixed than formerly. The slow spasms of increased rigidity were easily excited as before. At 6.30 p.m. the ward sister for a moment thought the child dead. It had ceased breathing, and the pulse had become imperceptible at the wrist. The attack had passed off when I reached the ward a few minutes later, and the child had resumed its previous condition. The temperature was 100° at 10 p.m.

On the eighth day, at 3 p.m., the patient had another of the attacks, during which respiration ceased. At 6 p.m. 0.4 gramme of tetanus antitoxin¹ was injected in five places under the skin of the abdomen. The temperature on this day was at 2 p.m. 102° (the highest point registered throughout), at 10 p.m. 100.6°.

On the ninth day the jaw and neck were less rigid. The arms, legs, and trunk were, perhaps, also a little less rigid. Slow spasms were easily evoked as before, but were less marked in intensity. The patient on this day had a succession of attacks at intervals of two to four hours, during which breathing stopped. They began at noon, and three of these occurred before the second injection of 0.4 gramme of antitoxin, which was made at 4 p.m. A third injection was made at 8.30 p.m. of the same quantity.

The attacks alluded to began with increase of rigidity and cyanosis, followed in a few seconds by total cessation of respiratory and all other movement. Then the rigidity was replaced by complete flaccidity, and the child lay as one dead. The pulse gradually lost force, and finally, in one or two of the most severe fits, became imperceptible at the wrist. The heart sounds, however, remained distinct, and indeed seemed more distinct than usual, perhaps by reason of the absence of respiratory sounds. The frequency of the pulse was diminished.

The first sign of recovery was a stertorous and imperfect inspiration. This was followed by other less and less stertorous inspirations at decreasing intervals, until the normal rhythm was established. The return to the more normal condition was in fact like that seen in cases of suspended animation, from other causes, for example, from chloroform inhalation.

In the course of the tenth day the patient had eight attacks, as above described. The duration of these varied from five, to ten or fifteen minutes. The longest interval without a single respiratory act in the attacks was seven minutes. In the longer attacks the child passed from one into another with a few intervening and imperfect respirations. At 7 p.m. it had its last and longest seizure, which ended fatally at 8 p.m.

The fourth and final injection was made at 1 p.m. on this day, when 0.8 gramme was injected. The temperature during the last twelve hours of life was subnormal.

On admission as in-patient, the navel was cylindrical in shape with a flat top covered with epithelium, having the appearance of a recent cicatrix. There was a yellow point in the centre which was not pus. There were a few dried blood scales in the sulcus at the base. The cicatrix and the

¹ The antitoxin we used had been obtained two months previously for another case, and the bottle had been then opened, and 2.5 grammes abstracted. (This was injected in a traumatic case a few hours before death, and had no appreciable effect). The bottle had been sealed with wax on the day following, and kept for the two months in a dark and cool place, and I presume had retained all its virtues.

skin around were carefully cleaned with soap and water and scrubbed with 1 in 20 carbolic and dressed with cyanide gauze and sublimated wood wool. The appearance of the navel did not materially alter during the remainder of the child's life.

In one of the severest of the attacks described above, artificial respiration was tried, but no improvement followed, and a few minutes after desisting the child recovered spontaneously.

It will have been seen that the infant had four injections of antitoxin in all, namely, one on the eighth day, two on the ninth, on each occasion 0.4 gramme being used, and on the tenth day one injection of 0.8 gramme. The total quantity used was thus 2 grammes.

No improvement in the condition of the infant followed, and no definite physiological effect was noticeable. No sign of irritation remained at the site of the punctures. It was interesting to note the completeness and rapidity with which the bulky injections were absorbed. The large swellings produced at the moment of injection could be seen to diminish in size immediately after their formation, and in two or three hours no swelling remained.

The clinical course of the case as detailed above is in some respects peculiar, but no doubt exists in our minds as to the correctness of the diagnosis. Unfortunately, the mother of the child refused to allow a *post-mortem* examination.

I have read the accounts of tetanus in numerous authoritative books, but have in none of them found attacks of failure of respiration described which resembled at all closely those in our case. In Fagge and Pye-Smith's book a case is mentioned in which attacks of lividity occurred without any sign of increase of spasm except a clenched state of the hands, and in one of these the patient died. In the same paragraph Poland is quoted as mentioning a case in which the heart's action was kept up for a short time after breathing had ceased. Bauer, too, is there quoted as stating it to be his opinion that the frequency of death from asphyxia has been over-estimated, and that the carbonic acid in the blood relaxes the spasms before death can take place, but I can find no account of frequent attacks of prolonged cessation of respiration with flaccidity of the muscular system to all outward observance. In the attacks described in our case there was an initial increase of rigidity, and cyanosis followed by relaxation of the muscular system, with the maintenance, apparently, of a stationary degree of cyanosis for many minutes, in one instance for seven minutes. How are these attacks to be explained? The condition of the glottis can only be inferred. The condition of the diaphragm was one of fixture, but whether it was relaxed or in spasm is also a matter of inference.

The abdominal muscles certainly, and the intercostals almost certainly, were relaxed. Possibly carbonic acid gas in the blood was the cause of the relaxation of the muscular system generally, including the diaphragmatic and glottic muscles. In that case the absence of respiration must have been due to an exceptional central or peripheral nervous state. Two possible explanations of the attacks are thus suggested. The glottis, diaphragm, and intercostals, or the diaphragm and intercostals only, may have been in a state of spasm when the other muscles of the body were relaxed. The inefficiency of artificial respiration rather points to closure of the glottis as existing. If this spasm existed then the asphyxia in our case was due to the causes which usually lead to the fatal termination of tetanus cases, but had the peculiarity of not being associated with general muscular spasm, and was attended with a remarkable persistence of cardiac action. On the other hand, if the respiratory muscles and glottis were in a state of relaxation, as the rest of the muscular system was seen to be, the asphyxia must be explained by a paralytic action of the tetanus poison upon the medullary centre of respiration, or upon the efferent nerves therefrom. In this connection it is of interest to note that during the intervals between the spasms the general rigidity and trismus was less marked than it had been in the earlier days of the disease.

In some cases of tetanus Dr. E. Rose is mentioned as having felt the pulse suddenly stop and death ensue. Possibly this syncopal ending was of nervous and toxic origin, as the asphyxia may have been in our case. The vasomotor centre

is sometimes affected in tetanus, producing contraction of arterioles. Liston is reported to have performed an amputation in which there was little or no bleeding by reason of contraction of the vessels in a case of tetanus. But in Liston's case, and probably in the syncopal cases, the toxic action is one of stimulation. To explain the asphyxia in our case, if all the muscles were relaxed, a depressant and paralyzing property of the poison has to be assumed unless simple exhaustion of the respiratory centre is a sufficient cause.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, ETC.

RUPTURE OF PULMONARY VALVE.

I VENTURE to send you the following notes of a case, in the belief that it may be of interest:

I was called to a patient at 1.25 A.M. on January 1st, and found a young man of 23 years of age, who had been to the theatre, and afterwards had eaten a hearty supper at 11.30 P.M., consisting of potato pie and a glass of beer. He was then quite well. Shortly after 12.30 A.M. he complained of pain in his chest, and felt sick. He went out into the yard and vomited freely. He was then given 10 drops of chlorodyne and a little soda water and milk. As he got worse I was sent for. I found him pulseless, hands and feet quite cold, no heart sounds to be heard, chest full of fine bubbling râles, respiration free but hurried. He spat a good quantity of blood-stained foam; there was no cough. He told me that he had pain in his chest, and that he was very cold. He died in about forty-five minutes, a considerable amount of frothy, pink, watery fluid escaping from the mouth during the last few minutes of his life.

About thirty-six hours after death I performed a *post-mortem* examination by order of the coroner. In disarticulating the left clavicle I wounded the subclavian vein, and the blood, which was black, fairly spouted. Heart healthy in appearance. On careful examination I found one segment of the semilunar valves of the pulmonary artery ruptured from a point close to the corpus Arantii to its base. Another was perforated. The lungs were full of black blood, but none extravasated. The stomach contained about 15 ounces of fluid, with portions of unchewed meat (pork and beef), and lumps of potato—not many of these. The kidneys were healthy.

Warrington.

A. W. HALL, L.R.C.P. and S.

AXIAL ROTATION OF THE TESTIS: SEQUEL TO A CASE.

IN the BRITISH MEDICAL JOURNAL of April 8th, 1893, I recorded a case of axial rotation of the right testis, which I saw on March 17th, 1893, one hour and a-quarter after the appearance of the first symptom. I was able to undo the half twist present, which gave immediate relief. Next day the testicle was normal in size, and free from tenderness. The lad shortly after this left school, and I lost sight of him. Mr. Edmund Owen, in a paper read before the Medical Society of London, suggested that it would be interesting to know whether the testicle received any permanent damage from the brief strangulation. I therefore wrote to the patient, and in reply on November 3rd, 1894, he stated that "the right testicle is considerably smaller than the other."

This case lends weight to Mr. Bryant's suggestion that certain cases of atrophied testicle have been caused by axial rotation.

Bedford.

W. GIFFORD NASH, F.R.C.S.

ALBUMINURIA DURING PREGNANCY.

Mrs. A., aged 36, who had had thirteen children (the last born twelve months earlier), and was again six months pregnant, on December 19th, 1894, complained of cough and lumbar pain. The temperature was 101° F., and bronchitic râles were heard generally in the chest; the skin was moist, the

tongue furred. She was retching violently. There was no œdema, facial or otherwise. Micturition was frequent.

The urine contained albumen to the extent of one-fourth. She was treated by applying mustard on hot poultices over the kidneys, and by the following mixture: Liq. ferri perchloridi, 3j; liq. ammon. acet. conc., 3ij; aquæ chlorof. ad 3vj; 3j quater die. For the bronchitis, wadding and camphorated oil, and linseed tea with liquorice and lemon juice were ordered. By December 30th there was left only a trace of albumen, and the cough had gone. She was able to get up and eat a little.

The point of interest in the case is that the bronchitis was sufficient to account for all the symptoms except one—namely, the lumbar pain reflected into the groin (pregnancy explaining the frequency of micturition); and the lesson I drew for myself was to test the urine of a pregnant woman as a matter of routine.

Shaftesbury Avenue.

F. ISDELL.

VESICAL SPASM CAUSED BY MEDICINAL DOSES OF STRYCHNINE.

SEVERE vesical spasm following the administration of liquor strychniæ B.P. in four-minim doses taken three times a day for a period of five days prompts me to send in a short account of the case, especially as this is the second time that I have noticed such symptoms occurring after the use of liquor strychniæ.

The patient, a man about 30 years of age, had been under treatment for some weeks for chronic gastric catarrh and stubborn constipation.

Dilute hydrochloric acid and Glauber's salts affected the gastric catarrh favourably, but did not materially relieve the constipation, so that I resorted to the addition of liquor strychniæ B.P. in the doses above mentioned to the original medicine. The constipation was at once relieved, but after a few days, the patient came to me complaining of greatly increased frequency of micturition—eight or ten times during the day and three or four times during the night.

This distressing symptom was coupled with a dull pain in the right loin in the region of the right kidney, which made him fancy that he had some kidney trouble. The urine was perfectly clear, of light colour, specific gravity 1015, and contained neither albumen nor sugar. I assured my patient that very probably on discontinuing the medicine for a few days, his troubles would cease, and to my great satisfaction this occurred.

The patient comes from a highly neurotic stock, the mother and two sisters suffering from neurotic complaints.

Canonbury, N.

JOHN H. SPITZLY, M.R.C.S., L.R.C.P.

MENTAL DISTURBANCE AS A CAUSE OF HERPES ZOSTER.

WITH reference to a memorandum on the etiology of herpes zoster, which appeared in the BRITISH MEDICAL JOURNAL of October 20th, the history of a case I am now attending may be interesting.

Mrs. P., an elderly lady of 70, in somewhat delicate health, was dreadfully shocked at hearing of the sudden death of her daughter. Four days after this news had reached her, she noticed an eruption attended by slight neuralgic pain, which turned out to be herpes zoster.

On the following day her daughter's funeral took place, and in the evening while the friends of the deceased, including Mrs. P., were taking tea together, they were much startled by the sudden smashing of the window of the room by a football thrown from outside.

Within a few hours of this second shock the pains became very much more severe, especially at night, and are now only slowly yielding to gelsemium, bromide of potassium, and strychnine, with draughts of bromide and chloral at bedtime.

The patient has never before been troubled with any form of skin eruption, and I think there is every reason to believe that the herpes in this case is due to the shock of the ill tidings she suddenly heard, and that the very marked increase of pain was due to the fright sustained on the day of the funeral.

I may mention that one of the young ladies who was present with the funeral party has suffered from severe infraorbital neuralgia ever since.

Old Kent Road, S.E.

F. L. POCHIN, M.B., C.M.