breathing was diaphragmatic; his pulse was soft, slow, and compressible; and his pupils were dilated and did not readily react to light. He had partially lost power in his arms and legs and he appeared to be dazed. His head was inclined backwards, the occiput resting on the spine. The front of the neck was distended and swollen and the vessels were engorged. The moment I tried to move the neck he was thrown into a violent spasm, the spasmodic contraction lasting a few minutes, the patient calling out all the time "Oh, my neck!" It was difficult to know quite what to do, but observing that he was becoming worse I had him carried upstairs to bed. This movement caused continuous spasmodic contraction of the arms and threw the neck and chest into a state of marked rigidity, the head all the time being forcibly bent backwards on to the spine. As the poor fellow appeared *in extremis* and considering the case one of partial displacement of the cervical vertebræ I resolved to try to reduce it. Securing the assistance of the parish nurse (who is, by the way, an unusually strong woman) and placing her in front of the patient I directed her to take both his hands and to pull him directly upwards. I placed myself behind and supported his head and pressed his shoulders forwards. So great was the spasm produced by this attempt that the nurse was forcibly drawn across the bed and I was pressed backwards against the iron framework at the top, the poor fellow calling all the time, "Oh, my poor neck. Doctor, I am dying!" I as quickly as possible got him again into the sitting position and placing my left hand underneath his chin and my right behind the nape of the neck I jerked the head upwards, at the same time forcibly bending the head forwards over the chest. A sensation of a bone slipping into its place was communicated to the hand and I felt certain that a dislocation had been reduced. On gently laying him back on the pillow he exclaimed: "Oh, my head is going up!" and to all appearances he looked as if he were dying. In a very few minutes he opened his eyes and said, "I feel better."

It may appear that I have entered too much into minutiae, but the case appeared to me so extraordinary and the symptoms so puzzling that a detailed account of them may not be out of place. It is obvious that dislocation of these bones must of necessity be rare considering the way in which they are closely bound together by strong ligaments and short, powerful muscles. When dislocations do occur they are almost invariably associated with fracture. The exact seat of the displacement in this accident was difficult to determine, but the probable site was between the fourth and fifth cervical vertebræ. Such a condition between the occiput and atlas is almost unheard of. Between the atlas and axis the odontoid is almost invariably fractured, death quickly ensuing. Between the second and third cervical vertebræ such a condition is not on record. The most common site of this displacement is between the fourth and sixth cervical vertebræ, and this accident is almost invariably complicated with fracture, though it does rarely happen without this complication. Two weeks have elapsed since the accident and the patient is now out of doors and walking.

Painswick, Gloucestershire.

A CASE OF TETANUS TREATED BY INTRA-CEREBRAL INJECTION OF ANTI-TETANIC SERUM.

By THOMAS D. GIMLETTE, M.R.C.S. ENG.,
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A MAN, aged 23 years, A.B. of H.M.S. *Duke of Wellington*, a fine young seaman of good physique and of very good previous health, was admitted into the Royal Naval Hospital, Haslar, for observation on the evening of May 3rd complaining of pains at the back of the neck between the shoulders and along the course of the spinal column, also of being unable to open his mouth on account of rigidity of the muscles of the jaw. He was found to have wounded his left ring finger a week previously with a piece of broken teacup and the wound had not healed. The temperature was normal, the pulse was 88, and the respirations were 22 per minute. The bowels had not been open for two days. The tongue was moist and

clean, but there was a peculiar offensive odour from his breath. He was given a purgative and 40 grains of bromide of potassium in two doses. On May 4th he had slept well and his bowels were open. The rigidity of the masseter muscles was more marked and the muscles of the abdominal wall were rigid. The pulse was 80, full, and hard. A diagnosis of tetanus was made. 10 grains of chloral hydrate and 15 minims of tincture of hyoscyamus were added to the 20 grains of bromide of potassium and given every three hours. On May 5th the symptoms became more marked and risus sardonicus was noticed occasionally. The mouth could be opened only three-quarters of an inch. Saliva collected in the mouth and could not be expectorated. Rigidity of the abdominal muscles increased and clonic spasms came on in them which gave rise to much pain and distress. There was inability also to swallow solids, but milk was taken easily. A consultation on the case was held and it was considered that it was a suitable one for treatment by intracranial injection of serum, after the method of M. Roux and M. Borrel of Paris, first performed in this country by Major D. Semple, R.A.M.C., of Netley. The operation was performed with the strictest aseptic precautions, the sterilisation of the needle with which the injection was made being most carefully carried out and the patient's head being shaved and scrubbed. An imaginary line from the root of the nose to the occipital protuberance was taken, another from one external auditory opening to the other, and a third from the point of intersection of these to the outer angle of the left orbit. At the centre of this third line an incision half an inch long was made down to the bone. The skull was then drilled with a specially constructed drill which, being provided with a stop, could penetrate bone and dura mater only. Through the hole thus made a serum injection needle three inches long, having the point rounded so as to avoid injury to the cerebral vessels, was introduced into the brain substance, being directed towards the spinal column. The injection syringe was so constructed that 2.5 cubic centimetres of concentrated serum could be injected and no more. The "concentrated" serum was made by inspissating 10 cubic centimetres of ordinary anti-tetanic serum to dryness; the dry serum was kept aseptically until required and then dissolved before use in five cubic centimetres of sterile normal saline solution. The process of dissolving cannot be hurried and takes one and a half hours; the normal saline aids the solution of some of the globulin which is practically insoluble in distilled water. The injection was made very slowly, 10 minutes being occupied in injecting 2.5 cubic centimetres, and while the injection was being made the needle was held perfectly steady by an assistant to prevent any laceration of brain tissue. After its completion the needle was withdrawn and the small wound closed by one horsehair suture and sealed with collodion. The operation was then repeated in a precisely similar manner on the right side, five cubic centimetres of the concentrated serum, corresponding to 10 cubic centimetres of ordinary anti-tetanic serum, being thus given intra-cerebrally. A subcutaneous injection of 10 cubic centimetres of ordinary anti-tetanic serum was given under the skin of the abdomen in the right flank. The original wound was thoroughly scraped by a Volkmann's spoon, the scrapings being received in a sterile tube for cultivation of the bacteria. The special instruments necessary for the operation were lent to me by Major D. Semple, R.A.M.C., who also was kind enough to assist at the operation. I have much pleasure in expressing my thanks to this officer.

On May 6th the patient passed a fairly good night. There were no vomiting and no clonic spasms; he was taking milk and beef-tea well. The temperature was 100° F. and the pulse was 104, very hard and bounding. The mouth could only be opened half an inch. The abdominal muscles were very strongly contracted. The least noise causing spasm of the masseters, and light being also displeasing, the patient was moved to a darkened room and a special nurse was provided for him. He had a quiet day up to 6 P.M., but then began to suffer from severe clonic spasms, frequently recurring, lasting about half a minute, the muscles affected being those of the lower jaw and abdomen. The teeth were tightly fixed during the attacks and the pulse became rapid (120), full, and hard. Paroxysmal tachycardia came on and the heart sounds were easily audible at a distance of two feet from the patient without a stethoscope. At 9.30 P.M., the patient being in much distress and pain, a subcutaneous injection

of five minims of solution of hydrochlorate of morphia was given, after which he slept for one and a half hours, but was awakened by very marked and violent attacks of opisthotonos with tachycardia as before. He was given subcutaneously 10 cubic centimetres of anti-tetanic serum and a draught of 25 grains of bromide of potassium and 20 grains of chloral hydrate. He slept fairly for the remainder of the night. On May 7th he had a severe attack of opisthotonos at 6.30 A.M. At noon 20 cubic centimetres of serum were given under the skin of the abdomen. This treatment was continued every day until May 15th, 200 cubic centimetres being given subcutaneously in all as well as the five cubic centimetres of concentrated serum intracranially. During the whole day (May 7th) he had attacks of clonic spasms of varying degrees of intensity from severe opisthotonos to transient risus sardonius. A spasm was caused by the subcutaneous injection, also by the noise of gun-firing at Spithead, or by the patient passing urine. A slight noise while the patient was asleep would cause risus sardonius without awakening him. Tachycardia always occurred during the violent spasms, profuse action of the skin followed them, and also a more rapid respiratory action. Towards evening the patient seemed to become worse, he was in great distress, and said he thought that he was going to die. A bromide and chloral draught was given at 9 P.M. and at 11 P.M., as he had not slept and was in great pain, a subcutaneous injection of three minims of liquor morphinæ hydrochloride was given, after which he had a fairly quiet night. The patient took fluid food well. On May 8th at noon he had had three attacks of clonic spasms since 8 A.M., more in the shoulders and neck than in the trunk muscles—not opisthotonos. He said that he felt better but for pain in the back of the neck. The bowels not having been moved since the operation were well emptied by an enema. The temperature kept at about 100° and the pulse was 96 and not so hard as it was. The spasm caused by the serum injection was not so violent, not amounting to opisthotonos, but all the muscles of the body appeared to be affected and the arms and legs; those of the shoulders and arms and lower jaw were most affected, so that the patient lay on his back with both arms extended over his head, with trismus and risus sardonius marked during their occurrence. He was able to swallow well, taking five pints of milk, three pints of beef-tea, and one raw egg in the 24 hours. There was slight delirium at night. From this date there was a gradual improvement in all the symptoms. The patient could open his mouth wide and put out his tongue for the first time on May 15th, and having had no clonic spasm for 24 hours the serum injection was discontinued on the 16th. From the 17th to the 20th he was troubled by spasmodic attacks of cough of laryngeal character and had occasional attacks of sneezing. He began to take solid food on the 15th and sat up out of bed on the 17th; he was allowed out in the grounds on the 28th and was transferred to a general ward on May 31st. He had still on June 2nd some stiffness of the lower jaw, some pain and stiffness of one arm, and the abdominal muscles still felt resistant, but not so board-like as they were. These symptoms had all disappeared on June 21st, when he returned to duty. On July 4th he still remained perfectly well.

Remarks.—The diagnosis of tetanus was in this case confirmed by the isolation of the bacillus from cultivations from the wound scraping by Major Semple, R.A.M.C., at Netley, and also by the finding of it in cultivations made from the first dressing of the wound by Staff-Surgeon O. W. Andrews, R.N., at Haslar. Judging from the severity of the symptoms of the case before operation and also for the two days immediately following the operation it may fairly be stated that, humanly speaking, but for the serum treatment this patient must inevitably have died. No "brain symptoms" have followed the introduction of the long needle and injection of serum into the brain substance—in fact, the patient made a steadily progressive and perfect recovery. The operation was carried out exactly after the manner of M. Roux and M. Borrel of Paris and the case is a striking example of the efficacy of the treatment introduced by them.

THE CHELSEA HOSPITAL FOR WOMEN.—This hospital will be closed to in-patients from the middle of July to the end of September in order to permit of certain improvements being carried out. The out-patient department will be closed during August only. An appeal is being made for public assistance towards defraying the cost of the alterations.

CHINOSOL IN PHTHISIS.

BY ALEXANDER MACGREGOR, M.D. ABERD.,
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DISEASES OF THE CHEST.

WITHOUT having good grounds one hesitates to add to the long list of remedies already employed in the treatment of phthisis, but while waiting for the discovery of a pure and reliable tuberculin it is justifiable to give a fair trial to any drug which may possibly help the patient to carry on a more or less successful fight with the disease. Other micro-organisms than the tubercle bacilli play a very important part in the destructive morbid processes which take place in the lungs in consumption, and it seems to me that it is against those other microbes that the drugs now so much used in phthisis exert their antiseptic or germicide action. In the light of the bacteriology of phthisis—in the light of the fact that in most cases of phthisis we have to do with "a pulmonary sepsis on a tubercular basis"—we can understand the use of such drugs as creasote, guaiacol, &c., being followed by good results. I think it is evident that those drugs do not act directly on the tubercle bacillus, but by their action on the other micro-organisms and their products they bring about an improvement in the general condition of the patient and so increase his power of resistance; and then, given suitable hygienic surroundings and other favourable circumstances, the tuberculous process is likely to go on to fibrosis and to thus cure itself.

Dr. A. G. Cipriani¹ records eight cases of tuberculous disease, three of them being cases of pulmonary tuberculosis, treated with chinisol. He gave one gramme in 24 hours and he was satisfied that improvement followed the administration of this drug. I have now used it in more than 100 cases of phthisis and I am satisfied that I have had better results than ever I had from creasote or guaiacol. Chinisol is the oxyquinoline sulphate of potash; it is a powerful germicide, but it does not seem to be much used as an ordinary antiseptic. Taken internally it is well borne in doses of five grains three times a day after food. In two cases it caused diarrhoea and on that account had to be discontinued, and in one case in which the larynx was involved it gave rise to a very painful sense of burning, even when much diluted, and so was not persevered with. In almost every case improvement in the patient's general condition follows the use of the drug. "I feel so much better in myself," is the usual report and it is naturally concluded that this is due to the action of the chinisol on the associated micro-organisms and their toxic products. In many decided improvement in the condition of the lungs was the result and in several all adventitious sounds disappeared and recovery seemed to have taken place. The following are short notes of a few of the cases in which chinisol was used and in which I was able to watch the effects of the treatment.

CASE 1.—A woman, aged 29 years, was first seen on Nov. 11th, 1898. She had been ill for 18 months, and 12 months, and also a week, before her visit there was hæmoptysis. She complained of pain in the upper part of the chest on the right side, of cough, and of loss of flesh. There was dulness over the apex and upper part of the upper lobe of the right lung and numerous crepitant râles were heard over the affected part. The left lung was normal. A small cantharides blister was applied to the chest and three grains of chinisol were given three times a day after food. When the patient was seen a month afterwards there was great improvement in the condition of the lung, the breath-sounds were almost normal, and only an occasional râle was to be heard. She said that she now felt very well. A fortnight later it was reported that she no longer coughed and that she still continued to feel well. On Jan. 20th, 1899, the note in the case-book says: "She feels perfectly well and looks a picture of health. Beyond slight dulness over the right apex nothing abnormal can be detected." She continued to take chinisol up to the beginning of March, but during the fortnight following that she seemed to have caught cold and there was a return of the râles over the right apex and a few were also heard over the left. Chinisol was again given and the râles disappeared. I am inclined

¹ Allgemeine Medicinische Central-Zeitung, No. 75, 1897.