in the upper and outer aspect of his thigh, even though the other parts show this distinctly, with erection of the hairs over the rest of the limb.

Not only is there this anaesthesia, or rather analgesia, but perverted sensations are present in the affected area. These are variously described, and take the form of shooting pains, of a sensation as though an invisible hand had grasped the thigh and were screwing round a handful of the flesh, and of a sensation as though scalding water were pouring down the outside of the limb. These sensations are usually of short duration, and are of variable onset; they may not occur for months on end, or even for years in old-standing cases, but are liable to recur again and again on little or no provocation. Their onset may be ascribed to changes in the weather, to damp and cold combined, to going out into the cold frosty night air from a warm billet, or to exercise, especially moving at the double. The pains may be nothing more than a mere tingling, or they may be so severe as absolutely to incapacitate the patient for the time being, and it is this possibility of the occurrence of sudden attacks of absolutely incapacitating pain that makes the condition of importance from the point of view of military surgery.

I have observed a patient in one of these paroxysms of pain obtain a certain amount of relief by adopting the following attitude. He bent his knee and raised the heel off the ground, flexed his body forward at the hips and seized his thigh with his hand, applying steady pressure. In this position he remained without moving for about a couple of minutes until the pain passed off, afterwards moving forward again slowly and cautiously, only to adopt the same posture a few paces further on, exercise having brought on an almost immediate recurrence of the pain.

The etiology of the condition seems to be unknown. Various more or less unsatisfying causes, including alcoholism of course, have been suggested, and the general opinion seems to be that it is probably of toxic origin.* A case is on record in which pressure of a long corset apparently induced the condition, for when a piece was cut out from that structure where it was supposed to be exerting pressure on the nerve the symptoms disappeared. One of my cases in civil practice quite distinctly occurred for the first time during involution of the uterus after childbirth, while in only one of all my cases was there any definite story of alcoholism, though even here other factors might have been at work, as the patient was a school-master, who was too fat and took little or no exercise. Robust and well-developed persons may suffer from this complaint; I have seen it in a man who had been an international footballer.

It seems possible, however, that the condition may owe its origin to purely mechanical causes and be dependent on the local anatomical peculiarities associated with the course of the external cutaneous nerve. This nerve becomes subcutaneous in the upper and outer part of the thigh by piercing one of the strongest sheets of fibrous tissues in the body, the fascia lata. Posture, as above described, seems to ease the pain during the paroxysms, and exercise—the patients are convinced—to increase it or even to precipitate an attack. This must be associated with the anatomical peculiarities, and it seems feasible that the condition itself is merely caused by a nipping of the nerve trunk at its point of emergence through the fibres of the fascia lata, a possibility that will be increased in any circumstances that conduce to an overgrowth or fibrosis of that fascia. The external cutaneous is the only nerve that has this course, and in meralgia paraesthetica this nerve is alone affected.

It has been suggested to me that if this theory is correct it may be possible to relieve the condition surgically—by cutting down on the nerve, tracing it to its point of emergence through the fascia of the thigh, where this might be incised, and a flap either stitched back or excised, in order to relieve pressure on the nerve. It is a suggestion that is perhaps worth following up.

The five cases met with among soldiers are briefly described below. It is unnecessary to go into full details, as the sensory tests and the distributional area of the analgesic skin are always the same.

* A case, seemingly of this condition, is even reported as having occurred after poisoning by carbon monoxide, the toxic gas that causes much trouble in mines. In this instance intense neuralgia in the upper part of the thigh set in ten days after the gas poisoning and continued for fourteen days. (Huchzenmeyer, *Ueber Kohlendunstvergiftung*, Inaug. dissert., Berlin, 1866.)

CASE I.—Private, aged 24; July 9th, 1915. Outside of both thighs symmetrically affected for past two days (weather at present damp and overcast, and patient sleeping on the ground under canvas). On stepping out smartly he is suddenly pulled up by a sensation as if his flesh had been gripped tightly. Cutaneous sensibility is impaired in the area supplied by external cutaneous nerve; on the inside of the thighs the sensation is normal.

CASE II.—Private, aged 22; July 19th, 1915. Pain in left thigh; coming on acutely the previous morning and preventing marching. Walks with a limp, has pain locally, and cutaneous sensibility is dulled. The other thigh is not affected.

CASE III.—Lance-Sergeant, aged 21; March 22nd, 1916. Acute pain in right thigh of four days' duration. Has never been similarly affected. Onset with aching; while walking he gets sudden stings in his thigh, causing him to stumble. While on a route march his thigh felt as though it were gripped, the sensation causing him great pain. The area of the external cutaneous nerve is analgesic, with a small anaesthetic point at both its upper and its lower limit. He was given phenacetin and rest; at night his thigh was so sore that he was unable to sleep for the pain. Next day he walked with a limp, and said that while he was walking sudden stinging pains shot up the thigh and caused him to stumble.

CASE IV.—Private, aged 18 years; April 5th, 1916. Bilateral, in a dirty, ill-nourished youth who has been six months in the army and who previously plucked fowls for a living. First attack was in Ireland three months ago. The pains occurred mostly when walking and in damp weather; they came and went and were sometimes worse than at others. Occasionally he had sensations as if an open knife were in his trousers pocket and had stuck into and lacerated the limb; at other times as if scalding water were pouring down his thigh. He had smooth, relatively anaesthetic areas on both thighs in the distribution of the area of the affected nerve.

CASE V.—Private, aged 44 years; April 26th, 1916. Of right thigh, with pains running between his hip and knee on marching, these pains having ensued on coming out of the trenches ten days ago and having occurred daily since. When the pain comes on he is unable to use his leg, which he thinks gets quite stiff at these times; it leaves him after resting, but when he has rested and starts off again it gets very sore, and he is then able to do very little. "Sometimes it is a sharp penetrating pain and at other times it is more dead-like." He had the same condition the winter before last, and was in a civil hospital for it for four weeks, being treated, he says, as a case of rheumatics. Is elderly and not well developed; locally the skin is smooth and thickened. He complained also of some pain in lumbo-sacral muscles and had defective teeth.

Treatment, apart from the suggested operative interference, is of little use. Tonics, massage, electrical treatment (including the various forms of high frequency) have all been tried and have all failed. When the attacks are occurring, rest and substances such as phenacetin are indicated, while purgatives should be administered, as pressure of a loaded sigmoid in the region of the lumbar plexus is calculated to exalt the irritability of the affected nerve. Warm underclothing must be worn in all cases, as the patients are unanimous in ascribing the onset of their attacks to climatic conditions, changes of temperature, cold and damp.

The attacks of pain tend to wear off and to become less frequent with the lapse of time. The feature of the condition, however, is the unreliability of the symptoms and the likelihood of relapse.

SHELL SHOCK AND ITS TREATMENT BY CEREBRO-SPINAL GALVANISM.

BY
WILFRID GARTON, CAPTAIN R.A.M.C.

THE term "shell shock" is made use of to describe two distinct conditions—one a severe type of traumatic neurasthenia, and the other bearing no resemblance to a neurasthenic condition, but characterized by hysterical manifestations.

It is for shell shock of the neurasthenic type only that cerebro-spinal galvanism is of service as a treatment, for, its use being based on the assumption that neurasthenia is an organic disorder, there is no reason to expect any favourable results to follow its use in a condition of functional disorder.

In the neurasthenic type of shell shock most, if not all, of the following symptoms are found to be present: Headache (always aggravated by the advent of thundery weather), insomnia, mental depression, loss of memory, nervousness, bad dreams, fatigue (without exertion).

tremors, wasting, and loss of appetite. Paralysis of limbs or groups of muscles and localized pains are also present in a number of cases. The resemblance between this condition and neurasthenia following severe illness is so striking that a similarity of origin is exceedingly probable.

Any one of the above symptoms appearing separately might be looked upon as a functional disorder, but the co-existence of all or nearly all of them in a series of cases admits of only one explanation (if the simplest explanation is the most probable), and that is that they are the effect of a common cause—organic disorder of the central nervous system, and, as there is no gross lesion, this is probably a disarrangement of metabolism. Furthermore, the character and personality of the patient are greatly changed by this condition, and it is inconceivable that this alteration can take place independently of any structural damage or metabolic disturbance in the organism from which the character and personality take their origin and depend on entirely for their continued existence.

A possible explanation of the appearance and persistence of the symptoms is that the violent concussion of the explosion produces a partial paralysis of the *nervi nervorum*. The interference with the nutrition of the whole nervous system would prevent the restoration of the *nervi nervorum* to their normal activity, and thus the evil would be acting in a circle. This would account for the resemblance between these cases of shell shock and cases of neurasthenia following severe illness, for a partial paralysis of the *nervi nervorum* might be produced by the action of toxins.

The cure of neurasthenia by suggestion in some cases is not an inexplicable contradiction, for it is conceivable that the paralysis of the *nervi nervorum* may be of just such an extent that recovery is only prevented by the mental depression consequent on the condition maintaining a state of lowered vitality. In such cases relief from the mental depression would result in a cure.

Now if there is any probability that shell shock of the neurasthenic type is due to a paralysis of the nerves regulating nutrition or a disorder of metabolism, then the use of the galvanic current is a treatment from which one has every reason to expect good results, for the most powerful agent we have for stimulating the nerves to activity is electricity.

The best form of apparatus is a battery of wet Leclanché cells connected to a switchboard on which are two resistances, each of 1,500 ohms, one in series and the other in parallel with patient and milliampèremeter. The treatment is then commenced with no resistance in parallel and full resistance in series. The parallel resistance is first increased to its full extent and then the series resistance diminished until the required amount of current is obtained. If this apparatus is not at hand a battery of twelve dry cells with cell collector and galvanometer, and a resistance of at least 1,500 ohms may be used. No current derived from the mains or any universal apparatus should ever be used for this treatment.

A pad composed of about sixteen layers of lint, soaked in a solution of sodium salicylate in distilled water, is applied to the forehead, care being taken that the pad is evenly wetted, and that its centre coincides with the middle line of the forehead. Over the centre of the pad is placed a metal plate, and the whole firmly bandaged to the head. The metal plate is connected to the negative pole. A pad of the same thickness, about 10 in. by 6 in., is soaked in tap water, covered with a metal plate, and firmly bandaged to the lumbar region. This is connected to the positive pole.

The current is increased very slowly, taking about twenty minutes to attain the maximum of 20 milliampères, at which point it is allowed to remain for twenty minutes, and then is slowly reduced to zero. When increasing the current the cell collector is advanced before reducing the resistance, and when decreasing the current the resistance is used first.

For a first treatment I give only 10 milliampères for ten minutes, and do not pass the full strength of current (20 milliampères) till the third or fourth treatment. With patients who are nervous of electricity I find it a good plan to give labile galvanism to the spine for two or three days before commencing cerebro-spinal galvanism.

Having found this treatment successful in cases of neurasthenia, I treated several cases of shell shock by the

same method shortly after joining the service. Unfortunately, I was unable to keep these patients under my care for a sufficient length of time to effect a cure, but in every case I was impressed with the rapid progress made towards recovery. I had no further opportunity of treating this condition until the end of February, 1916. My first patient had not suffered by a shell explosion at close quarters, but he had been exposed to shell fire in the trenches for a considerable time, and as he showed most of the symptoms of shell shock, I think the case worth recording, although it was not of a severe type.

CASE I.

Private S., aged 34. Constantly exposed to shell fire during the latter half of last year. When first seen he was suffering from pain in the back and legs, tremors, headache, fatigue without exertion, nervousness, insomnia, mental depression, wasting, and loss of appetite. Cerebro-spinal galvanism was commenced on February 23rd, but after three treatments his regiment was moved to another district. He was transferred about a month later to a home service battalion, and being stationed in this district again, asked permission to continue his attendance at this hospital, as he had derived so much benefit from his treatment here. The treatment was again given three times a week for five weeks. At the end of that time he had gained considerably in weight, the tremors had disappeared, and he stated that he felt quite well except for the pain in his legs, which had increased. I took an x-ray plate of his legs, which showed a syphilitic condition of the bones. Treatment for this condition was carried out by the medical officer of his regiment, and he now feels perfectly well.

CASE II.

Private H., aged 30, was knocked over and buried by a mine explosion on December 12th, 1915. He was unconscious for some hours. He was in a V.A.D. hospital for a month after arriving in England, and then returned to his regiment for light duty. He was still exceedingly nervous, and was so distressed by being placed on guard on a railway that he reported sick. When first seen he was evidently in an extremely nervous condition, and very depressed mentally. He complained of bad dreams, want of sleep, loss of memory. He was also suffering from severe headaches, fatigue, and loss of appetite. He was considerably wasted.

Cerebro-spinal galvanism was commenced on March 25th. After four treatments he was sent out of hospital owing to an error, as fit for duty. His medical officer was communicated with, and as the patient was very much better, he was allowed to remain on light duty, and received treatment again on April 5th and 7th.

On April 8th he received news of the death of one of his children, and had no recollection of what happened afterwards until he found himself in Birmingham. About twelve days later he reported to the nearest police station that he was absent from his regiment without leave. He came to this hospital again on May 1st, and was admitted. Treatment was recommenced, and by the end of May he had gained about 1½ st. in weight, and appeared to be in perfect health. Treatment was continued until July as a precaution against a return of the condition.

CASE III.

Sergeant P., aged 37, was blown up by a mine explosion on July 27th, 1915. He was unconscious for fifteen hours. On recovering consciousness his left lower limb was found to be paralysed, and it remained so for five months. He was treated at a military hospital for four months, where he was given electric baths, and then removed to another military hospital, where he remained for three and a half months, being treated daily by massage, faradism, radiant heat, and ionization. He left there on March 25th, at his own request, to return to light duty. He reported sick again on April 7th. When first seen he was suffering from headache, insomnia, bad dreams, loss of memory, tremors, pain in the lumbar region, mental depression, and fatigue without exertion. He stated that he had lost flesh early in his illness, but had regained his normal weight, and that his headache was less constant than at first, though undiminished in intensity.

He has been treated three times a week by cerebro-spinal galvanism since April 22nd. He has now perfectly recovered from loss of memory and mental depression, and exhibits no tremor. There is very little nervousness. He still suffers from slight headache in the morning. He is sleeping fairly well, and is not much troubled with dreams. He suffers from fatigue, but far less than when treatment was commenced. The pain in the lumbar region is not much improved, but in every other way he is making steady progress. While under treatment he has been doing clerical work continuously.

CASE IV.

Sapper M., aged 30, was blown up by a mine explosion in September, 1915. He was unconscious for ten hours. He had the usual symptoms of shell shock, but tremor all over the body was particularly prominent. There was also drop wrist on the left side. After three months in a military hospital he returned to light duty. His condition gradually became worse again, and he reported sick about the middle of April. When first seen tremor was very noticeable. He complained of headache and insomnia, which had not diminished at all while under

treatment. There was also loss of flesh, muscular weakness, loss of memory, mental depression, and bad dreams. He reported sick on account of the tremor increasing and persistence of paralysis of his forearm.

He has now had six treatments by cerebro-spinal galvanism. He is sleeping well, and has only slight headaches occasionally. The tremor has disappeared, his memory is good, and he is quite cheerful. Some voluntary movement returned to the extensors of the hand and wrist after treatment of the spine by labile galvanism, and the power of movement is increasing although he has had no local treatment for these muscles.

The conclusion I have arrived at from the trials I have carried out of this treatment is that nearly all cases of the neurasthenic type of shell shock would derive great benefit from it, and the majority of cases, excepting those of the most severe type, would be cured in under three months.

TREATMENT OF MENINGITIS.

BY

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PNEUMOCOCCAL meningitis is still considered so universally fatal that it seems useful to put on record cases of recovery.

My first successful case occurred a few years ago in a child between 3 and 4 years old, who had a severe attack of bronchopneumonia lasting a fortnight. The lungs began to clear up, but the temperature remained between 102° and 103° F., and the child became drowsy. When admitted to hospital there was almost complete coma; the neck was retracted, and there was strabismus. By lumbar puncture a thick white fluid flowed off under pressure; it looked like pus from an empyema, and gave an abundant growth of pneumococci. The child was put on urotropine gr. 3 every four hours, and was given 5 c.cm. of Pane's antipneumococcal serum by the mouth; no food was given for two hours before or two hours after. The Pane's serum was given every twenty-four hours on an empty stomach for three days, then every other day, and later twice a week. Lumbar puncture on the third day gave a less thick fluid. After the third day there was slow but steady improvement. The temperature did not settle to normal for six weeks, but at the end of three months the child was perfectly well.

Since then I have had two recoveries in children treated in the same way. I give Pane's serum by the mouth in children, preferably when waking in the early morning, as the stomach is then at its emptiest. In pneumonia it has always acted well taken in this way. The dose by the mouth is double that necessary hypodermically, but the child is saved the pain of the injection.

The only case in an adult which I have treated was a soldier admitted to hospital in April.

He had had headache for eight or nine days, with a temperature from 99° to 101° F. for a week, and vomiting independently of meals. On admission the temperature was 101°, the pulse 90. He complained of severe headache and frequent vomiting. There was a large crop of herpes on his lips, the tongue thickly furred, and the mouth very foul. His head was not retracted, but it could not be moved forwards beyond the vertical. Kernig's sign was present. Knee-jerks were absent, and the plantar reflexes were flexor. Cloudy fluid was obtained by lumbar puncture. Nothing abnormal was found in the chest. He was given urotropine gr. 20 every four hours.

Next day the cerebro-spinal fluid was reported to give a growth of pneumococci, and 10 c.cm. of Pane's serum was injected in the flank; this was repeated every other day for four doses, then every third day for three more doses. Improvement began about the fifth day, the headache being less severe, and the temperature falling in the morning to 98°, though still 101° in the evening, instead of keeping consistently high. Vomiting was less frequent also. As the general condition improved the pulse-rate became faster, 100 to 120. For the first three days it had not risen above 90, though the temperature was 100° to 101° all the time.

The temperature definitely began to fall on the twentieth day after admission, and became normal by the twenty-third. Urotropine gr. 20 was given every four hours up to this date without any urinary symptoms. The patient became very emaciated during the illness, and was a long time regaining flesh and strength, but he is now at a convalescent home feeling quite well.

Lumbar puncture is much simplified if a hypodermic syringe of eucaïne and adrenalin solution is injected under the skin at the selected site, and also down between the arches of the vertebrae, in adults as deeply as the hypodermic needle will reach, in children of course not far enough to risk entering the spinal canal. After waiting

five minutes, lumbar puncture can be done painlessly and without any movement on the part of the patient.

An interesting case of streptococcal meningitis, again a soldier, was admitted under me in February.

He had been ill for a fortnight and complained of intense headache, which kept him awake at night. His pulse and temperature were normal for the first four days. He did not vomit, his tongue was very furred, and his breath offensive. There was no retraction of the neck and no Kernig's sign. No drugs had any appreciable effect on the headache. Four days after admission he had a sore throat and his temperature rose to 100° F. There was then for the first time some difficulty in making the chin touch the chest. A day later rigidity of the neck was definite. There was also oedematous swelling of both temporal and preauricular regions, more marked on the right side. Next day there was oedema of the eyelids as well as of the temporal regions. Kernig's sign was present for the first time in slight degree.

The cerebro-spinal fluid was cloudy. After examining this a bacteriologist declared the case to be one of spotted fever, and had him removed to the sanatorium, where he came under the care of Dr. Duncan Forbes, who, when the man died a few days later, kindly showed me the results of the *post-mortem* examination. There was pus at the base of the brain containing a Gram-positive streptococcus. The body of the sphenoid bone was extensively diseased.

It seemed evident that the disease was primarily of the bone, and that the meninges were affected later. The most interesting feature of this case was the swelling of the temporal and orbital regions with definite signs of meningitis, coming on after the throat became infected. There was no nasal discharge nor any indication that the ethmoid was diseased.

The most severe case of meningococcal cerebro-spinal meningitis in which I have seen recovery take place was the following:

A boy aged 14 was seen in consultation several times with Dr. H. J. Pulling in January, 1915. He got up well one morning; at dinner time he refused his food, and complained of headache. When I saw him, at 8.30 p.m., he was lying on his side with his legs drawn up. He was quite comatose, with marked strabismus and paralysis of the left arm. There was evidence of pain on pushing the head forward, but no real retraction of the neck; Kernig's sign was very marked, the knee-jerks were weak, the left plantar reflex extensor; temperature 103° F. Lumbar puncture gave milky fluid under great pressure; over a test tube full was allowed to flow before the stream became of normal pace. There was no rash that day. He was given 8 grains of urotropine every four hours through a nasal tube, and was also fed in that way; 10 c.cm. of Pane's serum were injected as it was at hand. The cerebro-spinal fluid gave an abundant growth of meningococcus, after which Flexner's serum was obtained and injected subcutaneously. By the third day he had improved remarkably, being quite conscious and taking food well, but he relapsed though not to unconsciousness. Later there was incontinence of urine and faeces, but vomiting was not troublesome. He became extremely emaciated, and always lay on his side curled up and often moaning. It was very difficult to prevent the formation of bedsores. He took urotropine for a long time, and opium was given for the relief of pain and to promote sleep. He was very ill for two months, but Dr. Pulling ultimately pulled him through, and he is now quite well mentally and physically except for slight stiffness of the left arm.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

COLLOSOL ARGENTUM.

I HAVE been using collosol argentum lately, and I think the results may interest others.

The first case in which I used it was a lady who had had pyorrhoea for several years. I gave her 15 minims of the drug hypodermically in the arm. One injection cured her.

A young girl, aged 18, came to my house with acute inflammation of one eye with an ulcer on the cornea. Two drops of collosol argentum were dropped in the eye at 7 p.m., and a pad placed over the eye. When she came next morning the eye, to my astonishment, was quite well; the ulcer had disappeared, and there was no inflammation.

A man in poor health was admitted to hospital and I removed his appendix. He did very well till the fourth day when he developed acute intestinal obstruction. He was opened again and a twisted intestine was put straight, but although he had good relief from the bowels he did not do well. The wounds suppurated, and he got septic diarrhoea which nothing seemed to relieve. In despair I injected 20 minims of collosol argentum every day. The diarrhoea soon stopped, the pus dried up, the wounds took on a healthy aspect, and he made a good recovery.

A child, aged 3, had tuberculous glands of the neck, and was very emaciated. The glands were removed and the wound did badly. Collosol argentum (10 minims) was given by the mouth