Case F.—A man, aged 57, with severe anaemia, diagnosed as probably pernicious. The blood count at the commencement of treatment (September 23rd, 1924) was as follows: Red blood corpuscles 2,600,000, white corpuscles 23,000, haemoglobin 46 per cent. Counts taken at monthly intervals showed a gradual improvement, and the last count, taken in April, 1925, showed a decrease of white blood corpuscles to 9,000 per cubic millimetre. The patient when last seen seemed practically normal.

Another type is seen in the following case.

Case G.—A man, aged 35, with neurasthenia of some years' standing. He was melancholic, had lost his grip on life, and had to give up his work. He suffered from insomnia and loss of memory. In this case the whole body was treated for three minutes every other day, gradually increased to four and a half minutes. There was marked improvement at the end of two weeks. At the end of a month he was able to take a fresh post, and I understand that he has not suffered since.

These cases are only samples, and I feel convinced that titanium rays, used with discretion, are frequently of extraordinary value. When there is an obvious psychological element in the diseased condition titanium rays are often of extreme value, but I believe that the improvement is out of all proportion to the mere "psychical appeal" a course of treatment involves.

At the present stage it has been deemed advisable to withhold treatment in certain cases, but the success attending such a large percentage of those who do come under treatment seems to justify further strenuous investigation. It may be pointed out that three to four minutes' exposure to the titanium rays is equal to many hours of the sun's rays. Considerable caution is required in the selection of cases. At present phthisis in an advanced stage is one disease for which these rays should never be used.

Among other forms of disease in which the results of this treatment are highly encouraging are tuberculous wounds, septic and irritant conditions of the skin, sciatica and lumbago, etc., but space will not allow me to deal with these in detail at the present time.

I append some controlled laboratory observations on the bactericidal effects of titanium rays. I quote these as indicating the richness of the radiations in the extreme ultra-violet.

"Experiments were carried out with the titanium rays as evolved in the apparatus used in the treatment of patients. Petri plate cultures were used, one series containing twenty-four-hours' cultures of the test organism, and the other thickly sown with the respective test organisms an hour before the exposure. To avoid the temperature factor the rays were used openly, and not focused on the plates. The results were as follows:

"*A. Pneumococci.*—A twenty-four-hours' culture on blood agar was exposed for five minutes to the rays. Some of the growth was then removed and inoculated into blood agar tubes. No growth of the organism was obtained after forty-eight hours' incubation at 37° C. A similar plate not exposed, and kept as a control, gave rich subcultures under the same conditions of incubating. A blood agar plate thickly spread with a young culture of the pneumococcus was exposed to the rays for five minutes and then incubated for forty-eight hours. No growth of organisms took place except at one margin where there was a fringe of colonies at the outer circumference of the medium. This was found to be due to the holder casting a shadow at the lower extreme edge of the plate, and so this area unavoidably escaped subjection to the rays. A control plate of pneumococci similarly spread and incubated yielded a rich growth of the organism.

"*B. Streptococci.*—A *Streptococcus pyogenes* plate showing twenty-four-hours' growth of the organism and exposed to the rays for five minutes was sterilized, no growth of the organism being obtained. The control plates gave rich growths. The newly spread plate of the streptococcus submitted to the rays showed no growth except at the extreme margin where shadow was unavoidable. The control plate showed a rich growth under similar conditions of incubation.

"*C. Typhoid.*—A *B. typhosus* plate culture containing a confluent growth of twenty-four hours was sterilized by five minutes' exposure. Subcultures could not be obtained. The newly spread plate of *B. typhosus* exposed for five minutes gave no growth of the bacilli except at the extreme margin where the shadow prevented exposure. The control plate showed a rich growth of *B. typhosus*.

"*D. Anthrax.*—A forty-eight-hours' culture of *B. anthracis* showing spores was spread on agar plates and one of them given ten minutes' exposure, the extra time being allowed to compensate for the very resistant character of the spores of this organism. After forty-eight hours' incubation the exposed plates showed growth of the bacillus at the shadow margin and a very occasional colony towards mid-centre of the plate. The control plate showed rich confluent growth, and on comparison it was seen that the control plate contained at least 90 per cent. more growth than the exposed plate, not counting the colonies at the shadow margin, which it is fair to regard as an unexposed portion."

REFERENCE.

¹ Macht, Bell, and Jävers: *Amer. Journ. Physiol.*, 1926, lxxvi, p. 210.

ADVANCED TETANUS CURED BY INTRATHECAL INJECTION OF ANTITOXIN.

BY

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THE prophylactic value of antitoxin was fully established during the war, but even at the end of it doubt was expressed as to its value in the treatment of the clinically declared disease. Permin and Faber,¹ quoting Danish statistics, give a mortality of 79 per cent., the prognosis varying directly with the incubation period prior to development of the primary symptoms. Cases developing symptoms in ten days or under from the primary trauma show a mortality of over 90 per cent. British cases in the war showed a mortality of 50 per cent., the common causes of death being cardiac failure and exhaustion.

In considering the treatment of declared tetanus the pathology has to be taken into account. A combination has formed between the toxin and the motor nerve cells of the central nervous system, toxin is circulating in the blood, and is still being manufactured in the wound.

Sherrington's experiments on monkeys showed a 56 per cent. cure of experimentally established tetanus by intrathecal injection of antitoxin. The early researches of Sicard² showed much quicker results in the time of onset of spasms by injecting tetanus toxins into the subarachnoid space than by the intravenous or subcutaneous routes. Hence, *per contra*, antitoxin administered intrathecally should act more powerfully and quickly than by the other routes.

The case about to be described illustrates the value of treating the various pathological phenomena of established tetanus by the intrathecal administration of powerful doses of antitoxin, by supporting the patient's heart and general system during the muscular spasms, and by removing promptly the site of infection.

A Chinese boy, aged 12½, had his left leg crushed in its middle third by the wheel of a Chinese cart. A bad compound comminuted fracture of both tibia and fibula was the result, and the native doctor was immediately called to attend.

The child's condition became progressively worse, and on the ninth day following the accident he was brought to hospital. Below the seat of injury absolute dry gangrene had been established, and when the patient was lifted off the stretcher the lower part of the leg fell off. There was no haemorrhage. The child had fever (102° F.) and a rapid pulse (120), and definite head retraction was present, with masseteric spasm and the typical "risus sardonicus" of declared tetanus.

In view of these facts I at first refused to operate, but, on the pleading of the parents, attempted what I regarded as a forlorn hope.

The child was given morphine 1/6 grain, and put under open ether anaesthesia. A pint of intravenous saline was administered, and a rapid circular amputation performed at the seat of election, no attempt being made to suture flaps. Two premolar teeth were extracted with difficulty to permit easy feeding, and then a large intrathecal injection of antitoxin was administered.

Arguing on the principle that the lumbar enlargement of the cord was the site of attack, the lumbar puncture needle was introduced through the eleventh dorsal intervertebral space, and about 15 c.cm. of cerebro-spinal fluid drained off; 20 c.cm. of standard antitoxin, representing 20,000 units, were then injected. The shoulders and pelvis of the patient were raised, in order to make the site of injection the most dependent part, for four minutes, and 4,000 antitoxin units were then administered subcutaneously.

On the next day typical opisthotonic and pleurothotonic spasms were present; the trismus was much worse, and there was considerable rigidity of the rectus abdominis muscles. The temperature was 101°, and the pulse 134. The wound was slightly septic. A further intrathecal injection at the same site, of 20,000 antitoxin units, was administered, and followed by 10,000 units subcutaneously. Mouth-feeding with a tube and funnel was established, through the dental space previously prepared, and rectal salines (10 ounces, with 5 per cent. glucose and 30 grains of potassium bromide) were administered every four hours.

On the third day the temperature was 100°, and the pulse 126; opisthotonos and trismus were present; 4,000 units were administered subcutaneously, and salines and tube feeding were continued.

On the fourth day the opisthotonos was very slight, but trismus persisted. The temperature was 99°, and the pulse 118; 4,000 units were again administered subcutaneously, and rectal and tube feeding continued.

On the fifth day opisthotonos had practically disappeared, and there was a slight relaxation of the masseteric spasm. The child's general condition was much better.

On the sixth day all spasm had practically disappeared, although there was some difficulty in swallowing, and tube feeding had to be continued. The masseteric spasm completely disappeared with the dysphagia; the child made an uneventful convalescence, the stump healing by granulation; he left hospital on the twenty-eighth day.

This case illustrates how the energetic and persistent symptomatic treatment of an apparently hopeless case of tetanus was rewarded. It appears to justify the claims made for the value of the intrathecal injection of antitoxin, and I consider that intrathecal injection at the anatomical site of the anterior horn cells of the spinal cord, supplying the injured muscles which are the actual seat of toxin manufacture in the wound, is all-important for its success. In this case the lumbar enlargement of the cord was fully impregnated with the antitoxin, and this appeared to be the successful factor in the case.

REFERENCES.

- ¹ Permin and Faber: *Communications de l'Institut Séro-Thérapique de l'Etat Danois*.
² Widal, Sicard, et Ravaut: *Bull. Soc. Méd. des Hôp. de Paris*, 1901.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CARCINOMA OF THE THYMUS GLAND.

A short time ago I examined a man who complained of gnawing, but not severe, pain in the region of the junction of the cartilages of the eighth and ninth ribs on the right side. It appeared to be a case of intercostal neuralgia. There were no other symptoms so far as I could discover.

Treatment was continued for six weeks, but did not relieve the pain, and there was increasing anaemia and some wasting. Later a small triangular area of dullness with tubular breathing was detected behind, close to the spine, and I informed the relations that probably cancer of the lung was developing, and was the cause of the symptom of severe pain in the region mentioned from pressure on the intercostal nerves. No expectation.

X-ray examination showed cloudiness and small dark areas over the lungs. The radiologist suspected tuberculosis, but it was obvious that the dark areas were due either to byssinosis—the patient was a collar cutter by profession and ran a small private factory of his own—or else that the areas were secondary deposits over the lungs. Irregular temperature, but not a daily one, developed, and, as was to be expected, pleural exudation took place. On several occasions large quantities of fluid were removed; microscopical examination of this gave negative results.

As the relatives were always in doubt as to the cause of the illness, a *post-mortem* examination was allowed; this showed well marked massive cancer near the root of the right lung with secondary nodules in both lungs. On the right the growth was adherent to the dome of the diaphragm, which was perforated, and there was a fan-shaped involvement of the liver. One possibility was that the carcinoma started from the mucous glands of the larger bronchi at the root of the lung, and that the secondary nodules arose along the lymphatic vessels surrounding the bronchi. The second and most likely supposition is that the cancer started in Hassall's corpuscles in the only partly atrophied thymus gland.

The microscopical report is as follows: "The section shows a malignant new growth composed of irregular angular cells. It may be derived from a growth originating in Hassall's corpuscles of the thymus, but further information about the history is desirable."

May I offer the suggestion to those who so ably work on the cancer problem that humanity may become susceptible to cancer when the thymus gland does not completely atrophy, but takes on an altered function, producing a blood plasma saturated with thymic juice, rendering the body thus susceptible to cancer organisms (?), and that any local source of irritation which lowers the organ's resistance allows cancer to originate and settle in that locality?

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A LARGE VESICO-URETHRO-VAGINAL CALCULUS.

THE two reports on vaginal calculi published in the JOURNAL by Lieut.-Colonel W. F. Brayne (January 2nd, 1926, p. 17) and by Mr. E. Farquhar Murray (February 6th, 1926, p. 238) prompt me to record the following case:

A married woman, aged 52, was admitted to the Mansfield and District Hospital under the care of Dr. Hunnard for incontinence of urine.

She stated that a year earlier she began to suffer from frequency and pain at the end of the act of micturition, but fearing that it might be a cancer she did not consult a doctor. The intermittent attacks of pain subsided to give place to a persistent aching. At first she had some control over micturition, but none for six months. The urine was thick and foul-smelling, and she was very distressed on account of the bad smell emanating from her, and by fear of cancer.

On vaginal examination a stone was seen projecting from the anterior wall of the vagina, wedged in a large gap about two inches long and one inch wide. The gap stopped short of the external meatus of the urethra. Urine was continually dribbling away from the upper part of the fistula. The stone was removed, and she had very severe cystitis; repair of the fistula was not attempted. The stone was white, smooth except at the top end, and more or less rounded. It weighed 4½ ounces, and measured 4½ by 4 inches; its nucleus, according to x-ray appearances, consisted of oxalate.

Mr. D. Greig, the curator of the Museum of the Royal College of Surgeons, Edinburgh, to whom I sent the stone, considered it a rarity. At Dr. Hunnard's request I performed a plastic operation under spinal anaesthesia, six weeks after the first. The patient made an uneventful recovery.

I am informed now, after a year and a half, that she is in excellent health, and has full control over micturition, though she has slight frequency, having to empty the bladder every four hours, no doubt due to the fact that the bladder contracted during the time she had incontinence, and its capacity for holding the normal quantity of urine diminished.

I am much indebted to Dr. Hunnard for permission to publish this case.

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AN ALTERNATIVE TO CIRCUMCISION IN PHIMOSIS.

AFTER many years in general practice, during the greater number of which I had a partner or employed an assistant, I was struck with the fact that not one of them knew that there was an alternative to circumcision in the treatment of phimosis. Therefore I infer that a good many others do not know it. It was taught me by my principal when I was an assistant in 1883. It is as follows.

With strict antiseptic precautions, an ordinary silver probe is taken in the right hand and with the left hand the foreskin is drawn back as far as possible, the orifice being slightly stretched. The probe is then insinuated between the glans and the foreskin, about the centre, and is coaxed back until the blunt point is seen or felt to have gone as far as the base of the glans. The probe is then gently worked laterally, first to one side and then to the other, so as to break down the adhesions between the mucous membrane of the glans and the prepuce. In doing this the point of the probe should be worked round as far as the fraenum on either side, and in bringing it out care should be taken to break down the adhesions which surround the orifice of the prepuce. Some cases have very few adhesions, and the little operation is quite easy. When the adhesions are more extensive, it can always be managed with a little patience. When done successfully it should be possible for the foreskin to be drawn back to the base of the glans quite easily. The surfaces should then be cleansed with boric lotion and smeared with carbolic oil, and the foreskin drawn forward again. The nurse should be instructed to draw back the foreskin once or twice a day, to prevent it adhering again. On several occasions, owing to not having a good nurse to hold the baby, I have had to complete the operation at a second sitting, but have nearly always managed it at one. On one occasion I damaged the fraenum in bringing the probe round. There never appeared to be any redundancy of skin afterwards, at all events none to cause inconvenience.

I have never come across a case in an infant which I could not manage easily. With one case in an older patient I failed.

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