What may be termed the "vital" changes in the pyrogenic reaction, so far as known, are chiefly expressions of a powerful stimulation of certain productive capacities of the cells and tissues, more especially those that are extra-ordinary, and the rapid mobilization of these products. After an initial leucopenia there is a leucocytosis in which a striking blood picture has been described and figured, that by Cowie and Calhoun² showing in some cases many young and atypical cells, myelocytes, mast cells, nucleated reds, and increased size and development of the platelets. Changes in the white cells, the blood pressure, and pulse frequency have been described (with illustrative charts) by Gow.³ Miller and Perry⁴ record the curious phenomenon of phagocytosis of erythrocytes in the peripheral blood by the large mononuclear cells. Others have obtained evidence of increase in circulating antibodies, at first by detachment from their mooring stations and later (two or three days) by new production.

Now, changes very similar have been described as the effect of artificial heat. Thus, J. B. Murphy and Sturm,⁵ in a series of experiments, found that mice subjected to dry heat of 55° to 65° C. for five minutes showed an initial leucopenia, followed by leucocytosis, which continued for two to three weeks, the increase amounting to a gain of over 200 to 300 per cent. above the normal for the animal. Mice so treated developed a high degree of immunity to cancer grafts as compared with the controls. Precisely similar results were obtained with bovine tubercle bacilli, the resistance in the heated mice being increased from two to three-fold. In regard to phagocytosis, Ledingham⁶ found that when leucocytes were put in contact with fresh serum and staphylococci and incubated together at different temperatures for the same period of time (varying from 15 to 45 minutes) phagocytosis was considerably increased at temperatures over 37° C., up to 43° C. McCallum⁷ states that the influence of temperature has not hitherto been sufficiently recognized, and quotes a number of experiments showing that animals kept at a high temperature in a thermostat room, in whom small doses of bacteria or toxins had been injected at intervals, developed a much more effective defence than those left at ordinary temperatures, in that "agglutinins and bacteriolytic substances were produced far more quickly and in much greater amounts than in the controls."

We find, as a matter of fact, that the conditions amenable to pyrogen therapy are chiefly those which are benefited by thermal baths (water or air), such as arthritis (various), neuritis and neuralgia or myalgia, certain skin affections, and subacute or chronic inflammatory exudations; and, further, the results are so far comparable in view of the more intense and prolonged pyrexia produced by the pyrogen and the collateral effects of its autogeneration.

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ILIO-TIBIAL BAND GRAFTS FOR THE RADICAL CURE OF LARGE INGUINAL HERNIAE.

BY

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THE difficulty of securing a satisfactory radical cure in cases of large inguinal herniae is so well known that it need not be enlarged upon, but if evidence is needed it is furnished by the number of operations which have been described for the purpose. It is also obvious that the results obtained are not always entirely successful, and there is, therefore, some excuse for this description of yet another method of dealing with the condition.

Fortunately, herniae which cannot be treated by Bassini's operation, or some modification of it, are not common, but in the three cases to be described the base of the sac was very wide, and the lower fibres of the internal oblique—those arising from Poupart's ligament—were so weak that it was impossible to bring down any part of the muscle to the deep surface of the ligament; therefore, after closing the base of the sac by interlocking ligatures, or by

a continuous suture, there remained nothing to strengthen the abdominal wall over the hernial site except the external oblique, which was greatly stretched and weakened in each case, the superficial fascia and the skin. Recurrence was practically certain if the operation had been completed, leaving the abdominal wall in such a weak condition, and I thought it would be worth while to try a graft of the ilio-tibial band to take the place of the internal oblique.

The usual incision for the radical cure of hernia was made, and, after ligaturing bleeding points, the external oblique was divided over the whole length of the cord. The remains of the internal oblique were raised from the underlying structures by blunt dissection, and the sac found and separated in the usual way. The sac was opened and the contents replaced in the abdomen, and, with a finger in the sac to prevent the exit of these contents, interlocking sutures were placed and tied, and the sac was removed about a quarter of an inch beyond the ligatures. The cut edges were also brought together by a continuous silk suture. Two strips of gauze were passed beneath the cord, so that it might be lifted out of the way while the graft was being sewn into position beneath.

I then made a semilunar incision, with its base anterior on the outer side of the patient's thigh, raised the flap of skin and subcutaneous tissue, and removed a piece of ilio-tibial band of such a size and shape that, when folded diagonally, it would fill the triangular space between Poupart's ligament, the outer border of the rectus sheath, and the exit of the cord through the fascia transversalis.

Diagram to show ilio-tibial band graft in position. Dotted lines indicate deep or buried structures or stitches. The external oblique is not shown except in relation to Poupart's ligament. The internal oblique external to the exit of the cord should be brought down to Poupart's ligament if necessary.

The folded edge representing the diagonal of the piece of band removed was stitched by a continuous suture of silk to the deep edge of Poupart's ligament from the attachment of the conjoined tendon to the pubic spine to a point a little external to the exit of the cord, and the inner edge was also stitched with silk to the outer border of the rectus sheath (conjoined tendon). The upper and outer edge was passed beneath the fibres of the internal oblique and transversalis muscles, and anchored to the deep surface of these by two or more mattress sutures of chromicized catgut, so that when contraction occurred during some effort requiring the use of the muscles of the abdominal wall, the graft should be drawn tight, and so offer the greatest possible resistance to the exit of any of the abdominal contents. These deep sutures should, of course, not be drawn so tight as to cause strangulation of the muscle fibres included by them. If any part of the internal oblique could be brought down to the deep surface of Poupart's ligament over the graft, this was done. The cord was replaced on the graft, and the external oblique and superficial structures were closed over it in the usual manner.

Three cases were operated on in this way, and the following is a brief account of them:

CASE I.

Pte. T.: left inguinal hernia. Operation on December 3rd, 1915. The hernia was very large, and the base of the sac would allow three fingers to be passed into the abdomen. The external oblique was very much stretched, and its oblique fibres were widely separated; the intercolumnar fibres were very weak, and the whole structure could not have given any support to the abdominal wall in the hernial region. The part of the internal oblique arising from Poupart's ligament was very weak also, and would not have offered any effective resistance if it had been brought down to the ligament. After ligature and

removal of the sac a single layer of ilio-tibial band was inserted in the way described and the wound was closed.

The patient replied to a letter of mine on June 16th, 1921, stating that he is a miner, and is able to do full work without any trouble; that he has never worn a truss; that the scar does not bulge on coughing or straining, and that he is most grateful for the result.

CASE II.

A. M. B.: double inguinal hernia. Left side operated on March 15th, 1917. The hernia was as large as in the first case. A double thickness of ilio-tibial band, produced by folding the piece removed diagonally, was inserted in the way described.

In answer to my inquiry the patient stated, on June 19th, 1921, that, although he has some cramp-like pains in the groin, especially after sexual intercourse, he has no bulging of the hernial region on coughing or straining, and does not wear a truss. He also expresses gratitude for the operation, which, he says, is quite successful.

I operated on the other side at a subsequent date. Here the conditions were much better, the base of the sac being smaller, and the internal oblique stronger. I did not consider a graft necessary on this side, and did an ordinary Bassini's operation, which is quite successful.

CASE III.

Bdr. F. C.: left inguinal hernia. Operation on May 2nd, 1917. The abdominal wall was very weak in the hernial region and the sac had a large opening. I could not have made a satisfactory repair by the usual method, and therefore inserted a folded graft as described.

The patient writes on June 19th, 1921, to say that the operation is quite successful. He has no pain whatever, and no bulging on sneezing, coughing, or straining. I quote his own words: "I am perfectly cured, and never felt so well before. The work I do is heavy, but I never feel any pain, so shall never want to wear a truss."

The operation has stood the test of six years in the first case and of four years in each of the others without recurrence of the hernia, and two of the patients have been, and are, doing heavy work. I am confident that repair by usual methods would not have been satisfactory, and I believe that this method may be of considerable value in difficult cases. I have not seen any trouble from the removal of the piece of ilio-tibial band. There is a slight bulging of muscle through the gap for a few days after the operation, but none of these patients had muscle hernia on leaving hospital.

For stitching the graft into position I used silk, because I thought it would remain unabsorbed for a considerable time, and would therefore hold the graft until it was firmly united to the neighbouring tissues, but, provided catgut which will last three weeks and is absolutely sterile can be obtained, I do not see any reason why it should not be used if desired. In each case healing was uneventful, and I had no trouble from the use of silk.

IONIC MEDICATION IN THE TREATMENT OF NEURITIC AND RHEUMATIC PAINS.

BY

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CASES of neuritic and rheumatic pains are frequent events in general practice, and not a few of them prove rebellious to treatment. It may be questioned whether in such cases practitioners generally realize the benefit that may be obtained by the employment of ionic medication, especially in cases where ordinary drug treatment fails to give relief.

The treatment is easily carried out by means of the following apparatus, all of which may be obtained at small cost from makers of electrical requirements: namely, a switchboard connected with the electrical mains supply, with a sliding resistance, and with a milliampère meter in circuit; two insulated conductors connected with the poles of the battery and with flexible metal electrodes 4 in. by 3 in.; two pads, each of 16 to 20 layers of lint and of a size sufficient to prevent the metal electrodes from coming in contact with the patient's skin; 2 per cent. solutions of quinine hydrochloride and of sodium salicylate and 1 per cent. of potassium iodide for different conditions, while at the indifferent electrode a 2 per cent. solution of common salt is employed. The only other requirements are bandages to keep the pads in close contact with the patient's body and a suitable couch.

In all cases the pads, especially the one placed in connexion with the positive pole, must be thoroughly saturated with the warm solution employed. The current must invariably be applied and switched off very slowly and smoothly. A current of from 15 to 75 milliamperes is employed according to the locality of the pain and the age, sex, and condition of the patient. The séance should be given daily for twenty to forty minutes. Occasionally I have combined ionization with high-frequency massage to the general advantage of the patient and as a helpful agency in the encouragement of sleep.

Notes of a few cases lately under my care may induce others to test this method of treatment:

Trigeminal neuralgia. A lady, aged 52, sent to me in February, 1921, by Dr. Archd. Sloan, complained of neuralgic pain in the area of the left fifth cranial nerve, and particularly in the supra-orbital region. The pain had been present more or less continuously for twenty years, and was aggravated when the patient washed her face or when she was exposed to wind. Ionization with solutions of quinine hydrochloride (connected with the positive pole), of sodium salicylate, or of potassium iodide, each of the last connected with the negative pole, were employed on successive days. After thirty-three applications there was distinct improvement, and by the end of April the pain had completely ceased. I saw her on August 5th, when she informed me that since the end of April she had had no pain; and that the experiences which had previously provoked or aggravated the pain could now be enjoyed without any discomfort. In addition, her general health had greatly improved.

I have successfully treated many cases of neuralgia of the superficial branches of the circumflex and musculospiral nerves. Their intractability to ordinary methods is well known, yet, with very few exceptions, I find that relief can be secured by ionic medication, a solution of quinine hydrochloride being the most useful. One case as an example may be cited.

A solicitor, aged 52, otherwise in excellent health, sent to me by Dr. Walls Christie in January, 1921, complained of a sudden attack of pain of three days' duration in the right arm, the pain being so severe as to cripple the use of the limb. At the same time there had developed a sensation of numbness in the outer three and a half fingers. Seventeen applications of ionization with a solution of quinine hydrochloride effected a complete cure, and neither the pain nor the numbness has returned.

The average number of applications required is from fifteen to twenty, but many patients are relieved after a less extended course. A lady, 40 years of age, sent to me by Dr. R. O. Adamson on account of severe brachial neuralgia, was completely relieved after six applications. Another lady, aged 33, sent by Dr. W. McMillan, had her brachial neuralgia removed after nine visits.

Neuralgia of the smaller occipital nerve. An elderly lady, advised by Dr. Linton of Renfrew and Dr. George S. Middleton of Glasgow, came into my private nursing home in September, 1920, complaining of great pain at the back of the head and over the right parietal region and vertex. The pain had lasted for more than six months. Ordinary drug treatment and rest in bed had produced little result. Ionic medication with solutions of quinine hydrochloride and of sodium salicylate, however, gave a complete and lasting cure.

Neuralgia in the region of both tuber ischii. A young medical student was referred to me by Dr. Ernest G. Fortune on account of pain in the region of both hips. This had lasted for five years and had prevented him from engaging in any form of sport to which he had previously been devoted. He could stand, lie down, and walk slowly, but any hurried effort caused him suffering. I skiagraphed both hip-joints but discovered nothing abnormal. Quinine ionization was applied twice over each tuber on successive days with surprising effect. Three evenings afterwards he went to a dance "by way of a trial," as he remarked, and took part in every dance with no sensation of pain at the time or ill effect thereafter.

Neuralgia of the twelfth dorsal nerve. A colliery manager, aged 60, consulted me fifteen months ago on account of a severe and continuous pain over the area supplied by the twelfth left dorsal nerve. The pain had troubled him more or less for two years, and though he had tried many forms of treatment, including, he said, the surgical division of the nerve, he had derived no benefit. Ionization with quinine, however, relieved him very considerably and permitted him to continue his work, though this entailed exposure to heat and cold and to wet clothes.

I may, perhaps, be permitted to quote my own case. About nine years ago I was completely laid aside for three weeks with violent neuritic spasmodic pain in the region of the twelfth left dorsal nerve, extending to the thigh. Ionization with quinine gradually produced complete cure, and though I have since been engaged on home military service for four and a half years, have spent months under canvas, been exposed often to wet and inclement weather, and engaged constantly in field exercises and route marches, I have had no return of the pain.