Group II.

- (a) Non-apposition of fractured ends from various causes—for example, interposition of soft structures; over-extension with weights; loss of bone.
 (b) Movement between apposed ends.
 (c) Prolonged severe infection.

With reference to Group I: Comparatively little is known about (a), but pituitary extract is certainly worth a trial; (b) is an important factor, and everything possible should be done to encourage use consistent with prevention of movements at the site of fracture. It is here that massage plays an important part. As regards (c) the blood supply may be injured originally or later cut off by formation of fibrous tissue, and either of these conditions certainly leads to very delayed union.

Under Group II are classed those causes of non-union which may be called lack of opportunity. The non-apposition of fractured ends is, I think, by far the greatest cause of non-union, and this is, in the great majority of cases, produced by the interposition of some soft structure.

The practice, as was advocated by Leriche, of wholesale removal of all bony fragments in compound comminuted fractures is to be condemned.

Movements between the fractured ends is, I believe, another very common cause of non-union or delayed union, and I venture to state that far more damage has been done by neglect of really adequate splinting than good has accrued by the much vaunted early movements, which have often been instituted regardless of all other considerations.

Treatment.

Due regard must be paid to the general condition of the patient. Inducing the patient to drink large quantities of milk and the giving of calcium salts I believe to have no beneficial effects. Doses of anterior lobe of pituitary, 10 grains daily, by mouth, of fresh gland, or subcutaneous injections of extract of anterior lobe, are well worth a trial, especially in those cases of delayed union which are particularly common in the tibia. During the administration of pituitary the urine must be examined for sugar, and the administration stopped or dose reduced if glycosuria becomes marked. I have not as yet got sufficient data to make any positive statements on the influence of pituitary extract.

The most important part of the treatment will be that directed to the local condition. Here massage and electrical treatment are important to improve and maintain nutrition and keep all the surrounding structures in good condition. Movement and use should be encouraged whenever possible—for example, the wrist and hand in cases of ununited humerus. Where infection is still present this must be cleared up, and an interval of at least three months allowed after healing; during this time special attention should be paid to all joints and soft structures, and use of the whole part encouraged, a temporary splint or support being used the while to allow of maximum use. Deformities should be corrected where present.

This delay for the clearing up of slightly infected cases is not always a necessity; it depends upon the type of operation contemplated. I have treated several cases of non-union of humerus in which there has been a sinus, and obtained excellent results by a step operation or dovetailing and providing drainage.

It is sometimes desirable to perform two operations. At the first scar tissue is excised and the sclerosed ends of bone removed; the wound is then completely sutured and the main operation done a month later. This preliminary operation is the more indicated in those cases where prolonged infection has been present and a bone graft is contemplated, for it will serve not only the purpose of eliminating unhealthy tissue, but also as an indicator that infection is absent.

Injured nerves are best dealt with after union has taken place and proper treatment can be devoted to the part; it is seldom possible adequately to treat the two conditions concurrently. Of course, nerves merely caught in between the bone ends and adherent must be freed, but, on the whole, I prefer to interfere with the nerve as little as possible at the time of operating on the fracture.

The operation consists in (1) attaining apposition; (2) retaining apposition without possibility of movement between the ends.

The fractured ends are exposed by the most convenient route consistent with minimum injury to muscles, nerves, and vessels. The ends are then freed from all fibrous tissue. Most or all of the sclerosed bone is removed and several holes made with a fine drill. The method of actually attaining apposition will depend upon the bone and the condition of the bone ends—for example, 3 in. shortening of a humerus is a trifling matter causing little disability, but it would be a most crippling

deformity in a tibia. The methods employed are (1) the "slot or dovetailing" method, (2) the "step" method, (3) the sliding bone graft, and (4) bone transplantation, the slot being filled with an accurately fitting piece of bone cut from some other bone, usually the tibia.

The last is the most successful type of bone transplantation to use. Intramedullary pegs of bone, where they are used to bridge a gap, are prone to fracture after a period of time. Sometimes it may be desirable to transplant a whole piece of bone—for example, a piece of fibula. Speed is of importance directly bone is exposed, as it dries very quickly, and to prevent this the parts must be kept bathed with warm normal saline. In every case the ends are securely bound together by drilling holes and using thick thirty-day chromic catgut. When this has been done quite good stability is obtained, and the operation cannot be regarded as satisfactory unless this is so, particularly in cases of bone graft.

It is to be noted that many patients have a rise of temperature for a few days after the operation, but this is not to be taken as an indication for opening up the wound unless the rise of temperature is maintained. In a few cases where there is extensive scarring, the skin may slough, and this condition is best treated with spirit dressings, thereby the necrosed area is kept sterile and in a short time an aseptic scab will be formed without infection of the deeper tissues of the wound.

The whole limb is then put up in plaster, paying particular attention to fixation of the joint above and below. On no account should plates, wires, screws or other non-absorbable substances be used—they are unnecessary and almost without exception injurious. A radiogram, through the plaster, may be taken in a day or so, to see that all is well.

In cases where dovetailing or step operation has been performed the plaster can be removed at the end of six to eight weeks and a radiogram taken, after which the plaster is reapplied. It is usual to find that there is sufficient union to permit of limited movements being instituted in one of the joints. At the end of three months the plaster can be replaced with a detachable support, applied to afford protection from severe strains, but allowing of free movements of all joints. During this period the patient is encouraged to use the limb, and massage and electrical treatment is applied.

After a bone graft or transplantation, it is wise not to remove the plaster before the end of three months, and it should then be reapplied for another three months and a protective splint used for a further period. The time in plaster will depend upon the condition found in the radiogram.

The length of time during which a bone has been ununited seems to have little influence upon the ultimate prognosis, and a period of years of non-union should not deter one from operating with a reasonable certainty of a good result.

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THE TREATMENT OF HAEMORRHOIDS BY ELECTROLYSIS.

BY

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In the earlier part of 1914 I read a paper at the Royal Society of Medicine on the treatment of haemorrhoids by electrolysis, and I referred there to the very satisfactory results which I had obtained by this method. During a great portion of the four and a half years of the war, which I spent in Boulogne, I had many opportunities of carrying out this treatment, and the more I see of its results the more convinced I am that, in suitable cases, it is the method of election for this very troublesome complaint. For the sake of convenience haemorrhoids may be divided into three classes:

1. *External*, which occur at the mucocutaneous margin of the anus, and are due to varicosity of the inferior haemorrhoidal branches. These as a rule give no trouble unless they become

inflamed and thrombosed, and for such I believe the best treatment is an incision and removal of the clots.

2. *Internal*, which do not prolapse, and which give rise to symptoms of haemorrhage and a dragging pain. The operation for this condition is severe—though not usually accompanied by danger—and painful, and I have found that the large majority of such cases can be cured by applications of the high frequency vacuum tubes, aided by suppositories containing adrenaline.

3. *Intero-external*, which prolapse and become “nipped” by the sphincter, giving rise to great pain, and, frequently, both haemorrhage and discharge. These, and true internal haemorrhoids, are usually dilatations at the junction of the superior and middle haemorrhoidal veins.

It is for the last named very common type of pile that patients usually apply for relief, and for which sedative and astringent ointments and suppositories afford little permanent benefit.

I am convinced that the treatment by electrolysis is the most certain and the least painful. No general anaesthetic is required, and the patient is not confined to bed, as a rule, for more than twenty-four hours at most. There is no pain on defaecation after the treatment, nor reflex difficulty in emptying the bladder, and the cure, as far as the haemorrhoid treated is concerned, is permanent. The prolapsed pile is treated in the manner to be described, and the patient then left alone for ten to fourteen days. If at the end of that time there is another haemorrhoid in evidence it can be treated in a similar manner, but I have never had to administer more than three treatments in any case, and this only on one occasion.

Method.

The patient, having had the bowels thoroughly cleared out by an aperient over-night and a saline in the morning, is placed on the left side, and a large indifferent electrode, connected to the negative terminal of a source of constant current, is applied over the right buttock and hip, taking care that it is in close apposition with the skin. If the haemorrhoid is not fully prolapsed the patient is asked to strain to bring it down. The pile is now painted with a mixture of phenol gr. 30, menthol gr. 30, quinine hydrochlor. gr. 22, adrenaline gr. 1/100, which I have found to be the best “surface anaesthetic,” and after a minute or two it will be found that a local anaesthetic can be injected into the tissue below the base of the haemorrhoid without pain, provided that a sharp fine needle be employed. I usually employ sol. urea and quin. hydrochlor. (Parke, Davis and Co.). After about ten minutes the pile is completely anaesthetic, though almost immediately after being painted it can be painlessly grasped with artery catch forceps to prevent its retraction. Two or three long zinc needles, or thin spears made from “slivers” of sheet zinc and soldered to flexible insulated wire, are thrust into the base of the pile parallel to its long axis, and several more into the substance of the pile. All these needles are connected to the positive pole of the source of current, and are packed round with oiled wool to prevent their causing blisters on the parts round the anus. The current is now slowly turned on till a strength equal to about 12 to 15 milliampères per needle is reached, and is allowed to flow for ten or fifteen minutes and then gradually turned off. It will be found that the needles are quite difficult to withdraw owing to the firmness of the clot formed, and it is often well to reverse the current, making the needles negative, for a couple of minutes to facilitate withdrawal.

After the treatment the pile has changed from purple red to grey. It is covered with adrenaline and chloretone ointment and pushed well up into the rectum, and a suppository of chloretone gr. 5, morphine gr. $\frac{1}{4}$, and novocain gr. $\frac{1}{4}$ inserted. The patient is sent home with directions to go to bed for twenty-four hours, to take a dose of confection of senna and sulphur the following night, and is also instructed that, should the pile prolapse, it must be replaced at once.

The process by which the haemorrhoid is cured is twofold. The vasa vasorum are obliterated, and thus the blood supply is cut off from the walls of the vein, and at the same time a firm, closely-adherent clot is formed in the lumen of the dilated portion.

Advantages of the Method.

1. It is practically painless at the time of treatment.
2. There is very little, if any, pain afterwards.
3. The patient is not kept away from his work.

4. There is no risk of separation of the clot as far as my experience goes, or in the experience of others who have used this treatment.

5. There is no necessity to dilate the sphincter.

I do not consider this treatment is indicated in cases where the piles do not protrude, nor when they are very large.

I do not propose to quote a series of cases, but two recent ones are typical:

A lady, 75 years old, had for two years suffered from small prolapsing haemorrhoids, constant discharge from the anus which stained her linen, and intense pruritus. Two treatments at an interval of ten days, which caused her absolutely no pain either at the time or afterwards, has effected a complete cure of the haemorrhoids, of the discharge, and of the pruritus.

A medical man in busy general practice who had had a prolapsing pile for eighteen months, and discharge and pruritus, was treated on a Saturday afternoon. He had some pain that night, but visited his patients on Sunday and every subsequent day. He has had no trouble since that one treatment.

These results are typical of what one may expect with careful technique in suitable cases.

TUBERCULIN IN EPILEPSY.

BY

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For many years we have administered tuberculin with excellent effects to at least two hundred patients each week. These patients chiefly suffer from chronic ulcerative pulmonary tuberculosis and tuberculous adenitis, and are resident in the Consumption Sanatoria of Scotland, the Colony of Mercy for Epileptics, and the Orphan Homes of Scotland, Bridge of Weir, Renfrewshire.

Two cases particularly are interesting, and deserve to be recorded. Some textbooks¹ on the subject of tuberculin mention epilepsy as a contraindication to its administration. Our experience shows that, so far from that being so, it is a decided indication for its use, especially under two circumstances: (1) the presence of a tuberculous lesion, active or quiescent; (2) a family history of tuberculosis.

Six and a half years ago we began to give tuberculin to a patient (A. D.), who was 32 years of age, who had suffered from epilepsy of the major type since the age of 7, and who had a large mass of tuberculous glands below the right ear with several discharging sinuses; the mass was as large as a closed fist. There was a smaller mass supraclavicularly on the left side, and chronic pleurisy at the left base. No other change was made in the patient's life—the environment, work, and drug treatment were the same as had been the case for many years. We hoped by tuberculin to help the tuberculous condition, and had no thought of it benefiting the epilepsy. In the course of a year and a half the glands disappeared entirely and the pleurisy cleared up. *Pari passu* with the disappearance of the tuberculous lesions, the epileptic fits became fewer and after two and a half years ceased entirely, and the patient likewise improved mentally. When the fits had been absent for a period of three years the patient was discharged from the colony, and she took up work as a domestic servant. We have kept her under observation and under tuberculin treatment during the year, and she has remained perfectly well. For four years thus, apparently as the result of this one new factor—the administration of tuberculin—this patient has been free both from tuberculosis and from epilepsy.

Encouraged with the results of treatment in this case, about eighteen months ago we began to administer tuberculin to several other epileptics who had no clinically obvious or apparent tuberculosis, but gave a family history of tuberculosis. One of these (F. A.) has responded excellently. He was 14 years of age, and had had epilepsy for an indefinite period—the father could not tell how long. His mother had died of consumption. The fits were very severe in character, and one month no fewer than 338 were recorded—309 major and 29 minor. He was decidedly weak-minded, and was certified under the Mental Deficiency Act (1913) as a mental defective. Tuberculin was first given to him in November, 1919. For nearly fourteen months he has had no signs of epilepsy, and mentally he has also improved. The records of his case show that previously he was pugnacious and irresponsible, but during the past year he has been well behaved, and fairly industrious.

Five others, to whom tuberculin has been given for six to twelve months, show a diminution in the number and in the severity of their seizures. Three show no change. We have begun to give tuberculin to a hundred epileptic