THE CONSERVATIVE TREATMENT OF TUBERCULOSIS OF JOINTS.*

BY

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TEN to fifteen years ago it was customary to treat surgical tuberculosis of joints almost in the same way as cancer. One was advised to operate and remove tissues widely—even amputate—as soon as the diagnosis was made. In recent years, however, this practice has given way more and more to conservative measures, and particularly in surgical tubercle in childhood, of which I wish more especially to speak. There is still no doubt that in adults, where time is important, and the production of a speedy result essential, and where growing epiphyses have not to be reckoned with, the more radical measures are permissible, and even advisable, but in children I am becoming more and more convinced that extensive operative procedures are rarely, if ever, called for, and when necessity arises for them it is due to some gross error in diagnosis or treatment at the outset of the disease.

Let me turn for one moment to the consideration of some of the dangers of the radical operative procedures. First and foremost there is the danger of general tuberculosis and tuberculous meningitis.

At the annual meeting of the British Medical Association in Liverpool, in July last, H. J. Stiles opened a discussion, in the Section of Diseases of Children, on the after-results of major operations for tuberculous diseases of the joints, and gave the results of ten years' operative work. He had performed a total of 205 excisions of the hip, knee, ankle, and elbow joints, and out of this number there were 25 deaths—a percentage of 12. The deaths occurred, roughly speaking, from a few weeks up to one and a half years after operation and were chiefly within the first six months. The great majority of these deaths were from tuberculous meningitis and general tuberculosis. In a recent paper on the results of joint excisions C. A. Morton states that 2 per cent. died within two months of the same causes. Granted that the cases subjected to excision were advanced, I think, nevertheless, that the mortality from general tuberculosis occurring after the operation was very high, and that in all probability, if conservative measures had been persevered with, the death-rate would have been lower.

If we consider for a moment the nature of the operation—that cancellous bone with its large vessels is cut across—it is obvious how the dissemination of the tubercle bacillus is brought about. I think that even after conservative operations upon tuberculous joints there is probably a considerable amount of tuberculous material—bacilli and toxins—forced into the general circulation. If the dose be large, and the resisting power of the patient low at this time, general tuberculosis will result.

It is with the object of minimizing this danger that I strongly urge, before any operative procedure is undertaken on a tuberculous joint, that the resisting power of the blood be raised by a course of tuberculin.

Secondly, there is danger of direct shortening from resection of large portions of bone, often necessary to "get outside" a focus of disease.

Thirdly, there is the grave injury to the growing ends of the bone, with subsequent lack of growth, leading often to most appalling shortening. I have met cases in adults who had been subjected to excision of the knee-joint in childhood, with shortening of 12 inches. H. J. Stiles, whose results appear to compare very favourably in this respect with those obtained by others, in excision of the knee-joint has had 2 with shortening of over 5 in. Also arising from injury to the epiphysis, abnormal growth occurs, producing various curvatures which require cuneiform resection.

Finally, I may mention the immediate danger, always to be feared in these delicate children, of death under anaesthesia or from post-anaesthetic acidosis.

It may be accepted as a general principle that this is a disease from which recovery will take place naturally provided the best conditions, local and general, be furnished. I have met numerous cases, and one stands out particularly in my mind, in which joint pains were present for a considerable period and then disappeared without any form of treatment whatever, only to be followed again later, perhaps after six months or more, by undoubted tuberculosis of the joint. One cannot doubt that if Nature, unaided, were able to bring about a temporary cure, she would, assisted by the various means at our disposal, have produced a more lasting result.

At this hospital, situated as it is in the centre of a very large area densely populated with the poorest of people, we see an enormous number of cases of surgical tubercle, and are afforded an exceptionally good opportunity for studying the disease. To illustrate my remarks, I have chosen examples of tuberculosis of hip, knee, ankle, tarsus, shoulder (rare in children), elbow, and wrist.

Before commencing a description of the actual measures I adopt, let me say one or two words as to the diagnosis of tuberculous cases. A skiagram is taken as a matter of routine, and it is surprising how valuable this method is in the diagnosis of early tubercle, especially in those joints, such as the hip, in which most often the primary focus is in the bone.

When a doubt exists after x ray and careful clinical examination I employ either a hypodermic injection of Koch's old tuberculin 0.001 to 0.002 c.cm., or von Pirquet's cutaneous reaction. There are objections I admit to both these tests, but in certain cases they are of value. The old tuberculin injection is almost certain to produce in tuberculous cases a general reaction with a temperature of 101° to 102° F., and a rise in the pulse rate of 20 beats to the minute, a slight feeling of malaise, and some local reaction at the site of injection. I cannot help feeling, however, that it is possible (very remotely I admit) to do harm in certain cases by the test. One so endeavours, in the administration of tuberculin, to avoid a general reaction that I think one should be consistent and not evoke it as a test. However, with 0.001 c.cm. very little damage can be done. Von Pirquet's cutaneous reaction is absolutely safe, but I have so often seen it fail in cases undoubtedly tuberculous that I am bound to say that I do not regard a negative result with very great faith.

Hygienic treatment is of great importance, but is so well known that I will only say that in the Queen's Hospital, drawing as it does its patients from a district where feeding and other conditions are of the worst possible description, I give as a routine a mixture of equal parts of cod-liver oil, malt, and syr. ferri phos. co. zi-ii t.d.s., and I take measures to keep the bowels open. These children have to rest continuously for many months, and the absence of exercise produces often marked constipation. As a result of this the appetite falls off and they suffer from alimentary toxæmia in addition to tuberculosis. One eminent surgeon of this city advises the operation of short-circuiting to avoid this condition. Although not advocating any measure so heroic I employ means to achieve a similar result, and the best remedy I know is paraffinum liquidum (B.P.). One drachm twice or thrice a day will suffice as a rule, and after a week or so the dose can be reduced.

Rest—absolute and prolonged—is essential, and during the early weeks of treatment the patient is best kept in bed when dealing with the larger joints—hip and knee. A light extension helps to correct deformity, and relieves the starting pains which are often such a distressing feature of tuberculous disease of those joints.

Deformity of the hip and knee should be corrected very gradually, the level above the bed at which the weight acts being adjusted according to the amount of flexion present. The weight used should be as small as possible, for it must be remembered that harmful stretching of ligaments may easily be brought about. Temporary immobility in the case of the hip-joint can be obtained by a long Liston, but it is not advisable to trust to this too long—a double Thomas's splint should be made and fitted by the time that the extension is removed, usually after a month or six weeks.

If possible the child should be taken into the fresh air every day in some form of spinal carriage after the preliminary six weeks in bed. After six months a single

* A post-graduate lecture delivered at the Queen's Hospital on April 9th, 1913.

Thomas's splint may be obtained and the child allowed to get about on crutches with a patten on the sound side.

In the case of the knee-joint, after the preliminary extension and correction of deformity it is best to have a Thomas's knee-splint fitted, or in very poor people plaster-of-Paris may be used to immobilize the articulation. The advantage of Thomas's splint is that it prevents any weight being applied to the joint, at the same time allowing the patient to get about with crutches and a patten.

The ankle-joint should be immobilized in plaster at a right angle, or better, by a wooden back splint with a footpiece and a projection below, which prevents walking. Crutches and a patten can be used to allow the child to get about. In disease of the tarsus similar treatment should be adopted as for the ankle-joint. The shoulder in children—a rare articulation to be attacked by tubercle—is best and most simply immobilized by bandaging to the trunk with a small pad of wool well dusted with boracic powder in the axilla and between the arm and chest wall. The elbow should be fixed at a right angle with a wooden splint or plaster. The wrist is perhaps best kept at rest by an anterior wooden splint reaching as far as the metacarpo-phalangeal joints, so that movements of the fingers can be carried out.

Splints of celluloid or poroplastic have the advantage of lightness, and are of sufficient strength for the treatment of the joints of the upper limb.

After all signs of active disease have disappeared and immobilization has been carried out for a considerable period the great question of return to use arises. It is one of the most difficult matters to decide in the treatment of any joint as to when splints should be left off and movement allowed. Personally I rarely allow movement under six months, and in many cases insist on a year or two years' fixation.

I find the periodical examination by *x* rays of great value in determining the progress of the healing process in joint tubercle where foci are present in the bone. The reparative changes are accompanied by sclerosis, and this is shown in an *x*-ray picture. Having decided that splints may be left off, I first advise that freedom be given only at night. Then, if, after a fortnight or month, no untoward symptoms arise, I leave off splints during the day-time and allow massage and gentle movements. Thus, cautiously, a return to normal function is obtained.

Bier's Treatment.

In tuberculosis of any joint below the shoulder in the case of the upper limb, and the hip in that of the lower, venous engorgement should be obtained by Bier's elastic bandage.

Bier employs three methods to obtain congestion—the elastic bandage, the cupping glass, and the hot-air chamber; but practically only the first is applicable to almost every case.

Great care should be taken to obtain the right degree of constriction. Excessive pain should not be caused; in fact, many children appear to like the application. The pulse below should never be obliterated, and the blood should always return promptly when expressed from the skin with the finger. The limb below the bandage should be of a bluish-purple colour, never white; in some cases considerable oedema may develop.

I usually begin by applying the bandage for one hour and leaving it off for three; later three hours on and three off, except at night; and later still, in some cases, the bandage may be left on during sleep.

I employ Bier's treatment as a routine method.

Iodoform Injections.

A most useful adjunct to the treatment of joint tubercle is the injection of iodoform emulsion. In this hospital I have not used it for every case, but rather for those that have not improved as rapidly as I wished with immobilization and Bier's treatment.

It is claimed by some that the iodoform by liberating free iodine in the tissues directly attacks and destroys the tubercle bacilli; but I think that it acts chiefly by producing a sclerosis in and around the diseased area. The solution used is 10 parts iodoform in 80 parts glycerine and 20 of water. The iodoform, glycerine and water should be carefully sterilized, and the injection made into the

joint cavity, and into the surrounding tissues; 1 to 2 oz. may be used. If any pus exists in the joint cavity it should be aspirated through the cannula before the injection is made. Considerable redness locally and a rise of temperature to 100° and 101° F. may follow the injection; but as a rule everything is normal by the second or third day after. The injections should be repeated three to four times at intervals of a fortnight.

Abscesses.

If abscess develops a needle of large bore connected to a Record syringe should be thrust into the cavity, and the contents sucked out. The syringe should then be detached, leaving the needle *in situ*, and filled with iodoform emulsion (1 to 2 oz.), which is then injected into the abscess cavity.

The needle should always be introduced through a considerable thickness of tissue and in an oblique manner, so as to avoid danger of sinus formation. Many surgeons prefer to make a small incision into the abscess, curette gently away the lining membrane, and after washing out with saline and injecting iodoform to close without drainage. This method I think very liable to lead to sinus formation with its attendant dangers of secondary infection.

Operation.

Some cases of joint tubercle will not yield to these measures, and we have to operate. Here again, however, I am very strongly in favour of the more conservative operation of arthrectomy or erosion as opposed to the radical excision. The advantages of arthrectomy are:

1. No extensive section of bone.
2. No loss of length.
3. No interference with the epiphysial line, and therefore no deficiency or abnormality in growth.

All these grave objections obtain in excision.

The joint surfaces are exposed through a suitable incision, diseased synovial membrane dissected away, and the tuberculous foci in the bony extremities curetted.

It may be argued that foci of disease are occasionally overlooked, and undoubtedly this may be so, but I am doubtful whether even the most careful excision always succeeds in removing all infected material. What probably happens most commonly is, that the surgeon removes the major portion of the disease, and Nature does the rest.

After arthrectomy considerable movement in the joint may be obtained; this in the upper limb is to be aimed at, but in the lower it is probably better to bring about ankylosis at the hip and knee when disease has progressed far enough to warrant operation. This result may be achieved readily by removing a thin scale of cartilage from the opposing joint surfaces.

It is occasionally necessary to excise joints in childhood, but this operation should be reserved for those cases in which there is either complete disorganization or ankylosis in a faulty position.

Amputation.

I am glad to be able to say that up to the present I have never performed amputation for tuberculous disease of a joint in a child. It should never, or very rarely, be necessary in childhood, because time can be given for prolonged conservative measures.

I would only amputate for joint tubercle if in addition to extensive bone involvement there were also gross infection of soft parts, secondary infection with pyogenic organisms and amyloid disease.

Tuberculin.

I am very firmly convinced of the value of the administration of tuberculin in all cases of surgical tuberculosis, unless the infection with the bacilli is so grave as to cause a highly oscillating temperature or other grave signs.

No case of tuberculosis should be operated upon without a preliminary course of tuberculin, as this will, I am sure, help to guard against those distressing cases of general tuberculosis arising after operation. Tuberculin must not, however, be regarded as more than a useful adjunct. Alone it will not cure. All other means at our disposal should also be employed.

The methods of administering tuberculin are by hypodermic injection and by the mouth. The former is

obviously the more scientific, and the latter has been generally condemned as of no value. Nevertheless, it is a method that I have employed as a routine in the out-patient department, and I can speak of it in the highest possible terms. It has the merit of extreme ease of administration.

I have three bottles made up with normal saline containing in each ounce $\frac{1}{100}$, $\frac{1}{50}$, and $\frac{1}{25}$ mg. of T.R.; $\frac{1}{2}$ per cent. phenol helps to preserve the solution.

I commence by giving a child $\frac{1}{2}$ of the weak solution, or $\frac{1}{100}$ mg., and the next week double the dose provided there has been no rise of temperature. In the out-patient department I rarely increase the dose beyond $\frac{1}{25}$ mg., as supervision is not easy.

I believe strongly in small doses to begin with, gradually increased and continued over a long time.

I have never seen any harm result. As a rule, after one or two doses the appetite and colour are better, and the lesion shows slight improvement.

I have here to-day a case of tuberculosis of the tarsus and metatarsus, which has had nothing in the way of treatment except tuberculin and cod-liver oil mixture. The child has run about on the diseased foot practically the whole time except for the first month of treatment, when, owing to the large swelling on the dorsum of the foot, it could not get its shoe on.

Before proceeding to demonstrate the cases of joint tuberculosis that I have collected here to-day, let me emphasize what I have already said, that surgical tuberculosis of joints in children can be cured and most efficiently cured, by the conservative measures which I have just now rapidly reviewed, and that the more radical methods are rarely required, and do not give such good results.

CASE I.—T.B. Hip. G. D., female, aged 8. First seen in April, 1912. Symptoms for three to four weeks. X ray shows changes in head and under surface of neck. *Treatment:* Rest in double Thomas six months. Tuberculin by mouth every fourteen days. November, 1912, movements in hip normal. April, 1913, splint off one month. No evidence of disease.

CASE II.—T.B. Knee. A. B., female, aged 13. Symptoms started January, 1910. Treated for some months with rest in plaster at convalescent home. November 23rd, 1910, readmitted. Knee very swollen. Synovial sac distended with pus. X ray showed erosion of cartilages and bone of tibial and femoral epiphysis. *Treatment:* Tuberculin by mouth every week until July, 1911. Iodoform injections on five occasions with aspiration of pus. Bier's elastic bandage, one hour on, three off. *Present condition:* Healthy-looking girl. Walking since July, 1912, with apparatus to guard against flexion. Shortening $\frac{1}{2}$ in. Knee ankylosed.

CASE III.—T.B. Ankle. F. A., female, aged 2 years 6 months. First seen March 5th, 1913. History five to six weeks. X ray, no bony changes. *Treatment:* Splint, Bier's bandage, tuberculin. *Present condition:* General health much improved; some reduction in size of swelling.

CASE IV.—T.B. Metatarsus (also subcutaneous nodule on buttock). First seen March, 1912. Large swelling over dorsum of foot. X ray shows large focus in first metatarsal and epiphysis of cuneiform metatarsal joint. *Treatment:* Splint one month; tuberculin by mouth every week. Child has run about since first month of treatment. *Present condition:* Swelling disappeared; no pain or symptoms of any kind; walks perfectly. X ray shows marked sclerosis around the foci.

CASE V.—T.B. Hip. H. P., male, aged 11. Abscess tapped left side, September, 1910; iodoform; double Thomas one year; tuberculin every week. Splint left off September, 1911. *Present condition:* Movements at hip perfect; slight limp; shortening 1 in. X ray shows focus in neck sclerosed; some coxa vara.

CASE VI.—T.B. Elbow. C. K., aged 8 years 9 months. January, 1912, swollen elbow; all signs disappeared after one month; was quite well through the summer. October, 1912, swelling recurred, gradually increased, pain marked, limitation of movement. January, 1913, x ray shows large focus in diaphysis of humerus. *Treatment:* Immobilized in plaster at right angle; tuberculin by mouth; general condition improved; swelling about the same.

CASE VII.—T.B. Wrist. P. B., aged 5 years 3 months. December, 1912, large swelling on dorsum; sinus discharging; x ray shows no bony change. *Treatment:* Splint from elbow to metacarpal joints; Bier's bandage; tuberculin; iodoform injections on three occasions. *Present condition:* Sinus healed; swelling almost disappeared except on radial side of wrist; movements of fingers good; no pain; general condition improved.

CASE VIII.—T.B. Shoulder. M.B., female, aged 3 years. September, 1912, swelling and pain right shoulder; abscess pointing anteriorly; x ray showed very extensive disease of head and shaft. *Treatment:* Tuberculin given for two weeks. *Operation:* Incision in front of deltoid; joint opened; sequestra and granulation tissue sharp-spooned; iodoform emulsion introduced; healed per primam; arm fixed to chest by bandage;

tuberculin continued. *Present condition:* Wound soundly healed; movements in joint slight; no pain; general condition good.

CASE IX.—T.B. Knee, and teno-synovitis middle finger of right hand. E. H., female, aged 3 years. November, 1910, typical tuberculous swelling knee; x ray negative. *Treatment:* Thomas's knee splint; crutches and patten; Bier's; tuberculin. *Present condition:* Knee shows no swelling, stiff but some movement which is increasing; walking well; finger practically normal.

Presidential Addresses

TO THE

BRANCHES OF THE BRITISH MEDICAL ASSOCIATION.

METROPOLITAN COUNTIES BRANCH.

THE PROFESSION, THE PUBLIC, AND THE INSURANCE ACT.

By R. L. LANGDON-DOWN, M.B., M.R.C.P.

In entering upon the duties to which you have called me, may I be allowed to give expression to the two feelings which are uppermost in my mind? The first is the sense of the honour you have conferred upon me in placing me in the chair of this Branch, for which I take this the earliest opportunity of thanking you; and the second is the sense of the responsibility that rests upon me. All I can say is that I will do my best to carry on the high traditions of the office, well assured that in this I shall have the help and support of able and willing workers on the Council, as my predecessors have had in the past.

Since the report of the Council was issued death has withdrawn from among us a distinguished member of our profession, who was also a member of this Branch, and for a brief period edited our JOURNAL. Sir Jonathan Hutchinson, by his enthusiasm for medical education and by showing how much could be done to advance science by the method of patient observation, record, and comparison, will always be remembered among the great men we honour as pioneers in medicine. His name and memory therefore claim a place in our thoughts to-day.

REORGANIZATION.

The report of the Council for the past year shows that the Branch has been ready to take the lead in important matters of Association policy, such as the rearrangement of the boundaries of Divisions, and the proposals it has made for strengthening and perfecting the constitution of the Association, on the initiative of Dr. Biggs, which are now the basis of the proposals before the Representative Meeting; it has also devoted much time and thought to the suggestions of the Central Council dealing with schemes for a public medical service under the auspices of the Association and in regard to improvements of the Insurance Act. The power of organization and the readiness to work enthusiastically shown by the Metropolitan Divisions during the latter part of last year was very remarkable, and reflected great credit on them and their leaders. Such a record cannot fail to give weight to the counsels of this Branch in the Association, and any changes in the constitution which may give greater powers and more duties to the Branches will naturally affect the work and responsibility of the Metropolitan Branch in an especial degree.

The rearrangement of the Division boundaries in which this Branch took a very early part, following the enthusiastic lead of Dr. Sykes and Dr. Barnes, may seem to some to have been a mere piece of mechanical adjustment. I venture to think it is of more significance than that: it implies a new meaning, a fresh principle of policy. Hitherto the criterion in mapping out Divisions had been the convenience of members in attending meetings; now we have taken as the guiding idea the necessity for making our organization march side by side with the organization for local government, and our boundaries tally as far as possible with those of civil administrative areas.