SURGICAL TUBERCULOSIS IN CHILDHOOD.¹

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WHAT is meant by the term "surgical tuberculosis"? The treatment of tuberculous disease is generally held to belong to the province of the physician, and indeed it remains a medical disease from start to finish. Whatever the form it may take it has to be combated by medical means, and the object of such is: (1) To improve the general health of the sufferer; (2) to raise his constitutional powers to the highest pitch; and (3) to develop certain specialized protective powers by which we now know the invading bacillary army can best be checked and often destroyed. This duty falls to the physician; but as the disease gains ground certain conditions may develop which hamper his efforts, and which his training does not fit him to deal with. Thus, there arise certain collections of fluid having distinctly poisonous qualities, or by their position and bulk constituting a distinct danger to life. Clearly these must be got rid of. Or caseous masses result from dying tuberculous tissue and lead to suppuration and abscesses. These, if left to themselves, will come to the surface, discharge, and then become contaminated with septic organisms, and so lead to more rapid progress of the disease. When such conditions arise, the man who uses his hands has to come to the help of the man who uses his brains, and by the safe removal of the "peccant" fluids, in accordance with the rules of the surgical art, has to take a share in the treatment of the disease.

Let it be clearly understood, then, that in the treatment of tuberculosis both the physician and the surgeon may each have to take a part. But though the surgeon has to be requisitioned for certain features that may develop, yet at no time ought the medical treatment to be omitted. Medical treatment is essential in every case; surgical treatment in a certain proportion is a necessary adjunct, and as it is chiefly concerned in the clearing away of dead or harmful material it has been characterized as "scavenging."

But do not let this derogatory description of the character of surgical aid blind us to its great value. Few things are more striking than the effects of this scavenging. The removal of a poisonous

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effusion, or a large focus of disease generating the toxins whose absorption is the cause of failing health and strength, is often attended with such immense relief that within the space of a week or two a patient may have attained to a much higher plane of health, and be steadily reacting to that medical treatment which, before the surgeon's intervention, had seemed to be absolutely useless.

Principles of Surgical Aid.

Now the surgeon, when he is called upon to remove these harmful products of the tuberculous parasite, bases his procedures upon one of two principles. Either he clears away the disease or the tuberculous fluid, removing only what is unhealthy, or he goes wide of the disease, and cuts through the surrounding healthy parts, taking away healthy tissue as well as unhealthy.

The first principle—the removal of disease alone or of effusions—is the only one admissible in certain cases. In this group are included such different conditions as tuberculous ascites and tuberculous pleuritic effusion, spinal abscesses, glandular abscesses, and tuberculous inflammation of the interior of many bones.

The second principle—the removal of the disease by dissection through the surrounding healthy tissues—is designed to remove the whole of the disease and to obtain a clean wound carefully preserved from infection by the material which is being taken away. The cases that lend themselves to this method are those in which the mischief is confined to an organ having a definite capsule, by which extension of the disease to the surrounding tissues is prevented for a long time. In such cases, if removal be completed before the capsule has ruptured, the prospect of complete eradication of the disease is distinctly enhanced. The cases that can be treated in this way include many instances of tuberculous glands and of renal tubercle.

The same principles hold in the case of joint tubercle. But here another important matter besides the cure of the disease forces itself upon the surgeon's attention. The treatment must be so directed that when cure is complete the limb remains as useful and as free from deformity as possible. The best results are those achieved with no other aid from the surgeon than such measures as will keep the joint fixed and at rest, and will prevent deformity. The disease is checked and cured almost entirely by medical means. But amongst the poorer classes medical measures have rarely the shadow of a chance. Our general hospitals are supplied with very large numbers of joint cases from these classes, and they are quite unable to provide them with the treatment which would cure a large proportion of them if they could be taken thoroughly in hand at an early stage. Sooner or later, in the majority, conditions arise which necessitate surgical inter-

ference—it may be to save a limb, or sometimes to prevent the loss of a life. Now, in such surgical proceedings as aspiration of abscesses, or erosions of joints, the first of the two principles is involved; whilst the second is seen in excisions of joints and amputations.

The Nature of Tuberculous Infection in Children.

I have attempted to give you a bird's-eye view of the main principles which guide the surgeon when he is called upon to supplement the medical treatment of tuberculosis. His help is required with great frequency in certain manifestations of the disease, and it has become customary to apply the term "surgical tuberculosis" to such cases as commonly call for his intervention. As a matter of course, these cases come into the surgeon's charge at an early date, both in hospital and in private practice. It is, therefore, both a matter of interest and of duty that he should understand how the main forms with which he comes in contact originate.

It has long been recognized that abdominal tuberculosis in children was due to infection conveyed to them in their food, whilst pulmonary tuberculosis was the result of an infection inhaled through the respiratory passages. So roughly it came to be believed that the first form was in the main contracted through tuberculous cows, and the latter from tuberculous human beings. But there was very great difficulty in unravelling the problems that were raised by these two forms of infection. How was that produced by the human bacillus to be distinguished from the infection due to the bovine microbe? That milk frequently contained bacilli which came from cows with tuberculous udders was well known; but these bacilli had no definite characteristics by which they could be certainly distinguished by the microscope from the bacillus of tubercle obtained from human sources. Evidently the microscope could not decide whether a tuberculous lesion had a human or a bovine origin. This difficulty was at last solved, and it is now possible, by means of laboratory methods which need not be described now, to decide whether any particular case of tuberculosis is of the human or the bovine form.

This advance is full of interest. It will enable the local incidence of the disease to be certainly attributed to its real cause, and will point with clearness to the measures which should be taken for its prevention. When once this point had been solved, pathological workers began to show that such common surgical conditions as tuberculous cervical glands and tuberculous bones and joints were in some cases due to human infection, and in others to the bovine. But the most thorough and systematic results come to us from the laboratory of the Royal College of Physicians of Edinburgh. Dr. John Fraser has investigated seventy consecutive cases of bone or joint tubercle, with three excep-

tions of twelve years of age or under. Dr. Philp Mitchell has investigated seventy-two consecutive cases of tuberculous cervical glands in children up to the age of twelve years. All these cases were drawn from the Edinburgh district. The results are worth your attention. Of the bone and joint cases, up to eight years of age, the bovine infections were twice as numerous as the human infections (*viz.*, thirty-nine to nineteen); but though the proportion fell slightly after eight years, yet of the whole 70 cases, 41 were bovine, 26 were human, and 3 were both bovine and human. Of the 72 cervical gland cases 65 were due to bovine infection, and 7 to human, and again the disparity was greatest in the younger children. Therefore the large majority of these 142 cases, all except 3 young children, derived their disease from food. From this it will be seen that so far as the Edinburgh area is concerned, there is good reason to feel sure that a very large proportion of the commoner forms of surgical tuberculosis in children are due to bovine tubercle.

But the collateral facts connected with these two groups of cases are also instructive. There was a history of pulmonary consumption in the patient's family in only three of the gland cases, but each of these cases had been living in contact with a consumptive when the glands appeared, and in all the human type of bacillus was isolated from the cervical glands.

A similar suggestion of the association of the human infection with a family history of pulmonary tuberculosis comes out in the bone and joint cases, but not quite so convincingly. In twenty-one cases there was a history of pulmonary tubercle in the family, and in fifteen of these the infection was human (and in six bovine). In half the cases the child had been living in contact with a consumptive when the bone lesion developed. On the other hand, in those cases which showed no family history of pulmonary tubercle, the bovine infections were forty-three and the human only nine.¹ After reading these results it is not astonishing to learn that the great majority of these children were bottle-fed, that no sterilization of the milk was attempted, and that the veterinary supervision of the byres in the area was utterly inadequate.

The Edinburgh results show a much greater incidence of bovine tuberculosis than those of other observers, but they are more systematic, and practically limited to children up to twelve years of age. Now, it is during the early years of life that milk is so largely used as a staple food, so that as age increases it seems only natural that the human should come to outnumber the bovine infections, and that in adults the infection should be almost entirely human.

¹ In three cases both bovine and human infections were present. This must be remembered if the numbers are checked.

The habits of a population and the kind of control exercised over the byres and the milk-supply must have a considerable influence upon the amount of bovine infection in different places; consequently the Edinburgh figures only convey to us the condition of things in that district. Each local area would have to be investigated on similar lines, and uniformity of results could not be expected.

But already it is clear, so far as surgical tuberculosis is concerned, that a case will be made out for the drastic supervision of milk-producing cows. It appears that a cow may give milk infected with tuberculous bacilli for some time before it shows any sign of illness, or before its milk can be recognized as not normal by those who are accustomed to milk it. It is also stated that clinical examination of the animals cannot be relied on to detect early tubercle of the udder, and that the most reliable method for the detection of the tuberculous infection in milk is by the injection of the milk into one of the experimental animals (a guinea-pig or a rabbit). That this plan, however perfect, will ever come into universal use for the object of weeding out all tuberculous cows at the very earliest period of the disease is, I think, not very probable. But there can be no question that if tuberculous milk is prevented being put upon the market there will be a very *great diminution* in the amount of surgical tuberculosis in children.

Tuberculous Glands.

In many cases of tuberculous glands, especially when met with in the neck, the disease is so widespread, and the tendency to caseation and suppuration so marked, that surgical effort has frequently to be limited to the opening of abscesses and scraping away of the débris and the tuberculous tissue in the interior of the broken-down glands. Dismal as these cases appear they not infrequently show a marvellous power of recovery. But they are very slow and tedious, and may drag on, with constantly recurring glandular trouble, for a number of years before the weakness is overcome, and they gradually pass into a condition of good health. There are many people going about to-day, leading useful and valuable lives, who will never forget the never-ending trouble with their glands, which spoilt the pleasure of their early years. The shadow of it still remains in the disfiguring scars which are a constant mortification as well as a reminder of their youthful misery.

But if, when the glands of a definite area become affected, a wide removal of them is carried out, the result, as a rule, is extremely satisfactory. The excision should be free. If only the enlarged glands are removed, others which are infected but not much enlarged are left behind, and recurrence will take place; so that to get the best results the whole lymphatic area should be cleared away. Parents naturally

shrink from operation upon their children, and would prefer that it should be as little formidable as possible. But it would be well that they should appreciate how much is to be gained by thoroughness in this matter. It may be summed up in a few sentences. They may be assured that: (1) the treatment of the case will be shortened by many months or even years; (2) convalescence will be hastened; and that (3) the result will be more permanent and scarring less. Moreover, if excision is resorted to early, the less serious and extensive is the operation that will be required.

Bones and Joints.

The other great group of surgical tuberculosis is that of bones and joints. Tubercle of bone, when it affects the ends of the long bones, is inseparable from joint tubercle, for the disease advances from the bone to the joint, or if the soft structures of the joint are first attacked the disease spreads in the other direction—*i.e.*, from the joint to the bones.

But tubercle often attacks the shaft of a bone, and remains for a long time a disease of bone purely, and has to be dealt with on the same principles which guide the surgeon's action in the case of glands: (1) The shaft of the bone may be opened up, and the tuberculous tissue removed by scraping until healthy bone is reached; the cavity left is suitably dressed; the wound is then closed and heals promptly; or (2) a piece of the bone containing the disease is removed entire from the periosteal envelope of the bone. The separation in the continuity of the bone is made through a healthy part, and some healthy tissue is removed with the disease.

The scraping method is the one more commonly called for, but in certain situations the more radical procedure can be used with gratifying success. In the forearm and the leg there are two parallel bones, and certain portions of these, if affected by tubercle, can be removed from inside the periosteum, which is then filled by a wax or paste and closed. If pains are taken to prevent this cylinder of soft paste from crumpling up, in the course of a few months the place of the paste is taken by new bone thrown out by the periosteum, and a bone having the same shape as the original one is reproduced. The value of the parallel bone is that it acts as a splint, and is useful in preventing the crumpling up.

It is hardly necessary to point out that after the second procedure there is less danger of recurrence than after the first, for in the scraping operation it is quite possible for some ramification or outlying nodule of disease to escape destruction and so predispose to relapse. As in the case of excision of glands, the second method shows the trend of surgical opinion to go wide of the disease and cut through healthy tissues. It aims at leaving behind no outlying portion of tubercle from which recurrence can result.

Practical Measures.

I propose to devote the remainder of my time to the consideration of the treatment of joint tuberculosis and to only one remedial agent—viz., rest.

Of all methods which have been employed this is the one that has stood the test of time, and it now occupies an assured position from which it is not likely to be dislodged. Fifty-four years ago—in 1860—John Hilton, in the introductory portion of his famous lectures on “Rest and Pain,” wrote these words: “It is rest—physiological as well as mechanical—which I hope to prove in the course of these lectures to be so important as to demand the very serious attention of every practical surgeon.” From that time rest has been the fundamental principle in the treatment of inflamed joints, and amongst others of tuberculous ones. Many other methods have been introduced from time to time, some more, others less, useful. Some have disappeared, some have remained; but not to supersede rest, only to be employed side by side with it, or in certain phases or conditions.

Now I do not wish to imply that operative procedures have not their proper place in the treatment of tuberculous joint conditions, but to-day it would be out of place for me to spend time upon their discussion, and rest, if properly made use of, will, in a large proportion of cases, make recourse to them unnecessary. In dealing with tuberculous joints of the upper extremity the surgeon does not meet with any insuperable difficulty in the maintenance of a condition of continuous rest, but the lower extremity is much more troublesome to manage. Various forms of apparatus can be employed which enable the knee and the ankle to be kept fixed and at rest without necessarily confining the patient to bed.

But the most difficult of all is the hip-joint, and though a very useful splint is available, yet the leverage of the limb, the difficulty of maintaining extension, and looking after the child's cleanliness, make the recumbent position necessary, if adequate rest is to be secured. The large majority of cases of hip disease occur amongst the poorer classes, and of necessity come for treatment to a hospital. Their home surroundings are as a rule quite unsuitable for any case of tuberculous disease, and the management of a hip case is quite impossible in them. Only in a hospital can these cases get the rest and extension treatment which is so essential to their recovery. But the general hospitals can only give them a small portion of the help that is needed. They cannot retain cases of hip disease as in-patients for a sufficient length of time for recovery to take place.

This is what occurs. These cases are admitted in the early stage of the disease and kept in bed for rest and extension for perhaps three

months, and then the more acute symptoms having subsided, they are fixed up in Thomas's splints and treated as out-patients. Various circumstances connected with the child, its parents, and their household arrangements, make this period of treatment spasmodic, fitful, and unsatisfactory. Before long many of the cases come back with a relapse, and are again admitted, and the same process is repeated, perhaps more than once. Then abscess formation occurs, and rapid deterioration of the patient results in operative procedures—probably excision—when the patient enters upon a period of prolonged convalescence which may end in recovery in a fair proportion of cases, or may be interrupted by further relapses, and possibly ultimate amputation or death.

In the Alexandra Hospital for Hip Disease in Queen Square, Bloomsbury, cases of hip disease are admitted and not sent out until they are fit to go. They may be kept in for two or three or more years, and are treated by rest and extension. Now in 1880 a Committee of the Clinical Society, composed of seven of the leading surgeons of the day, was appointed to investigate the results of the treatment of hip disease, and an opportunity occurred of contrasting the results following operation (*i.e.*, excision) with those obtained by rest. For this investigation the Hip Hospital furnished 384 cases which had been treated by prolonged rest and weight extension. The report of the Committee is an important landmark in the history of the treatment of hip disease. Twenty years after Hilton gave his lectures it was shown: (1) That the mortality of cases treated by rest and extension was considerably less than that of cases treated by excision (33·5 to 40 per cent.); (2) that after treatment by rest and extension the limb is more firm and useful for purposes of progression than after excision. These conclusions find general acceptance to-day, thirty-four years after that report was made, yet there have been only one or two moves in hospital arrangements to meet the situation.

In Leeds our hospital authorities are well aware that these hip cases are very inadequately dealt with under present arrangements, and I know they would like to see their way to do something more for them. Now this need not be made a very expensive matter. The first thing to be recognized is that hip-joint cases, when once the disease is diagnosed, should be taken charge of, and kept in hospital and treated with rest and extension, with good food and abundance of fresh air for as long a time as may be necessary. The time required might be from one to two years, sometimes three, and possibly in rare instances, four years. They should be kept entirely outside the scope of the ordinary hospital routine, and a separate building, preferably in the country and on high ground, set apart for them. The building need be little more than a big verandah in which the children would

live. There would be need for some rooms for the staff and for protection of the children in very inclement weather, but I understand that in practice it is found that the only use for these latter rooms is for the punishment of those children who are naughty. They are threatened that they will have to get indoors at night, and the threat is sufficient. The nursing staff would not be large, for the only operations would be the aspiration or drainage of abscesses, and few dressings would be called for. And lastly there would be the cost of living and of the general household menage.

It may be that the actual cost of this continuous rest treatment of hip cases will prove to be no more than is now spent upon them during their intermittent periods of hospital residence, for the requisite operations and for the necessary apparatus and dressings during the years of their out-patient attendance.

This is the line that I hope some day will commend itself to the Board of the Leeds Infirmary when their present great responsibilities have diminished and permit other things to be considered. The responsibility of laying out money subscribed for hospital purposes is great. If it is spent to exploit new methods of treatment it may very soon be found that it has been thrown away. I would humbly suggest that it is safer and wiser and more economical to proceed upon old lines that have been proved to be sound. The treatment of tuberculous hip disease by rest and extension is now proved to be very sound, and the public money may be safely spent upon it with the certain knowledge that it will be well employed.

THE ARNETH COUNT IN PULMONARY TUBERCULOSIS.

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THAT changes in the polymorphs occurred in many infections has been known for a very considerable time, but the alterations in structure were not utilized in diagnosis, prognosis, or treatment until Arneth, in 1904, published his observations on the grosser nuclear appearances met with in certain diseases. That finer alterations in the chromatin network also occurs is, I think, unquestionable; but neither these nor the alterations in size, numbers, or staining reactions of the granules in the body of the polymorph have hitherto been turned to much