SOME SURGICAL ASPECTS OF FILARIAL DISEASE.

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Filarial diseases in tropical and sub-tropical countries are responsible for a multitude of surgical conditions, ranging from trivial ailments to surgical emergencies of the severest kinds. When one considers that millions of people are infected with this nematode, about which we know so much in some respects and so little in others, one cannot but feel attracted towards the subject.

It is amply proved that filarial infection can exist without any signs or symptoms being exhibited by the victim. In some cases this infection can persist for a considerable period and cause no disability, while in others the earliest evidence of infection may be a serious lymphatic obstruction, inflammation, or other surgical complication.

F. bancrofti and *F. medinensis* are the two parasites responsible for the greatest amount of suffering as regards human beings, their definitive host. The life-history of *F. medinensis* is well known, as are the inflammatory processes associated with the extrusion of the adult female from the tissues of the human host. But there is also a not uncommon class of surgical complications produced by this parasite to which I would like to refer, as sufficient attention has not been paid to them in the literature of the subject. These are the protean signs and symptoms which may arise from the irritative lesions directly due to calcified pieces of the dead worm remaining buried in the tissues. Acute or chronic cases of myositis, synovitis, inflammations of nerves, fibrous tumours, or abscesses, and many kindred affections, may be met with, and offer considerable difficulties as regards diagnosis. Such sequelæ may not appear until months or years after the death of the worm, but the history of the eruption of other guinea-worms, or even the fact that the patient comes from a part of India where the worm is known to be common, should give rise to suspicion as to the real cause of the trouble.

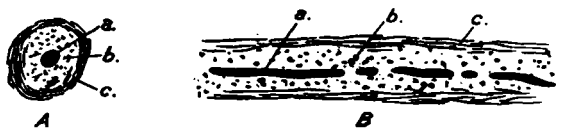

Fig. 188.—Diagram to show the structure of the calcified cord. *A*, cross section; *B*, longitudinal section. *a*, central axis; *b*, the middle coat; *c*, the outer coat.

The importance of realizing the surgical significance of the remains of the calcified guinea-worms in the tissues was only impressed upon me when acting as Consulting Surgeon to the Mesopotamian Expeditionary Force. Almost every Indian race was represented in the Force, and I was given an opportunity of studying guinea-worm affections in patients coming from some of the most heavily-infected Indian provinces. A brief reference to a few selected cases will serve as illustrations.

A young Madrasi complained of pain in the scrotum. On examination a cord was felt about four inches long and rather thicker than the ordinary clinical thermometer, occupying the loose areolar tissue outside the left tunica vaginalis. It was hard, but not brittle, easily movable, and with two free ends. There was no tenderness. A round elastic mass, about ¼ in. in diameter, could also be felt attached above and behind the left epididymis. A radiogram proved that these were calcified guinea-worm remains.

In this case, as in many, the calcified cord had a moniliform outline on the *x*-ray plate. After removal by operation the structure of the cord resembled the roughly-drawn diagrams *A* and *B*, representing a cross-section and longitudinal section respectively (*Fig.* 188). The central axis (*a*) was fragmented, hard, and calcified, and this was surrounded by a middle coat (*b*) of putty-like consistency and an outer coat of fibrous tissue (*c*). The print of this radiogram has faded too much to be worth reproducing.

A store-keeper, age 35, was admitted into hospital complaining of a painful mass above the right heel. A hard, irregular tumour was felt in and around the tendo Achillis, flattened from before backwards, and with irregular edges projecting beyond the tendon laterally and anteriorly. The *x*-ray print (*Fig.* 189) illustrates the condition admirably, except that the dense fibrous tissue surrounding the calcified cord is not shown.

FIG. 189.—Showing calcified guinea-worm remains in right heel.

This patient had been infected with guinea-worm in Jodhpur State during three years' residence there, and stated that twenty-one worms had been extruded from his legs, all below the level of the knees.

Other instances of this interesting surgical condition are shown in the *x*-ray prints (*Figs.* 190, 191, 192, 193). The diagnoses made in these cases were, respectively, chronic rheumatism of the ankle-joint, chronic traumatic synovitis of the knee-joint, periostitis, and sciatica. This proves how very baffling these conditions may be, and how ineffectual the treatment is until their true nature is ascertained.

As a general rule excision of the calcified cords is the proper treatment, but this can be very difficult, and in some instances the amount of disability may not justify an extensive dissection. Several patients were quite content to suffer a certain degree of pain or disability rather than undergo an operation.

FIG. 190.—Calcified guinea-worm infestation diagnosed as chronic rheumatism of the ankle-joint.

Surgical affections connected with infestation by the *F. bancrofti* are very numerous. They may be broadly classified as being either inflammatory in nature or due to lymphatic obstruction, and quite often these two types are combined. Some of the well-known complications and sequelæ are :—

1. Filarial fever, which is often associated with elephantiasis, cellulitis, orchitis, etc. The only evidence of infection in other cases is the presence of microfilariæ in the blood. Erysipelatoid attacks may also occur at irregular intervals.

2. Abscess and gangrene, most commonly scrotal.

3. Orchitis, acute hydrocele, acute arthritis or synovitis.

4. Lymphatic varices, fistulæ, gland varices, lymph scrotum.

5. Chyluria and chylous effusions into the peritoneum, tunica vaginalis, etc.
6. Elephantiasis of the scrotum, legs, arms, mammæ, vulvæ, and skin.

These complications vary much in severity, and though in rare instances they may rapidly prove fatal, in the great majority of cases the effects are transient, though liable to recur at decreasing intervals and with increasing severity.

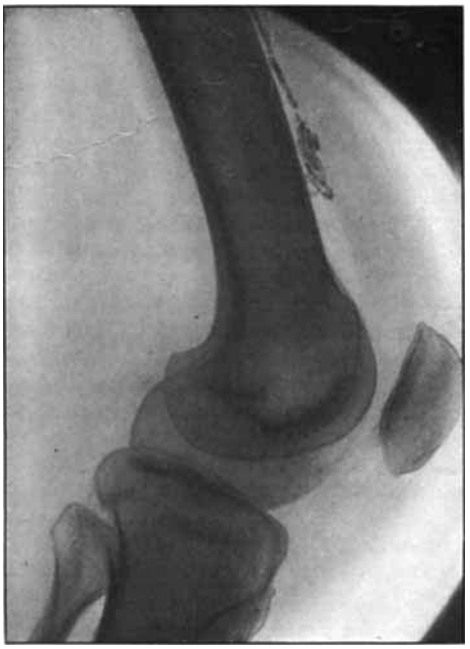

FIG. 191.—Another case diagnosed as chronic traumatic synovitis of the knee-joint.

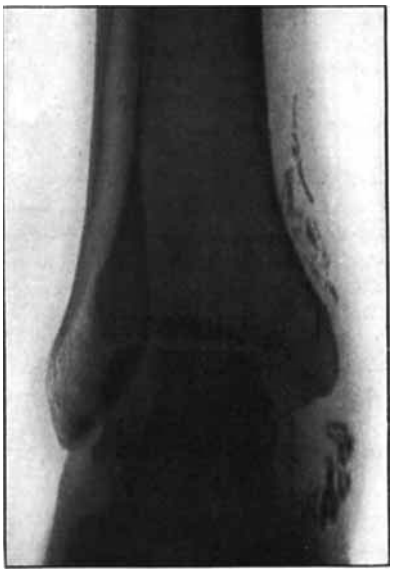

FIG. 192.—Another similar case mistaken for periostitis.

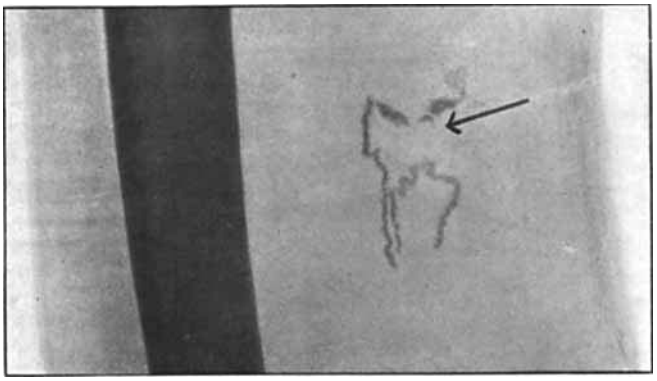

FIG. 193.—A case of calcified guinea-worm remains diagnosed as sciatica

It will not be necessary to describe even the more important of these surgical affections, as they are all well known and fully described in text-books on the subject.

There are many problems connected with filariasis which still await solution. We cannot account for the age incidence of the various complications, because we do not know how long it takes for the parent worm to develop in the tissues and produce free

embryos. Surgical complications scarcely begin to appear before the age of 10 years, they are most common in years 20–40, and after 50 years become quite uncommon.

We do not know why hyperfilariasis does not occur in more patients continually exposed to the bites of infected mosquitoes, and though it appears that all classes are liable to infection, why is it that some individuals escape altogether? The wife may be infected and the husband escape. Women appear less liable to infection than men, and perhaps the poorer classes are more infected than those who are better off.

Probably gravity has a good deal to do with the common infection of such parts as the scrotum, the external genitals, legs, etc. These parts also contain large numbers of lymphatics. Whether the warm and moist surfaces in these regions help filarial growth we cannot say.

Elephantoid enlargements are the most obvious surgical complications which we believe to be associated with filarial diseases. But there is no certain chain of evidence to prove to us how these hypertrophies occur. They are only found in regions where filariasis is common, and there is much evidence to prove that filarial infection is the necessary link in the etiological chain. But I am not at all satisfied that we know the exact pathology. Is it the microfilariæ which are responsible? We know them to be apparently innocuous in the great majority of cases when found in the circulating blood, but it may be otherwise if they are shut off in a confined space by blocked lymphatics. Under such conditions the restless movements of their teeming millions may well produce irritative effects on the endothelial walls. Though adult filariæ may block large lymphatics and lymph glands, it does not seem likely that they can produce such extensive lymph stasis as occurs in these cases. Their living bodies or calcified remains are not found in sufficient numbers to account for the œdema and fibrosis which result. One must remember, however, that in the case of such minute nematodes, absorption and disintegration of their tissues would occur in a very short space of time.

We are forced to conjecture that elephantoid thickenings are the result of either the irritative or toxic effects produced by the worms or ova, or that some concomitant infection such as a streptococcal invasion is responsible. We have ample evidence that such streptococcal invasions do occur, in that erysipelatoid inflammations commonly complicate the cases, and streptococci can be readily obtained by puncturing lymph spaces or lymphatic glands. These attacks exhibit an extraordinary periodicity which it is not easy to account for, unless it be that the intervals between the attacks represent the period of short immunity produced by each exacerbation.

There are several other points which are of interest in connection with this secondary streptococcal infection. It was found during the war that tissues infected by streptococci —generally introduced with multiple minute foreign bodies, such as fragments of missiles— were liable to a very serious inflammatory reaction if again interfered with, even when weeks or months had passed after the original injury. This is not true in the case of the erysipelatoid inflammations affecting elephantoid enlargements. Surgical operations can be performed with impunity on filarial tumours a short time after an attack of inflammation has subsided. It is true that suppuration is not unknown in such cases, but it is quite uncommon. It is even possible to implant gross foreign bodies, such as large strands of silk in the operation of lymphangioplasty introduced by Sampson Handley, without necessarily reproducing a streptococcal cellulitis. It therefore seems obvious that the streptococci met with in these cases are not of an intensely virulent type.

It is a curious fact that in the case of the calcareous threads left behind quite often after the death of adult guinea-worms, and generally broken up in a moniliform manner, we seldom meet with a similar streptococcal invasion. In these cases the foreign body is a large one, and one would expect a greater degree of tissue irritation.

One must admit that the pathology of these erysipelatoid inflammations in connection with filarial enlargements is not at all well understood. Given a streptococcal infection, the solid œdema and fibrous thickening of the subcutaneous tissue is easily explained. It is exactly what is met with after many attacks of cellulocutaneous erysipelas in non-filarial cases. An infant under my care a short time ago had had several attacks of cellulitis of

this type, resulting in a brawny œdema of the legs. It is now slowly disappearing, but one can readily imagine that consecutive attacks at regular intervals would cause a good deal of fibrosis and produce a condition of elephantiasis not differing in any essential respects from the cases generally described as filarial.

A very acute condition described as 'septic phlebitis of the spermatic cord' by the late Colonel R. Bird, I.M.S., and also known as 'funiculitis' (Castellani), occurs in India. This is a very dangerous form of streptococcal invasion of the spermatic cord rapidly spreading upwards and downwards and causing streptococcal septicæmia, if not promptly dealt with by surgical methods. I have often wondered whether some of these cases are initiated by filarial infections. The terribly acute nature of this streptococcal invasion is, however, rather in contrast to less severe types met with commonly in filariasis. But the wholesale lymph stasis in the latter, which is absent in funiculitis, may to some extent explain this. I would be glad to know whether any experiments have been carried out to ascertain the degree of virulence of the strain of streptococci commonly found in filarial infections.

The etiology of hydrocele in India has been very little worked out. Undoubtedly some of these cases are filarial, but in a great many patients no evidence of this infection exists. Specimens of fluid from ten cases were examined recently; none of these produced any growth on culture, two showed numerous filarial embryos, one numerous spermatozoa, while in most cases tyrosin and cholesterin crystals—particularly the former—were abundant. In many instances the cord presents no evidence of thickening or disease, but small patches of subacute inflammation can be found on the epididymis. No further clue, however, has so far been found to account for these patches. Of the many methods of cure practised in India for hydrocele, open operation is the only one which can be adopted as a radical cure. Various modifications are carried out by surgeons; but it may be fairly stated that they all attempt to achieve the desired result either by removal of the secreting layer of the parietal tunica vaginalis or by its eversion or plication. It would be of great labour-saving value if, by some non-irritating chemical or bacterial agency, the endothelial lining of the tunica vaginalis could be obliterated without causing injury to the testis or neighbouring tissues. It is also possible that a permanent filtration channel could be devised, on the lines attempted in ascites, by implanting a foreign body or a piece of fascial tissue in a window created for the purpose in the parietal wall of the tunica vaginalis. The open operation is a very satisfactory one; but in districts like Bengal and Orissa, where a large percentage of the population is affected in this way, a simpler procedure is badly needed.

Great ingenuity has been exercised by surgeons in devising operations for elephantoid enlargements. A very brief reference to some of them will be made here. Generally speaking, the surgery of pendulous thickenings is very successful, but similar affections of the extremities are much more difficult to deal with.

In the lower extremity, decortication of the whole affected area followed by skin-grafting and 'lymphangioplasty' (Sampson Handley), is not a very satisfactory procedure. The removal of considerable strips of tissue, muscle-deep, from the lowest part of the swelling to a region of healthy tissue above (Kondoléon), has been found to be the most successful operation.

The operation for the removal of elephantoid enlargements of the scrotum and sheath of the penis is one which has developed a good deal within recent years. Considerable variations exist in the type of operation performed in various parts of the tropics. The following points sufficiently indicate the procedure followed by me:—

1. The incision varies with the size and variety of tumour, and is not very important except that the perineal flaps should be made as wide as the healthy tissues will allow of. In very large tumours it is wise to isolate and lay bare the penis and testicles before fashioning the perineal flaps. In the case of smaller tumours it is quicker to cut these flaps and expose the testicles from behind, and deal with the penile sheath last.

2. Much time is saved by tearing through the tissues with gloved fingers as soon as the soft œdematous layers are reached.

3. Blood-vessels, which are generally of considerable size, should be tied with catgut after clamping; twisting is not a safe procedure.

4. The testicles should be accommodated beneath the perineal flaps, when these are sufficiently large to cover them. Failing this, they can be placed more easily in pockets excavated by the gloved fingers in the subcutaneous tissues of the adjacent parts of Scarpa's triangle.

5. Drainage is not generally necessary.

6. It is important to fix the fibrous sheath of the penis at its base by catgut sutures to the adjacent skin edges, to prevent retraction. I never utilize the preputial mucous membrane, though often tempted to do so, to cover the distal portion of the raw surface of the penis: it is very liable to solid œdema. Skin-grafting can be done at once or after a week by Thiersch's method.

7. The efficient dressing of these cases is most important, and the method introduced by the late Colonel C. R. Stevens, I.M.S., is very suitable. It is by means of rolls of 1-inch lint soaked in 1 per cent picric lotion or normal saline. About four inches of the beginning and end of each roll are applied in turn to the surface of the belly, perineum, or inguinal region, while the central parts of the bandages are wound round the penis. These tails are then held down by an ordinary double spica bandage after the usual dressing of gauze and cotton-wool has been applied. The lint becomes sufficiently stiff on drying to keep the penis comfortably cased.

8. Every precaution must be taken to prevent any soiling of the wound by urine.

The only weak part of this operation is the Thiersch's skin-graft of the penis. No suitable flap or modification of the Indian operation (as for rhinoplasty) has yet been devised to replace it. Quite recently I have tried a new device and have been astonished at the success obtained. This consists in cutting a sufficiently large flap from the thick œdematous tissue covering the region of the dorsum of the penis. This is pared down at the end of the operation with a razor and curved scissors till it is barely thicker than the normal skin of the penis and is then used to cover up that organ completely. Contrary to expectation, this skin has become quite soft and pliable after a few days, and if this result is always obtained, this procedure will remove the only real defect of the operation. It would seem that the skin and subcutaneous tissues of the dorsum of the penis and of the pubes are quite capable of filtering off their own lymph if not embarrassed by the lymph stasis of the scrotum and neighbouring parts.