

Lecture on elephantiasis arabum / by Sir Joseph Fayrer.

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Fayrer, Sir Joseph, 1824-1907.
Royal College of Surgeons of England

Publication/Creation

[London?] : [publisher not identified], [1879]

Persistent URL

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LECTURE ON ELEPHANTIASIS ARABUM,

BY SIR JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.

March 1879.

THE subject to which I propose to-day to direct your attention is Elephantiasis Arabum—a disease seldom seen in this country, but of frequent occurrence in certain tropical and intertropical climates, and therefore well worthy of your consideration, as it is not improbable that some of you may have to exercise your profession in those countries.

Whatever the causes may be—and I shall tell you of those to which it is generally assigned, there can be no doubt that this disease gives rise to most remarkable outgrowths, and necessitates most formidable surgical proceedings, which, in the majority of cases, are followed by the happiest results, and are in some cases the only treatment to which it is amenable. Indeed, I scarcely know of any morbid condition in which greater relief is afforded by such interference, or in which the good results of a surgical operation are more signally demonstrated. Of course, you will understand that I do not intend to discuss the question merely from this point of view, but in its more extended aspects as a constitutional disease, and in relation to various etiological questions that have from time to time arisen, in respect to its geographical distribution, and the predisposing and determining causes of its occurrence in certain individuals and in certain localities.

I am able to show you specimens of the disease, which have been recently sent to me from Calcutta, and take advantage of the opportunity thus offered of bringing the subject before you. You will observe there are two specimens, which, in their present condition, after the action of spirit, present very much the same appearance, though they were very different while they yet formed part of the patients' bodies. One is the ordinary, the other the nævoid or lymphoid variety of the disease; and I shall explain the difference, which is of degree rather than kind, presently. They were both removed from natives of India by Professor Partridge, in Calcutta, where the operation is exceedingly common, and both appear to have been very small tumours, though excellent illustrations of the pathological anatomy of the disease. The larger specimen is one of the ordinary elephantiasis. It was removed from a Hindoo (Brahmin), aged thirty, a native of Calcutta. The tumor was of three years' growth, and weighed, after removal, 3lb. 4oz. The smaller is a good specimen of the lymphoid or nævoid form. It occurred also in a Hindoo in Calcutta, was of three years' growth, had been attended with irregular attacks of fever, and had yielded at times a copious discharge of milky, sometimes of sero-sanguinolent, fluid, of which he had frequently relieved himself by tearing away a small portion of the integument. Both recovered after operation.

Such morbid growths have frequently been examined microscopically, and the result generally has been to show that though there is a great disturbance in the proportions of the histological elements, there is, after all, nothing really new—that, in fact they are good examples of simple hypertrophy, which no doubt is significant of a constitutional disorder, the precise cause of which is at present obscure; though, from the prevalence of the disease in certain regions coincidently with certain conditions of climate, soil, and other influences, it is impossible not to suspect, that the disease is in some measure dependent on these conditions.

Recently the discoveries of Lewis, Bancroft, Manson, Sonsino, Dos Santos, and Crevaux have thrown new light on the etiology of this and other tropical diseases; and how far they seem to connect themselves with elephantiasis I shall presently relate to you. But first I must give you some account of the general pathology and symptomatology of the disease.

Elephantiasis has many synonyms: Bucnemia tropica; Morbus elephas; Elephantiasis Indica; Spargosis; Hernia carnosae; Phlegmasia Malabarica;

Egyptian sarcocoele; Barbadoes leg; Glandular disease of Barbadoes. In different parts of India, where I have studied it, it is known as Da-ool-fl (Arabic), Fil-pai (Persian), Hathi ka-paon (Hindustanee), Sleepatham (Sanskrit), Peerun-kaal (Tamil), Muntha-kaal (Malayalam), Mothakaaloo (Telugu), Kya-gyee-gna (Burmese), and probably by other local names.

It is endemic in certain tropical and intertropical countries, generally near the coast, as Dr. Chevers, I think, said, where the malaria and sea air mingle. It is found in India, the Malayan Peninsula, China, Arabia, Egypt, the West Indies, parts of America, and probably, sporadically, all over the globe, perhaps excepting the extreme northern and southern regions.

Certain climatic conditions—humidity, heat, malarious influences, and proximity to the sea—seem to be concerned in causing it; it has frequently been observed that removal from the locality checks, whilst return to it reproduces the disease; and now, according to Lewis, Manson, Bancroft, and others, the presence of a filaria in the blood and lymph is considered to be largely concerned in the causation; at all events, this parasite is frequently associated with, if not the cause of the disease. This is a subject on which more information must be obtained before a decided opinion can be expressed; but it cannot be denied that the casual relation of the nematode to elephantiasis and other morbid conditions, has some show of probability. The discovery by Dr. Manson that the mosquito, as an intermediary host, is instrumental in propagating the filaria, and consequently the disease, is also very interesting, and in both an etiological and sanitary point of view worthy of careful consideration; but I think we may hardly yet regard this as established; and we must wait until further observation shall have confirmed his views.

Elephantiasis may be defined as a non-contagious disease—at least it is so in the ordinary sense in which that term is used, though Manson's discovery of the part played by the mosquito in transferring the filaria would seem almost to raise a doubt of this,—characterised by recurring febrile paroxysms, inflammation and progressive hypertrophy of the integument and the areolar tissue, occasionally by swelling of the lymphatic glands, enlargement and dilatation of the lymphatics, sometimes to such an extent as to give rise to a varicose distended appearance of the surface of the growth, in some cases, by the co-existence of so-called chyluria and the presence in the blood and lymph of minute nematoid parasites; the hypertrophy of the integument causing enormous enlargement of the extremities, but especially of the scrotum, prepuce, or labia, sometimes of other portions of the integument. The greater tendency to hypertrophy in the genital organs, it would seem, is coincident with the larger supply of lymphatics to these than to other tissues. The bones of the extremity may even share in the hypertrophy. There is abundant albuminous deposit in the cells of the areolar tissue, and sooner or later degeneration of both muscular and osseous tissues.

It is totally distinct from leprosy (*Elephantiasis Græcorum*), with which, owing to its name, it is sometimes confounded. They are, however, unlike in symptoms as in nature, and have nothing in common, although it is to be noted that Mr. Vincent Richards ascertained that out of 636 cases collected by him in Orissa, 40 individuals, or 6.29 per cent., suffered from leprosy also, showing that the diseases may coexist.

It would be well to abandon elephantiasis as a generic name for true leprosy. Being derived from the supposed resemblance of the parts affected to the limb of an elephant, it is more appropriate to the disease which really does bear that character than to true leprosy. In reference to this, Bateman says that the Arabic writers drew a distinction. They described *bucnemia* as *elephas*, and leprosy as *elephantia*. Though here, again, it would seem that there was a confusion among terms by translators.

The ordinary form in which the disease occurs is hypertrophy of the integument and subjacent areolar tissue of some part of the body, notably of the legs and external genital organs; those parts most profusely supplied with lymphatics, apparently, being most affected. The skin becomes enormously thickened by hypertrophy of all the fibrous elements of its structure, which is attended by the deposit of a quantity of albuminous fluid in

the areolar tissue. The papillæ in many cases become prominent, and much increased in size. The skin is formed into hard rugose masses or folds, not unlike the appearance of the skin of an elephant's leg. The feet and toes being sometimes almost hidden under it; the scrotum and labia form enormous outgrowths, often attaining great size and weight, accompanied by large hydroceles, the contents of which are often white, like milk or chyle, owing to exudation of lymph containing degenerated lymph-cells, or glistening with tabular crystals of cholesterine. From the male, tumours have been removed weighing upwards of 100 lbs. They vary in condition, according to the state of contractility of the muscular elements. At times they are densely firm, at others they are flaccid and soft. In certain cases there is a highly hypertrophied and dilated condition of the lymphatics, especially near the surface, they are prominent, turgid, soft, elastic or fluctuating, while during the periods of febrile excitement, they are so turgid as sometimes to rupture, discharging a chyloid fluid, giving rise to a sort of varicose or nævoid condition, the cells and ampullæ when punctured give exit to a quantity of lymph fluid, sometimes clear, sometimes whitish or pinkish, which coagulates firmly after removal, and in which are found the filaria of Lewis, and the loss of which causes great exhaustion. In some cases where this distinctly varicose or nævoid form is not assumed, the surface of the outgrowths during the periodic febrile attacks, assumes a herpetic condition, with an acrid and offensive serous exudation.

Now these outgrowths, though they are very interesting as such, are still more so as evidences of a constitutional disease, the result of certain climatic causes the nature of which is not yet understood; although considering its geographical distribution, it seems probable that whatever else—filaria or other agent—may be at work, the so-called malarious influences probably play an important part in its production. The discovery of the existence of nematodes in the blood, and that chyluria and hæmatozoa are frequently (if not always) associated with elephantiasis, is not only suggestive of a common origin of these diseases, but also of an explanation of other hitherto imperfectly understood tropical cachexiæ however. The ordinary form of elephantoid hypertrophy may occur independently of chyluria, or hæmatozoa, or of any *obvious* change in the lymphatics (though no doubt the latter may exist), nor is it to be assumed that the disease is always due to hæmatozoa; for there may be other and totally different causes. It is to be remembered that the hæmatozoa are very difficult to detect when they are present, and the fact that they are associated with some cases of elephantiasis and chyluria, suggests that further research may reveal a closer connexion between them, and throw light on a still somewhat obscure subject.

I think it is desirable, whilst fully recognising that hypertrophy from lymphangitis may occur in other conditions, to limit the term "elephantiasis" to the constitutional form of disease that is found within certain geographical endemic areas, and is manifested by periodic paroxysmal recurrences of fever, accompanied by the disturbed state of the lymphatic system, the progressive hypertrophy, and sometimes by hæmatozoa, I have already described. There are cases of hypertrophy of the skin with dilated lymphatics, and occasional constitutional disturbance, and that may be and are described as elephantiasis; that occur here as they do elsewhere, but I do not think they are identical with, though very similar to, the true elephantiasis as it is seen in tropical or intertropical climates.

Elephantiasis affects both sexes and all ages. No race is altogether exempt, but the dark skinned seem more liable to suffer than the fair. Men suffer in a larger proportion than women. Waring says that of 945 cases observed in Travancore 716 were males, or 75.76 per cent.; 229 were females, or 24.34 per cent.,—or about 3.5 males to 1 female; prejudices against submitting women to examination may, however, account in some measure for the disproportion. It is most common in adults, and is very rare in children, or beginning in aged persons; though it has been seen in infancy and in old age. The period of life between twenty and forty is that most prone to be affected. V. Richards, who carefully studied the disease in Bengal, thinks that hereditary predisposition is a cause;

of 236 persons affected, 193, or 73 per cent., had one or both parents suffering from the disease.

The malady is not always attended by obvious disturbance of the general health during the intervals of the febrile attacks, which in some instances are few and slight. The appetite, spirits, and general condition are good, the functions normal, and the only inconvenience is the size and weight of the outgrowth. Though it is frequently quite the reverse; the rapidly recurring febrile attacks, pain, exhaustion, suffering and visceral complications induce cachexia and debility so serious as to render even surgical interference impracticable. Hepatic and splenic complications do not, as a rule, result from the persistence of elephantoid fever alone, though they are not unfrequent as a direct result of malarious poisoning, when they seriously aggravate the evils of the sufferer's condition. Whilst albuminuria and chyluria may be present, in some cases, after the outgrowth has attained a certain size, it ceases to grow, or increases very slowly and insidiously, without febrile disturbance. The health is generally good, though there is probably a tendency to recurrence of fever once or twice a month. The parts become hot, tense, painful, swollen, and often discharge a serous or lymph-like fluid, which may be acrid and offensive. Some tumours, however, seem very slightly affected, and remain perfectly dry. But in all cases the growth progresses, and even when, as occasionally happens, fever ceases to recur, there may still be a slow and painless increase of the tumour. Sometimes, it is very rapid; at others it is slower, with intermissions of activity and indolence. According to Richards, the average duration of the disease, as deduced from the observation of 636 cases, was eleven years and a half; the earliest age was nine years, the latest at which he observed it was eighty years of age. It appears that the disease does not of necessity shorten life; though no doubt—especially when there is any splenic or hepatic, complication, diabetes, or albuminuria—dangerous ulceration and even gangrene may supervene.

In some cases there is reason to believe that debility and cachexia, as well as the disease itself, interfere with the procreative power. But men who have long been incapacitated have become fathers after removal of the outgrowth; and there is no reason to conclude that the disease, unless it cause great debility, is necessarily attended by loss of generative power in either sex, though it would seem that women have a tendency to abort when they are affected.

Various causes are assigned for the disease in the regions where it prevails. Air, water, food, and, as it is frequent near the sea coast, eating fish, have been credited with it; the vicinity of certain forms of vegetation, geological formation of soil, have each or all been regarded as causes. Climate and locality, some undefined endemic influence, combined with poor living, are doubtless predisposing causes, and it is probable that, like some other cachectic conditions observed in tropical climates, it may be determined by the presence of filariæ in the nutritive fluids. It is interesting to learn that Dr. Manson, in China, considers that the geographical distribution of elephantiasis is much the same as that of the mosquito; indeed, he and Dr. Bancroft attach much importance to the rôle played by these insects as intermediary hosts and propagators of filariæ, and the disease. I have already mentioned the important discovery by Dr. T. Lewis of the existence of the embryos of the filaria in human blood, and it is impossible not to recognise the important bearing that his researches may have on their relation to elephantiasis, chyluria, and other disordered states of the lymphatic system. Further investigation may confirm or it may reject these views, but one cannot but recognize the importance of the discoveries, though their precise import in relation to elephantiasis is still *sub judicæ*.

Dr. A. Webb believed that in some cases the disease was of syphilitic origin, but this view has not met with much support from others, nor is it based on any very positive evidence. As to its origin, it is to be noted that whilst the disease occurs in malarious regions, it is not always more prevalent where paludal fevers are most severe, and though it is, frequently associated, is not identical with malarious fever. It is probable

that its occurrence, like that of dysentery, goitre, and other forms of disease, may be determined in some way by the causes that give rise to intermittent fever, splenic cachexia, neuralgia, &c., and which in our ignorance of their real nature, we call malaria! The subjects of this disease in India, are under the impression that it is caused by lunar influences and have the firmest conviction that the paroxysms of fever and inflammation are due to, and synchronous with, lunar changes; and as it no doubt frequently happens that the fits do occur at the same time as the changes of the moon, it is not strange that the natives should hold a belief, which is almost universal in regard to the influence of the moon on other vital conditions and by no means always confined to the ignorant. Such, however, is the case, and in many cases you might as well try to convince the person that he had no disease at all, as that it was not so determined.

No race, as far as I know, is exempt from the disease, but whatever may be the explanation,—perhaps it may be in better living, less exposure to the causes,—the white appears to be less subject to it than the dark races. It does occur occasionally, though very rarely—I have seen it twice only,—in the pure European in India; more frequently in those of mixed races, and it will generally be found that when it occurs in persons of European parentage, there is a mixture, however slight, of dark blood. Waring says that the lower animals are not exempt; even birds have been known to suffer from a swelling of one or both legs, which, though unaccompanied by fever, was in all respects similar to the hypertrophy of elephantiasis.

The disease occurs in different forms and in various degrees of severity. In some, the attacks of pain are of repeated recurrence, from intervals of a fortnight to a month, the increase of the hypertrophy being rapid; in others they are irregular, slight in intensity, whilst the growth of the tumour is slow and less pronounced. Long intervals of quiescence, varied by occasional increase of the swelling with very little fever occasionally occur. In some cases, the growth is slow and continuous, without *any* disturbance of the general health. The hypertrophy appears to be simply an increase in the natural histological elements, the structural changes being most marked in the outset in the lymphatic tissue, and the hypertrophy progressing most rapidly and conspicuously in parts like the scrotum, labia, or certain portions of the integument where lymphatics most abound. That this is the determining cause of more growth in one locality than another, I think is pretty certain. In some examples—those which I described as *nævoid* elephantiasis, Dr. Vandyke Carter as lymphatic varix—the lymphatics and lymph spaces undergo great hypertrophy and dilatation, giving rise to a soft, elastic, spongy, varicose condition, which, when punctured, gives exit to a quantity of whitish or pinkish fluid, like that of so-called chyluria, which of course is not *chyle*, but lymph, whitened by fatty degenerate lymph-cells, or reddened by blood-cells, coagulates firmly on removal, and exhausts the patient just as the loss of so much blood would exhaust him. The lymphatic glands share in the enlargement. In other respects the progress of this is like that of the ordinary form of the disease, and it is the same, or nearly the same, in structure. Hydrocele is one of the earliest symptoms, and nearly always accompanies elephantiasis. Inflammation of the lymphatics of the cord is also a frequent initiatory process.

In Europe and in India we also see cases in which lymphangitis and hypertrophy take place with a dilated varicose state of the lymphatics and glands, occasional fits of excitement, increase of temperature, and discharge of *chyle-like* fluid, the loss of which is very exhausting. These resemble, but are not really, true elephantiasis.

Mr. D'Arcy Power has made a careful microscopical examination of these specimens. The larger tumour did not show any material change in the epidermis, but great thickening of the subcutaneous connective tissue, which was pervaded by numerous bands of unstriated muscular fibre dispersed transversely and vertically, as well as numerous free nuclei. The tissue was compact, and mainly destitute of fat; the hairs and their follicles normal; sweat-glands of large size; bloodvessels numerous and large, and the lymphatic channels dilated and abundant. The smaller tumour also showed considerable hypertrophy of the subcutaneous connective, and hypertrophy of

the hair-follicles, sebaceous and sweat glands. The bloodvessels and lymphatic channels were large, the latter containing numerous small refracting angular bodies, staining deeply by reagents. The specimens were carefully examined for filariæ by Mr. Henry Power, Dr. Cobbold, and Mr. Macnamara, who had also seen them. It was suggested that the numerous small semi-circular bodies, about the diameter of red blood-corpuscles, met with in the second case in the lymphatic channels, might be transverse sections of filariæ. If so, the number of these organisms present must be very large.

But little impression has yet been made on this disease by constitutional treatment; remedies, though useful during the febrile paroxysms in moderating their severity and the excess of local action, have little power in preventing recurrence or in checking its onward progress. Preparations of iodine in combination with quinine, arsenic, and iron, have all been found useful to a certain extent. During the fever, salines, diaphoretics, aperients, and such remedies as are useful during the pyrexial stages of malarious fever, are indicated. The internal use of opium in some form may be necessary to relieve the intense pain which often accompanies the onset of the stage of excitement, when the suffering in the spermatic cords, testes, and generally in the lumbar regions is sometimes so intense, combined with the depression caused by nausea and retching, as almost to prostrate the patient from exhaustion.

The local application of iodine or some of its preparations, by inunction or otherwise, of such forms as the iodide of lead or the biniodide of mercury, have been thought to be useful; but as they are generally applied in conjunction with pressure when the patient is kept in a recumbent posture, the benefit is probably quite as much, if not more, due to the mechanical action of posture and pressure, as to drugs.

A due combination of local and constitutional remedies, with rest, improved diet, and improved hygienic conditions, may, and no doubt do, somewhat control the progress of the disease and relieve suffering; no remedy, however, is so potent as change of climate. This, if effected in the earliest stages, may completely arrest the disease, and, perhaps, but this is doubtful, even disperse any incipient structural change that may have occurred.

It has occasionally been observed in the rare cases in which it affects Europeans, that returning to Europe they have, after a time, lost the disease, and almost, if not entirely, any hypertrophic changes that may have occurred. Natives of India improve, and the disease often ceases to progress, if they leave the endemic area during the early stages, to go and reside in other and drier localities. Such a change, for example, as from Calcutta to Delhi, in the case of a native of Bengal who is affected, is often effective in arresting, if not in curing, the disease. It is constantly observed, however, that after the hypertrophic condition has become advanced, the paroxysms of fever are still liable to recur, even when the climate is changed, though they do so with less violence, showing that the tumour itself acts in some way as a source of discrasia that perpetuates the recurrence of the febrile state, which ceases altogether after the growth has been removed. This, where the disease affects the genital organs, is practicable. When the limbs are the seat of disease, it is not so.

The onset of elephantiasis is frequently attended with great suffering. There is high fever, intense pain in the lumbar region, the groins, the spermatic cords and testes, which become much congested and swollen, whilst acute hydroceles form. This is often accompanied by sympathetic vomiting, nausea, rapid and erythematous swelling of the external parts; and if the extremities be attacked, the swelling is frequently very tense and painful, accompanied by much effusion into the areolar tissue. The surface of the integument is much inflamed, and sometimes discharges a serous ichor or chyle-like fluid, according to the extent to which the lymphatics are engaged in the particular case. There is much constitutional disturbance, increase of temperature, and often depressing nausea and vomiting especially when the cords and epididymus are implicated; whilst the great tension and swelling of the cords is apt to dilate the abdominal rings so widely that, after they subside the patient is liable to suffer from hernia through the widened inguinal passages.

During the fever and excitement, salines and aperients, with soothing local

applications, fomentations, and often opiates, are necessary to relieve pain and give rest. When this stage has passed, quinine is useful, which if anæmia exist should be combined with iron, which may be all the more necessary if other indications of malarial cachexia be present. Many tonics have been recommended, but there is no reason to believe that, beyond their general action as tonics, antipyretics, or febrifuges, drugs have any special action on the disease. Richards thinks that he has seen benefit result from confining certain natives of Orissa to a milk diet! but it is to be feared that even this simple form of treatment will not generally succeed.

It is impossible to overestimate the importance and value of change of climate; in the case of Europeans this should be to Europe, in that of natives of the country to a district where the disease does not prevail—beyond damp and malaria as much as possible; and in addition, all measures should be resorted to that can tend to improve the general health and the condition of impoverished blood.

Surgical treatment, where the hypertrophy is advanced, is often most successful in relieving the sufferer not only of the outgrowth, but also of the fever, which ceases when the former is removed, for it would seem that it acts as a source of dyscrasia keeping up the recurrence of fever as long as it remains.

Tumours of the genital organs, sometimes of enormous size, are now removed with complete success, and considering the formidable character of the operation and the magnitude of the mass—which has occasionally exceeded 100 lb. in the male—with comparatively small mortality.

The removal of a scrotal tumour is effected by incisions along the course of the cords and the dorsum penis. The cords, testicles, and penis are turned out by a few touches of the knife, and then reflected and held up on the abdomen, while the mass of the tumour is rapidly swept away by a few bold incisions in the perineum. The removal should not occupy more than $2\frac{1}{2}$ to $3\frac{1}{2}$ minutes, unless any complication should arise from adhesion of the testes to cicatrices, such as are often caused by the application of the moxa, which is a favourite native method of treating the disease in the early stages. The numerous venous and arterial bleeding points should then be arrested by ligature or torsion, and the surface of the wound dressed with oiled lint covered with antiseptic dressing.

No attempt should be made to preserve flaps of integument. It is unnecessary, and almost certain to be followed by recurrence of the disease. The process of cicatrization goes on rapidly, and in from two to four months all is closed in by cicatrix tissue, which gradually perfects itself, and is not liable to become the seat of a return of the disease.

Before commencing the operation, especially in the case of a large scrotal tumour, it is well to drain it of blood by placing the patient on his back, elevating the tumour on to the abdomen for an hour or so before the operation, during which time pressure by a bandage (a modification of Esmarch's) may be tried, and cold (ice) may be applied. During the operation the application of a whipcord ligature drawn tightly round the neck of the tumour prevents loss of blood, and it is very important that not more blood than can possibly be helped should be lost from the numerous bleeding points, which are seldom controlled with fewer than twenty to thirty ligatures, often more. The shock of the removal of so large a mass is often severe and causes anxiety. The patient should in such cases not be moved until reaction has thoroughly set in, and care should be taken that at or soon after that period, no hæmorrhage should occur from small vessels which during the operation may have escaped notice.

The subsequent dressing of the wound must be conducted with care and attention, pressure being judiciously applied when the testes are being closed in by the rapidly contracting cicatrix. During the first forty-eight hours it is better not to interfere with the dressing, as up to that time, and even later, they are completely glued to the surface of the wound by the masses of lymph which are exuded. Then the dressings can be changed without much trouble, to the patient or fear of causing hæmorrhage. The subsequent applications consist simply of lint, with carbolised solutions; and as the wound closes, it

is occasionally necessary to aid the contraction by strips of adhesive plaster. A weak solution of chloride of zinc carbolic acid or other antiseptic should be frequently sprinkled over the dressings to destroy the fetor of the discharges, which, during the hot weather, (the thermometer at 90° in the shade) decompose very rapidly. Professor Lister's mode of antiseptic dressing would be most efficacious here I think. The elongated cords rapidly contract, and in the course of three or four weeks, the testes, which were dependent half-way to the knee, are drawn up and begin to be enclosed within the cicatrix.

As to the constitutional treatment, for the first few days whilst there is feverish excitement, salines and restricted diet are requisite; but the necessity for more food soon occurs, the patient requiring a plentiful supply to repair the loss caused by the profuse drain. The periodical paroxysms of fever which accompany the growth of the tumour disappear after the operation, and the relief afforded to the sufferer is great.

In thin persons the abdominal tourniquet may be applied.

The process of healing occupies from two to four months, but when complete is very satisfactory. The genital organs are covered and protected, and the relief to the sufferer, who had for years been encumbered with a tumour of perhaps thirty to sixty pounds' weight, may be imagined. The procreative powers are also frequently restored. Of 193 cases of scrotal elephantiasis operated on in the Medical College Hospital in Calcutta between 1849 and 1871, thirty-five, or 18.2 per cent., proved fatal, the causes of death being pyæmia, embolism (cardiac and pulmonary plugging), diarrhoea, tetanus shock. Some of these deaths were due to insanitary conditions, and probably would not have occurred under more favourable circumstances.

The tumours removed varied in weight from two or three pounds to 110 lbs. The ages of the patients ranged from twenty to over fifty years. It is to be observed that the recorded weight of the tumours generally is that of their solid parts, after the blood and fluid had drained away, and does not include the fluid of the hydroceles, which in some of the tumours adds so much to both the weight and bulk.

The vermicular movements of the tumours, some time after their removal, are very remarkable—the contraction being in some instances, so well marked as to cause distinct motion of the entire mass; illustrating remarkably the contractile action of the dartoid structure.

It has been suggested by high authority that elephantiasis of the limbs may be treated by ligature of the main artery, but it is difficult to understand on what physiological principle this mere temporary starvation of the limb should have any efficacy in removing the local expression of a constitutional disease. That it might temporarily ameliorate it there is no reason to doubt, but the same effect could be produced by pressure on the limb or its artery, or by continuance in the recumbent posture; and such, indeed, has been the result of experience in certain cases in India. Ligature of the femoral artery, which was necessarily accompanied by protracted rest in bed, the application of bandages, and the general diminution in size that would follow such an ordeal, was followed by a considerable reduction in the size of the leg. The improvement, however, was temporary, and the disease returned to its original dimensions on the patient's resuming the usual mode of life.

There is probably not sufficient reason on physiological principles for expecting permanent improvement in the case of true elephantiasis by merely temporarily arresting the flow of blood, and subsequently altering its channel of distribution in the limb through the anastomoic circulation or to warrant ligature of the main artery: and, as has been stated, ligature of the femoral artery for elephantiasis of the leg failed in Calcutta to produce any permanently good result. It is therefore so far neither supported nor confirmed by experiment.