PRELIMINARY REPORT ON THE AUCHINCLOSS OPERATION FOR ELEPHANTIASIS

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One of the distressing conditions that is fairly frequent in the tropics is elephantiasis. Up to the present time the Kondoleon operation has offered the best means for relief. This operation was first described by Kondoleon, in Greece, in 1912. The principle upon which it was based was the establishment of an anastamosis between the superficial and deep lymphatics. The results, however, have been disappointing. In 1928 Burke(1) reported his experience with this operation and concluded that the Kondoleon operation, for the cure of elephantiasis, has offered discouraging results. Even Kondoleon(2) in 1924, twelve years after he introduced it, made the following statement:

"A complete cure was realized only in a few cases, and then when there was no sclerosis and when the edema was not of long standing. The ultimate outcome has not been as good as was expected at first, but sufficient to justify the operation."

Consequently, when a new procedure was introduced by Auchincloss(3) recently, which would appear to offer better results because of the principles upon which it is based, it was received here with a good deal of enthusiasm.

During the past year O'Connor(4) has made some very important discoveries culminating many years of study of filariasis. Since elephantiasis in Porto Rico is associated with filarial disease and lymphangitis, in fact O'Connor's work would seem to indicate that the filarial worm is the etiological agent, it was natural that patients with elephantiasis would be thoroughly studied, first for the purpose of establishing the etiology of the lymphangitis and second to throw more light on the pathology and etiology of the local condition.

As a result of this work, aided materially by Golden(5), who

studied the condition with the X–Ray, the following facts were established:

1. The presence of extensive fibrosis of the subcutaneous tissue with thickening and obliteration of the vessels and lymphatics.
2. The calcification of the filarial worms, the deposit of calcium in the tissues, and the calcification of the blood vessels. (These areas of calcification can be demonstrated by the X–Ray by using Golden's technique.)
3. The presence of the filarial worms deep in the sub-cutaneous tissue or lying on the deep fascia.

Auchincloss proposed the removal of this elephantoid tissue with the deep fascia, thereby removing the diseased tissue and the filarial worms lying in intimate contact with the deep fascia, and obviously permitting the establishment of a better lymph drainage for the subcutaneous tissue that has been left, which then lies in direct contact with the muscle. This procedure would also bring the leg to a relatively normal shape and size.

To do this he makes a vertical incision from just below the knee to the ankle, along the tibia. At the upper and lower ends of this incision he makes obliquely transverse incisions. This permits the dissection both laterally and medially of a wide flap of skin extending to the midsaggital plane or even posterior to it. Care is taken to leave sufficient subcutaneous tissue with the skin flap to maintain its blood supply. The exposed underlying subcutaneous tissue and the deep fascia are then removed, the excess skin cut away and the remaining skin flaps snuggly sutured. In legs that are extensively involved a second operation about two weeks later may be carried out, at this time making the approach from the posterior aspect of the leg. It has been suggested by some that in cases where only limited areas are involved these areas alone may be removed by an approach directly over them.

We have carried out this procedure in the following five cases:

Case 1.—Mrs. I. V. L., age 32. No. 8 University Hospital. Entered December 16, 1930—Discharged Jan. 6, 1931.

Chief complaint: Elephantoid swelling of the left ankle region. One-year duration.

Present illness: Eleven years ago she had a typical attack of lymphangitis involving the left leg; two years later a similar attack; then an attack once a year until three years ago. For the past three years she has had an attack every month. While the leg would swell with every attack she has only had a persistent swelling for the past year.

Examination of the left leg showed an increased thickness of the underlying subcutaneous tissue of its outer aspect just above the external malleolus and extending to the back and inner side. In this area her attacks of lymphangitis usually begin. There was also an area over the middle of the leg anterior to the medial side of the tibia where attacks occasionally began.

Because of the increased fibrosis over the lateral aspect of the leg and because most of the attacks commenced in this area it was decided to do a modified operation with a lateral approach. It was also decided to remove a small amount of underlying subcutaneous tissue and fascia from the area on the medial aspect of the leg where some attacks started, and from the region of the internal malleolus where there was some swelling.

The patient was kept in bed for one week with the leg elevated. The skin was clean and in good condition and it was felt safe to operate. She was operated December 23, 1930. (See Figure 1.)

Pathological report of the tissue removed: "Throughout the subcutaneous fatty tissue are dense bands of collagenous connective tissue in which many of the lymphatic capillaries show hypertrophied walls. Abont some of the blood and lymph channels are small but dense accumulations of lymphocytes and plasma cells. There are areas of edema, more numerous in the fibrous septa. Diagnosis—Chronic edema. (Elephantiasis) (Koppisch)."

This patient developed a slough of the skin along the line of the incision on the lateral aspect of the leg for almost its whole length. In some places the slough was one inch wide. This was due to a too close dissection of the skin. It was two months after operation before this wound was healed. The other wounds healed by primary union. This patient has also had one other unfavorable sequela. It is a pitting edema of the foot. Dr. del Toro(6) has also had the same experience in a case of this character where the fibrosis was not marked. Evidently the cutting of the saphenous vein in these mild cases interferes with the return blood supply sufficiently to result in this swelling. In the more advanced cases this does not occur, indicating that an adequate collateral circulation has already been established.

The only favorable result we have had in this case is the absence of attacks of lymphangitis. At the time of writing this article it is three months after the operation. Before her operation she had an attack every month. (See Figures 3 and 4.)

Case 2.—Mrs. A. L., age 18. No. 394 University Hospital. Entered December 9, 1930. Discharged Jan. 16, 1930.

Chief complaint: Elephantiasis for one-year duration involving the right leg.

Present illness: The patient had an attack of lymphangitis about three years ago. This was her only attack. Following this there was a gradual increase in the size of her leg until one year ago when it reached its present size.

Examination of the left leg shows very marked enlargement from the knee down but most marked around the ankle and foot. The skin is much thickened, hard, rough and dirty. The subcutaneous tissue is fibrotic. There is no pitting on pressure. (See Figures 5 and 6.)

This patient was kept in bed with the leg elevated for twenty days pre-operatively during which time the leg was cleaned as thoroughlly as possible. There was some lessening in size and some softening of the subcutaneous tissues at the end of this period. She was operated December 29, 1930. (*Note.*—Before operating this case and the subsequent ones, but after anesthesia, the leg was tightly bandaged from the toes to the knee with a rubber bandage. A tourniquet was then applied just above the knee. As a result of this procedure there was no bleeding during the operation). (See Figure 7.)

The patient made a very satisfactory recovery. The wound healed by primary union. The final condition of the leg was very much better than before the operation but her involvement was so extensive that another operation will be necessary. (See Figure 8.)

Case 3.—Mr. N.P., age 43. No. 48 University Hospital, entered December 17, 1930; discharged March 16, 1931.

Chief complaint: Elephantiasis of the left leg for four years' duration.

Present illness: Swelling in the left leg was first noticed about eighteen years ago. Three years ago he had his first attack of acute lymphangitis. He has had three subsequent attacks, the last one eight days ago.

Examination of the leg shows that it is only slightly larger than the right. No marked elephantoid condition. There is some thickening of the skin and the subcutaneous tissues are hard. There are a number of small ulcers on the leg, one on the medial aspect just above the malleolus. (See Figure 9.)

The patient was kept in bed for sixteen days preoperatively with the leg elevated. The skin was cleaned and the ulcers treated. All healed in this time except the one just above the malleolus. We decided, however, that if we removed this ulcer by a wide incision, discarded the instruments that we used and thoroughly iodinized it, we could proceed with safety. Operation January 2, 1931. (See Figure 10.)

Pathological report: "All sections show dense bands of collagenous fibrous tissue throughout the fat lobules of the subcutaneous layers. There are peri-vascular accumulations of plasma cells and lymphocytes. There is some edema of the fibrous septa. The most interesting changes are in the blood vessels. The medium-sized vessels appear to have much thicker walls than would be expected from the caliber of the lumen. The lymphatics have greatly hypertrophied walls, the smooth muscle fibers of which are irregularly arranged. No areas of calcification and no worms. Diagnosis: Chronic edema (elephantiasis). (Koppisch)."

The patient developed an infection at the lower end of the wound, evidently from the ulcer that was removed. As a result about six inches of the tibialis anticus tendon was destroyed. The patient was in the hospital for sixty-nine days postoperatively. On the fifty-fifth day a tiersch graft was planted over the granulating wound and fourteen days later he was discharged. (See Figure 11.)

This case illustrates the absolute necessity of having the leg free from infection. At the present time he has some swelling of the foot. Flexion is limited, although he manages to walk without any difficulty and has no pain.

Case 4.—Mrs. L. L. F., age 42. No. 397 University Hospital. Entered January 8, 1931; discharged February 4, 1931.

Chief Complaint: Swelling of both legs, especially the left, with thickening of the skin. Recurrent attacks of lymphangitis.

Present illness: There has been swelling of her legs for a period of seventeen years, with frequent attacks of chills, fever, and pain in the leg, typical of lymphangitis. She has not had an attack of lymphangitis for two years.

Examination: Both legs show some swelling from the ankle to the knee with some thickening and fibrosis through the middle part of the leg. This is more marked in the left leg than the right. (See Figure 12.)

The patient was kept in bed for twelve days before operation. The skin was in good condition, the swelling was less marked and there was some softening of the tissues at that time. Operation, January 19, 1931. (See Figure 13.)

Pathological report: "Throughout the subcutaneous fatty tissue run dense fibrous bands which are edematous. An occasional lymphatic with hypertrophied wall is seen. There are rather scanty and small perivascular accumulations of round cells. One section through a medium-sized artery shows beginning calcification of the tunica media. Diagnosis—Chronic edema.—(Koppisch)."

The patient made a very satisfactory postoperative convalescence, the wound healing by primary union. (See Figures 14 and 15.)

The result in this case would appear to be very satisfactory. There has been no pitting edema of the leg. She has no pain or discomfort. If the condition remains satisfactory for a period of six months the other leg will be operated on.

Case 5.—Mrs. L. M., age 28. University Hospital. Entered January 8, 1931; discharged March 17, 1931.

Chief Complaint: Elephantoid swelling of the right leg for fourteen years. Attacks of lymphangitis.

Present Illness: The swelling in her leg started fourteen years ago, followed in about six months by her first attack of lymphangitis. Since then she has had two attacks of severe lymphangitis every year up to the present time. Her last attack was three weeks ago. In 1918 a Kondoleon operation was performed. For about one year after this operation her leg was somewhat smaller, but then began to increase in size.

Examination: The left leg is apparently normal in size. The right leg is very much enlarged and irregular. The skin and subcutaneous tissues are thick, hard and lumpy. There is no enlargement above the knee. On the inner and outer aspect of the leg is a scar extending from the ankle to knee, the site of the former Kondoleon operation. The skin is clean and in fair condition. (See Figure 16.)

The patient was kept in bed for 25 days before operation. During this period there was not very much change in the size of the leg. The tissues may have become a little softer. First operation January 6, 1931. Anterior approach. (See Figure 17.)

The convalescence was uneventful except for the accumulation of some serum under the skin flap. This necessitated a small counter incision and drained for about one week. The stitches were removed on the thirteenth day. The wound healed by primary union except for a small area at the upper end of the vertical incision.

Second operation, February 20, 1931. Posterior approach. (See Figure 18.)

Pathological report: "The sections show broad bands, of connective tissue passing through the fat with a thick mantle of lymphocytes about the blood-vessels. In all of these sections are found numerous microfilariae, some of which are calcified, others stain with eosin. They appear brittle as they are often fragmented transversely. In one section the microfilariae are calcified and about them are deposits of calcium in the connective tissue. In many of the sections the arteries are sclerotic and their lumina narrowed. In one section a small vessel, apparently an artery, has a deposit of calcium occupying chiefly the adventitia and the outer part of the media. No giant cells are found. Some of the lymphatics are distended. Diagnosis: Filariasis. Elephantiasis.—(Von Glahn)."

The convalescence was uneventful. The stitches were removed

on the sixteenth day. The wound healed by primary union. No serum collection. (See Figures 19 and 20.)

There is a marked improvement in the appearance of the leg although it is still enlarged. She has no pain or discomfort upon walking. The immediate result is satisfactory.

DISCUSSION

From this small experience we would draw the following conclusions:

1. In the selection of cases it would seem desirable to select the fairly well advanced cases, with at least a three plus fibrosis. The three well advanced cases in this group gave the best results.
2. If fairly mild cases are selected with very little increase in the size of the leg, as in Case 1, there is considerable doubt in my mind whether a localized procedure is of any value. Our reason for operating these cases would be to stop the attacks of lymphangitis and to prevent any further advance of the condition. Since the present view indicates that the filarial worm is the etiological factor, and since we know that it is rather widely disseminated in the subcutaneous tissues it would seem reasonable to do an extensive dissection in order to be as certain as possible that all the worms were removed. The operation in this type of case is somewhat disfiguring, is associated with postoperative edema of the foot and the ankle and it is not entirely free from danger so that at this time we do not feel we are justified in advising it.
3. In all cases the patient should be kept in bed for at least ten days preoperatively with the leg elevated. This time can be well spent in preparing the leg surgically. Some cases will require a considerably longer period depending upon the condition of the skin and the amount of swelling.
4. No case should be operated on with the slightest local infection.

It will only be after three or more years have passed that the value of this operation can be determined. Frequently the Kondoleon operation was followed by freedom from attacks of lymphangitis and improvement in the condition of the leg for a number of years, then to have the whole picture recur, often with greater intensity.

In this group of cases we would criticise our conservatism. The fear of injuring the blood supply to the skin flaps prevented our

removing as much tissue, in some instances, as we should have. We are now convinced that the flaps are in no danger provided from one-fourth to three-eighths inch of subcutaneous tissue is left with the skin.

As a result of the X–Ray studies that are being carried on by Golden, and the investigations by O'Connor of the life cycle of the filarial worm and its reaction in the tissues it is expected that the indications and modification of this operation will, in a short time, be more definitely established. Our present impression is that Auchincloss has made a very definite contribution to the treatment of elephantiasis, and that time will justify this conclusion.

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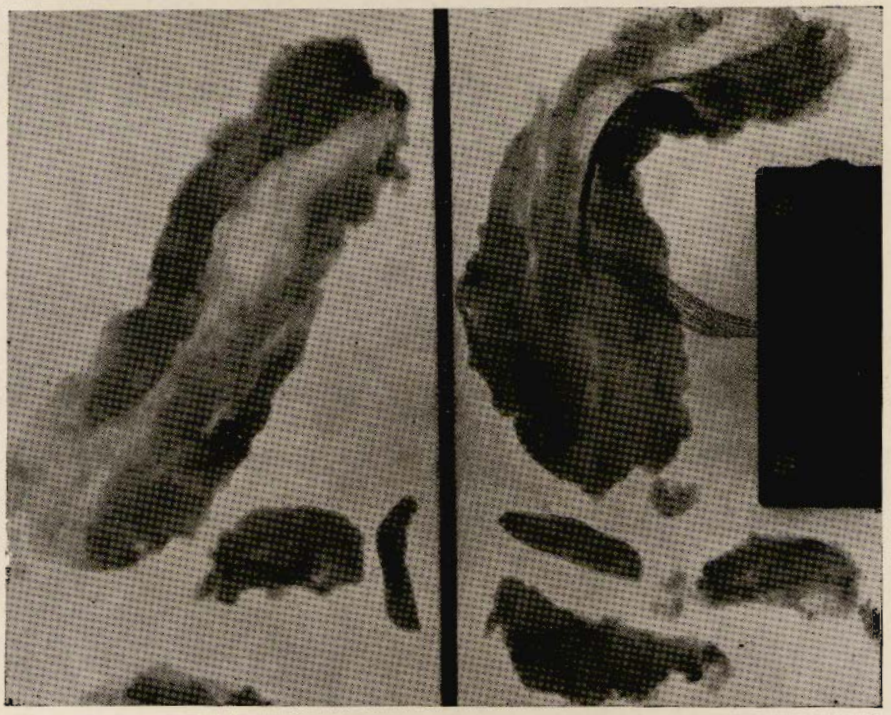
1. Burke: (1928) Results in Porto Rico of the Kondoleon Operation. I. G. O. **47**: 843.
2. Kondoleon: (1924) Operations for Elephantiasis Edema. Arch. Franco Belgrs. de Chirurgie. Brussels. **27**: 104.
3. Auchincloss: (1930) Porto Rico Journ. Pub. Health and Trop. Med. **6**: 149.
4. O'Connor: (1931) Porto Rico Journ. Pub. Health and Trop. Med. **6**: 263.
5. Golden and O'Connor: In preparation.
6. Del Toro: (1931) Personal communications.

FIG. 1

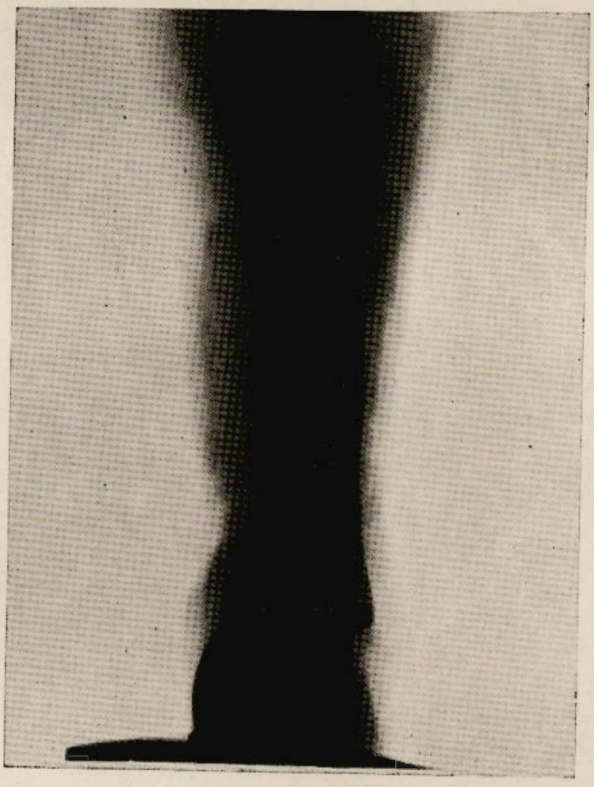
CASE 1.—Mrs. I. V. L. Pre-operative X-ray of the left leg. "Fibrosis two plus-more marked on the lateral and medial aspect and in the lower than in the upper part of the leg. Golden."

FIG. 2



CASE 1.—Mrs. I. V. L. X-ray of the tissue removed. "Fibrosis four plus. Presence of a few suggestive calcium shadows. Ruiz Cestero."

FIG. 3

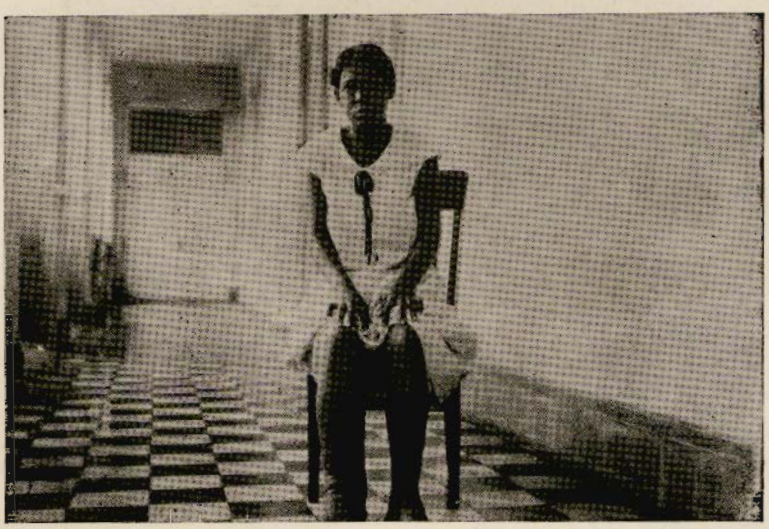


CASE 1.—Mrs. I. V. L. Post-operative X-ray of the leg. "Fibrosis two plus. No suggestive calcium shadows. Ruiz Cestero."

FIG. 4

CASE 1.—Mrs. I. V. L. Photographs taken two months after operation. Note puffiness of the foot and ugly scar at site of slough.

FIG. 5

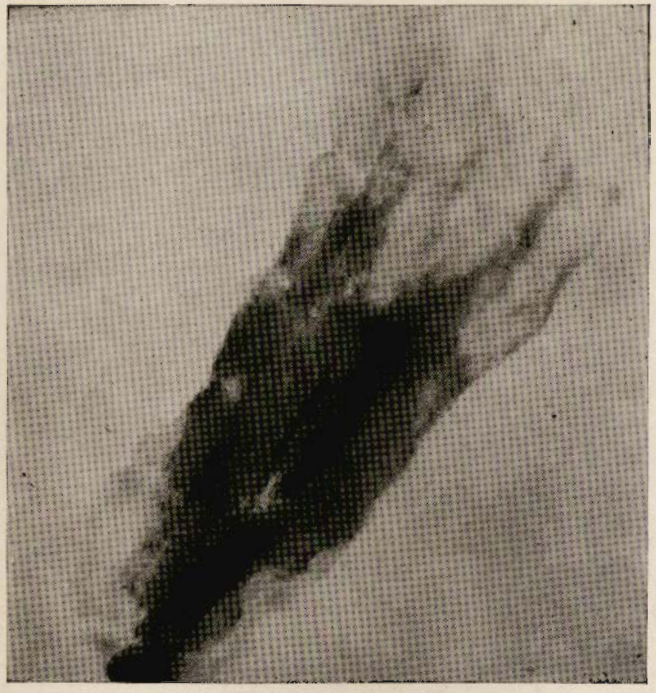


CASE 2.—Mrs. A. L. Pre-operative photograph showing marked elephantisis right leg.

FIG. 6

CASE 2.—Mrs. A. L. Pre-operative X-ray. "Fibrosis four plus. No suggestive calcium shadows. Golden."

FIG. 7

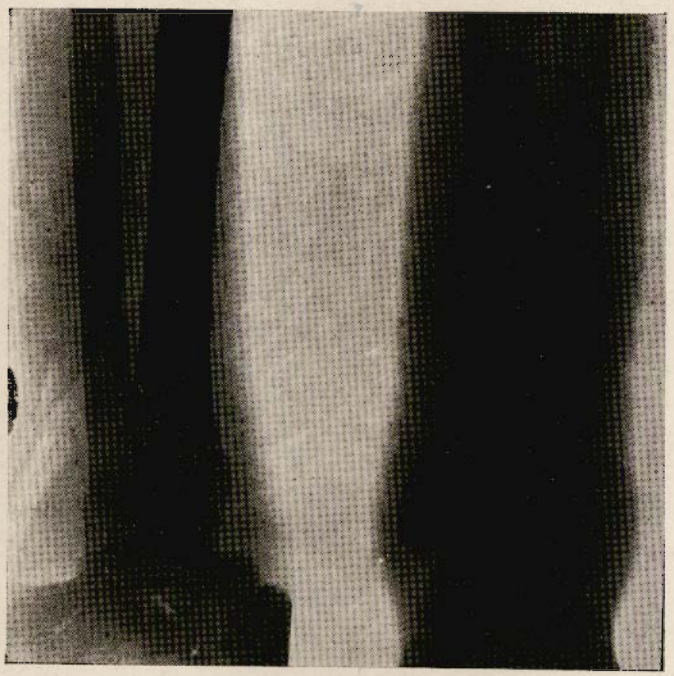


CASE 2.—Mrs. A. L. X-ray of tissue removed. "Fibrosis four plus. No suggestive calcium shadows. Ruiz Cestero."

FIG. 8

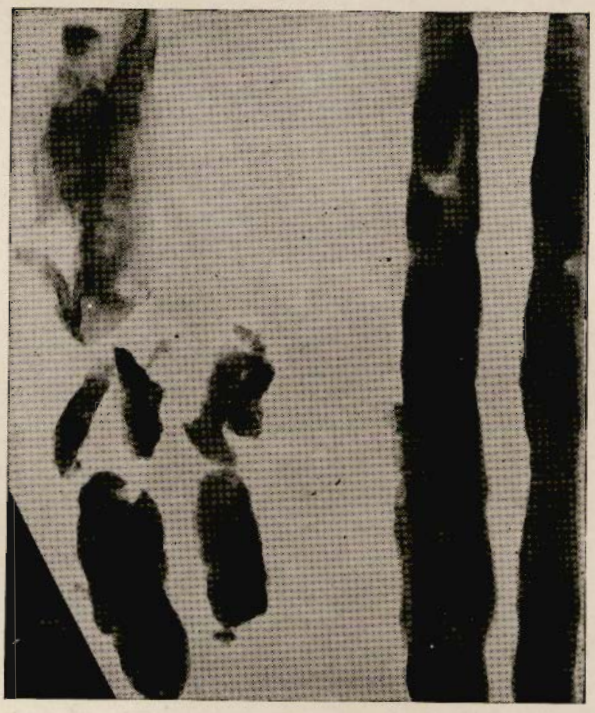
CASE 2.—Mrs. A. L. Final photograph—two months post-operative

FIG. 9



CASE 3.—Mr. N. P. Pre-operative X-ray of the left leg. "Moderate elephantiasis with four plus fibrosis. Golden."

FIG. 10



CASE 3.—Mr. N. P. X-ray of the tissue removed. Two strips of skin included. There was only a thin layer of elephantoid tissue. "Few suggestive shadows of calcified filarial worms. Ruiz Cestero."

FIG. 11

CASE 3.—Mr. N. P. Photograph of leg at time of discharge—69 days after operation. Note the extent of the slough.

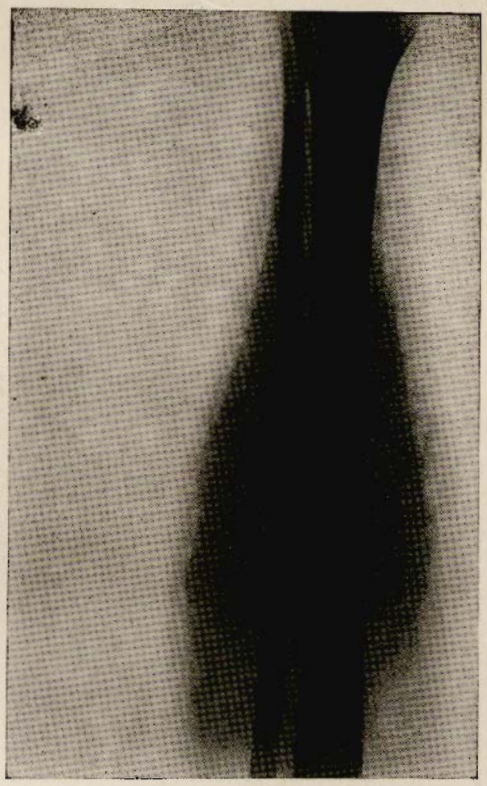
FIG. 12

CASE 4.—Mrs. L. L. F. Pre-operative X-ray of the left leg "In the middle aspect of the middle and lower third there is three plus fibrosis. Probably slight calcification of the fibrous tissue at the lateral and posterior junction of the middle and lower third. Golden."

FIG. 13

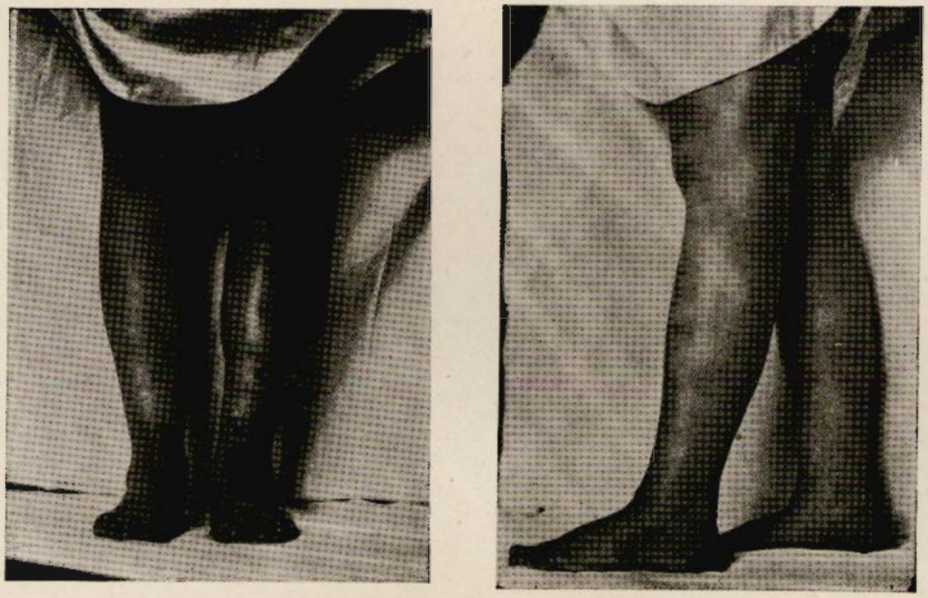
CASE 4.—Mrs. L. L. F. X-ray of the tissue removed. "Suggestive calcium shadows of calcified filarial worms. Fibrosis three plus. Ruiz Cestero."

FIG. 14



CASE 4.—Mrs. L. L. F. Post-operative X-ray of leg. "Fibrosis three plus. No X-ray evidence of suggestive calcium shadows of filarial worms. Ruiz Cestero."

FIG. 15

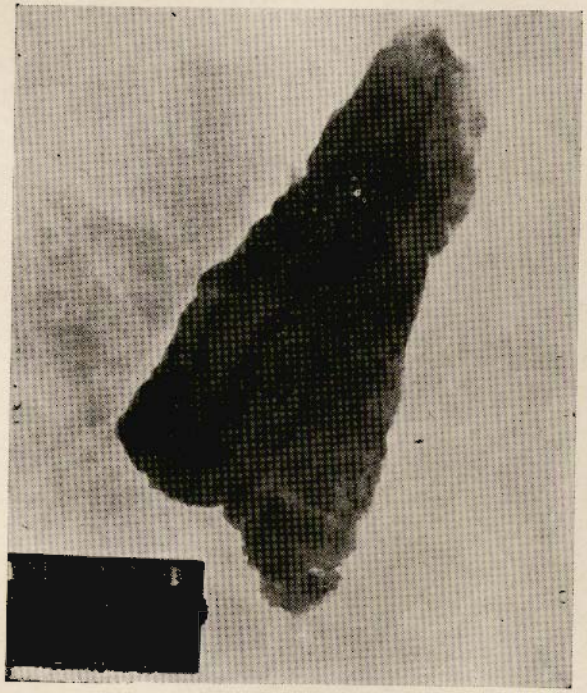


CASE 4.—Mrs. L. L. F. Photographs eight weeks after operation.

FIG. 16

CASE 5.—Mrs. L. M. Pre-operative X-ray of the right leg. "Fibrosis very marked —four plus—below the knee. No positive shadows. Golden."

FIG. 17



CASE 5.—Mrs. L. M. X-ray of tissue removed at first operation. "Fibrosis four plus. There are a few suggestive calcium shadows. Ruiz Cestero."

FIG. 18

CASE 5.—Mrs. L. M. X-ray of tissue removed at second operation. "Four plus fibrosis. There is one suggestive calcium shadow. Ruiz Cestero."

FIG. 19

CASE 5.—Mrs. L. M. X-ray of leg at time of discharge.. "Fibrosis four plus. No calcium shadows. Ruiz Cestero."

FIG. 20

CASE 5.—Mrs. L. M. Photographs five weeks after the first operation.

FIG. 21

CASE 5.—Mrs. L. M. Photograph three weeks after the second operation.

FIG. 22

CASE 5.—Mrs. L. M. Lateral view of the leg at time of discharge.