

## Loa-Loa in the District of Columbia

### A Case Report

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THE expanding interest of United States citizens in travel and work abroad in tropical countries has exposed increasing numbers of them to diseases endemic to those countries. The use of rapid air transportation poses a threat of spread of certain of these diseases to other parts of the world. In addition, cases of diseases contracted in tropical areas, by persons returning to the United States may cause diagnostic problems for the American physician.

A case of loiasis is described in an American man who spent two years in Western Nigeria and who became symptomatic several months after his return to Washington D. C.

#### CASE REPORT

B.T.B., a 40-year-old man, was admitted to Freedmen's Hospital on December 10, 1963 because of painful swelling of the right hand and arm and of the left eyelids and periorbital area. He had returned to Washington, D.C. by air on August 1, 1963 after having spent two years in Ikere, Western Nigeria.

On his return he underwent a routine medical examination at a local clinic. At that time it was noted that he had a high eosinophil count on his peripheral blood film and an unsuccessful intensive search was made for parasites in the blood and stool.

On November 18, 1963, while attending a football game the patient noticed mild edema of the dorsum of the right hand associated with muscular discomfort of the right forearm. The edema subsided slightly during the evening but the next morning he noted increased swelling of the right hand, edema of the right arm and edema of the left eyelids. Over the subsequent two week period the edema of the involved areas increased.

The patient was referred to Freedmen's Hospital for a tropical medicine consultation on December 9, 1963. The clinical impression of the consultant was probable Calabar swellings due to Loa-Loa infection (Figs. 1 & 2). The next day the patient complained of increased swelling of the left periorbitum along with marked periorbitum and retrobulbar pain. He was admitted immediately to the hospital. That night he complained of intense pain in the left eye. Examination revealed a thin white worm, about 3cm. in length, crawling under the bulbar conjunctiva at the lower outer quadrant. At that time the patient



Fig. 1. Calabar swelling of the right hand showing edema of the dorsum compared with the normal left hand.



Fig. 2. Calabar swelling of the right arm.

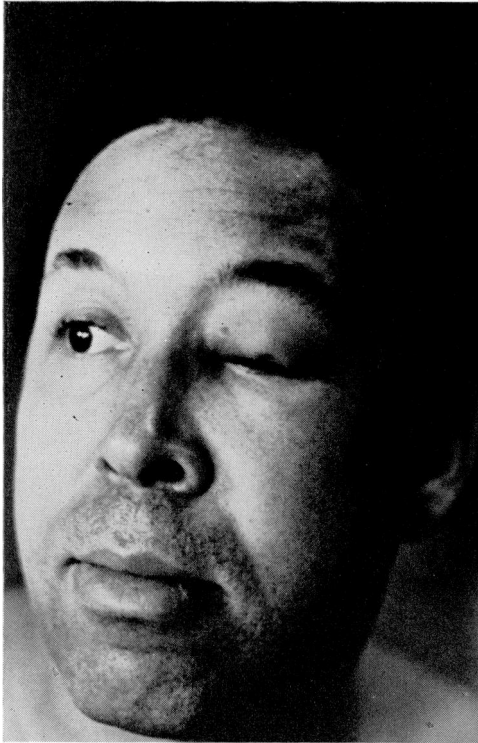


Fig. 3. Calabar swelling of the left eye.

experienced increased swelling of the periorbital area and chemosis (Figs. 3 & 4).

The patient's past history was of interest. He was in the Merchant Marine from 1943-1948, traveling to Europe and Asia. He was hospitalized during that time because of an intestinal "worm infection." While in Nigeria he was treated for malaria, dengue and cutaneous myiasis.

With the exception of the findings noted, the physical examination was otherwise normal.

**Laboratory Studies.** The laboratory studies on admission revealed a hemoglobin of 13.41 Gms%, a hematocrit of 43%, red blood cell count of 5,010 per mm,<sup>3</sup> white blood cell count of 12,950 per mm,<sup>3</sup> and an erythrocyte sedimentation rate of 35mm per hour. The differential white blood cell count revealed 1-stab, 27 segmenters, 30 lymphocytes and 43 eosinophils. The total eosinophil count was 3,207 per mm.<sup>3</sup> The urinalysis was essentially negative and the total serum protein was 6.96 Gms% with 4.15 Gms% albumin and 2.81 Gms% globulin. SGOT was 51 units and SGPT was 44 units. The serological tests for filariasis were strongly positive; the hemagglutination test was positive 1:12,800 and the flocculation test was positive 1:80. The filarial skin test was positive using *D. immitis* skin test antigen (Melcher's). The chest x-ray was essentially normal.

Repeated day and night blood films, thick and thin, stained with Giemsa stain were negative for microfilariae.

On 12/13/63 the patient complained of swelling over the left temporal area and several pruritic wheals on the

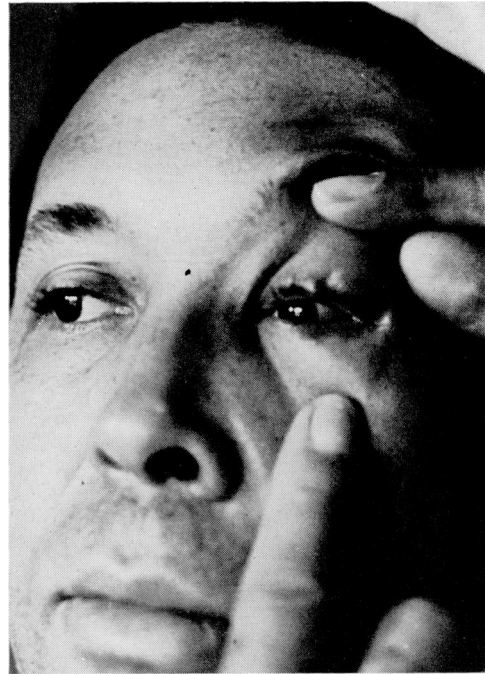


Fig. 4. Conjunctival injection of the left eye a few hours after transit of an adult *Loa*. The scarring of the upper lid is from a previous surgical procedure.

right arm anteriorly near the axilla. The previous he had a sensation of dyspnea and substernal pain after retiring.

On 12/14/63, the patient was started on diethylcarbamazine citrate (Hetrazan), 3.5mg per kilogram daily for 21 days together with tripeleminamine HCl, (Pyrizenzamine), 50mg t.i.d. The Hetrazan dosage was started at 50mg t.i.d. and gradually increased over 3 days to 100mg q.i.d. for 21 days. The patient had no untoward reactions to the drug therapy. An electrocardiogram on 12/16/63 was essentially normal. Two days after therapy was started a marked reduction in the swelling of the left periorbital area and the right hand and arm had occurred. A small linear hard swelling, about 2cm in length, was noted on the right upper arm near the axilla. This was thought to represent a dead *Loa* worm.

The next day a biopsy was performed and the linear swelling was excised. Microscopic examination of the specimen revealed, in the dermis, several nodular accumulations of inflammatory cells, principally arranged around skin appendages and capillaries. The inflammatory infiltrate consisted of eosinophils, lymphocytes and plasma cells. The infiltrate extended into the subcutaneous fat and involved the adipose tissue as well as the fibrous septae which separated the fat lobules. No microfilariae or other parasitic forms were seen. The impression was dermatitis and panniculitis consistent with, but not diagnostic of parasitic etiology.

A repeat differential white blood cell count on 12/17/63 revealed 55% eosinophils with a white blood cell count of 14,900/mm<sup>3</sup> and total eosinophil count of 8,195/mm.<sup>3</sup>

The patient was discharged from the hospital on 12/22/63 in an improved condition. He continued his Hetrazan at home until completion of the 21 day dosage regimen. Follow-up examination on January 6, 1964 revealed that the swelling around the left eye and of the right hand and arm had almost completed subsided. A repeat filarial antigen skin test was positive.

A lymphangiogram was done via the lymphatics of the right hand and showed normal lymphatic vessels and nodes which drained into the right jugular vein. A venogram of the right arm was done via the anti-cubital vein and showed normal venous return from the basilic vein to the subclavian vein to the superior vena cava to the right atrium.

Serological tests for filariasis were repeated as follows:

	5/4/64	7/15/65	2/11/69
Hemagglutination	1:800	1:400	1:400
Flocculation	1:20	1:5	Negative

Follow-up examination of the patient in March 1964 revealed complete disappearance of the Calabar swellings. He has been followed periodically since and has remained well. A differential white blood cell count on 2/11/69 revealed 51 segmenters, 48 lymphocytes, 1 basophil and eosinophil. The hemoglobin was 15.2gms% the hematocrit was 46% and the white blood cell count was 8,900mm.<sup>3</sup> An electrocardiogram done on the same day was essentially normal.

#### DISCUSSION

Loiasis is an infection with the filarial worm *Loa loa* and is transmitted by species of *Chrysops* flies. The disease is found in the equatorial rain forests and their fringes in West Africa, mostly along courses of great rivers. It is widely distributed in West Africa from 8° N. to 5° S. of the equator from the Gulf of Guinea eastwards to the Great Lakes. Its distribution is mainly confined to the coastal plains. Loiasis is especially common in the Cameroons but is also common Southern Nigeria,<sup>3</sup> (Fig. 5).

The adult *Loa loa* is 30mm or more in length, the female as a rule being longer than the male. Microfilariae *loa* are diurnal and appear in large numbers in the peripheral blood during the day but disappear at night. The development of the worm in the body is slow and it takes one year or longer for the worm to reach maturity. It has been suggested that the slow development of *L. loa* accounts for the frequent failure to find the microfilariae in the blood.<sup>1</sup> The observation has also been made that microfilariae *loa* often disappear from the peripheral blood when Calabar swellings are present.

The *Loa loa* worm is long lived and it has been reported that live microfilariae *loa* were found in

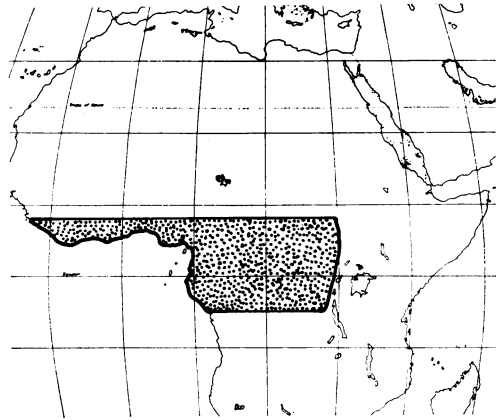


Fig. 5. The shaded area represents the geographic distribution of *Loa loa* in West Africa from 8°N to 5°S of the equator.

the peripheral blood for 17 years in a patient who had left Africa.<sup>2</sup>

The deer or mango flies of the genus *Chrysops* which transmit *Loa loa* are usually found in forest swampland. The males do not suck blood but the females bite man throughout day, especially in the early morning and late afternoon.<sup>2</sup>

The incidence of infection with *L. loa* is variable. It ranges from 8 per cent to over 90 per cent in different areas of the endemic zone.<sup>2</sup> The incidence is highest in the rain forests and lower in the forest fringe.<sup>3</sup>

Forest monkeys in the Cameroons have been shown to be infected with *Loa loa*.<sup>2</sup> The importance of the monkey as a reservoir host has not been defined.<sup>3</sup>

The adult *L. loa* worms migrate freely through the subcutaneous connective tissue usually without causing local tissue reactions. However, they may cause itching, pricking, creeping sensations, neuralgia and transient edematous swellings (Calabar swellings, fugitive swelling).<sup>2</sup> When the adult worm wanders under the conjunctiva it may cause considerable discomfort and swelling. Should the wanderings of the adult worm take it into the rima glottis, the urethra or the central nervous system, serious consequences may occur.

Toussaint and Dannis<sup>1</sup> reported a clinicopathological study of generalized loiasis with meningoencephalitis and ocular involvement. Microfilariae *loa* were found in the brain and in the retinal vessels. There was aneurysmal dilatation of the retinal capillaries, extensive retinal hemorrhages and retinal albuminous exudate.

Ive et al<sup>4</sup> demonstrated a 91 per cent incidence of filariasis among 47 cases of endomyocardial fibrosis in Nigeria. All of the patients were from southern Nigeria. When a specific type of filariasis could be demonstrated, it was usually *Loa loa* (36 per cent). The authors stated that the association of endomyocardial fibrosis with filariasis (particularly *Loa loa*) in Nigeria may be a clue to the etiology of endomyocardial fibrosis.

It is apparent that *Loa loa* infection may have serious consequences, in addition to the discomfort which it may cause the patient. It is important therefore to bear in mind certain diagnostic aspects of the disease. The diagnosis should be considered in any patient who has spent some time in West Africa and who presents with an unexplained eosinophilia.

The most outstanding clinical feature of *Loa loa* is the occurrence of transient tumors called Calabar or fugitive swellings. These swellings may be due to: 1) the migration of the worm; 2) the liberation of numerous microfilariae by the female; 3) toxic products of the parasite; and 4) an allergic reaction by the host.

These swellings are about the size of a hen's egg and may be preceded by discomfort in the area. They persist for several days and the recurrence of Calabar swellings of the arm or leg appears to cause induration of the fascia and connective tissue round the tendon sheaths. Urticaria and dermatitis may also be produced.

The demonstration of microfilariae *loa* in the blood and/or adult *Loa loa* in the subcutaneous tissue or subconjunctival area is diagnostic. Additional confirmatory evidence is obtained by the hemagglutination, flocculation, complement-fixation and intradermal tests.

Treatment with diethylcarbamazine (Hetrazan, Banocide) is quite effective in dosages of 2.0 to 3/5mg/Kg/day for 10-21 days. Allergic reactions are encountered in about 70 per cent of patients under therapy, therefore an antihistamine should be administered during the first week of treatment. This use of an antihistamine is especially important since diethylcarbamazine may cause severe allergic reactions in patients with *Onchocerca volvulus* infection. Thus it is important to determine whether patients with *Loa* also have an *Onchocerca* infection.

#### SUMMARY

All patients returning from West Africa should have blood, stool and urine examinations for parasites. Any patient presenting with an unexplained marked eosinophilia, Calabar swellings and a history of travel or residence in West Africa should be considered to have *Loa loa* infection until shown to have some other disorder. The diagnosis is confirmed by demonstration of microfilariae *Loa* or adult *Loa* and/or the presence of strongly positive serological and skin tests for filariasis.

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### ANNOUNCEMENTS

The *Infectious Diseases Section*, Department of Medicine, Howard University College of Medicine, is offering fellowships in Infectious Diseases and Tropical Medicine commencing July 1, 1971. Fellows must be American citizens or possess a permanent visa. The program involves nine months clinical and research experience at Howard and three months clinical and research experience at the University of the West Indies, Faculty of Medicine, Kingston, Jamaica. For details and application forms, please contact M. E. Grigsby, M.D. at the above address, Washington, D.C. 20001.