Leprosy treatment in Africa with the Flying Doctor Service of East Africa

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SUMMARY

The Flying Doctor Service of East Africa and the African Medical and Research Foundation (AMREF) have been especially helpful in disseminating education along with associated primary and secondary health care to leprosy-affected regions of the Third World for over thirty years.

Reconstructive surgery has helped leprosy victims both functionally and psychologically, reestablishing their courage and belief in the fact that this dreaded social stigma need not affect their ability to hold a job, maintain personal relationships and lead an otherwise normal life within the community.

Introduction

East Africa's Flying Doctor Service represents one of the most effective and versatile organizations working in the Developing World today. The Flying Doctor Service is a branch of the African Medical and Research Foundation, (AMREF), an organization whose major mission today is that of bringing health training and education to the developing countries of East Africa, mostly Kenya, Uganda, Tanzania, southern Sudan, and Somalia. The national health budgets in developing countries of Black Africa generally provide less than $4.00 per person per year.

The history of plastic and reconstructive surgery in East Africa owes a great deal to the Flying Doctor Service for its tireless effort in promoting this specialty throughout the region and giving it its initial momentum. Over its 31 year history, the organization has performed a wide variety of both general and plastic (reconstructive) surgical procedures on a large percentage of patients living in remote areas. Without the help of the Flying Doctor Service, many of these patients would have received minimal treatment or none at all. Of equal importance, its surgeons have served to help disseminate modern surgical treatment and technique throughout East Africa. This has helped and supported peripherally-located medical centers in their effort to become self-sufficient and responsive to the needs of modern patient care.

The problem of plastic surgery in developing countries in often different from that seen in the West. This is partly because of the prevalence of diseases like cancrum oris, filariasis, and leprosy; also because of the severity of the deformities as a result of late diagnosis and inadequate primary treatment. The combination of delayed or inadequate primary healthcare of many infectious diseases and general lack of preventive health education measures lends to a large population of young patients with bone and soft tissue-sepsis and post-traumatic deformity, burns in particular.

In addition, there are social, cultural, and economic factors which serve to complicate matters greatly, especially with regard to communication and transport. The ability of the local medical facilities to provide patients with early and appropriate treatment is undermined, resulting in a continuous flow of otherwise preventable deformities and crippling handicaps.

Complex medical and surgical cases sometimes rule out the possibility for a patient to safely undergo successful reconstructive surgery in the local rural setting. In such instances the Flying Doctor Service has acted as an "air ambulance" service, transporting specific patients to Nairobi for treatment under more appropriate conditions. The ability to carry out such a service helps define the very flexible nature of the organization.

The problem of leprosy in East Africa

Leprosy in East Africa can present at any age, although cases in infants less than 1 year of age are extremely rare. The age-specific incidence peaks during childhood in most developing countries, with up to 20 % of cases occurring in children under 10 years [1]. Since leprosy is most prevalent in poorer socioeconomic groups, this may simply reflect the age distribution of the high-risk population (60 % of Kenya's population is under the age of 15 yrs.). The sex ratio of leprosy presenting during childhood is essen-

tially 1:1, but males predominate by a 2:1 ratio in adult cases.

In East Africa, the disease is prevalent in the humid, low lying areas such as the Lake Victoria basin or along the Indian Ocean coastal region. Environmental factors such as overcrowding, due to inadequate housing, lead to more frequent close contact with the source of the infection and favor the spread of leprosy.

Despite significant progress in raising levels of education and public health in rural areas, leprosy is still endemic in many developing countries, where the disease continues to be considered as an hereditary disease or a punishment from God. Such patients do not seek medical treatment until the disease has reached advanced stages. A further complication is the patients' relative remote distance from medical care facilities.

Due to the inherent demands involved in supporting a family or meeting the obligations of subsistance agriculture or herding, leprosy victims in the developing world remain reluctant or are altogether unable to properly rest secondary injuries when they develop. Due to anesthesia a person does not notice injury; even if he does happen to recognize it, he often lacks the means to take adequate care of the injury. When infected, such injuries lead to ulcers and cause demage to soft tissues, joints, and bones (Fig. 1). It is estimated that 25 % of patients who are not treated at an early stage of the disease develop anesthesia and/or deformities of the hands or feet [2].

Diagnosis

The tuberculoid variety is the mildest and most common subtype of leprosy encountered in East Africa. It is a relatively benign and stable form; severe lepra reactions may cause a progression to the more serious forms of borderline or lepromatous leprosy.

Skin smears are negative; skin biopsy indicates foci of lymphocyte epitheloid cells, and Langerhans giant cells in the dermis. The Mitsuda (lepromin) test is positive; the degree of positivity generally corresponds to the extent of cellular response in skin lesions and nerves [2]. This test is a guide to the resistance of the patient against leprosy rather than a diagnostic tool.

Early manifestations of tuberculoid leprosy are usually cutaneous or superficial involving the skin, anterior aspect of the eye, and mucous membranes of the nasal, oral and pharyngeal regions. Characteristic maculopapular lesions of the skin commonly exhibit central healing with peripheral spread. Sensory impairment in lesions is marked.

A diagnosis of leprosy is made by three cardinal signs: sensory impairment of the affected area; enlargement and tenderness of peripheral nerves associated with signs of peripheral nerve damage (paralysis, sensory loss, or sudomotor dysfunction); and the presence of non-cultivable acid-fast bacilli in the lesions [2].

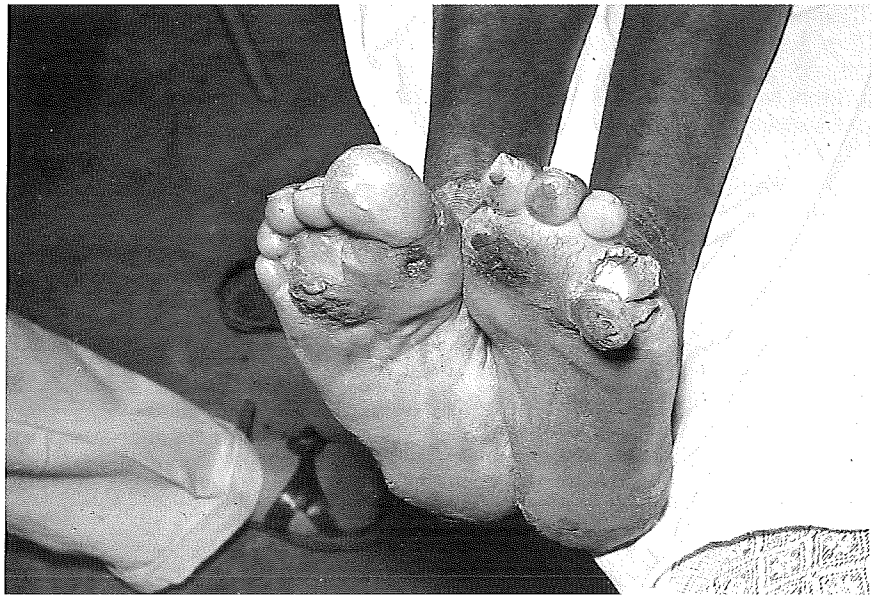

Fig. 1.—*Localized neuropathic plantar ulcers secondary to anesthesia.*

Treatment

Chemotherapy

Dapsone, a folate antagonist, is the mainstay of therapy on an international basis. It remains the drug of choice because of its low cost, ease of availability, and safety during pregnancy (this is a prime consideration in Kenya; women deliver an average of more than 8 children over a lifetime). Dapsone resistance, a problem of increasing concern, may be countered by combined administration with Clofazimine (Lamprene).

Rifampicin is the most rapidly acting mycobacterial drug known for M. leprae, but is cost prohibitive and is associated with many side effects, indicating increased levels of supervision, a difficult task in treating patients living in remote regions.

Surgery

Most leprosy-associated deformity due to paralysis can now be corrected by reconstructive surgery, which is capable of giving excellent results provided adequate post-operative physiotherapy is carried out. Surgery restores much of the lost function while providing cosmetic improvement and also prevents secondary deformity. However, results are poor when primary deformity accompanies secondary deformity.

Prior to surgery a patient must be investigated for anemia, intercurrent infections, and the ability to adequately rest the region receiving surgery. The optimal candidate for reconstructive leprosy surgery shows a negative skin smear, a positive Mitsuda (lepromin) test and a skin biopsy which has been negative for three years prior to surgery.

Facial surgery-repair of lagophthalmos

The most extensive damage to organs of the face is found in patients who had developed leprosy prior to the introduction of modern anti-leprosy treatment, or in patients in whom the treatment with sulfonamides had been started too late (Fig. 2).

Repair of the sequelae of facial-nerve palsy and the complete fatty regeneration of facial musculature constitutes a complex problem in the reconstructive treatment of leprosy (Fig.

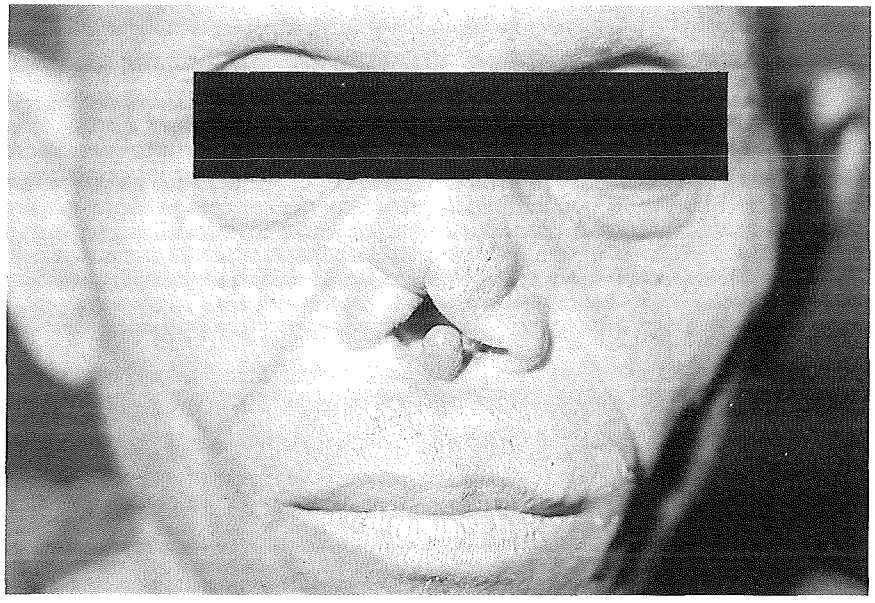

Fig. 2.—*Defect in cartilaginous component of nasal skeleton with septal perforation resulting in saddle nose.*

3). In paralytic lagophthalmos, a myofacial plasty is extremely useful in restoring the shape of the palpebral fissure and active closure of the eyelids. This procedure most commonly involves the temporalis muscle. It achieves a good dynamic effect and thus prevents associated secondary deformities and possible blindness.

Hand surgery-tendon transfer in repair of clawhand

Clawhand is an example of major nerve disruption manifested by a loss of cutaneous sensibility and by joint imbalance deformity with power loss (Fig. 4). The paralysis at the lumbrical level subjects the fingers to unopposed extension at the metacarpophalangeal joints. Since the forearm muscles are never paralysed, cla-

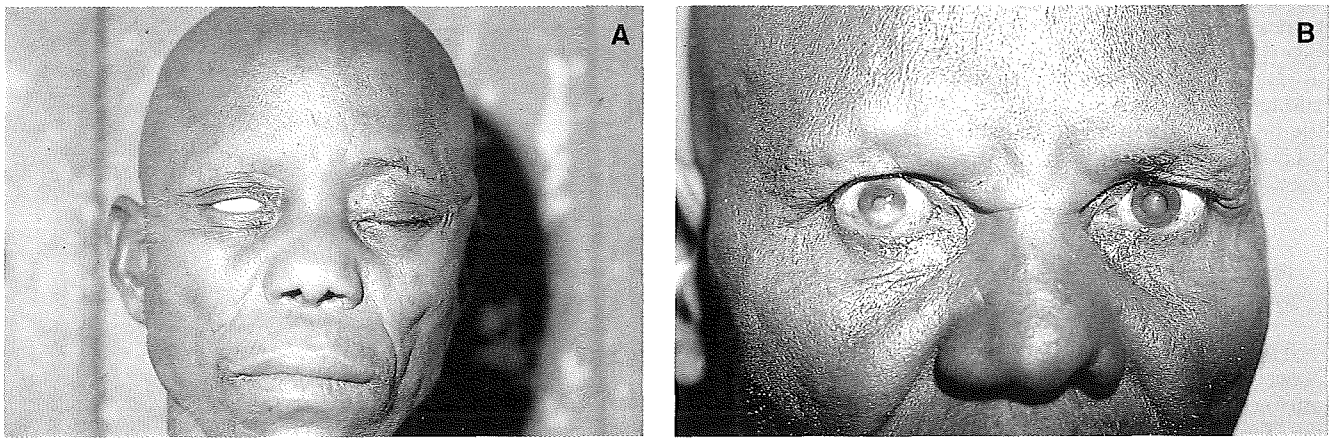

Fig. 3.—*a) Right-sided paralytic lagophthalmos. The opposite eye has previously been repaired with a myofacial plasty for the same lesion. b) Exposure keratitis due to facial nerve palsy resulting in inability to properly close palpebral fissure.*

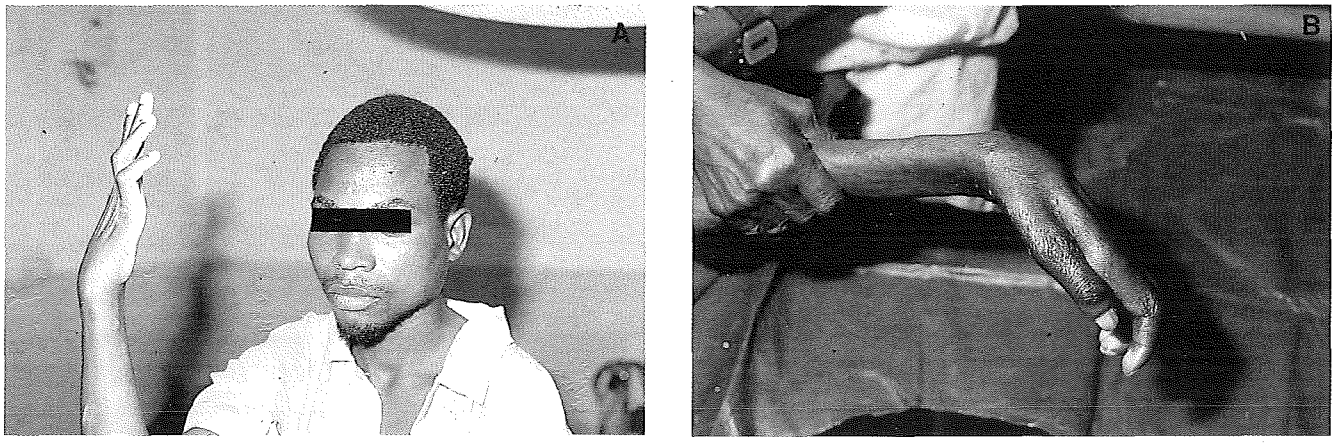

Fig. 4.—*a) Paralysis of ulnar nerve with resultant claw hand. b) Triple palsy with paralysis of the ulnar, radial, and median nerves with resultant wrist-drop.*

whand deformity is corrected by using one of the unaffected forearm muscles like the palmaris longus.

Hand surgery-Krukenberg kinoplasty in wrist amputation

An extremely useful procedure for bilateral hand amputees is the Krukenberg kinoplasty [3]. This technique transforms the forearm stump into a cleft to form a forceps, with the radial ray moving actively against the ulnar ray (Fig. 5). It restores functional grip and provides retention of tactile, pain, temperature and proprioceptive input. The patient's functional abilities are thus substantially increased. Extensive scarring, contractures, widespread muscle wasting or neurological deficits in the stump are contraindications. This technique is especially useful in lesser developed countries where prostheses may not be available.

Adequate and consistant post-operative physiotherapy is imperative. Pronation and supination are strong, normal movements; abduction and adduction of the rays, however, are the important movements to be learned if the patient is to benefit from the operation [4] (Fig. 6).

Foot surgery-Syme tarsal amputation

The Syme tarsal amputation is a procedure employed in patients with advanced bone and soft tissue sequelae (Fig. 7). Amputations in the developing world should never be taken lightly; a patient who can not be gainfully employed in the local economy puts additional strain on family and community members for his support.

This operation remains popular because of its relative surgical simplicity and minimal post-operative requirements. Following surgery, patients are routinely fitted with an "elephant boot", which serves to stabilize and balance the weight bearing aspect of the newly formed stump while giving the patient much improved mobility with no risk of secondary injuries.

Discussion

Leprosy in East Africa is almost invariably synonymous with features of advanced stages of the disease manifested as severe secondary injury

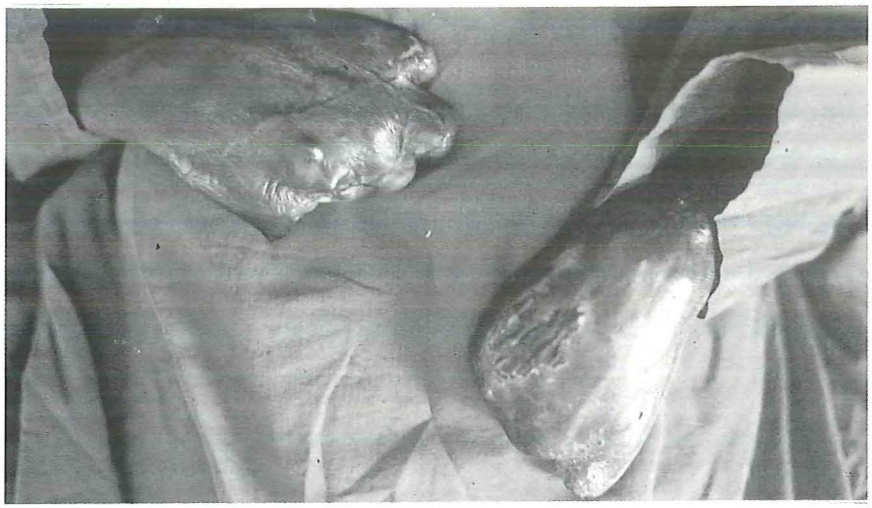

Fig. 5.—*Severe bone resorption and soft tissue degeneration of hands requiring Krukenberg kinoplasty.*

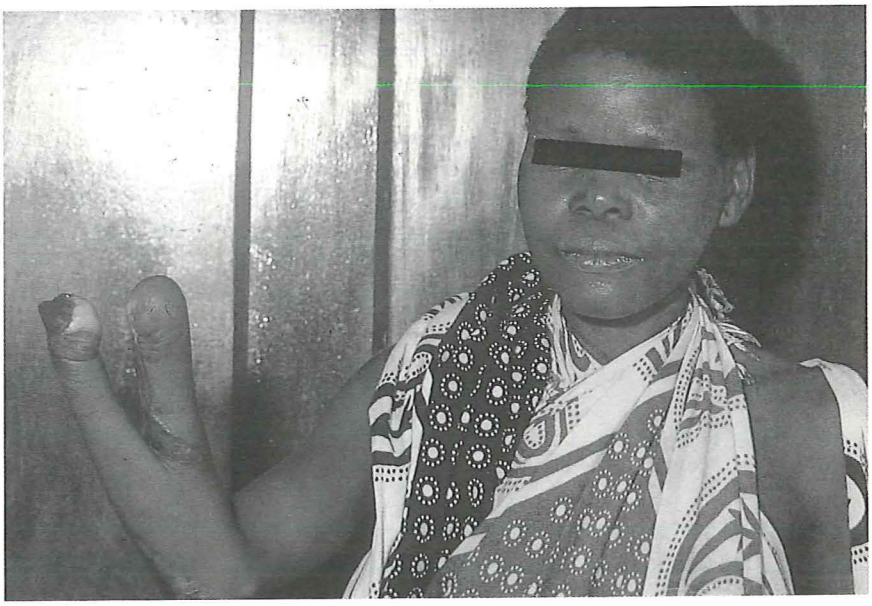

Fig. 6.—*Functional ability one year after Krukenberg's operation as demonstrated by abduction of rays.*

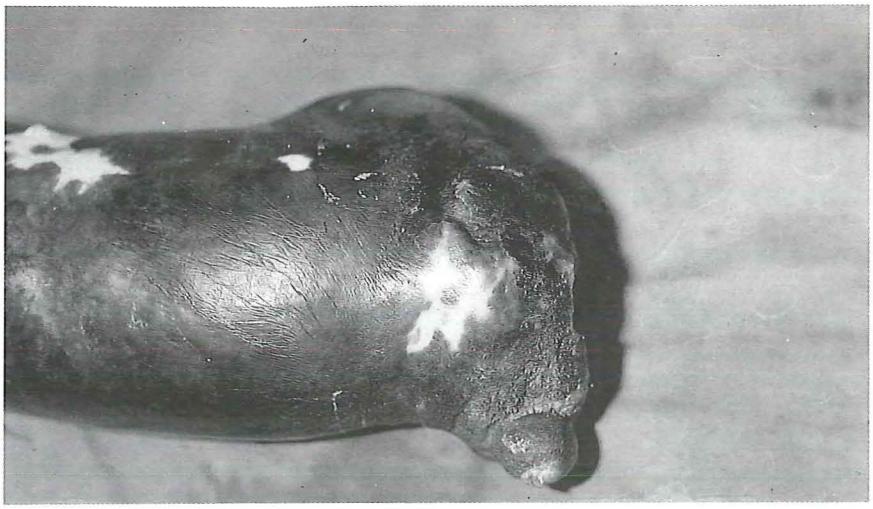

Fig. 7.—*Advanced bone and soft tissue sequelae of the foot requiring Syme tarsal amputation.*

and deformity. The vast majority of leprosy-associated-sequelae are preventable with prompt and adequate administration of chemotherapy.

Patients rarely seek prompt treatment for signs and symptoms of leprosy from medical centers because of fear, ignorance, and remoteness from medical facilities. Cultural and geographic factors affecting the patient population, rather than chemotherapy limitations, are responsible for the poor state of patient health upon initial presentation at medical centers. The relative low cost of Dapsone makes this drug readily available to medical centers and their patients throughout East Africa.

Leprosy victims in remote geographic regions frequently seek initial treatment and cure from the "mganga", the traditional doctor, or "witch doctor". This is due as much to pressure from within a patient's own culture and its beliefs as from geographic isolation. Eventually, when such primative intervention fails to satisfy the medical needs of the patient, such patients seek modern medical treatment as a last resort. This underlying reluctance toward modern medicine is the prime reason for extended delay in receiving proper treatment. Such skepticism on behalf of patients may also be dangerous after chemotherapy has begun; many patients discontinue Dapsone intake due to the fact that 3-6 months are required for evident signs of clinical improvement. The incidence of secondary Dapsone resistance is frequent in such patients. Alternate drugs normally indicated in cases of Dapsone resistance pose serious problems with cost, availability, and side effects in developing countries.

Greater effort is needed on behalf of the medical community to help train and educate tribespeople at the village-community level so that patients will be better able to identify initial signs of leprosy and, more importantly, emphasize the need for regular and sustained full-dosage compliance for the prescribed duration of treatment. Patients exhibiting neurological disorders with resultant functional loss should be made aware that they need not be passive and fatalistically accept their current condition as immutable; significant functio-

Fig. 8.—*Postoperative views of patients who have undergone reconstructive surgical procedures at a leprosarium in East Africa.*

nal and aesthetic improvement is possible through reconstructive surgery.

The key to successful health models in developing countries is simplification and peripheralization as far as possible, joined with consistent training and support of the basic medical services within the community. It is more practical and far cheaper for a consultant to travel to peripheral regions than to expect a multitude of patients to make their way to a distant medical center. It also ensures better patient-doctor rapport, earlier detection and treatment, and better follow-up.

The number of leprosy patients that have been aided by the Flying Doctor Service over the years represents a very small fraction of the actual amount of leprosy victims who could benefit from reconstructive surgery. Yet their resources are limited; it has been agreed that curative medicine is only a small part of the answer in leprosy treatment. Significant progress in diminishing the incidence of leprosy in East Africa —and internationally— will only be achieved when patients understand the benefits of prompt treatment and the consequences of neglecting to obtain it (Fig. 8).

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TRATAMIENTO DE LA LEPRA EN AFRICA

Resumen

El Servicio Médico Aéreo de Africa y la Fundación para la investigación y la Medicina Africana (AMREF) han sido especialmente eficaces en la educación y el tratamiento primario y secundario de la lepra en el Tercer Mundo durante más de 30 años.

En el presente artículo se revisa el problema de la lepra en el Africa Oriental, con especial énfasis en el papel de la cirugía plástica reconstructiva de las deformidades causadas por tal enfermedad.