



A Four Pronged Avant-Garde Approach [Chowdhry's Regimen] to Forefend Below Knee Amputation in a Patient of BL Hansen's Disease Having Associated Complications

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Abstract

Trophic ulcers, mutilation of digits, auto amputation are common sequelae in patients of leprosy sometimes warranting limb amputation as a life saving measure to avoid potential sepsis. Not only does it increase the morbidity in affected patients but also weighs heavily on the economical status, quality of life, social and mental well being of the patient and the health system of the country. We have documented here a four pronged strategy which was used to salvage the lower limb of a patient who had extensive multiple trophic ulcers with mutilation of digit and uncommon occurrence of sinuses, who was advised to undergo below knee amputation of the affected limb by orthopedicians and surgeons unanimously. Patient undergoing treatment by this approach improved dramatically thereby not only forefending the need of amputation but also conserving its functionality. Such an approach of management can be extensively used in the management of many such patients leading to not only salvaging the limb but also to improve the life quality of such patients.

Introduction

Leprosy is a chronic granulomatous infective disorder which primarily affects the peripheral nerves and skin. Leprosy patients present with varied signs and symptoms and the cutaneous lesions are of varying morphology and histopathology depending upon the immunological status of the patient. These differences help to classify the leprosy patients into tuberculoid leprosy at one end and lepromatous leprosy at another end of the spectrum. Since the primary infection affects the nerves, patients often develop permanent neurological deficit leading to various complications and sequelae such as atrophy, paresis, deformity of limbs, and mutilation of digits, trophic ulcers, Charcot's joints and even auto-amputation which are amongst the few reasons of social stigma associated with this disease. One of the most common sequelae in patients of leprosy is trophic ulceration which not only shows poor healing but significantly decreases the quality of life as well. It also serves as a nidus for secondary infection warranting surgical intervention. At times even amputation of the involved digits/part or of limb may be required, in cases where the wound is kept uncared, ultimately leading to secondary infection, sinuses and eventually putrefaction of the underlying structures including muscle mass, tendons and even extending deep up to the bone. Hence, the efficient management of these trophic ulcers with associated complications may serve as the key step to salvage the limb and also life, in some cases. Our experience with one such patient whose limb was salvaged by a novel method is being documented here.

Case Presentation

A 66 year old male presented with complaints of multiple scaly, erythematous plaques, present all over the four limbs and back associated with total anesthesia of the affected areas since past 11 months. He also complained of recurrent fever which was mild-moderate grade and associated with body ache, malaise and anorexia. There was a history of hypertension and Diabetes Mellitus Type 2 for which he was on medication for past 6 years but without adequate control of blood sugar levels, resulting in him being treated for diabetic neuropathy and resultant ulcer at a tertiary care centre. On examination, patient had multiple erythematous, circumscribed plaques over back, bilateral upper and lower limbs. He had significantly thickened, cord like nerves with mild tenderness of B/L ulnar and common peroneal nerves. Mild muscle weakness (power 4/5) in distal muscles of extremities was found on examination. Pitting oedema was also present on lower limbs. There was almost total loss of sensation to temperature and fine touch over all four limbs, and this was more pronounced distally. Skin biopsy from the anesthetic patch showed loose granulomatous perineural

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Received Date: 01 Feb 2019

Accepted Date: 21 Feb 2020

Published Date: 25 Feb 2020

Citation:

Chowdhry S, Priya, Meena A, Sahu R, Dhali T, D'Souza P. A Four Pronged Avant-Garde Approach [Chowdhry's Regimen] to Forefend Below Knee Amputation in a Patient of BL Hansen's Disease Having Associated Complications. Clin Case Rep Int. 2020; 4: 1142.

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and dermal infiltrates suggestive of border line lepromatous leprosy. Slit-skin smear showed acid-fast bacilli with bacteriological index +3. A diagnosis of BL Hansen's disease with type 1 reaction, on the basis of characteristic changes in skin lesions and nerve tenderness along with diabetes mellitus type 2 and hypertension was made and the patient was started on Multi bacillary treatment for Leprosy along with Injection Dexamethasone 8 mg IV bd which was later tapered to 4 mg IV od. Once the patient started showing favorable response in lesions gradually over the course of 4 weeks, the patient was shifted to oral Prednisolone 30 mg once daily and this was further tapered on out-patient basis with regular follow-up for next 3 months. Adequate hypoglycemic drugs (Tab. Sitagliptin 50 mg 1 bd, Tab. Metformin 1 g bd and Tab. Glimepiride 2 mg od) were prescribed so as to maintain the normal blood sugar levels during this period. After around 6 months of MDT, patient was lost to follow-up. He presented again 2 months later with multiple large trophic ulcers involving the great toe and dorsum of left foot which covered almost three-fourth of the foot. The ulcer was secondarily infected with oozing of copious amount of greenish purulent discharge. Patient was found to have complete anesthesia over upper and lower limbs, claw hand deformities in both hands with healed burn scars with deteriorating muscle strength in both feet (power grade 2/5).

After evaluating the condition of the multiple trophic ulcers and other compounding factors such as poor local hygiene, improper care of the foot, non-avoidance of precipitating factors by the patient along with untimely treatment, underlying co morbidities like diabetes, clinical opinion of an orthopedician and surgeon was sought, who were unanimous to go ahead with below knee amputation. The great toe had already undergone complete auto-amputation on presentation leaving a large ulceration in its place (12 cm × 8 cm) (Figure 1) and the X-ray of the affected foot showed presence of bony sequestrae present in situ. Another ulcer (10 cm × 5 cm) (Figure 1) was present over dorsum of foot with copious discharge and dirty slough, revealing the underlying tendons and soft tissue. After careful consideration, an attempt was made to save the limb for which a new approach was devised to tackle the overall condition, induce healing of ulcers and protect the limb from amputation.

The first step in this newly devised management strategy plan was assessment of limb damage followed by thorough exploration and proper debridement of slough, dead tissues and bone sequester. The ulcerated and necrosed area was debrided along with removal of decayed soft tissues including dead muscle and tendon mass (Figure 2) in order to decrease the infective load and induce the process of healing. Locally, antiseptic dressing with Microdacyn gel (Hypochlorous acid 0.008% W/V + oxidized water 97.64% + Sodium hypochlorite 0.0002% w/v) daily along with oral antibiotic cover comprising of combination of amoxicillin 500 mg and clavulanic acid 125 mg and oral hypoglycemic drugs (Tab. Sitagliptin 50 mg bd, Tab. Metformin 1 g bd and Tab. Glimepiride 2 mg od) to control blood sugar levels was part of the management schedule. Despite de-bulking and daily dressings of the affected part, after few weeks the patient developed a new ulcer over the medial aspect of foot on the base of second toe which on exploration and probing revealed the presence of sinus tract connecting to the ulcer on the dorsum of foot (Figure 3). For this, extensive careful daily debridement was undertaken coupled with daily antiseptic dressing. The process resulted in the wound showing minimal reduction in dimensions though its base was clean and with minimal slough. Granulation tissue though present was not healthy and healing was extremely slow and not satisfactory. Patient

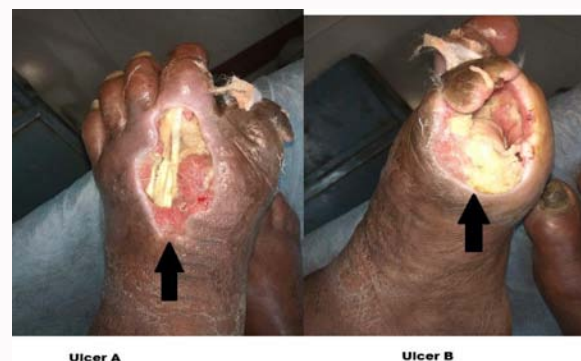


Figure 1: Showing Ulcer A (10 cm × 5 cm) present on dorsum of left foot with copious discharge and dirty slough, revealing the underlying tendons and soft tissue and Ulcer B (12 cm × 8 cm) at the site of mutilated left great toe which had already undergone complete auto-amputation, on presentation.



Figure 2: Ulcer A and B after debridement showing minimal reduction in size and unhealthy granulation tissue.

was thereafter shifted to the next phase of the new innovative regimen and continued with the daily antiseptic dressings.

The second step, involved daily dressing with topical application of injection phenytoin solution, which was placed on the ulcerated surfaces to promote the growth of granulation tissue after the ulcers were rendered apparently non-infective by the first step of intervention.

Simultaneously, the sinus tract which was formed and was not healing as systemic antibiotics had limited outreach of medication at the terminal end of the sinus which was ending in a dead end cavity. This resulted in potential growth of anaerobic/facultative anaerobic micro-organisms like *E. coli* which was sensitive only to Colistin and *Proteus vulgaris* which was sensitive to Doxycycline and Linezolid. Hence the patient was started on IV Inj. Linezolid 600 mg bd and oral 100 mg doxycycline bd.

The third step, inspired by syringing in ophthalmology, intended to flush out the debris from the blind ended cavity of the sinus tract, syringing of the tract on lines similar to that carried out in chronic dacryocystitis, was attempted to clear the pus, debris, obstructive membrane and slough occluding the tract and other similar biologic material deposited in the cavity with a mixture of hydrogen peroxide solution and povidone-iodine solution in a specified ratio. After flushing the tract clean, normal saline was used clear the path of any remnants and wash the tract clean. Thereafter in the next part a solution of Gentamicin and Metronidazole was prepared in a specified ratio and instilled the in the sinus tract and dead end cavity to achieve bacteriostasis. This manoeuvre was carried out under the



Figure 3: Showing Ulcer A and B along with a newly developed ulcer, Ulcer C present over the medial aspect of left foot located at the base of second toe which on exploration and probing revealed presence of sinus tract connecting ulcer C to ulcer A.

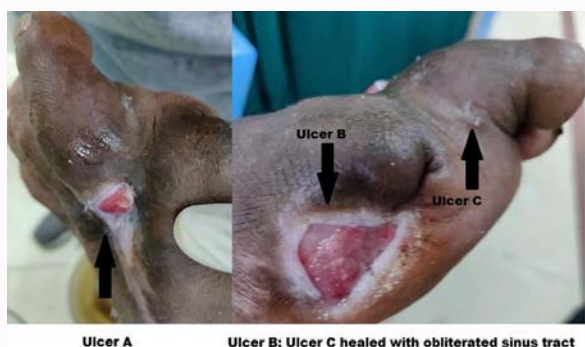


Figure 4: Showing partial healing of Ulcers A and B and complete healing of Ulcer C with obliteration of the sinus tract.

cover of systemic antibiotics viz. Inj. Linezolid 600 mg IV tid and Cap. Doxycycline 100 mg bd for 14 days, on the basis of culture sensitivity report.

With the abovementioned procedure, soon the sinus tract showed significant improvement in just few days itself in the form of cessation of all purulent discharge and debris with notable decrease in the size of the mouth of the tract and eventually complete healing of the ulcer over the base of the second toe medially but still complete obliteration of tract was not achieved due to possible epithelization of the tract as patency of the sinus was maintained throughout the period of syringing.

Therefore, the fourth step was adopted to achieve obliteration of the tract which was the last step in our strategy. Diluted Phenol (Carbolic acid) in a specific percentage was instilled in the tract for denuding and resurfacing of the epithelium inside the lumen of the tract. This resulted in formation of granulation tissue and complete closure of the tract on its own without the need to slit it open and re-suturing, as normally done in conventional surgery elsewhere. Single manoeuvre of controlled phenolization achieved the desired result (Figure 4). The healing of the ulcer and sinus was almost complete and achieved the desired results. Unfortunately the patient developed another superficial sinus 5 mm superior to the former lesion about 20 days later, which had no evidence of infection or oozing of any discharge or pus. The present tract was much smaller and superficial and horizontal unlike the previous one which was long, deep and ending in a big blind ended cavity. Step 2 of this approach was carried out on multiple consecutive days and a single Step 4 was again undertaken and this resulted in dramatic improvement (Figure 5).



Figure 5: Showing complete healing of Ulcer A and significant reduction in dimensions of Ulcer B. Sinus tract obliterated and no new ulceration.

Discussion

Leprosy primarily affects the peripheral nervous system and skin. Nerve damage leads to decreased sensitivity, changes in tropism and motor function, which predisposes to ulceration in leprosy patients with site predilection for high pressure areas such as the feet, and lower limbs and less commonly fingers and upper limbs. Patients towards the lepromatous spectrum of the disease have a higher risk of formation of chronic ulcers than those in other end of the Hansen's spectrum. Another etiological factor in the aetiopathogenesis of Hansen's diseases is the direct invasion of the blood vessel walls and endothelium by the causative organism *Mycobacterium leprae*, resulting in local focal granulomas, vasculitic changes, superficial cutaneous necrosis and incumbent ulcerations [1]. In lepromatous leprosy, the inflammatory infiltrate and bulk of *bacilli* engulfed by macrophages can often cause obstruction of superficial veins and venules culminating in vasculitis and resultant gangrene. This may lead to adversities and complications like osteomyelitis, septicemia, amputation of digits/limbs [2]. Invariably leprosy patients often have chronic venous insufficiency, commonly seen with other co-morbidities, which may lead to the formation of ulcers with atypical clinical presentations like necrosis, large ulcers and unleashed tendons as seen in our patient [3,4]. Therefore, such patients especially those with underlying co-morbidities once released from treatment after completion of full course of MDT, struggle to deal with everlasting sequelae in the form of trophic ulcers which significantly decreases their quality of life. An already fragile healthcare expenditure in developing nations can further crumble with continued and prolonged medical care in such kind of patients predisposed to high morbidity and mortality.

It can be seen that a four pronged approach; firstly in the form of extensive debridement of dead skin, subcutaneous tissue, muscle, tendon and even bone sequester [5], secondly by promoting the granulation tissue in a non-healing ulcer by use of Phenytoin which are not responding to conventional treatment [6]; thirdly adopting syringing methodology utilizing a fixed combination of medications like a specified ratio of hydrogen peroxide and iodine, followed by flushing with normal saline and lastly instilling and re-flushing with fix ratio of combination of sterile solution of Injection Gentamicin and Injection Metronidazole on regular basis, so as to achieve a complete aseptic state [7] and fourthly by closing the sinus tract and its blind ended cavity non surgically, by using a specific concentration of diluted Phenol [8].

In normal circumstances where the foot is completely anesthetic,

with almost three-fourths of the foot having putrefied soft and hard (bone) tissues, uncontrolled diabetes since years, non-healing multiple large trophic ulceration, sinuses with deep extensions, secondarily infected with uncommon micro-organisms sensitive to exclusive limited expensive antibiotics, amputation is the only option left and is the most preferred treatment of choice in such patients. It is already known that trophic ulcers are notorious for delayed healing and/or progression into large non-healing ulcers. This, coupled with additional confounding underlying co morbidities like diabetes with poor glycemic control often leads to extremely poor prognosis in such kind of patients. This treatment regimen (Chowdhry's regimen), probably the first of its kind worldwide postulated and implemented successfully has shown extremely promising results and has been successful in preventing the below knee amputation of our patient and saved the foot from impending amputation when all other attending/referring doctors (Orthopedicians and Surgeons) recommended below knee amputation. The irrigating fluid used in syringing has been designed to target the dead blind end of sinus which was harbouring *E. Coli*, *Proteus* and similar organisms which were sensitive only to expensive drugs like Colistin in the present case and still despite its administration, it wouldn't have reached the concerned site due to multiple anatomical and pathophysiological factors in such kind of lesions found in such patients. This regime needs further usage and evaluation in similar clinical situations which are predominantly and commonly found in poor developing countries. This novel approach is scientific, economical and highly efficacious in the needy patients of Hansen's disease who face such issues worldwide, especially in countries where this disease is endemic.

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