

**FILARIAL LYMPHEDEMA LOWER LIMB DEBULKING 34 CASES**Baburao Ravuri<sup>1</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** There are various treatment options in the management of filarial lymphedema of the lower extremities. The end point, regardless of the method adopted is a reduction of the girth of the limb, prevention of future increases in limb girth, prevention of recurrent episodes of streptococcal cellulitis; more important the treatment method used should not lead to any secondary problems that may far out shadow the primary co Majority of the methods adopted are mainly of the secondary prevention kind; very few of the procedures to date cure the disease condition. A few of the methods have been historically found to be more effective than the others; this may be real or apparent as the methodology of-reporting swelling in the lower limb may not have been consistent and there are too many variables to consider. This study seeks to evaluate the efficacy of one such treatment protocol for the management of filarial lymphedema of the lower limb 80 patients were admitted for filarial lymphedema of the lower limbs from 2005 to 2015 Of these 42 patients underwent surgical treatment; operative records for 8 of these patients was insufficient to analyse; among the remaining 34 patients 19 patients were unavailable for review. This left us a patient population of 15 for the final analysis. The surgical treatment of all of the 15 patients was identical, after preop preparation by using compression bandages to soften the edema along with a period of bed rest debulking of excess skin and subcutaneous tissue and primary closure was done. The intro operative application of Esmarch bandages helped in expelling fluid from the tissues and this ensured that closure was obtained with no tension at the margins. Patients were kept for at least 5 days post op before discharge; the routine use of compression crepe bandages postop along with bed rest ensured that we did not have a single case of skin necrosis or wound disruption in the postop period. All patients were given advice regarding penicillin prophylaxis and asked to come for fitting of custom made compression garments. They were kept on review every 3 months for 1 year, every 6 months for another 1 year and then a yearly review.

**INTRODUCTION:** There are various treatment options in the management of filarial lymphedema of the lower extremities. The end point, regardless of the method adopted is a reduction of the girth of the limb, prevention of future increases in limb girth, prevention of recurrent episodes of streptococcal cellulitis; more important the treatment method used should not lead to any secondary problems that may far out shadow the primary complaint.

Majority of the methods adopted are mainly of the secondary prevention kind; very few of the procedures to date cure the disease condition. A few of the methods have been historically found to be more effective than the others; this may be real or apparent as the methodology of-reporting swelling in the lower limb may not have been consistent and there are too many

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variables to consider. This study seeks to evaluate the efficacy of one such treatment protocol for the management of filarial lymphedema of the lower limb.

**PATIENTS & METHODS:** 80 patients were admitted for filarial lymphedema of the lower limbs from 2005 to 2015.

Of these 42 patients underwent surgical treatment; operative records for 8 of these patients was insufficient to analyse; among the remaining 34 patients 19 patients were unavailable for review. This left us a patient population of 15 for the final analysis.

### **SURGICAL METHODS:**

1. Preoperative period of enforced rest in bed and periodic application of esmarch bandage and crepe bandage.
2. Elliptical excision of redundant skin and subcutaneous tissue followed by primary closure in the leg, foot or both.
3. Compression bandages and bed rest for a period of 3 weeks.
4. Compression stockings and Penidure prophylaxis for a period of at least 3 months post-op.

**Assessment Methods:** History and clinical examination Systematic girth measurements Photography.

### **Points for Assessment of Results:**

|                                |   |   |
|--------------------------------|---|---|
| Location of swelling           | : | leg/foot/both.  |
| Grade of swelling              | : | III/IV.   |
| Previous treatment             | : | yes/no.   |
| Immediate complications        | : | Bleeding: yes/no.   |
| Early complications            | : | Infection/Wound disruption: yes/no.                             |
| Further episodes of cellulitis | : | Within 3 mts/ After 3 mts Recurrence of Swelling-foot/leg/both. |
| Compliance with treatment      | : | perfect/good/poor.  |
| Secondary complications        | : | Excrescences/Ulceration/Lymphorrhoea: yes/no.                   |

### **AIMS AND OBJECTIVES:**

1. Any complications related to the surgical procedure in the immediate or early post-op period- bleeding/infection/wound disruption.
2. Efficacy of surgical reduction of girth of the limb at varying periods of follow up (1-10 years post-op).
3. Whether the results are dependent on the distribution of the edema. (vis a vis thigh/ foot/ leg)
4. Number of episodes of cellulitis in the follow up period after surgery.
5. Secondary problems, if any-excrescences/ulceration/lymphorrhoea.

**REVIEW OF LITERATURE:** Filariasis has been a major public health problem in India next only to malaria. The disease was recorded in India as early as 6th century B.C. by the famous Indian

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physician, Susruta, in his book 'Susruta Samhita'.<sup>1</sup> In 7th century A.D., Madhavakara<sup>2</sup> described signs and symptoms of the disease in his treatise 'Madhava Nidhana', which hold good even today. In 1709, Clarke called elephantoid legs in Cochin as 'Malabar legs'. The discovery of microfilariae (mf) in the peripheral blood was made first by Lewis in 1872 in Kolkata (Calcutta).

Filariasis leads to irreversible chronic manifestations, which are responsible for social stigma besides causing considerable economic loss and severe physical disability to the affected individuals. Acute attacks of filariasis frequently traumatize the patients with transient episodes of disability, often confining the patients to bed rest for a few days.

In mainland India, *Wuchereria bancrofti*, the causative organism for filaria transmitted by the ubiquitous vector, *Culex quinquefasciatus*, has been the most predominant infection contributing to 99.4% of the problem in the country. Although the vector species breeds preferably in dirty and polluted water, it can also breed in clear water in the absence of polluted water. The infection is prevalent in both urban and rural areas. *Brugia malayi* infection is mainly restricted to rural areas due to peculiar breeding habits of the vector associated with floating vegetation. *Mansonia (Mansonioides) annuifera* is the principal vector while *A. (M). uniformis* is the secondary vector for transmission of *B. malayi* infection. The breeding of these mosquitoes is associated with aquatic plants such as *Pistia stratiotes*. In the absence of these plants, the vectors cannot breed. The vectorial role of *M. (M). Indiana* is very limited due to its low density. Both *W. bancrofti* and *B. Malayi* infections in mainland India exhibit nocturnal periodicity of microfilaraemia.

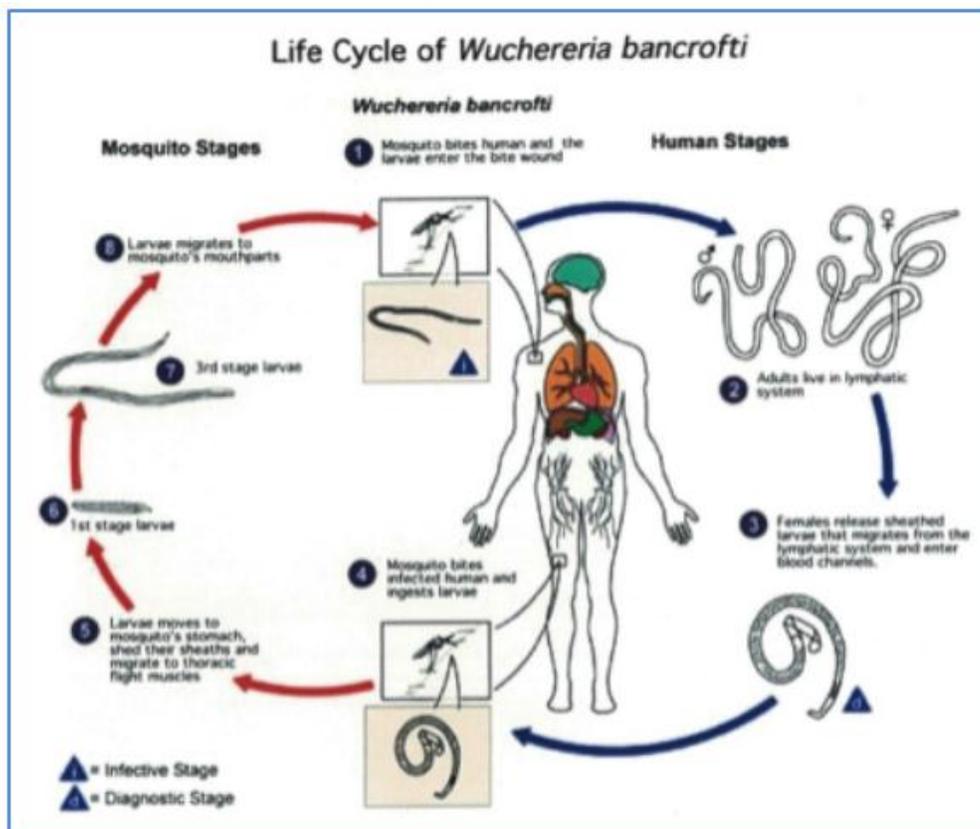


Figure 1

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Since lymphatic filariasis does not always result in clinical symptoms, the most accurate way to determine if someone is infected is a blood test. In most parts of the world, the parasites have a "nocturnal periodicity" that restricts their appearance in the blood to only the hours around midnight. Therefore, the diagnosis of lymphatic filariasis traditionally has depended on the laboratory examination of blood extracted between 1m and 2am when the worms are most active.

However, an antigen-detection test that is simple, sensitive and specific, called an ICT, is now available. The ICT test can detect infection within minutes and unlike previous tests can be carried out at any time of the day.

### **Outcome of filarial infection varies in different persons:**

- 1.** Asymptomatic in endemic areas inspite of having high count of microfilaria, non-endemic areas it produce early clinical manifestation.
- 2. Early Infection:** Patients experience fever, lymphangitis, headache, nausea, urticaria. High eosinophil count, recurrent attacks fever lasting for 3-15 days.
- 3. Chronic Infection:** It takes 10-15yrs to develop following repeated attacks because lymphatic damage leads to lymphangitis, lymphadenitis due to dead adult worm blocking the lymph vessels which leads to dilatation, lymphstasis hyperplasia of lymph node. Tropical pulmonary eosinophilia is most common in south India due to abnormal host reaction to the adult filarial worm.
- 4. Lymphedema & Elephantiasis:** Mechanical blockage of lumen of lymph vessels, obliterative endolymphangitis due to endothelial proliferation and inflammatory thickening, excessive fibrosis of afferent lymph vessel, fibrosis of afferent vessels and lymph nodes draining particular area. Lymphatic obstruction leads to swelling fibrosis, skin surface become coarse with warty excrescences, often cracks and fissures with secondary infection occurs. Elephantiasis most commonly affects limbs, genital organs and breasts.

**CLINICAL MANIFESTATIONS:** The clinical manifestations of filariasis depend upon the stage in the course of infection in the human host and the worm load (adult). The stages in the course of infection may be described as follows:

- A. Stage of Invasion:** The infective larva gains its entry into the human host and starts undergoing further development. Diagnosis at this stage rests on the triad of: Eosinophilia, lymphadenopathy and a positive intradermal test with the supporting evidence of history of residence in an endemic area.
- B. Asymptomatic or Carrier Stage:** This stage is usually with no clinical manifestation. The microfilaria (mf) carriers are usually detected by night blood examination.
- C. Stage of Acute Manifestations:** These comprise filarial fever, lymphangitis, lymphadenitis and lymphoedema of the various parts of the body and epididymo- orchitis in the male. It is mainly because of the infection of the lymphatic vessels (channels) by the adult worm.
- D. Stage of Chronic Manifestations:** The clinical manifestations comprise of elephantiasis of genitals, legs or arms, hydrocele, chyluria,

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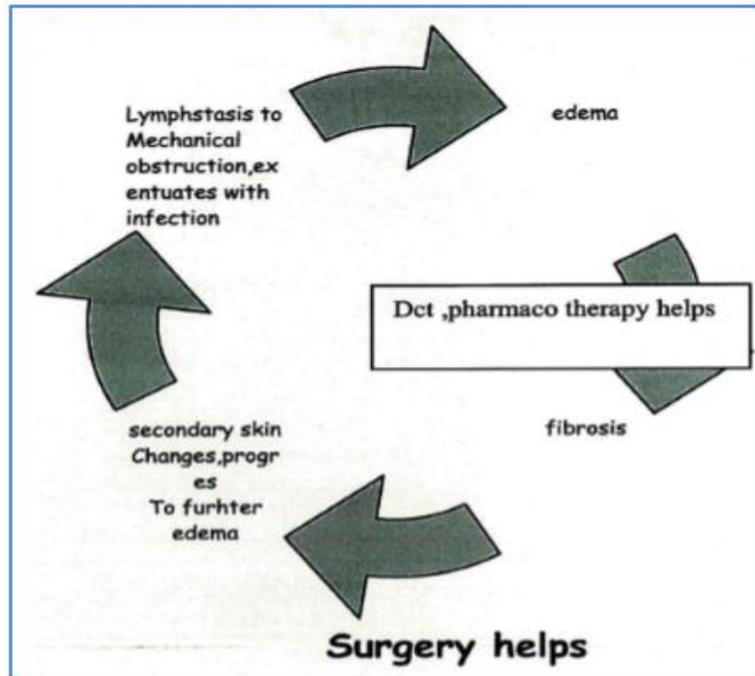
**The lymphoedema of lower limb is classified into four grades as given below:**

**Grade 1:** Early oedema completely reversible on elevation of limb.

**Grade 2:** Oedema of limb, which is partially reversible on elevation of limb without thickening of the skin.

**Grade 3:** Irreversible oedema of the limb with skin thickening.

**Grade 4:** Irreversible oedema of limb with papillary and nodular growth.



**Image 1**

**MANAGEMENT OF LYMPPEDEMA:** In the management of filarial lymphedema of the lower limbs both nonsurgical and surgical methods are available. They are seldom used in isolation but are usually applied as complimentary to each other. Frequently the non-surgical methods are adopted to prepare the patient for a more effective surgical intervention.

**Non-Surgical Methods:** These can be Physical or Pharmacological; the summary of each of these methods is presented in a tabular form below

### Summary of Physical Treatment Methods:

|         |  | <b>Advantage</b>   | <b>Disadvantage</b>  |
|---------|--|--|--|
| CPT/CDT | Created and developed by Danish therapists Dr. Emil Vodder and his wife, Estrid, in the 1930's | Backed by longstanding experience and generally involves a two-stage treatment program that can be applied to both children and adults | carried out only by professionally trained Personnel. Need supervised clinics. Contraindicated in arterial disease, painful postphlebotic syndrome or occult visceral neoplasia. |

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|------------------|--|---|--|
| Pneumo-Massage   |  | After external compression therapy is applied, preferably by a sequential gradient pump," form-fitting low-stretch elastic stockings or sleeves are used to maintain edema reduction. | Displacement of edema more proximally in the limb and genitalia and the Development of a fibrosclerotic ring at the root of the extremity with exacerbated obstruction of lymph flow needs to be assiduously avoided by careful observation. |
| Manual Massage   |  | Performed as an isolated technique, classical massage or effleurage usually has limited benefit.  | Performed over vigorously, massage may damage lymphatic vessels.   |
| Wringing Out     |  | "Tuyautage" or wringing out performed with bandages or rubber tubes   | Is probably injurious to lymph vessels and should seldom i. ever be performed  |
| Thermal Therapy  |  | A combination of heat, skin care, and external compression has been advocated by some practitioners in Europe and Asia  | The role and value of thermotherapy it the management of lymphedema remain: Unclear.   |
| Simple Elevation |  | Simple elevation of a lymphedematous limb often reduces swelling particularly in the early Stage of lymphedema.   | If swelling is reduced by Antigravimetric means, the effect should be maintained by wearing of a low Stretch, elastic stocking/sleeve.   |

### Summary of Pharmacological Treatment Methods:

|                   |  |  |   |
|-------------------|--|--|---|
| Filaricidal Drugs |  | To eliminate microfilariae from the bloodstream in patients with lymphatic filariasis, the drugs diethylcarbamazine, Albendazole, or Ivermectin are recommended. | Killing of the adult nematodes by these drug is variable and may be associated with an inflammatory-immune response by the host with aggravation of lymphatic blockage. |
| Diuretics         |  | Occasionally useful during the initial treatment phase of CPT.   | Potentially may induce fluid and electrolyte imbalance.   |

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|-------------------|--|--|--|
| Benzopyrones      |  | Oral benzopyrones, which are thought to hydrolyze tissue proteins and facilitate their absorption while stimulating lymphatic collectors,      | The exact role for benzopyrones as an adjunct in primary and secondary lymphedema treatment not known in higher doses has been linked to liver toxicity.   |
| Antimicrobials    |  | Antibiotics should be administered for bona fide superimposed acute inflammation (Cellulitis/lymphangitis or erysipelas).                      | A prophylactic antibiotic (usually broad spectrum) Recommended. Fungal infection, a common complication of extremity lymphedema, can be treated with antimycotic drugs (e.g., flucanazole, terbinafin) |
| Mesotherapy       | Pioneered in France by Dr. Michel Pistor, and has been performed there since 1952. | The injection of hyaluronidase or similar agents to loosen the extracellular matrix  | Is of unclear Benefit. invasive procedure  |
| Imnx. Therapy     |  | Efficacy of boosting immunity by intraarterial injection of autologous lymphocytes.  | Is unclear   |
| Diet Manipulation |  | In an obese patient, however, reducing caloric intake combined with a supervised exercise program is of distinct value in decreasing limb bulk | No special diet has proven to be of therapeutic value for uncomplicated peripheral lymphedema  |

**Surgical methods:** Surgical methods fall into one or either of the following categories.

- A. Methods to reduce the volume of edematous tissues "the debulking procedures".
- B. Methods to increase lymphatic drainage "The lymphatic restoration procedures".

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### A. Methods to reduce the volume of edematous tissues:

| Procedure                                  |   | ADVANTAGE  | DISADVANTAGE   |
|--|---|--|--|
| Skin And Subcut Aneous Tissue Excision     | One of the earliest procedures is the Kondolean procedure (1912). <sup>3</sup>                        | Resection of subcutaneous lymphematous tissue as well as creating a fascia) window as a means of establishing communication between the superficial and deep lymphatics  | The fascial window does not work, and only the tissue resection part of this procedure is still used             |
| Excision & Skin Graft                      | Sir Richard Henry Havelock Charles is known for describing a treatment for scrotal lymphedema In 1901 | Procedure whereby the affected subcutaneous tissue is resected down to muscle fascia and the area covered with skin grafts taken from the resected specimen  | Secondary complications, recurrent edema, ulcerariton, discharge Cellulites.                                     |
| "Swiss Roll" Operation                     | Thomson procedure <sup>4</sup>  | Combination type using techniques of both the Charles and the Miller surgeries. The limb is first debulked. The a flap of skin was sewn into the muscle of the limb with anticipation that flap would act as a "wick" drawing the fluids into the deeper lymphatics. | The effectiveness of the surgeries in doubtful and the procedure has been somewhat discarded.                    |
| Skin flap and Subcutaneous Tissue Excision | The Homans- Miller procedure (1936)   | Miller elevates an anterior and posterior flap from both a medial and lateral incision, raising flaps approximately 1 cm thick. The underlying lymphematous tissue is excised down to muscle fascia. The skin flaps are trimmed and sutured into position            | Occasionally second or even third operations are required to obtain the maximum benefit; can cause flap necrosis |

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### B. Methods to increase lymphatic drainage:

|                              |  | <b>ADVANTAGE</b>  | <b>DISADVANTAGE</b>   |
|------------------------------|--|---|---|
| Inserting Lymphatic Pathways | Handly 1908 introduced silk threads, Martorel 1958 fascia lata strips  | Introduced across the lymphatic barrier with idea that their capillary action would enable the lymph drainage | Forein body dense fibrotic tissue exacerbates the edema, unlikely to form new lymphatics around FL grafts |
| Entero-Mesenteric Bridges    | Kinmoth, 1982 <sup>5</sup>   | Enteromesentric lymphatics may form bridging lymphatics   | Hernias, intestinal Obstruction   |
| Omental Transposition        | Dick first used in 1935  | One or two longitudinal lymph vessels draining parallel to vessels drain in inf. Gastric nodes                | Hernias, intestinal obstruction, gastric dysfunction  |
| Lymphatic-venous Shunts      | Nodovenous shunt Olszeski, nielubowicz 1966 <sup>6</sup> , lymphovenous shunt Lain, Hovard 1963              | Reduce the edema by draining in to veins  | Nodal fibrosis, anastomotic blockage. Always need exisional procedure                                     |
| Micro-Lymphatic Surgery      | Lymphatic microsurgical techniques have more recently been developed (Campisi et al. 44, 1994 <sup>7</sup> ) | Physiological, reduce Edema in ti Lymphatics  | Anastomotic blockage, secondary excisional procedure required   |

A combination of methods is likely to be more successful in the management of lymph edema of the lower extremity as there is an additive effect obtained; more important, the method adopted should not produce any secondary complications that are worse than the primary disorder. The efficacy of any method adopted can only be judged by analysis of various aspects postoperatively. These factors are given below

|            | <b>Points to be noted</b>  | <b>Evaluation</b>  | <b>Point of measurements</b>   |
|------------|--|--|--|
| Limb girth | Measurement with measuring tape is easy and simpler, compared to volumetric (Mathes II ed) | Should be taken early morning in bed fixed time. at each follow up | Transmaleolar line is 1 <sup>st</sup> point, in foot each 4 cm one point marked as A, B, C, D. in leg each 6cm marked 2, 3, 4, 5, 6. thigh the distance is 8cm apart |

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|                          |  |  |  |
|--------------------------|--|--|--|
| Early/imm. Complications | Intro operative bleeding, post op bleeding haematoma                               | Needs re-operation                       |  |
| Secondary Complications  | Late complications like infection, wound dehiscence, necrosis                      | Ulceration, requires Secondary procedure |  |
| Cellulitis               | During follow up<br>Period Number of attacks of fever, pain,                       | Occurs<3 months, or>3 months no attacks  |  |
| Reversal of Skin changes | Pigmentation, excrescences<br>Papillamatosi, intertrigenous maceration, ulceration | No change, reduced, absent               |  |
| Recurrence               | Of edema at ankle, foot, leg, thigh.   | Grade of edema                           |  |
| Compliance               | Patient wellbeing related to morbidity of swelling, surgery.                       | Poor, good, perfect                      |  |

Thigh and leg debulking



foot dorsal debulking



10 yrs follow up p.o. photographs

on post op stockings



Front view



back view

**Clinical photographs**

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## Girth Measurements (in cm):

|                      | Foot |    |    |    | Ankle | Leg |    |    |    |    |    |   | Thigh |   |   |   |   |   |  |
|----------------------|------|----|----|----|-------|-----|----|----|----|----|----|---|-------|---|---|---|---|---|--|
|                      | D    | C  | B  | A  | 1     | 2   | 3  | 4  | 5  | 6  | 7  | 1 | 2     | 3 | 4 | 5 | 6 | 7 |  |
| <b>Rt Lower Limb</b> |      | 23 | 21 | 20 | 24    | 23  | 30 | 34 | 37 | 38 | 38 |   |       |   |   |   |   |   |  |
| <b>Lt Lower Limb</b> |      | 23 | 25 | 27 | 32    | 34  | 40 | 42 | 44 | 43 | 40 |   |       |   |   |   |   |   |  |



## Girth measurement (in cm):

|                      | Foot |    |    |    | Ankle | Leg |    |    |    |    |    |   | Thigh |   |   |   |   |   |  |
|----------------------|------|----|----|----|-------|-----|----|----|----|----|----|---|-------|---|---|---|---|---|--|
|                      | D    | C  | B  | A  | 1     | 2   | 3  | 4  | 5  | 6  | 7  | 1 | 2     | 3 | 4 | 5 | 6 | 7 |  |
| <b>Rt Lower Limb</b> | 21   | 21 | 22 | 26 | 27    | 29  | 30 | 32 | 35 | 34 | 34 |   |       |   |   |   |   |   |  |
| <b>Lt Lower Limb</b> | 22   | 24 | 25 | 30 | 30    | 32  | 40 | 43 | 43 | 43 | 42 |   |       |   |   |   |   |   |  |

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## Female 8yrs back operated Preoperative views:



## Girth measurement (in cm):

|               | Foot |    |    |    | Ankle | Leg |    |    |    |    |    |   | Thigh |   |   |   |   |   |  |
|---------------|------|----|----|----|-------|-----|----|----|----|----|----|---|-------|---|---|---|---|---|--|
|               | D    | C  | B  | A  | 1     | 2   | 3  | 4  | 5  | 6  | 7  | 1 | 2     | 3 | 4 | 5 | 6 | 7 |  |
| Rt Lower Limb |      | 20 | 21 | 23 | 24    | 24  | 27 | 32 | 35 | 39 | 39 |   |       |   |   |   |   |   |  |
| Lt Lower Limb |      | 22 | 27 | 29 | 29    | 41  | 52 | 58 | 53 | 53 | 48 |   |       |   |   |   |   |   |  |

## Male 4 yrs follow up pre and postop view:



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## Girth measurement (in cm):

|               | Foot |    |    |    | Ankle | Leg |    |    |    |    |    |   | Thigh |   |   |   |   |   |  |
|---------------|------|----|----|----|-------|-----|----|----|----|----|----|---|-------|---|---|---|---|---|--|
|               | D    | C  | B  | A  | 1     | 2   | 3  | 4  | 5  | 6  | 7  | 1 | 2     | 3 | 4 | 5 | 6 | 7 |  |
| Rt Lower Limb |      | 22 | 23 | 26 | 22    | 19  | 22 | 24 | 30 | 30 | 29 |   |       |   |   |   |   |   |  |
| Lt Lower Limb | 24   | 30 | 32 | 36 | 36    | 40  | 38 | 37 | 37 | 36 | 35 |   |       |   |   |   |   |   |  |

## RESULTS:

|                                 |    |
|---------------------------------|----|
| <b>Total Number of Patients</b> | 15 |
| Male                            | 5  |
| Female                          | 10 |
| <b>Location of Lymphedema</b>   |    |
| Leg and foot                    | 12 |
| Thigh, Leg and foot             | 3  |
| <b>Grade of Lymphedema</b>      |    |
| Grade III                       | 13 |
| Grade IV (+ulcer)               | 2  |

**PAST SURGICAL TREATMENT:** 1 of 15 patients had prior surgery (4 in number).

## COMPLICATIONS:

- IMMEDIATE (Post-operative bleeding) 0/15
- EARLY (Infection/Wound disruption) 0/15

**DISCUSSION:** The surgical treatment of all of the 15 patients was identical, after pre op preparation by using compression bandages to soften the edema along with a period of bed rest debulking of excess skin and subcutaneous tissue and primary closure was done.

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Though the excision was done after exsanguination and application of the tourniquet this was released prior to skin closure, this and the routine use of at least 2 suction drains ensured that no patient had to be re-explored for postoperative bleeding.

The intro operative application of Esmarch bandages helped in expelling fluid from the tissues and this ensured that closure was obtained with no tension at the margins.

Patients were kept for at least 5 days post op before discharge; the routine use of compression crepe bandages postop along with bed rest ensured that we did not have a single case of skin necrosis or wound disruption in the postop period.

All patients were given advice regarding penicillin prophylaxis and asked to come for fitting of custom made compression garments. They were kept on review every 3 months for 1 year, every 6 months for another 1 year and then a yearly review.

**CONCLUSION:** There is yet no fool-proof surgical method that not only reduces the lymph edema consequent to filarial infection but also normalizes the lymphatic physiology thus curing the patient of this disorder; this is probably because the pathologic effects of the adult filarial worms are not localized to one particular site or level: in addition though the primary effect of the adult worms may have been nullified, the limb enters a vicious cycle of edema, fibrosis and edema. Hence the inimical effects of fibrosis take on as important role in disease progression as the lack of normal lymphatic pathways. This is where there may be a role of pharmacologic agents and mesotherapy.

For a disease whose effects are felt lifelong, any surgical procedure has to be simple, reproducible and with minimal secondary problems; all these ensure perfect patient compliance and better results.

This study shows that judicious surgical excision of skin and subcutaneous tissue, preceded and followed by conservative decongestive therapy gives predictable post-operative results with minimal or no complications.

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