

# ***SURGICAL THERAPY IN LOWER INCOME COUNTRIES***

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# DISCLOSURE

**MEMBERS OF ASIAN  
DIABETIC FOOT  
NETWORK HAVE  
CONTRIBUTED TO THIS  
PRESENTATION**



**EMERGING FACE OF DIABETES IN LOWER INCOME COUNTRIES**

**LOWER INCOME  
COUNTRIES: Epicenter  
of “Diabetes Quake”:**

# Diabetic Foot Burden In SEA

- 82 million adults :20-89yrs(2017)
- Prevalence:8.5%
- undiagnosed:45.8%
- Urban areas:48.8%

**74 Million Diabetes Patients**  
**WE NEED TO**  
**LOOK AFTER**  
**148 MILLION**  
**FEET**



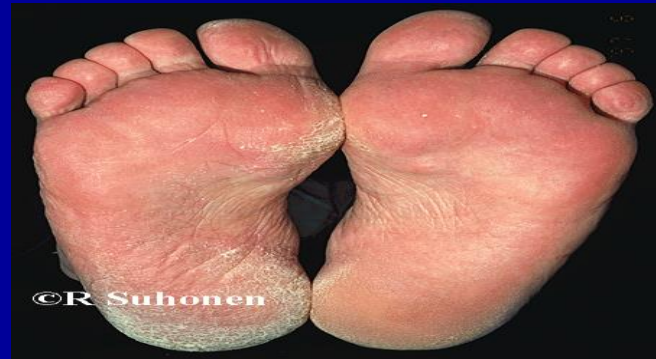
**200000 leg amputations every  
year due to diabetes**

**85% Higher Level amputations are for  
infected neuropathic ulcers These are  
totally preventable**

# **CHALLENGES IN SURGICAL THERAPY IN LOWER INCOME COUNTRIES**

# **TYPES OF INJURIES & INFECTIONS**





# FUNGAL INFECTION IN DIABETIC FOOT

# FUNGAL INFECTION



# THERMAL INJURY



# DIABETIC FOOT INJURIES



**HERBAL MEDICINE**



**MASSAGE INJURY**



**SHOE BITE**

# RAT BITE



# MASSAGE INJURY



# IMPACT OF SOCIAL MEDIA ON DIABETIC FOOT CARE

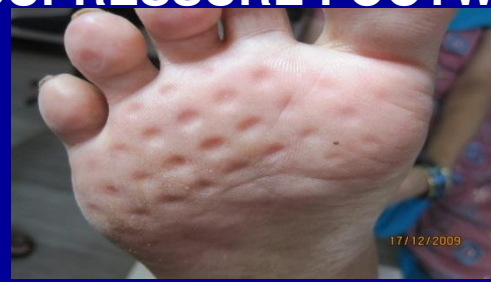
WHATSAPP HERBAL TREATMENT



STEAM BATH FOR MUSCLE FATIGUE



ACCUPRESSURE FOOTWEAR



FORMAL EDUCATION HAS NO RELEVENCE TO DIABETIC FOOT AWARENESS

# Mobile phones carriers of deadly 'superbug': Study

Malathy Iyer , TNN 8 April 2009, 03:37am IST

Doctors from a Navi Mumbai hospital recently completed a study that revealed a virtual colony of microbes living on mobile phones. MGM Hospital's Dr Chitra Pai and Dr Nikhil Tandel, in fact, **found the deadly superbug MRSA on some of the 120 mobile phones belonging to healthcare professionals that they tested.**

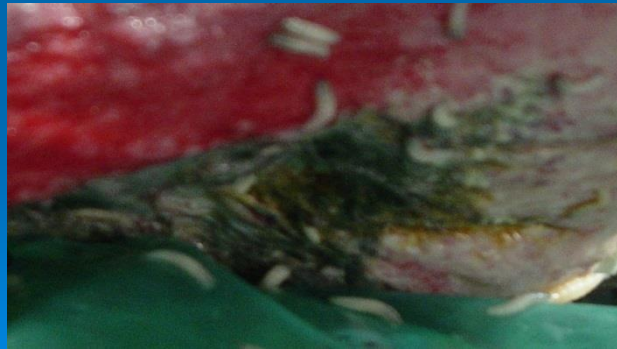
# Social Factors

- Lack of awareness in patients & doctors
- Population in rural area –  
Law of inverse care applies
  1. quality and poverty,
  2. distance from the first competent care level,  
time to reach it in time



# SOCIAL CHALLENGES IN OFFLOADING AND FOOT CARE





**INADEQUATE SOCIAL SUPPORT**

# DELAYED REFERRAL LEADING TO LOSS OF LIMB



# ECONOMIC FACTORS

## ▪ Cost

- **The Impact of DF on People's Life is Devastating.**
- **DM spends 10% of his/her yearly income.**
- **DFU spends 30% of his/her yearly income.**
- **DFI spends > 50% of his/her yearly income.**

**The cost to heal a complex diabetic foot ulcer is between 3 months and 6 years' salary depending on nationality**

**Cavanagh et al Diab care 2011**

**Only 15% population in India has  
some form of health insurance**

**DIABETIC PATIENTS IN LOWER INCOME COUNTRIES ARE OF YOUNGER AGE GROUP AND HAVE PREDOMINANTLY NEUROPATHY AND LESS VASCULOPATHY. EARLY REFERRAL TO SPECIALIZED CENTERS CAN REDUCE MORBIDITY AND MORTALITY**



**Higher level amputation is cheaper than amputation prevention by foot salvage surgery in lower income countries**

# **LOCAL/REGIONAL ANASTHESIA FOR DIABETIC FOOT SURGERY**

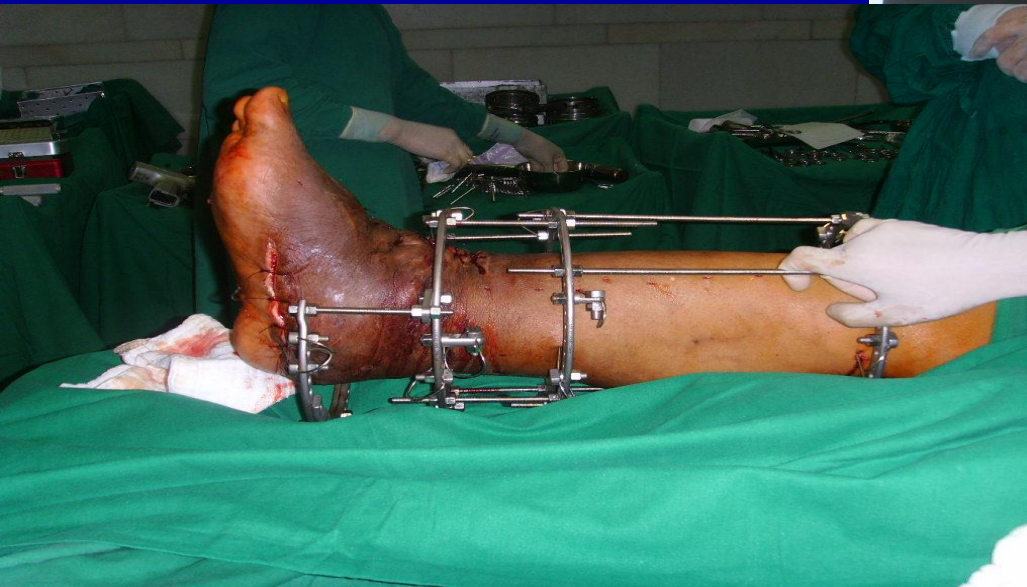
# ADVANTAGES OF LOCAL /REGIONAL ANAESTHESIA

- CAN BE USED IN SERIOUSLY ILL PTS
- DOES NOT NEED CHANGE IN DIET SCHEDULE
- EARLY CONTROL OF SEPTICEMIA
- CAN BE USED REPEATEDLY
- NO POST OP NAUSEA/VOMITING
- NO NEED OF POST OP STARVING
- ***USEFUL FOR LOWER INCOME COUNTRIES***

# **SURGICAL MANAGEMENT OF CHARCOT FOOT**

# Realities....

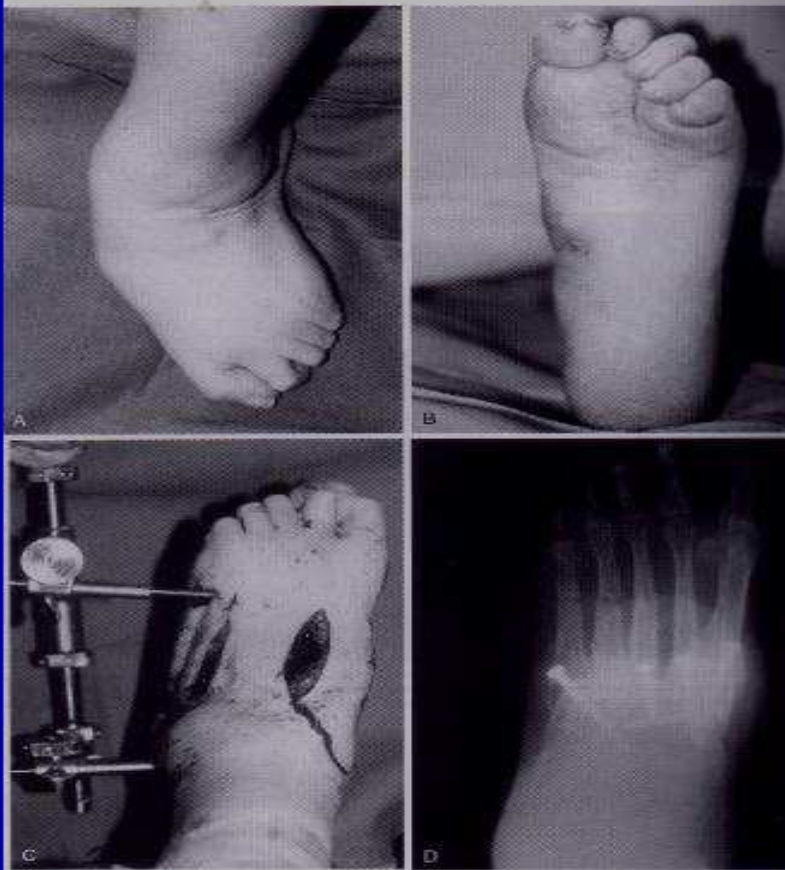
- Charcot Foot commonly under diagnosed
- Contact Casting is uncommon
- Usually treated as cellulites
- Surgical treatment is uncommon
- Higher level amputation





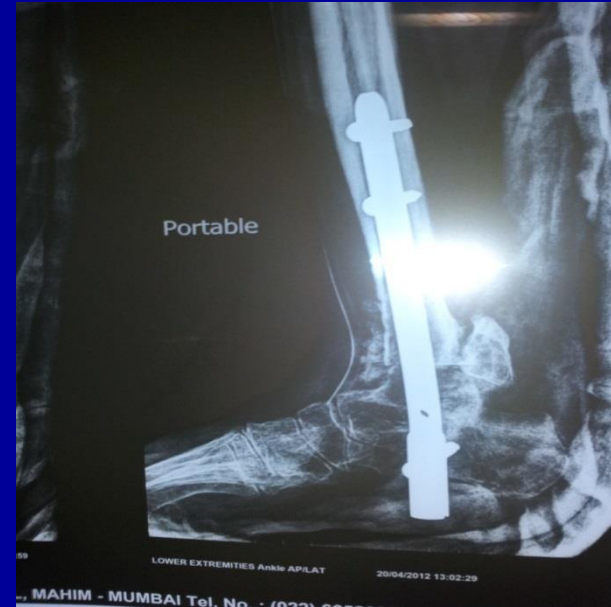
# SURGICAL CORRECTION OF CHARCOT FOOT

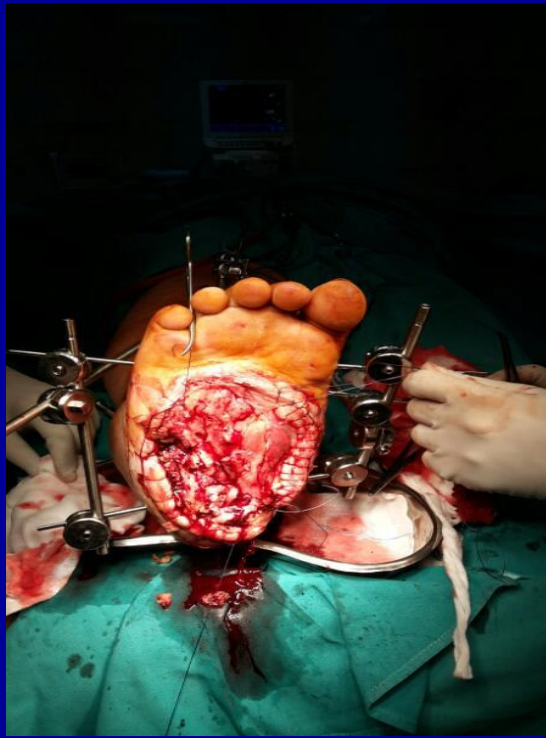
# SURGICAL TREATMENT OF CHARCOT'S FOOT





# CHARCOT FOOT FIXATION





## Charcot Foot Surgery

# **SURGICAL OFFLOADING**

# PRE OPERATIVE



# INTRA OPERATIVE





# Charcot Foot Reconstruction Medial Column Stabilization



# COLLAPSED CUBOID EXCISION

## Transposition of Tibialis Anterior to the Cuboid after Tarsometatarsal Amputation

<sup>1</sup>Pradeep Moonot, <sup>2</sup>Arun Bal, <sup>3</sup>Ammar Qureshi

### ABSTRACT

Forefoot and midfoot amputees are prone to develop nonhealing ulcers at the closure site. This mainly occurs due to the limited dorsiflexion ability of the ankle and associated loss of protective function as seen in diabetics. One of the proposed methods to prevent these postamputation ulcers includes tendoachilles lengthening during the procedure. We describe three cases with nonhealing ulcers on the lateral aspect after a midfoot amputation. All of the cases underwent a tibialis anterior transposition to the lateral aspect of the foot to correct the deformity and at the same time also achieved healing of the ulcers.

**Keywords:** Amputation, Diabetic foot, Midfoot, Tendon transfer, Tibialis anterior, Transmetatarsal.

not only addressed the problem of the supination deformity but also helped in promoting the ulcer healing.

### MATERIALS AND METHODS

We studied three patients diagnosed with diabetic foot where all of them had undergone a transmetatarsal amputation. Postoperatively, at an average of 1 year after the procedure, these patients presented with a nonhealing ulcer at the site of wound closure. Local examination revealed a supple foot with good range of dorsiflexion at the ankle and a correctable supination deformity of the foot.

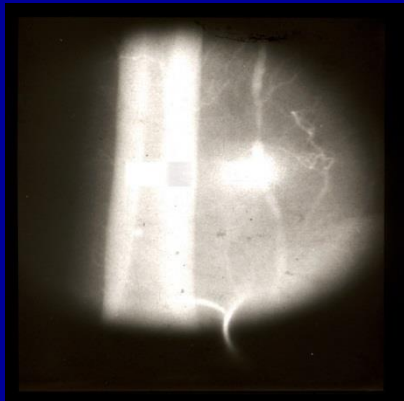
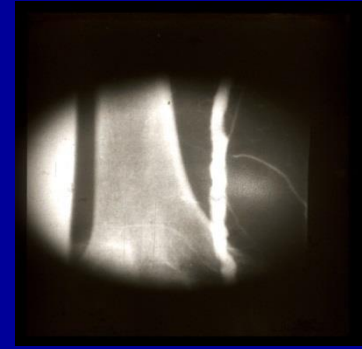


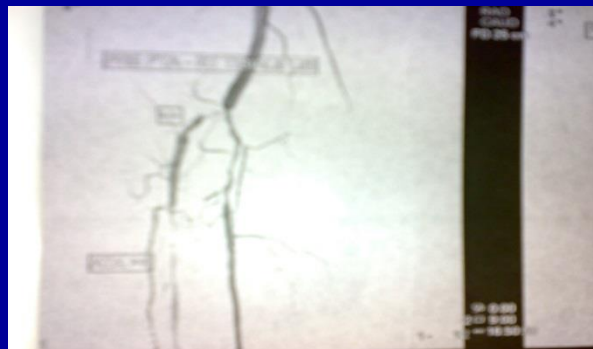
Figs 1A to F: Nonhealing ulcer on the lateral and plantar aspect of the stump

**PERIPHERAL VASCULAR DISEASE  
&  
DIABETIC FOOT SURGERY**



# PERIPHERAL ANGIOPLASTY IN DIABETIC FOOT ULCERS





**EFFICACY OF PERIPHERAL  
REVASCULARIZATION WITH CO2  
INSUFFLATION IN DIABETIC PATIENTS WITH  
CHRONIC KIDNEY DISEASE**

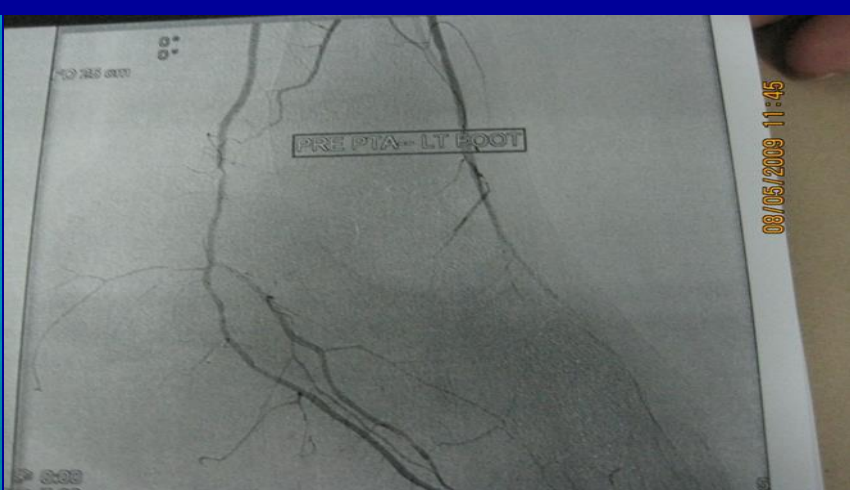
**DURATION OF STUDY: JULY 2016 –JULY 2018**

**TOTAL NO OF PATIENTS: 341**

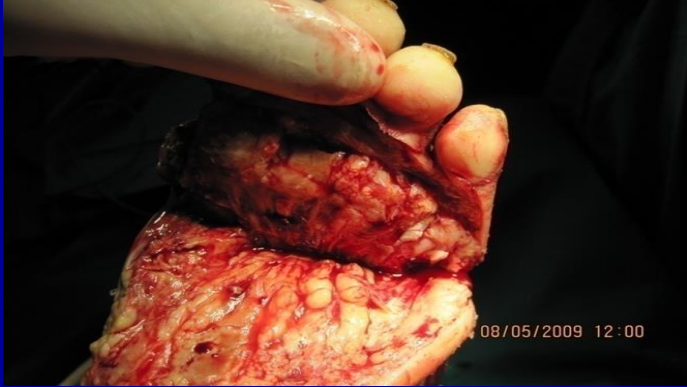
**AVERAGE SERUM CREATININE: 2.9MGMS**

**HIGHER LEVEL AMPUTATIONS: 11 PATIENTS**

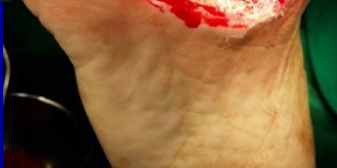
**TEMPORARY DIALYSIS REQUIRED :9 PATIENTS**



**FOOT INFECTION WITH PVD AND NEPHROPATHY**



# POST OPERATIVE WOUND CARE



**EXUDATING WOUNDS  
IN DIABETES**

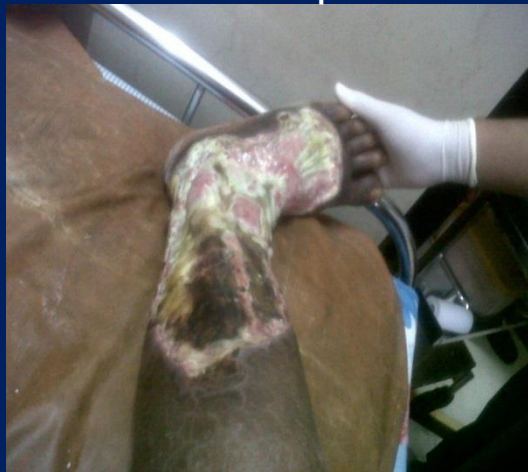


**TO PRESERVE FUNCTIONAL  
LIMB AND REDUCE  
MORBIDITY MORE THAN  
HEALING EARLY CLOSURE  
OF WOUNDS IS REQUIRED**

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Use of antibiotic loaded  
Biodegradable Calcium  
sulphate beads in infected  
Diabetic Foot Ulcers

Pre Op



Post Debridement & Pellet Application



After 72 Hours



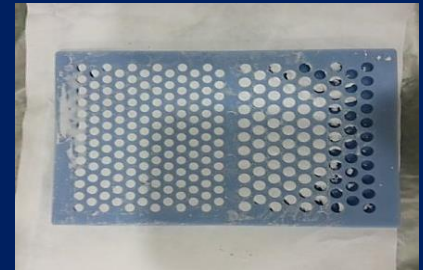
After 2 weeks



# Bio-composite Beads – Targeted drug delivery system



# Bio-composite Beads – Targeted drug delivery system



# Bio-composite Beads – Targeted drug delivery system



## Delayed primary closure (30)







## Regular dressing (51)



**GOAL OF SURGICAL  
THERAPY IS FUNCTIONAL  
LIMB SALVAGE & TO  
REDUCE MORBIDITY**

# Long Term Survival and Physical activity following Major Lower Limb amputation in Diabetic patients.

Dr. Priyatham Kamath

Dr. Arun Bal

Dr. Harish kumar

Total number of surgeries done during this period was 7,546 out of which 1029 patients under went major lower limb amputation .

Of which we followed up 300 patients, rest were lost to follow up due to various reasons

## **Mortality rate at the end of 5 years was 57.6%.**

Majority of patients were in the 5th and 6th decade of life , which showed to be statistically significant(p value 0.003) .

M.C cause of death was CAD(40%),followed by Sepsis(27.5%) ,CKD (16.9%) and CVA (6.2%). 18 % did not specify any particular cause.

The thirty day mortality was 10 % and M.C cause of death in them was sepsis.

Both CAD (141 patients)and CKD (108 patients) were independent predictors of decreased survival with p value of 0.005 and 0.001 respectively.

***In our study the 5 year survival rate was 42.4 % which was higher compared to a study done by (30.9%) Aulivola B et .al. and (26%) Robbins et.al.***

**EDUCATION & CADRE CREATION FOR  
DIABETIC FOOT SURGERY IN  
LOWER INCOME COUNTRIES**

**Diabetic Foot Surgery is not recognized as sub specialty in most of the lower income countries**

**Graduate & Post Graduate medical education has very minimal input about diabetic foot surgery**

**LIMITED OPPURTUNITIES FOR  
SPECIALIZED TRAINING IN DIABETIC FOOT  
SURGERY**

**SHORTAGE OF TRAINED AND QUALIFIED  
PARAMEDICS OR WOUND CARE NURSES**



**IF TRAINER AND TRAINEE  
ARE WILLING NOTHING IS  
IMPOSSIBLE-** Peter Drucker

# HOME WOUND CARE



**Cost of Hospital based Dressing:  
Rs.1750(US\$ 35)**

Average monthly income US\$ 100

- **WARD ASSISTANTS TRAINED TO DO HOME WOUND CARE**
- **TRAINED IN BASIC WOUND CARE**
- **NO FORMAL EDUCATION**
- **SERVICE TO REDUCE HOSPITALIZATION AND COST**

# DIABETIC FOOT ASSISTANTS



**\*12<sup>TH</sup> STANDARD PASSED IN MALYALAM MEDIUM,**

**\*TRAINED FOR 18 MONTHS IN ALL ASPECTS OF DIABETIC FOOT MANAGEMENT,**

**\*THEY CAN HANDLE, MAINTAIN AND CORRECTLY USE EQUIPMENT LIKE TcPO<sub>2</sub>, PEDOGRAPH, VAC MACHINE, SENSITOMETER**

**\*TRAINED TO ASSIST IN FOOT SURGERIES**

**\* TRAINED TO DO ALL TYPES OF COMPLEX WOUND DRESSINGS**

**\*MAINTAIN ELECTRONIC MEDICAL RECORDS**

# EFFICACY OF POLYURETHANE FOAM DRESSINGS IN DEBRIDED DIABETIC LOWER LIMB WOUNDS.

Results of a prospective study of 48 type-2 diabetic patients with operated lower limb wounds. **Wounds 2006; 18(10): 300-306.**

Dr.Ajit Kumar Varma, Sandhya M.N, Dr. Rajesh, Dr.A. Bal, Dr.H. Kumar.  
*Department of Endocrinology, Diabetes and Podiatric Surgery,  
Amrita Institute Of Medical Sciences And Research Center,  
Kochi, Kerala, India.*

**Results:** A total of 48 patients were studied, 24 in each group. The mean duration for wound healing in the foam group was ***22.5 ± 15.4 days while that in the control group was 52.0 ± 22.7 days (P < 0.0001).*** Conclusion: It was determined that there was a significant reduction in the time taken for wounds to heal when sterile, non-medicated polyurethane foam dressings were used as compared to conventional dressings.

# Home Dressings Packs



Price :

**Small Pack: Rs.35(US\$0.8)**

**Large Pack: Rs.65(US\$1.2)**

Contents: Sterile Gauze,  
Gamgee Pads, Sterile  
Bandage, Gloves, Foam  
Pad, Sterile Polythene  
Drape, sterile Saline

Total Cost of Dressing:

**Material Rs.65 +Dressers**

**Fees: Rs.100(US\$2.2)**

Total :**Rs.165(US\$ 3.4) per  
day**

# Surgical Outcome of Necrotizing Fasciitis in Diabetic Lower Limbs

**Authors:** Dr. Amit Kumar C. Jain<sup>1</sup>, Dr. Ajit Kumar Varma<sup>2</sup>, Dr. Mangalanandan<sup>3</sup>, Dr. Harish Kumar<sup>4</sup>, Dr. Arun Bal<sup>5</sup>

The Journal of Diabetic Foot Complications, Volume 1, Issue 4, No. 1, © All rights reserved.

Necrotizing fasciitis is a life and limb threatening soft tissue infection. It is one of the most aggressive forms of soft tissue infection. As the incidence of diabetes mellitus is increasing world wide, this rare infection is now on the rise in developing countries. Necrotizing fasciitis has a very high mortality rate. We reviewed retrospectively 44 diabetic patients who were operated for necrotizing fasciitis of the lower limb over a period of 1 year. Around 26.4% of our patients with necrotizing fasciitis underwent major amputations. The mortality due to necrotizing fasciitis in diabetic lower limbs at our institute was 6.81%. This is on the lower side as compared to that reported in the literature. This series of necrotizing fasciitis in diabetic lower limbs over 1 year period is among the largest series reported.

# Necrotizing Fasciitis treated with Aggressive Debridement

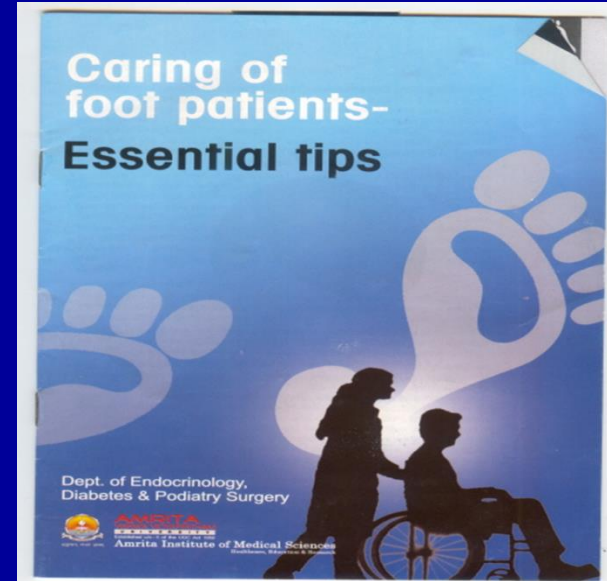
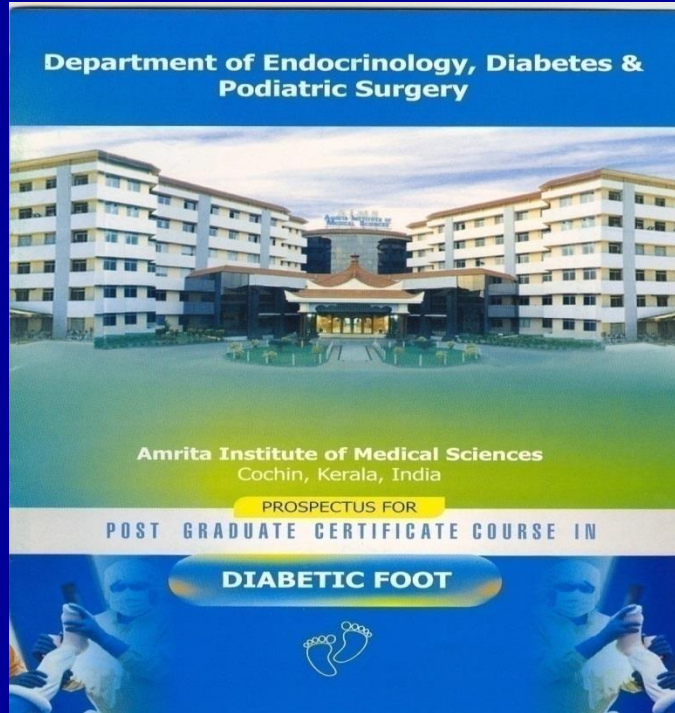
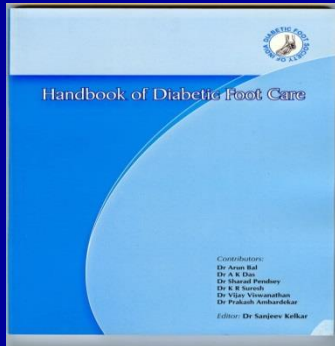
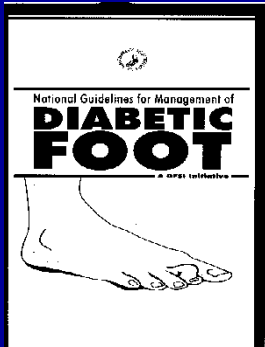


# HOW TO SALVAGE BIOMECHANICALLY VIABLE & FUNCTIONAL LIMB IN DIABETES

- PREFERABLY PRESERVE PROXIMAL PHALANX OF 1<sup>ST</sup> TOE TO PROTECT FHL TENDON
- THE LEVEL OF AMPUTATION SHOULD BE DISTAL TO FHB INSERTION
- SUTURE INSERTION OF PLANTAR FASCIA AND INTRINSIC MUSCLES TO METATARSAL HEAD WHEN TOE IS DISARTICULATED
- *IF 2<sup>ND</sup> TOE IS NOT VIABLE, PREFERABLY RAY AMPUTATION SHOULD BE DONE*
- IN 5<sup>TH</sup> TOE AMPUTATION TRIM THE LATERAL CONDYLES OF METATARSAL HEAD TO PREVENT POST OP ULCERATION
- *IF MORE THAN ONE OF LESSER RAYS ARE INVOLVED, THEN OBLIQUE EXCISION OF MT SHAFTS FROM 2<sup>ND</sup> TO 5<sup>TH</sup> MT IS BETTER AS IT PRESERVES 1<sup>ST</sup> TOE*
- TRANSMETATARSAL AMPUTATION SHOULD BE CONSIDERED WHEN 1<sup>ST</sup> MT IS DAMAGED
- *PERCUTANEOUS T.A. LENGTHENING SHOULD BE DONE*
- *MORE THAN SINGLE RAY IS NOT REMOVED*
- IN 5<sup>TH</sup> RAY PRESERVE THE BASE TO PROTECT PERONEAL TENDON ATTACHEMENT



# DIABETIC FOOT TRAINING



# CHENNAI DECLARATION

## Formation of Asian Diabetic Foot Network 2017

CHENNAI DECLARATION 2017, 8<sup>th</sup> December

We, the representatives from India, Sri Lanka, Philippines, Indonesia, Malaysia and Myanmar having deep interest in protection and prevention of amputation of Diabetic Foot as a mission came together on 8th December 2017 during the 15th Annual Conference of DFSI in Chennai. It is more an open forum, a loose network, voluntarily coming together. We expect more countries to join this network from these regions.

In this meeting discussions were held on the following issues:

What can each country contribute in terms of faculty to go to other countries for teaching, conducting workshops, contributing to ideas and develop and operationalize useful models to prevent diabetic foot related complications, sharing information on procurement of equipment and other items from across the region, helping each other in Government Liaison to bring more diabetes related services under insurance or third party payment system, develop and operationalize cost effective and time efficient ideas for DF outreach for patients and to a lesser extent doctors and paramedics.

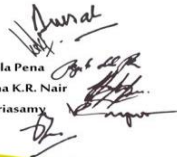
We also discussed about the needs of each country, constraints, barriers and difficulties in dealing with diabetic foot menace, about the institutional / medical college / university affiliations and ground conditions for furthering research and the feasibility of plan and start multi-institutional, multi-nation research from these regions about diabetic foot.

We explored the possibilities of research collaboration and approach the agencies like World NCD federation, NIH, IDF, and many others for research funding collectively.

We propose to hold a midyear conference in 2018 in India with a larger participation from many more countries from both South East Asia and Middle East to enlarge this forum, discuss and take the agenda further.

Signed by –

1. Prof. Arun Bal
2. Prof. Ko Ko
3. Dr. Pepito E. Dela Pena
4. Prof. Harikrishna K.R. Nair
5. Dr. Kayathri Periasamy
6. Dr. Em Yunir

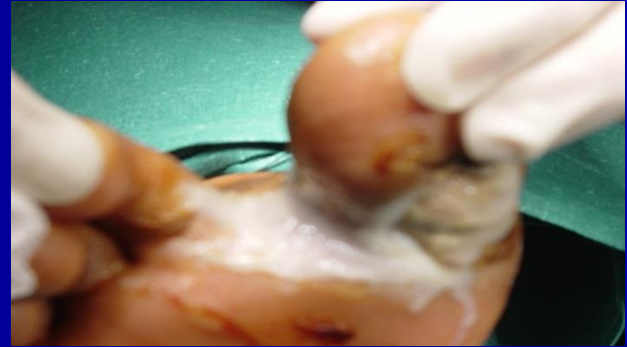
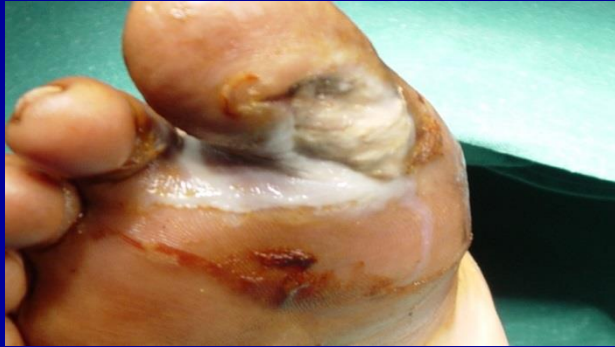


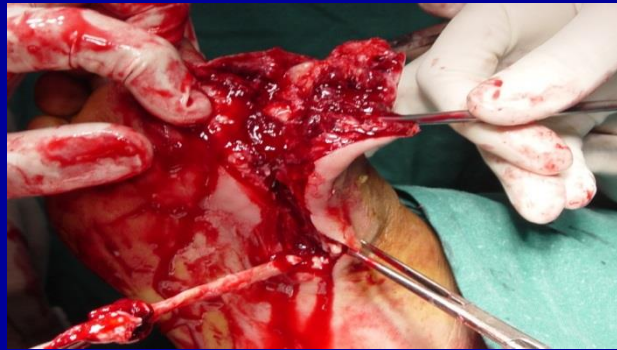
# **SURGICAL THERAPY FOR INFECTED DIABETIC FOOT**



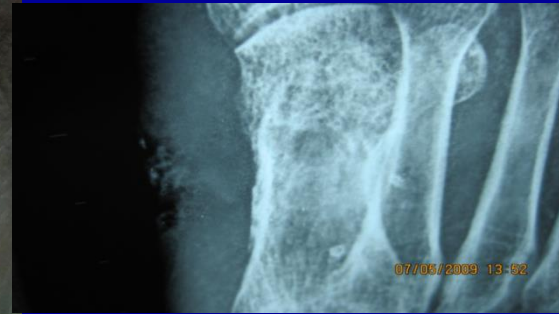
**FOREFOOT AMPUTATION  
WITH SKIN LOSS AND SKIN  
GRAFTING**

# MEDIAL PLANTAR SPECE ABCESS WITH FHL TENOSYNOVITIS





# ULCER WITH OSTEOMYELITIS



# COMBINATION OF DIABETES AND LEPROSY IS A MAJOR CHALLENGE IN SURGICAL THERAPY IN MANY LOWER INCOME COUNTRIES







**NON VIABLE TOE  
INFECTED TOE ULCER**



**MEDIAL PLANTAR SPACE ABCESS**



**CALCANEAL OSTEOMYELITIS**



**EXAMPLES OF LACK OF FOOT CARE**



**CHARCOT FOOT POST RENAL TRANSPLANT**



# INFECTED TROPHIC ULCER DEBRIDEMENT



# NECROTIZING FASICITIS FOOT AND LEG

DIABETIC FOOT IS  
*CINDERELLA*  
OF MEDICINE

# What needs to be done to improve surgical therapy in lower income countries?

- Optimal pyramidal referral system
- Easy access for patients
- Improved training in diabetic foot surgery
- Team approach
- Concept of “Time is Tissue”
- Strengthening of paramedical support
- Concept of functional limb salvage
- Use of cost effective technologies to reduce the cost treatment

**SUCCESS IS A  
JOURNEY FROM  
FAILURE TO FAILURE  
WITHOUT LOSING  
HOPE**-WINSTON CHURCHILL

A sunset scene with a large tree silhouette and the text "THANK YOU" in green. The sun is a bright orange circle on the left, and the sky is a gradient of orange and red. The tree is a large, spreading silhouette in the center. The text "THANK YOU" is in a bold, green, sans-serif font, positioned in the lower half of the image. The text has a white, brush-stroke-like shadow behind it.

**THANK YOU**