JIVAS
Jain Institute of Vascular Sciences

JIVAS NEWS

Quarterly Newsletter and Vascular Update
Jain Institute of Vascular Sciences
Bhagwan Mahaveer Jain Hospital

BMJH
Caring with Compassion

Volume : 26 | Issue : 3 | September 2026

Dr. Kalkunte R Suresh
MBBS, DABS, FACS
Director - Consultant Vascular Surgeon

Dr. Vivekanand
MBBS, DABS, FVES
HOD & Consultant Vascular Surgeon

Dr. Indushekar .S
MD DMRD
Consultant Interventional Radiologist

Dr. Vishnu. M
MBBS MS, FNB (Vas. Surg.)
Consultant Vascular Surgeon

Dr. Sumanth Raj
MBBS, MS, FIVS
Consultant Vascular Surgeon

Dr. Girija K R
MBBS, MHSc (Diab), F.Diab (RGUHS)
Consultant Vascular Diabetologist

Dr. Rahul R. Sima
MBBS, DNB, DrNB (Vasc Surg)
Consultant Vascular Surgeon

Dr. Mamata S H
MBBS, MS, FVES
Visiting Consultant Vascular Surgeon

Dr. Manjunath Kumar K
MBBS, MS, MRCS, AFRCS (UK)
Foot & Ankle Surgeon

Dr. Chethana Kulkarni
BNYS
Vascular Counselor

Diabetic Foot & Wound Care Center (HEJJE)

Dr. Vinaya A S
MA, Ph.D. Fellow Podiatry (UK)
HOD HEJJE & Chief Podiatrist

Ms. Usha .P
Co-ordinator HEJJE & Clinical Podiatrist

Administration

Mr. Ashok Kumar G C
BSc., MBA
Chief Administrative Officer/PR

Ms. Deepa Ramesh
ADBA
Senior Administrative Manager

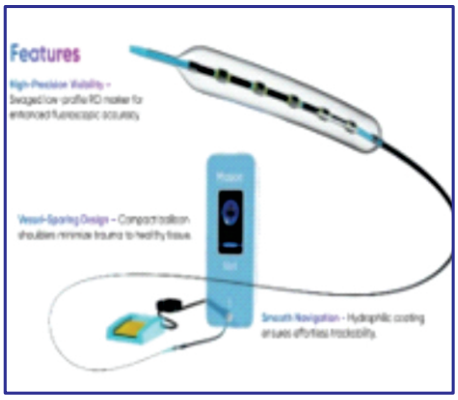
Mr. Sunil. L
BBA-Vascular
Executive - Public Relation / Data Management

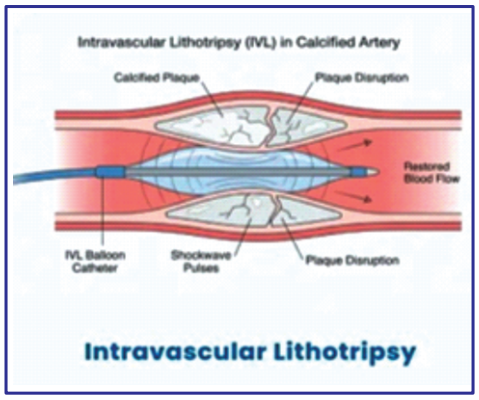
Appointment & Enquiry 24/7
080-22207188, 22260944 or
41100550 Extn.: 535/1700

WEBSITE :
jainvascular.in

Intravascular Lithotripsy in Peripheral Arterial Disease

Chronic limb-threatening ischemia (CLTI) is the most severe manifestation of peripheral arterial disease. Various revascularization techniques are employed to treat peripheral arterial disease. Intravascular lithotripsy (IVL) is a minimally invasive balloon-based treatment used for severe Peripheral Artery Disease (PAD) involving heavily calcified (hardened) blood vessels.





Illustrative images of the IVL system and the intravascular lithotripsy mechanism.

In IVL a low-pressure balloon carries emitters that release acoustic pressure waves. These waves are delivered at about 4 atm, pass through soft tissue largely unaffected, and fracture both superficial and deep calcium, which makes the vessel wall more compliant. This is the key difference from high-pressure angioplasty, which disrupts and stretches the arterial wall and, in complex lesions, often causes severe dissection that needs a bailout stent.

It also differs from atherectomy: IVL removes no plaque, so it carries a lower risk of embolisation and perforation. That makes it attractive where a permanent implant or distal embolus would be costly, such as the common femoral artery, the popliteal artery, or a limb that depends on a single runoff vessel.

Step-by-Step IVL Procedure for PAD

- Preparation & Anesthesia: The procedure is typically performed in a catheterization laboratory (cath lab) under local anesthesia and mild sedation.
- Access Site Puncture: We make a small puncture—usually in the groin, wrist, or leg—and inserts a short hollow tube called a sheath into the artery.
- Catheter Navigation: Guided by X-ray imaging (fluoroscopy) and contrast dye, a thin guidewire and a specialized IVL catheter with an integrated balloon are guided to the site of the calcified blockage.

For Circulation Among Medical Professionals only

- **Balloon Inflation (Low Pressure)** : Once positioned across the calcified lesion, the integrated balloon is lightly inflated to a low pressure (typically 4 atmospheres) using a mix of saline and contrast fluid. This makes contact with the vessel wall while avoiding trauma.
- **Sonic Wave Activation:** The generator sends energy to tiny emitters inside the balloon. This vaporizes the fluid momentarily to create localized sonic pressure.
- **Calcium Fracture** : The shockwaves pass safely through soft vascular tissue and shatter both superficial and deep calcium cracks within the plaque.
- **Cycles & Repositioning** : We deliver short pulses (usually 10 pulses at a time), deflating the balloon briefly to restore blood flow, and repeating the process along long calcified segments if necessary.
- **Final Expansion & Treatment** : After the calcium is broken up, the vessel becomes more compliant. We may expand the balloon further or proceed with plain balloon angioplasty, drug-coated balloons, or stent placement (though IVL often allows for stent avoidance).
- **Completion** : The catheter and sheath are removed, and pressure or a closure device is applied to the puncture site.

Potential benefits of IVL:

- Minimally invasive nature, reduced risk of downstream embolization, and the ability to treat complex calcified lesions that are challenging to manage with conventional techniques.
- **Stent Avoidance** : IVL often repairs the vessel well enough that doctors can "leave nothing behind" (avoiding permanent metal stents, which have high blockage rates in arteries like the superficial femoral or popliteal arteries).
- **Better Prep for Balloons/Stents** : It acts as a superior vessel-preparation tool before using drug-coated balloons (DCBs) or standard angioplasty.
- **High Safety** : It lowers the risk of vessel perforations, severe tears (dissections), or flying debris compared to traditional carving/cutting tools (atherectomy).

Reporting two cases of Puerperal Arterial Diseases who have undergone IVL at JIVAS

Case 1: 59 year old female presented with a 3-week history of an ischemic patch over the right heel, associated with pain and swelling. She has been diabetic for 15 years, recently diagnosed with hypertension.

On Examination: right heel gangrenous patch and absent pulses from popliteal artery below.

CT angiogram done showed proximal popliteal artery diffuse wall calcification - 30-40%. Mid and distal popliteal artery shows thrombotic occlusion associated with wall calcifications. Proximal tibio-peroneal - 60-70%. Distal tibio-peroneal trunk shows wall calcifications - 10-20% stenosis. Osteo-proximal anterior tibial artery 30-40%. Rest of the anterior tibial artery shows wall calcifications with focal areas of 10-20% stenosis distally as seen in Fig 2

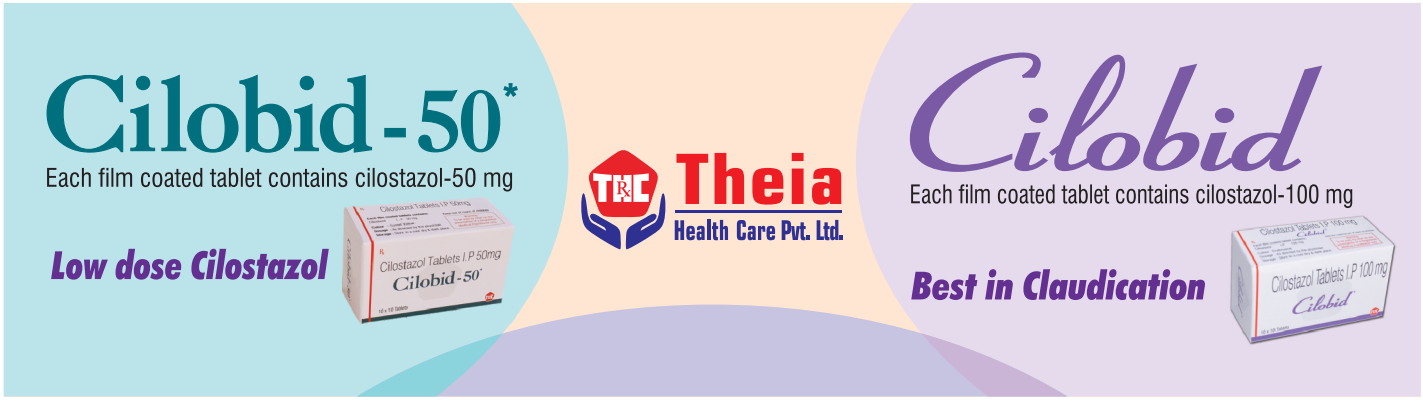
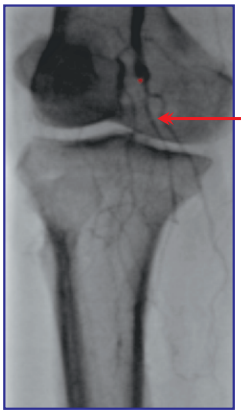
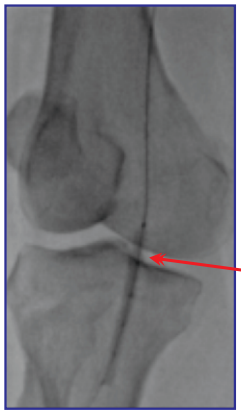



Fig 2


Fig 3


Fig 4

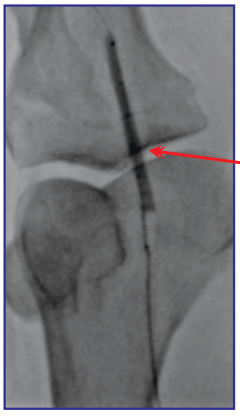
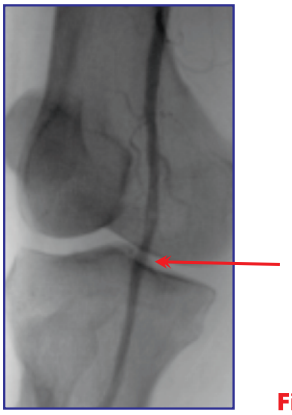

Fig 5

Figure 3. DSA—occlusion of the popliteal artery. Figure 4 and 5. IVL catheter placement and dilatation in the popliteal artery.

Patient underwent Right Lower Limb Popliteal Artery Angioplasty with Intravascular Lithotripsy + Anterior Tibial Artery Angioplasty via Right Superficial Femoral Artery Antegrade Access + Anterior Tibial Artery Retrograde access. Post operatively patient stable, wound had good granulation tissue.


Fig 6

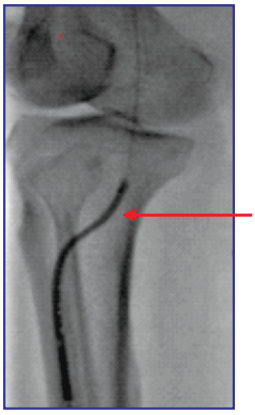

Fig 7


Fig 8A


Fig 8B

Figure 6. Post-IVL angiograms showing good flow in the popliteal artery. Figure 7. Proximal anterior tibial artery (ATA) angioplasty. Figure 8A and 8B. Pre- and post-IVL angiograms of the ATA.

Case 2: 73-year-old male presented with 3 week history of wounds over the left heel and leg, associated with pain. He had undergone left superficial femoral artery and popliteal artery angioplasty elsewhere 4 months back. He is known diabetic for 30 years and hypertensive for 10 years and known case of chronic kidney disease on medical management since 4 years.

On Examination: left heel dry gangrenous wound, with absent pulses from popliteal artery below.

MR angiogram (TOF) done showed Proximal common femoral artery short segmental moderate luminal narrowing for a length of 10.0mm. Proximal popliteal artery severe short segmental luminal narrowing for a length of 2.0cms. Rest of the popliteal artery is occluded. Osteo-proximal anterior tibial artery is reformed by collaterals. Tibio-peroneal trunk, peroneal, posterior tibial and medial plantar arteries are not visualized – Occluded.

Patient underwent Left lower limb digital subtraction angiography + Superficial Femoral Artery(SFA) /popliteal (PA) angioplasty/ stenting + Infrapopliteal angioplasty as seen in Fig10,11,12 and 13.

Intraoperatively (seen in Fig 14) in spite of plain old balloon angioplasty because of highly calcified vessels

adequate luminal gain was not achieved, patient had significant residual lesions, hence post angioplasty decision was taken to use Intravascular Lithotripsy.

He underwent left Lower Limb Superficial Femoral Artery(SFA)/Popliteal Artery(PA)angioplasty with Intravascular Lithotripsy + Proximal Anterior Tibial Artery (ATA)angioplasty via Contralateral Access.

Postoperatively: Patient stable, ATA pulse was palpable. Daily wound dressings were done, and the patient was discharged on POD 3.

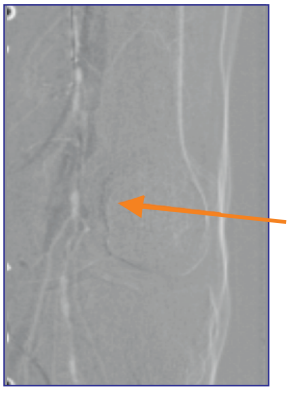


Fig 9

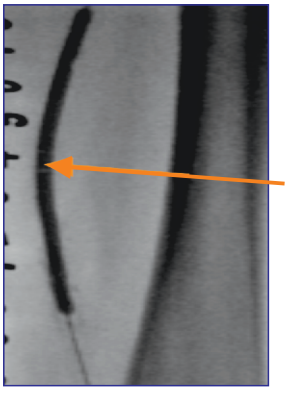


Fig 10

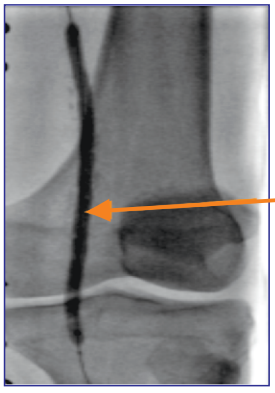


Fig 11

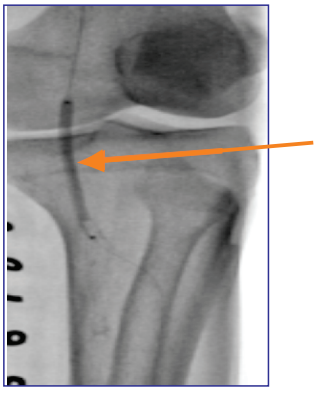


Fig 12

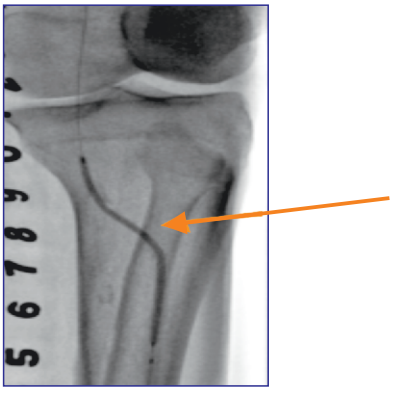


Fig 13

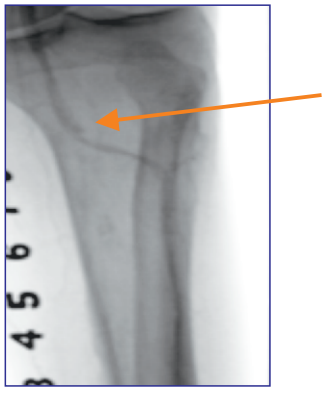


Fig 14

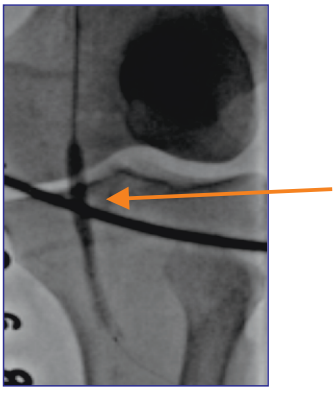


Fig 15

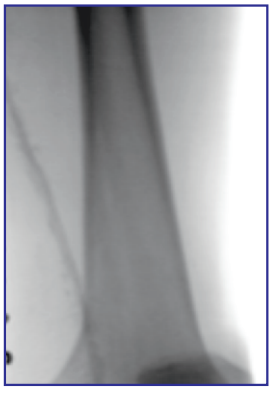


Fig 16

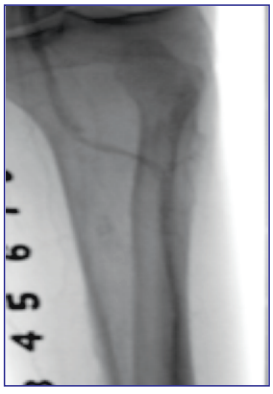


Fig 17

Fig 9. DSA showing complete occlusion of the popliteal artery. Figs 10, 11 and 12. Plain old balloon angioplasty (POBA) of the SFA/popliteal artery. Fig 13. Anterior tibial artery angioplasty. Fig 14. Post-angioplasty angiogram showing residual lesions in the popliteal artery. Fig 15. IVL catheter placement and dilatation. Fig 16A and 16B. Post-IVL angiograms showing good flow in the popliteal artery and the ATA.

Beyond the Stump: Rehabilitation After Lower-Limb Amputation

From surgical wound healing to restoration of mobility, independence and quality of life…

The amputation surgery may end in the operating theatre, but the patient's real journey begins afterwards:

- Will I walk again?
- Will I be able to work?
- Will I remain dependent on my family?
- Will I be able to climb stairs?
- Will I ever feel normal again?

These questions place rehabilitation at the center of modern amputation care. The success of an amputation should therefore not be measured simply by a healed wound. It should be measured by mobility, independence, participation and quality of life.

The global burden:

The epidemiology of lower-limb amputation varies substantially across countries. Differences in diabetes prevalence, peripheral arterial disease, trauma, healthcare access, limb-salvage strategies and definitions of major and minor amputation make direct international comparisons difficult.

Studies have reported major amputation ranged from 3.6 to 68.4 per 100,000 in the general population and 5.6 to 600 per 100,000 among people with diabetes.

The Indian patients:

Available Indian data is largely derived from hospitals, rehabilitation centers and regional studies.

- Historical Indian estimates cited in rehabilitation literature suggested approximately 500,000 people living with amputation, with around 23,500 additional amputations annually.
- The causes of amputation in India reflect a combination of diabetes, peripheral arterial disease, infection, delayed presentation and trauma.
- Interestingly, a North Indian rehabilitation-center study of 106 unilateral lower-limb amputees found trauma to be the leading cause, followed by diabetes mellitus, malignancy and peripheral vascular disease. The cohort was relatively young, with nearly half aged 20–39 years, illustrating that amputation in India cannot be considered exclusively a disease of the elderly. This has major implications for rehabilitation.
- For a 25-year-old traumatic amputee, the goal may be return to employment, sport and independent community mobility.
- For a 75-year-old patient with CLTI, diabetes, CKD and coronary disease, the goal may be safely transferring from bed to chair, walking to the bathroom and remaining independent at home.
- The definition of successful rehabilitation must therefore be patient-specific.

Mobility is not merely a rehabilitation outcome. It is a determinant of life after amputation. It is a bridge between rehabilitation and quality of life.

Rehabilitation begins before the operation

Whenever possible, rehabilitation should begin during the decision-making phase.

The multidisciplinary team should establish:

1. Preoperative mobility
2. Cardiopulmonary reserve
3. Cognitive status
4. Home environment
5. Occupation
6. Family support
7. Expected amputation level
8. Prosthetic potential
9. Patient-defined goals

The patient should understand that the procedure is not the end of treatment. A simple conversation can change expectations: "Our goal is not simply to remove the diseased limb. Our goal is to help you regain the highest possible level of independence afterwards."

Phase I: The immediate postoperative period

The first rehabilitation priorities are deceptively simple.

I. Pain control

Differentiate: Acute postoperative pain, Residual-limb pain, Neuropathic pain, phantom limb pain

II. Positioning

Contracture prevention begins immediately. For a below knee amputation, prolonged knee flexion should be avoided.

For an above knee amputation, attention should be paid to preventing persistent hip flexion, abduction and external rotation.

III. Early mobility

Bed mobility '! sitting '! transfers '! standing '! wheelchair mobility

Residual-limb care

Patients should be taught:

1. Skin inspection
2. Edema control
3. Compression/shaping when appropriate
4. Desensitization
5. Wound care

Phase II: Pre-prosthetic rehabilitation

This is often the most underestimated phase. Before asking the patient to walk, we need to prepare the body for walking.

Range of motion

Prevent:

1. Hip flexion contracture
2. Hip abduction contracture
3. Knee flexion contracture

Strength

Progressively strengthen:

1. Hip musculature
2. Core
3. Residual limb
4. Intact lower limb
5. Upper limbs

Balance

Progress through:

Sitting '! standing '! weight shifting '! stepping '! dynamic balance

Independence

Training should include :

1. Bed transfers
2. Toilet transfers
3. Bathing
4. Dressing
5. Wheelchair skills
6. Home safety

Phase III : The prosthesis

A prosthesis is a tool—not the rehabilitation itself.

Successful prosthetic use requires:

1. Healthy residual limb
2. Appropriate socket
3. Correct alignment
4. Progressive wearing schedule
5. Gait training
6. Community mobility

Socket problems can result in pain, skin breakdown, instability, pistoning and ultimately prosthesis abandonment. Hence the most expensive prosthesis is not necessarily the best prosthesis. The best prosthesis is the one that is appropriate to the patient's goals, anatomy, environment, affordability and ability to use it consistently

SIGVARIS GROUP
Compreflex®
Adjustable Compression Wraps by SIGVARIS
Superior Fit
Easy to Don and Doff
Set Compression Accurately
Made with Premium Materials
NOVOMED
www.novomed.in | +91 9353093024 | +91 7045500748



Phase IV: Gait rehabilitation

1. Walking training should progress systematically.
2. Weight shifting
3. Supported standing
4. Parallel-bar gait
5. Walking with an assistive device
6. Independent indoor mobility
7. Community mobility
8. Advanced activities
9. The final stages should include:
   a. Stairs
   b. Ramps
   c. Uneven ground
   d. Obstacles
   e. Turning
   f. Public transport
   g. Fall recovery

Looking beyond limb salvage……

The vascular surgeon's role does not end with skin closure. The rehabilitation pathway presents an opportunity to redefine the meaning of surgical success.

- Vascular surgery has made remarkable progress in limb salvage through endovascular therapy, bypass surgery, advanced wound care and multidisciplinary diabetic-foot programs.
- But not every limb can or should be salvaged.
- When amputation becomes necessary, the question changes.
- It is no longer simply: "Can we save the limb?"
- It becomes: "How can we give this patient the best possible life after limb loss?"
- That question extends beyond the operating theatre.
- It requires the vascular surgeon to work with rehabilitation physicians, physiotherapists, prosthetists, psychologists and families.
- The surgical wound may take weeks to heal.
- The patient's rehabilitation may take months.
- And adaptation to limb loss may continue for years.

The rehabilitation goal should reflect the cause of amputation.

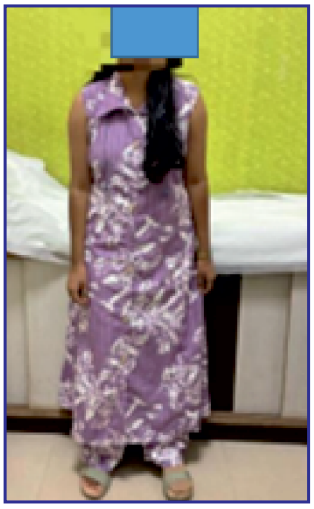
Traumatic amputation	Dysvascular amputation
Often younger	Often older
Greater prosthetic potential in many patients	Often limited by comorbidity
Return to work/sport may dominate goals	Independence and safe mobility may dominate
PTSD and trauma-related psychological issues	Diabetes, PAD, CKD and cardiac disease often coexist
Associated nerve/bone injuries may occur	Contralateral limb is frequently at risk

Neither group should be defined solely by age or amputation level. The correct rehabilitation goal is the patient's goal.

JIVAS EXPERIENCE OF YOUNG FEMALE REHABILITATION AFTER MAJOR AMPUTATION.

19-year-old female with Type 1 Diabetes Mellitus, had undergone a left above-knee amputation (AKA) for a non-salvageable infected left lower limb. She subsequently developed nonhealing infected AKA stump with protrusion of the femur through the stump. The culture was diagnostic of fungal infection of AKA stump with the background of uncontrolled type I diabetes mellitus. She underwent high revision AKA with wound debridement and subsequently the stump healed and was started on rehabilitation followed by prosthesis as seen below. She is now achieved complete independence in her daily routine.





Traditional endpoint: Healed stump.
Modern endpoint: Healed residual limb + mobility + independence + quality of life + protection of the contralateral limb

We are going to start acute rehabilitation for the in hospital patients and outpatient's complete rehabilitation for toe, toes, transmetatarsal amputation, above knee /below amputation. For the major amputation rehabilitation includes :The immediate postoperative period rehabilitation, Pre-prosthetic rehabilitation, the Prosthesis phase and gait rehabilitation.

Design & Printed by : **Shree Skandha Enterprises 18, Ist Cross, Magadi Road, Bangalore - 560 023 Mobile : 98450 52526**