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Collaborative Orthopaedic and Physiotherapeutic Care in Trans-Tibial Amputation Patient: A Case Report

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Abstract: The Case Study examines the 40 years old male patient of Below knee Amputation of Right Side, was bitten by a mouse and developed a gangrene for which he was operated 5 years ago. Amputated his Lower limb below knee amputation on 10th April 2026. The primary objectives of the patient's rehabilitation were to decrease phantom limb pain, prevent secondary complications, preserve range of motion, increase muscle strength, boost endurance and encourage functional independence in the postoperative phase. A intensive twelve-week program of physical therapy care was part of the recovery plan. The Intervention includes Week wise Protocol for the Patient. The Activity of Daily Living measure by Barthel Index, to measure the Mobility Basic Amputee Mobile Scale was used, The Hospital Anxiety and Depression Scale is used to measure the Depression and Anxiety.

Keyword: *Transtibial Amputation, Quality of Life, Phantom Limb Pain.*

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I. INTRODUCTION

The most frequent lower limb amputations worldwide occur below the knee, and they can be caused by a number of conditions, including diabetes, peripheral vascular disease, neuropathy, and trauma. Lower limb amputees often face significant life changes post-amputation compared to upper limb amputees (1). Physiotherapy plays a crucial role in enhancing the quality of life for amputees, addressing the challenges related to amputation.

II. CASE PRESENTATION

A 40-year-old man was apparently alright 5 years ago, when patient was bitten by a mouse and developed a gangrene for which three consecutive debridement followed by skin grafting was done by the orthopaedician. In May 2025 patient developed gangrene on same site along with Osteomyelitis of distal end of tibia along with ankle and hind foot. A long-term bone infection causing bone destruction and rocker bottom foot deformity for which he was operated for transtibial amputation on 10th April 2026. Patient had worked as a Clerk

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at Lawyers Office. The patient hoped that he would be able to keep participating in social activities and carrying out his activities of daily living (ADLs) on his own.

Fig 1 Preoperative

Fig 2 Postoperative

III. CLINICAL FINDINGS

Table 1 shows the detailed muscle strength examination results, Table 2 Shows the detailed Range of Motion of bilateral Lower Limb. The Barthel Index (BI) was 45 out 100, indicating that the patient was severe dependency[(2)]. The Basic Amputee Mobility Scale, score was 5 out 8, indicating able to safely, without verbal instruction or support from a person, even for safety reasons. The Hospital Anxiety and Depression Scale (HADS) was 7 out 21 (Depression – 5 and Anxiety – 2), indicating Normal.

Table 1 MMT for Hip, Knee & Ankle

Joint	Right (Pre)	Right (Post)	Left (Pre)	Left (Post)
Hip				
Flexors-	3	4	4	4
Extensors-	3	4	4	4
Abductors-	3	4	4	4
Adductors-	3	4	4	4
Internal Rotators-	3	4	4	4
External Rotators-	3	4	4	4
Knee				
Flexors-	3	3	4	4
Extensors-	3	3	4	4
Ankle				
Plantar Flexors-	Amputate		4	
Dorsiflexors-			4	

Table 2 Range of Motion for Hip, Knee & Ankle

Joint	Right (Pre PTRx)		Right (Post PTRx)		Left (Pre PTRx)		Left (Post PTRx)	
	Active	**Passive**	**Active**	**Passive**	**Active**	**Passive**	**Active**	**Passive**
Hip								
Flexion	$0 - 85^0$	$0 - 100^0$	$0 - 100^0$	$0 - 110^0$	$0 - 100^0$	$0 - 110^0$	$0 - 110^0$	$0 - 150^0$
Extension	$0 - 15^0$	$0 - 20^0$	$0 - 25^0$	$0 - 30^0$	$0 - 25^0$	$0 - 25^0$	$0 - 30^0$	$0 - 30^0$
Abduction	$0 - 40^0$	$0 - 45^0$	$0 - 40^0$	$0 - 45^0$	$0 - 45^0$	$0 - 45^0$	$0 - 45^0$	$0 - 45^0$
Adduction	$0 - 20^0$	$0 - 25^0$	$0 - 20^0$	$0 - 25^0$	$0 - 20^0$	$0 - 25^0$	$0 - 20^0$	$0 - 25^0$
Knee								
Flexion	$10 - 90^0$	$0 – 110^0$	$0 - 110^0$	$0 – 120^0$	$0 - 110^0$	$0 - 110^0$	$0 – 120^0$	$0 – 130^0$
Extension	$90^0 - 10$	$110^0 - 0$	$110^0 - 0$	$120^0 - 0$	$110^0 - 0$	$110^0 - 0$	$120^0 - 0$	$130^0 - 0$
Ankle								
Plantarflexion	Amputate				$0 - 45^0$	$0 - 50^0$	$0 - 45^0$	$0 - 50^0$
Dorsiflexion					$0 - 15^0$	$0 - 20^0$	$0 - 15^0$	$0 - 20^0$

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➢ *International Classification of functioning, Disability and Health (ICF)*

- *Body Functions*

Table 3 Structural Impairment with Clinical Reasoning

Structural Impairment	Clinical Reasoning	Investigation
s750. Bone (Tibial and Fibula)	Amputation (Due to Gangrene & chronic osteomyelitis)	On Examination

Table 4 Functional Impairment with Clinical Reasoning

Functional Impairment	Clinical Reasoning	Investigation
b134. Sleep	Due to Amputation	Patient reported questionnaire & clinical investigation
b280. Pain (at Suture site)	Due to sutures	On Examination
b280. Phantom Limb Pain	Due to Amputation	On Examination
b750. Reduced ROM	Due to Sutures and Amputation	On Musculoskeletal Examination
b770. Gait	Due to Amputation	On Examination

Table 5 Activity limitation & Participation Restriction

Domains	Performance Qualifier
d430 Lifting and carrying objects	Moderate difficulty
d440 Fine hand use	No difficulty
d465 Moving around using equipment	
d470 Using Transportation	Complete difficulty

Table 6 Environmental Factors

Environmental	Barrier	Facilitator
e310 Immediate Family	-	+ Complete Facilitator
e320 Friends	Moderate barriers	-
e410 Individual attitude of immediate family members	-	+ Complete Facilitator
e525 Housing services, systems and policies	Moderate barriers	-
e540 Transportation services, systems and policies	Severe barriers	

IV. CLINICAL INVESTIGATIONS

Fig 3 Pre-Operative X-ray, Lateral View showing Rocker Bottom Foot Deformity

Fig 4 Post- Operative X-ray, Lateral View after below Knee Amputation of Right Side

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➢ *Post Operative Orthopaedic Care:*

- Pain Relief: Manage phantom limb pain with medications

Table 7 Intravenously Administered Drugs

Intravenously Administered Drugs	**Dosage**
Inj Ceffuroxime	1.5 gm (1-0-1)
Inj Pan	40 mg (1-0-0)
Inj Pcm	1 gm (1-1-1)

Table 8 Orally Administered Drugs

Orally Administered Drugs	**Dosage**
Tab Ceffuroxime	500 mg (1-0-1)
Cap Omez	20 mg (1-0-1)
Tab Tramadol	100 mg (1-0-1)
Tab Chymoral forte	(1-1-1)
Tab Pregabalin	75 mg (0-0-1)

➢ *Wound Care:*

- Maintain a clean, dry, and sterile dressing.
- Non-adherent dressings.
- Antimicrobial dressings.
- Negative Pressure Wound Therapy (NPWT/VAC)
- Observe for loosening or separation of sutures.
- Observe for discharge.
- Stump Moulding (Residual Limb Shapping)

➢ *Post Operative Physiotherapeutic Care:*

Table 9 Short Term & Long Term Goals

Short Term Goals	**Long Term Goals**
1. Relieve phantom limb pain	1. Patient education with prosthesis
2. Bed mobility	2. Gait training with prosthesis
3. Active ROM exercise; caution to prevent unwanted stress to the incision	3. Proprioception training with prosthesis
4. Reduce oedema and swelling	4. Scar mobilization or massage
5. Prevent secondary complications	5. Balance training
6. Wheelchair training	6. Improve coordination of lower limb
7. Improve rom and prevent knee flexion deformity	
8. Strengthening of unaffected limb	
9. Care of stump	

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➢ *Post-Operative Day 1 to Week 1:*

- Relieve phantom limb pain & Bed mobility exercises
- Active Assisted ROM exercise

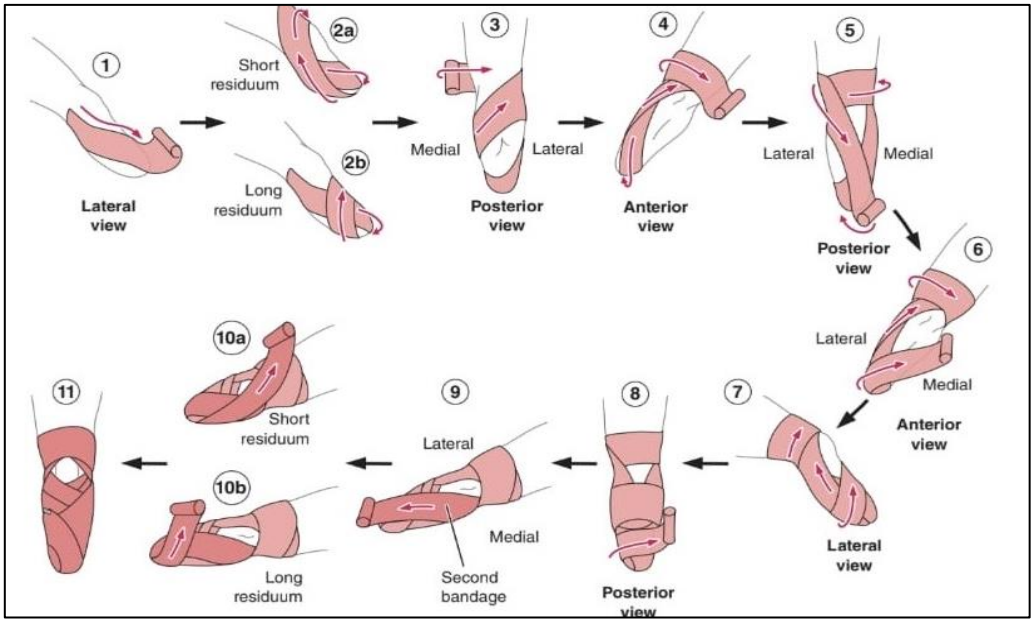

Fig 5 Stump Care

➢ *Week 2:*

- Bed mobility exercises, static muscle exercises, and sitting activities.
- Active ROM exercise
- Prevent secondary complications
- Stump care

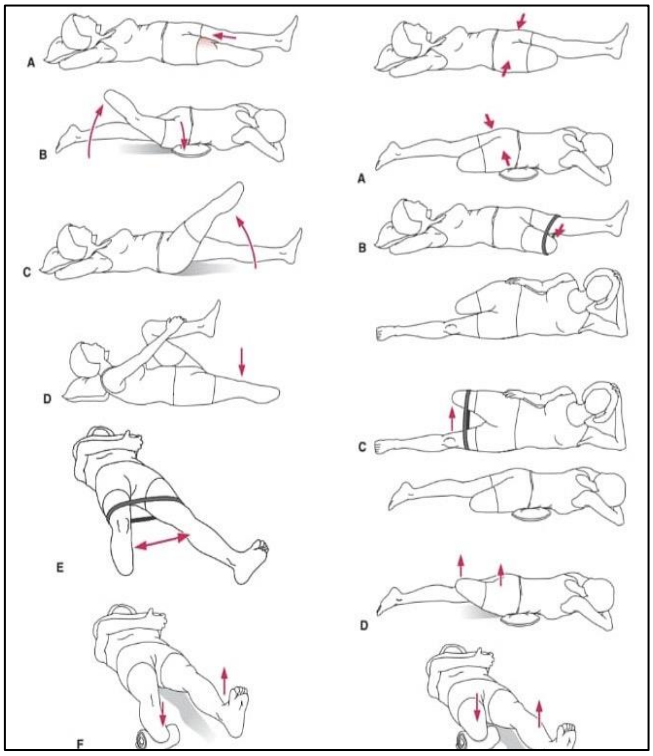

Fig 6 Transtibial Amputation Bed Exercises

➢ *Week 3 to 4:*

- Resistance exercises of unaffected limb,
- Deep breathing exercises.
- Advice Prone lying sleeping for 30 mins after every 2 hours.
- Anti Contracture Position
- Stump care

➢ *Week 5 to 6:*

- Pre-prosthetic phase initiation, pain management techniques, and edema control measures were implemented to prepare for prosthetic fitting.
- Both Icing and TENS as combination is used for the stump pain and phantom limb pain. Frequency: High Frequency, Intensity: Low Intensity, Time: 15 to 20 min, Type: To treat phantom limb discomfort, conventional, massage, and biofeedback treatments are employed [3].
- Edema control measures include bandaging.
- Proper residual limb positioning was given (Prone lying sleeping for 30 mins after every 2 hours).

➢ *Week 7 to 8:*

- Balance & coordination training to enhance mobility and prevent falls.
- Scar mobilization

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➢ *Week 9 to 10:*

- Walking aids training, ambulation education and balance exercises were provided to enhance mobility and prevent falls.
- Initially, ambulation was limited to 100m with the help of a walker, then progressed to the corridor.
- Proprioception training with prosthesis

➢ *Week 11 to 12:*

- Gait training with prosthesis.
- Improve coordination of lower limb.
- Job site Assessment & Initiation of occupational rehabilitation.

➢ *Follow up (Week 12):*

- The patient showed hip and knee movements, reduced discomfort and increased range of motion post-rehabilitation.

V. DISCUSSION

Our study showed improvement in quality of life, strength, range of motion and phantom limb pain. Similar results were found in and study conducted in 2022. All these exercises help to prepare the patients for the prosthesis fitting. Result of this case study were identical to a conducted in 2021, lower limb amputees receiving regular physiotherapy, phantom exercises led to noticeably improved pain control. [4,5] In the present case, the patient's functional activity significantly improved. Patient's Anxiety and Depression for his condition was also become normal, and patient was able to safely perform transfer technique, without verbal instruction or support from a person, even for safety reasons. [6,7]

VI. CONCLUSION

This case proved that patients with transtibial amputation must undergo physiotherapy rehabilitation program which is essential in improving and maintaining physical functions and the quality of life. It enhances prosthetic fitting for independence in ADL's. The addition of TENS is excellent modality for Phantom Limb pain management.

VII. CLINICAL IMPLICATION

This case underscores the need for larger prospective studies to evaluate standardized collaborative orthopaedic–physiotherapy rehabilitation protocols and their long-term effects on functional outcomes, prosthetic adaptation, gait performance, and quality of life in individuals undergoing trans-tibial amputation.

ABBREVIATIONS

ROM – Range of Motion
HADS – Hospital Anxiety and Depression Scale
PROM – Passive Range of Motion
AROM – Active Range of Motion
MMT – Manual Muscle Testing
TTA – Trans Tibial Amputation

➢ *Declaration by Authors:*

- *Funding: No funding sources*
- *Conflict of Interest: No conflict of interest*
- *Informed Consent: Informed consent was obtained from the patient.*
- *Ethical Approval: The study was approved by the Institutional Ethical Committee*

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