



Al-Mustaqbal University

Collage of Engineering

Prosthetics and Orthotics Engineering

Second Stage

PROSTHETICS I

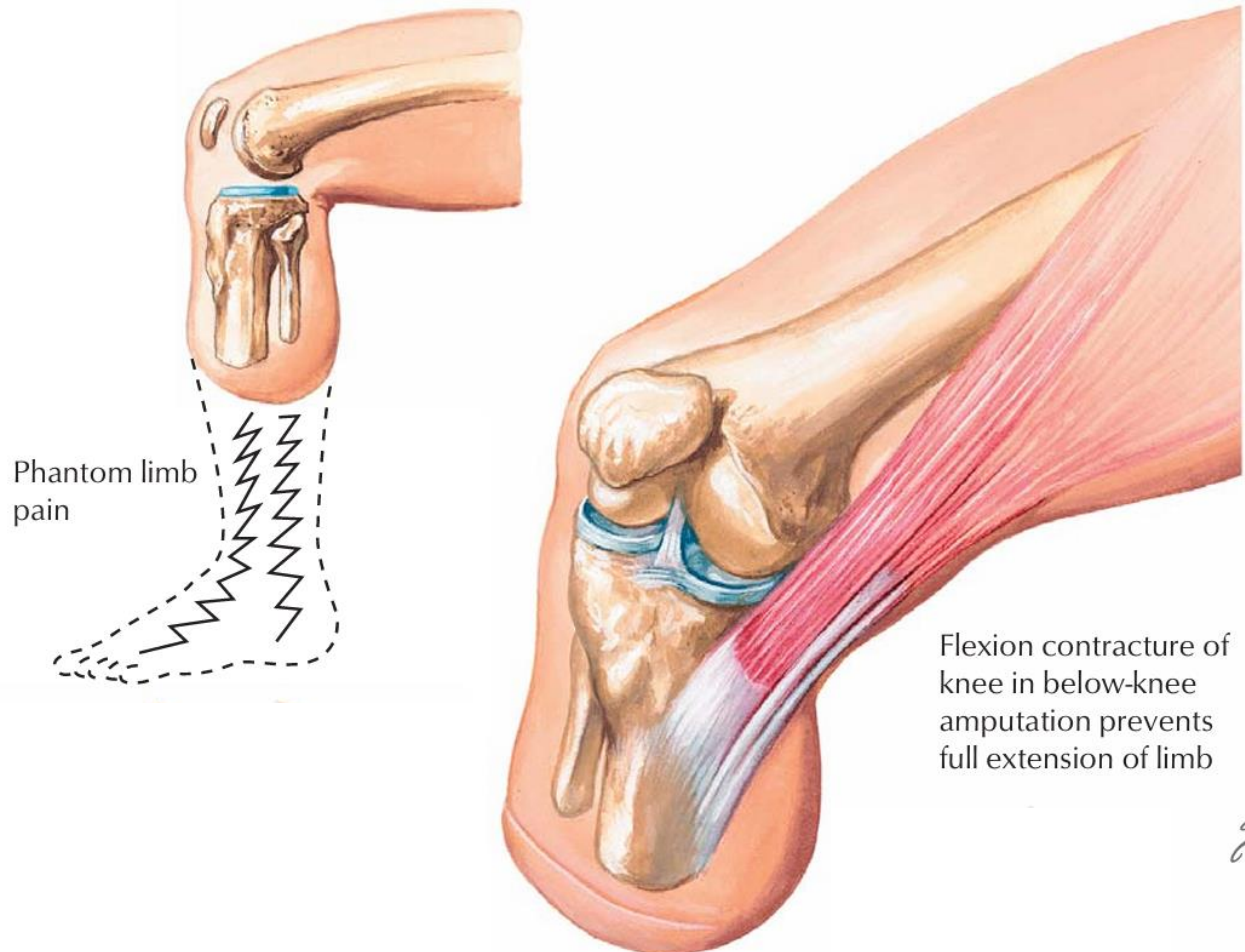
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Phantom limb
pain

This anatomical illustration is divided into two parts. The upper part shows a cross-section of a lower limb at the level of the knee joint, with the femur, tibia, and fibula visible. Below the amputation site, a dashed outline of a foot is shown with jagged, lightning-bolt-like lines indicating phantom limb pain. The lower part of the illustration shows a sagittal view of the knee joint in a flexed position. A blue band is wrapped around the joint, and a large, thick red muscle is shown in a contracted state, pulling the tibia forward and preventing full extension of the limb.

Flexion contracture of
knee in below-knee
amputation prevents
full extension of limb

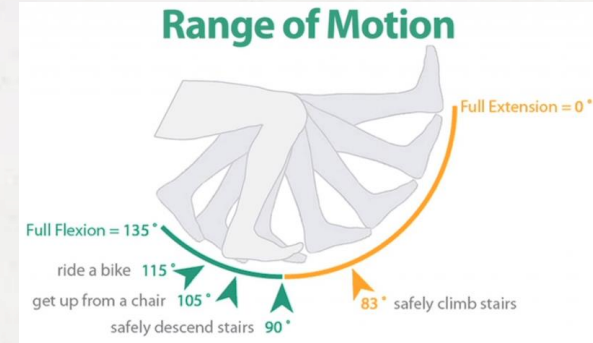
F. Netter M.D.

Early Prosthetic Management

(I) Rehabilitation and Prosthetic Prescription for Transtibial Amputees

1- Postoperative Goals for Transtibial Amputees:

1- Maintain Full ROM: Ensure the hip and knee can move fully to maintain mobility and flexibility.



2- Facilitate Rapid Healing: Help the surgical wound heal quickly so the patient can get a prosthetic sooner.

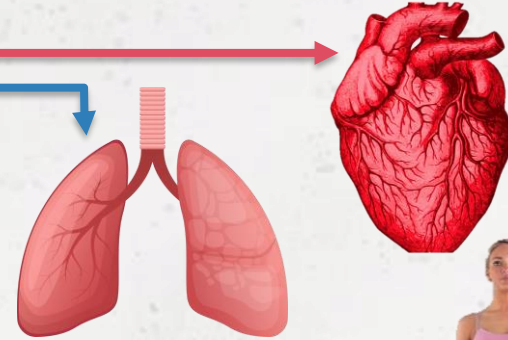


(I) Rehabilitation and Prosthetic Prescription for Transtibial Amputees

1- Postoperative Goals for Transtibial Amputees:

3- Stay Heart and Lung (Cardio-Pulmonary) Healthy:

Keep the heart and lungs strong to support overall recovery and prepare for using a prosthesis.



4- Enhance Balance:

Both static and dynamic balance is crucial for functional mobility and safety.



5- Facilitate Functional Strength:

Strengthen the remaining muscles to make it easier to use the prosthetic and move.



(2) Lifelong Rehabilitation of the Amputee

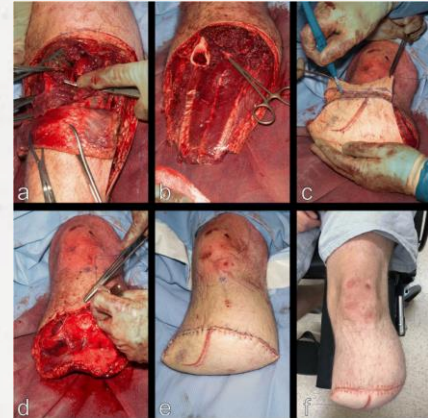
1- Preoperative Phase:

- Assess the patient's medical condition.
- Discuss surgical options.
- Manage expectations.



2- Amputation Surgery and Wound Dressing:

- Determine the length of the remaining limb.
- Perform myoplastic closure and soft-tissue coverage.
- Handle nerves and apply rigid dressing.
- Reconstruct the limb.



(2) Lifelong Rehabilitation of the Amputee

3- Acute Postsurgical Phase:

- Shape the limb and strengthen muscles.
- Help the patient regain a sense of control.



4- Preprosthetic Phase:

- Focus on wound healing and pain control.
- Promote upper body movement and provide emotional support.
- Discuss phantom limb sensations.



5- Vocational Rehabilitation:

- Equip and train the amputee for work.
- Address further education needs or job modifications.



K-levels are a system used to determine a person's functional ability for prosthetic use.

(3) Classification of Functional Potential for Patients



K0: No ability to walk or use a prosthesis.



K1: Can walk on flat surfaces.



K2: Can overcome simple obstacles like curbs and stairs.



K3: Can walk at different speeds and overcome most obstacles.

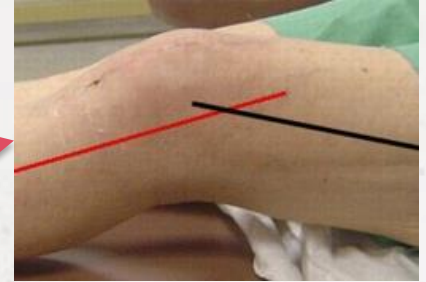


K4: Can perform high-level activities, like running or playing sports, often seen in active adults, children, and athletes.

(4) Complications and Prosthetic Fitting

1- Post-Surgical **Complications:**

- **Loss of Full Knee Extension:** Can delay fitting the prosthesis.
- **Permanent Joint Contracture:** Changes how the prosthesis is fitted.
- **Rigid Dressings:** Used to keep the knee fully extended and prevent complications.



(4) Complications and Prosthetic Fitting

2- Immediate Postoperative Protheses (IPOP):

Early Mobility: Helps patients start moving early.



Attention: Full weight bearing can cause damage to the healing surgery site.



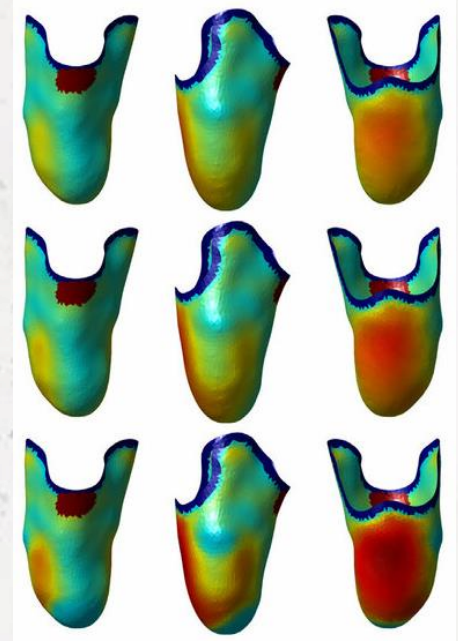
(5) Prosthetic Prescription

A prosthetic prescription details the features of a completed prosthesis, including:

1- Socket Design:

Purpose: Main connection between the limb and prosthesis.

Importance: Ensures proper force transfer during movement.

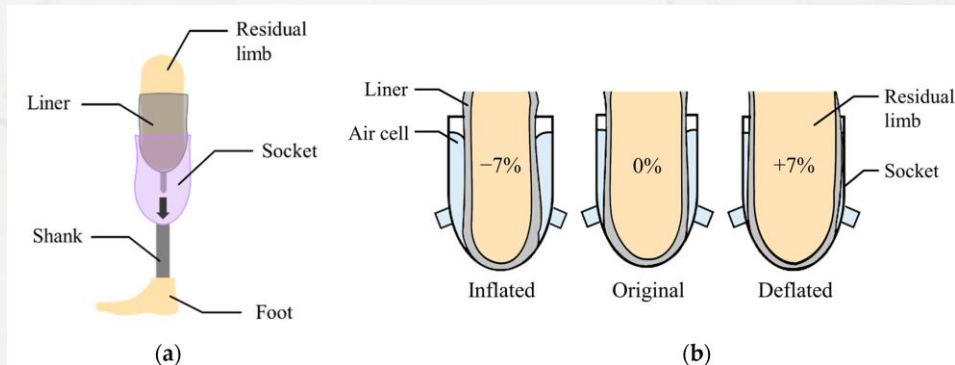


(5) Prosthetic Prescription

2- Skin-Socket Interface & Suspension Strategy:

Purpose: Provides a comfortable and secure fit.

Example: A soft liner can act as both an interface and a suspension.

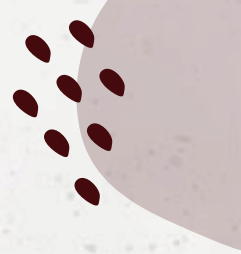


(5) Prosthetic Prescription

3- Additional Modular Components:

Examples: Feet, shock absorbers, and torque absorbers





1) What is the goal of maintaining full ROM in postoperative management for transtibial amputees?

- a) Improve strength only
- b) Ensure flexibility and mobility at the hip and knee
- c) Reduce pain
- d) Enhance cardiovascular health

2) What is the benefit of facilitating rapid healing in the postoperative phase for transtibial amputees?

- a) Improves balance
- b) Expedites prosthetic fitting
- c) Reduces muscle strength
- d) Enhances emotional support

3) Why is improving cardio-pulmonary conditioning important for transtibial amputees?

- a) Reduces the need for a prosthesis
- b) Assists in overall recovery and preparation for a prosthesis
- c) Decreases flexibility
- d) Increases muscle mass

4) Which phase focuses on assessing the patient's medical condition and managing expectations?

- a) Preprosthetic phase
- b) Acute postsurgical phase
- c) Preoperative phase
- d) Vocational rehabilitation

5) What does the preprosthetic phase primarily focus on?

- a) Residual limb length determination
- b) Wound healing, pain control, and emotional support
- c) Muscle strengthening
- d) Job modifications

6) In which phase is the determination of residual limb length and myoplastic closure performed?

- a) Preoperative phase
- b) Amputation surgery and wound dressing
- c) Preprosthetic phase
- d) Vocational rehabilitation



7) What is the main goal of vocational rehabilitation for amputees?

- a) Assessing medical condition
- b) Equipping and training for vocational activities
- c) Shaping the limb
- d) Emotional support

8) What does the K0 level in the K-Level Medicare Functional Classification indicate?

- a) Ability to ambulate on level surfaces
- b) No potential for ambulation
- c) Can traverse low-level environmental barriers
- d) Capable of variable cadence ambulation

9) Which K-Level describes individuals who can navigate simple obstacles like curbs and stairs?

- a) K0
- b) K1
- c) K2
- d) K3

10) Who typically falls under the K4 classification?

- a) Individuals with no ambulation potential
- b) Those who can ambulate on level surfaces
- c) Active adults, children, or athletes
- d) Patients with limited mobility



11) What post-surgical complication can delay prosthetic fitting?

- a) Enhanced balance
- b) Loss of full knee extension
- c) Improved muscle strength
- d) Increased flexibility

12) Why do clinical teams advocate for rigid dressings after surgery?

- a) To reduce muscle strength
- b) To ensure the knee remains in full extension
- c) To decrease cardiovascular health
- d) To manage pain



13) What is the purpose of IPOP?

- a) Delay mobility
- b) Facilitate early mobility
- c) Increase wound healing time
- d) Reduce balance

14) What should be taken into consideration when using IPOP?

- a) Ignoring weight bearing
- b) Ensuring full weight bearing can cause damage to the healing site
- c) Reducing the use of prosthesis
- d) Avoiding emotional support



15) What is a critical aspect of socket design in a prosthetic prescription?

- a) Color of the socket
- b) Interface between the limb and prosthesis
- c) Cost of the socket
- d) Weight of the socket

16) Why is the skin-socket interface and suspension strategy important in prosthetics?

- a) Provides aesthetic appeal
- b) Ensures a comfortable and secure fit
- c) Reduces cost
- d) Increases prosthetic weight

17) Which element can serve as both an interface and a suspension in prosthetics?

- a) Rigid frame
- b) Soft liner
- c) Metal rods
- d) Carbon fibers

18) What is the main focus of the acute postsurgical phase?

- a) Residual limb length determination
- b) Limb shaping and muscle strengthening
- c) Cardiovascular conditioning
- d) Job modifications

19) What is the main goal during the preoperative phase?

- a) Strengthening muscles
- b) Assessing the patient's medical condition and managing expectations
- c) Shaping the limb
- d) Facilitating rapid healing

20) Why is it important to enhance balance in postoperative management?

- a) To reduce muscle strength
- b) To ensure functional mobility and safety
- c) To decrease flexibility
- d) To improve emotional support



21) What is the importance of the socket design in a prosthetic prescription?

- a) Ensures proper force transfer during movement
- b) Reduces the cost of the prosthesis
- c) Improves the aesthetic appeal
- d) Increases weight

22) Which phase focuses on equipping and training the amputee for vocational activities?

- a) Preoperative phase
- b) Amputation surgery
- c) Preprosthetic phase
- d) Vocational rehabilitation

