Postoperative Care Following Traumatic Amputation
Disclosure Statements

I have the following relevant relationships in the products or services described, reviewed, evaluated or compared in this presentation.

Hanger Clinic

• Our speaker is a paid employee of Hanger Clinic and receives a salary.

Other Disclosures (if any):

• Financial

• Nonfinancial relationships (i.e. board member, association committees outside of Hanger Clinic)
Hanger Clinic
Continuing Education Program

- Spinal Orthotics
- Lower Extremity Orthotics
- Upper Extremity Orthotics
- Lower Extremity Prosthetics
- Upper Extremity Prosthetics
- Trauma Education
Objectives

Upon completion of this presentation, the participant will be able to:

• Describe the postoperative & early rehabilitation process for lower extremity traumatic amputation.

• Describe the goals and benefits of postoperative management

• Compare the effectiveness of various forms of postoperative prosthetic treatments

• Develop a post-op & rehab treatment plan
Agenda

• Introduction

• Postoperative & early rehabilitation process for lower extremity traumatic amputation

• Goals/benefits of postop management

• Effectiveness of postop prosthetic treatments

• Rehabilitation Treatment Plan and Peer Support
Rehabilitation from Amputation

Three phases:

1. Healing
2. Maturation
3. Definitive
General Rehabilitation Timeline for Patients with Lower Extremity Amputation

- **Apply post-operative protector**
- **Incision fully healed; Cast for prosthesis**
- **Pre-prosthetic training period from presurgery to temporary device**
- **Temporary prosthesis; Begin prosthetic gait training**
- **Sutures removed; limb shaping**
- **Ongoing therapy and prosthetic adjustments**
- **Receive permanent prosthesis**

0 wks | 4 wks | 8 wks | 12 wks | 4 mons. | 5 mons. | 6 mons. | 1 year

**Individual experiences will vary. Slow healers have a different timeline**

Adapted from www.gettingbacktolife.com
Initial Considerations for In-Patients

Residual limb
- Edematous
- Painful
- Critical state

Patient overview
- Mechanism of injury
- Comorbidities
- TBI
- Background

Emotional well being

Discharge from Hospital

- Protect surgical wounds
- Proper prosthetic care can reduce complications
- Quality & amount of attention devoted to patient determine outcomes
- Location and access to f/u drives post-op device selection

Images © Charles Krupa, AP, and Pat Greenhouse, Boston Globe Staff
Goals of Postoperative Treatment

- Heal the surgical wound
- Protect the amputated limb from trauma
- Minimize pain
- Reduce swelling & begin shaping amputated limb
- Preserve & improve ROM & strength of entire body
Goals of Postoperative Treatment

• Enable patient to learn to use appropriate mobility aids
• Begin controlled weight bearing
• Accomplish functional activities
• Facilitate psychological adjustments to limb loss (Peer support - AMPOWER)
Goal of Prosthetic Rehabilitation

Return the patient to daily life at highest possible level

Image © Charles Krupa, AP

Sigford, 2010.
Benefits of Postoperative Care

Over 400 articles describe postoperative treatment and consistently validate the benefits:

- Reduced pain
- Reduced time to prosthetic use
- Reduced hospital stay

Key to early mobilization:

- Healing the wound
- Shaping the residual limb

Post-op Complications

1. Fall trauma
2. Wound dehiscence
   Infection/slow healing
3. Contractures
4. Edema
5. Pain

Image by Lew Schon, MD
Summary of Falls Evidence

- 20% of lower extremity amputees experience a fall in the hospital
- 3% of all LE amputees experience a fall significant enough to require revision surgery
- 47% of those revision surgeries result in a higher level amputation
- Revision surgery due to a fall is reduced through the use of a Removable Rigid Dressing
- Hospital is responsible for falls costs for Medicare patients


Post-op Complications

Can be also be reduced with careful surgical technique with the goal of “reconstructing” a residual limb designed for prosthetic use:

• Effective length

• Stable distal shape with good muscle coverage

• Proper skin coverage & tension

• Closure in full extension & adduction for good ROM

• Pre-op consultation with your Hanger prosthetist
Post-op Protocols

• Flexible to meet patient needs and surgeon preference

• Should be known by all staff and initiated by the surgical team

• Specific instructions in patient’s chart & bedside

• Communicate with prosthetist and PT

• Regular staff training

www.amputee-coalition.org
Immediate & Early Prosthetic Treatments

1. Soft Dressings & Compression Therapy
   A. Ace Wrap
   B. Tubular elastic &
   B. Shrinker socks
   C. Gel Liners

2. Removable Rigid Dressings (RRDs)
   A. Plaster/fiberglass cast
   B. Bi-valved
   C. AmpuShield™ Program by Hanger Clinic

3. Other Rigid Dressings
   A. Non-weight bearing
   B. Weight bearing
1. Soft Dressings & Compression Therapy

A. Pressure Bandaging = Ace wrapping
- Oldest technique
- Frequently used
- Worn 24/7
ACE Wrapping

**Advantages**
- Inexpensive
- Readily available
- Minimal tension across suture

**Disadvantages**
- Re-applied several times a day
- Requires flexibility, hand strength, dexterity, visual acuity & endurance for independent donning
- Complication if incorrectly applied
- Doesn’t limit knee flexion
- Minimal protection from accidental trauma
- Non-weight bearing
- Uncertain amount of compression

© CSUDH O&P

1. Soft Dressings & Compression Therapy

B. Tubular elastic

- For bulbous, sensitive limbs
- Double or single layering of material
- Uniform compression

Images from www.snowboardervstreeblogspot.com
1. Soft Dressings & Compression Therapy

C. Shrinker Socks

• Various lengths, widths & grades of compression

• Apply carefully to avoid wound tension

• May require assistance with donning after recent amputation

© www.juzo.com

Donning Aid

© www.juzo.com
Tubular Elastic & Shrinker Socks

**Advantages**
- Many sizes readily available
- Can be more effective than Ace wrap in reducing limb volume

**Disadvantages**
- Can be difficult to don without assistance
- Apt to roll down the transfemoral (TF) limb
- Must be replaced as they stretch out or as volume decreases
- May irritate bony prominences or pressure sensitive areas

1. Soft Dressings & Compression Therapy

D. Silicone Liners

• Rolled, not stretched over limb
• Can be removed for incision inspection

Earle J, 2007.  © Hanger Clinic  © Ossur
Silicone Liners

**Advantages**

- Provides equalized compression with excellent adhesion
- Compression and properties of gel can help to minimize scar tissue
- Provides patient early opportunity to learn to use silicone liner

**Disadvantages**

- Liner traps heat & moisture
- Skin can macerate
- Requires hand dexterity & strength to don/doff
- Minimal protection against trauma
- Needs daily cleaning
- Needs more follow-up

© Medscape
2. Removable Rigid Dressings

A. Plaster or Fiberglass Cast

- Worn 24 hours/day
- Compression provided by layers of socks
- Simulated weight bearing

Wu et al, 1979.
2. Removable Rigid Dressings

B. Bi-valved Design

- Custom made from cast or pre-fabricated shells
- Transtubial extends above knee
2. Removable Rigid Dressings

C. AmpuShield™ by Hanger Clinic

- Post-operative limb protectors – 4 designs
- Custom-fit or custom-made from Insignia scan or measurements
- Allows for wound inspection, dressing changes & physical therapy
- Light weight & easy to clean
- Not for weight bearing
- Adjustable compression

© Hanger Clinic
## 2. Removable Rigid Dressings

Non weight bearing

### Advantages

- It is removable for limb inspection
- Protects & compresses limb
- Improves healing & reduces hospital stays
- Patient uses & learns concept of ‘sock-ply’ fit
- Plastic pre-fabricated shells & Ampushield™ designs can be washed
- Bi-valved & AmpuShield™ limits knee flexion
- Mimic partial weight bearing
- Can be used with soft dressings

### Disadvantages

- It is removable by non compliant patients
- Requires skilled team
- Plaster/fiberglass shorter version doesn’t limit knee flexion
- May need to be replaced with significant volume loss
- Not designed for ambulation

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3. Other Rigid Dressings

A. Non-Removable

• Not as frequently done due to advances in removable systems
• Plaster or fiberglass cast applied by trained personnel in operating room
• Controls edema, pain & protection
• Left on 7-15 days or less with signs of complications
• By itself or with prosthetic components attached for ambulation

*Choudhury et al, 2001.*
B. Weight Bearing Immediate

- Also known as Immediate Postoperative Prosthesis (IPOP)
- Rigid dressing with a pylon and foot
- Touch down weight bearing within 24 hours
- Discontinue weight bearing if wound healing complications arise
- Patient compliance is mandatory

_Burgess and Romano, 1985._
3. Other Rigid Dressings

**Advantages**

- Can help reduce falls
- Assists in acceptance of limb loss with early ambulation
- Early introduction to ambulation therapy & prosthetic use

**Disadvantages**

- Bulky & heavy, poor suspension
- Patient can apply too much weight too soon
- Must have compliant patient
- Trained and diligent rehab team required
- Time consuming
- Visual wound inspection is not possible
- Postop pain maybe mistakenly attributed to dressing

*Choudhury et al, 2001.*
<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>Cost</th>
<th>Ease of Application</th>
<th>Wound Healing</th>
<th>Protection from Trauma</th>
<th>Degree of Postoperative Edema</th>
<th>Postoperative Pain</th>
<th>Knee Flexion Contracture Risk</th>
<th>Time to First Prosthetic Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft gauze without Ace wrap</td>
<td>Inexpensive</td>
<td>Not difficult</td>
<td>Little impact on primary or secondary healing</td>
<td>None</td>
<td>Significant</td>
<td>Often severe</td>
<td>Very high</td>
<td>Prolonged</td>
</tr>
<tr>
<td>Soft gauze with Ace wrap</td>
<td>Inexpensive</td>
<td>Figure-of-eight wrap requires skill, frequent reapplication</td>
<td>Little impact on primary or secondary healing</td>
<td>None</td>
<td>Significant</td>
<td>Often severe</td>
<td>Very high</td>
<td>Prolonged</td>
</tr>
<tr>
<td>Shrinker sock</td>
<td>Low to moderate</td>
<td>Requires UE strength and dexterity</td>
<td>Used after primary healing has occurred</td>
<td>Minimal</td>
<td>Moderate</td>
<td>Somewhat less</td>
<td>Very high</td>
<td>Slightly shortened</td>
</tr>
<tr>
<td>Rigid dressing (thigh level cast)</td>
<td>Low</td>
<td>Requires training; MD or CP</td>
<td>Reduces time to primary healing</td>
<td>Excellent</td>
<td>Minimal</td>
<td>Minimized</td>
<td>Extremely low</td>
<td>Shortened</td>
</tr>
<tr>
<td>Removable RRD – Plaster (terminate under knee)</td>
<td>Low to moderate</td>
<td>Requires training; CP or PT</td>
<td>Reduces time to primary healing</td>
<td>Very good</td>
<td>Minimal</td>
<td>Minimized</td>
<td>Moderate</td>
<td>Shortened</td>
</tr>
<tr>
<td>Removable RRD – Custom fit (thigh level)</td>
<td>Moderate</td>
<td>CP custom fits</td>
<td>Reduces time to primary healing</td>
<td>Very good</td>
<td>Minimal if worn consistently</td>
<td>Minimized if worn consistently</td>
<td>Extremely low</td>
<td>Shortened</td>
</tr>
<tr>
<td>IPOP Rigid dressing - Plaster/custom</td>
<td>Low to high</td>
<td>CP applies in the OR or fabricates</td>
<td>Reduces time to primary healing</td>
<td>Very good</td>
<td>Minimal if worn consistently</td>
<td>Minimized if worn consistently</td>
<td>Low if worn consistently</td>
<td>Shortened</td>
</tr>
</tbody>
</table>

Table 2 adapted from Lusardi (2013), Table 20-7, pg 562. *Comparison of various postoperative options for management of new transtibial residual limbs following amputation.*

CP= Certified prosthetist;  MD = physician;  OR = operating room;  PT = physical therapist;  UE = upper extremity;  WtB = weight bearing
Rehabilitation Treatment Plan

- Postoperative Pain Management
  a. Massage & Tapping
  b. Desensitization
- Scar Mobilization
- Emotional Well Being
- Functional Mobility
- Gait Training
- Assessment of other injuries

- Exercise Program
  a. Strengthening
  b. Stretching
  c. Balance
- Weekly follow-up
- Patient/Family Education
- Contraction Prevention

Otto Bock
Rehabilitation Treatment Plan

Patient-centered plan

- Surgeon/Physicians
- Prosthetist
- Case Management
- PT/OT
- Nursing/Wound Care
- Family/Support Staff
- AEP/Support Groups/Peers

Sigford, 2010.
Postoperative Pain Management

1. Massage & Tapping
   – 2-5 minutes
   – 3-4 times/day

2. Desensitization
   – 2-5 minutes
   – 1-2 times/day

Images from Amputee Coalition of America. www.amputee-coalition.org
**Treatment Plan**

**Emotional Well Being**

- Patient counseling
- Regular follow-up with prosthetist and therapists
- Peer support
  - Individual
  - Group face-to-face
  - Online
  - Trauma Survivor’s Network

[Links]
- www.amputeecoalition.org
- www.empoweringamputees.org
- www.amputee-coalition.org
Treatment Plan

Functional Mobility
• Bed mobility
• Transfers

Gait Training
• With crutches
• Non-weight bearing

Images from CSUDH O&P Program and Otto Bock
Exercise Program

1. Strengthening
2. Stretching & ROM activities
3. Balance activities

Images from CSUDH O&P Program and Otto Bock
Treatment Plan

Exercise Program

1. Strengthening LEs

Strengthening UEs and Core

Images from www.kramesonline.com
Treatment Plan

Exercise Program

2. Stretching

3. Balance & Endurance

Images from CSUDH O&P Program and Otto Bock
Treatment Plan

• Residual limb assessed weekly
  – Circumference
  – Wound healing

• Patient/Family Education
  – Positioning, skin inspection, assistance by family members
Treatment Plan

Contraction Prevention

• Positioning
Treatment Plan

Patient Training and Education

- Hygiene
- Donn /doff
- Sock management
- TBI considerations
Summary

• Post-op care is critical to positive outcomes
  • Fully evaluate each patient
  • Select most appropriate device and protocol
  • Team input and communication are critical
  • Educate patient, family & rehab team
  • Follow-up, follow-up, follow-up
Questions?
Thank You and Feedback!
Postoperative Care Following Traumatic Amputation

Visit: HangerClinic.com/ContinuingEducation to provide us with feedback on this presentation.
Citations


References


References


References


• Mueller MJ. Comparison of removable rigid dressings and elastic bandages in prosthetic management of patients with below-knee amputations. Phys Ther 1982; 62: 1438-41. (Level I)


References


**Summary of study designs:**

- 4 Level I randomized controlled trials, 5 Level II matched cohort studies, 3 Level III case series or case reports (12 peer-reviewed published studies)