Evaluation of the Lower Limb Amputee

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Epidemiology -incidence

- Approx. 180,000 amputations per year in US
- 150,000 major amputations (BK 2/3, AK 1/3)
- Diabetes and dysvascular disease= 82% (97% lower limb)
- Trauma = 16 % (68 % are upper limb)
- Cancer = <1 % (75% are lower limb)
- Congenital = < 1 % (60% are upper limb)

Epidemiology-prevalence

- Approx 2 million amputee survivors in US (ACA)
- Less than half are diabetic/dysvascular with 4x higher prevalence in males and African Americans
- The majority are trauma related
- Age groups?

Survival

- Survival following amputation surgery due to dysvascular disease:
  1. Peri-operative (30 days)= BKA- 94% AKA- 83%
  2. 1 year= BKA -74% AKA-50 %
  3. 5 year= BKA- 48% AKA- 22%
- Survival following trauma/cancer is significantly better

Morbidity -dysvascular

- Revision surgery in dysvascular population = 18-25% with 10% converting BKA to AKA
- Amputation of remaining limb :
  1. 1 year= 11%
  2. 3 years= 44%
  3. 5 years= 53%

Morbidity- traumatic

- Revision surgery in trauma population= 14 %
- Wound infection rate= 34%

Epidemiology of Prosthetics

- Approx. 100,000 trans-tib amp per year
- Approx. 50,000 trans-fem amp per year
- 50-70 % are fitted with a prosthesis
- More than 75,000 new prostheses fitted per year for new and existing amputees (Medicare data)
- Annual cost of nearly **8 Billion dollars** per year

Reality Check

Americans spent **2 Billion** on donuts in 2004

Summary

- There are many more amputations due to diabetes annually compared to trauma related, however, the long-term survival for the trauma patients is much better and much longer.
- The "50/50 rule" remains unchanged for the dysvascular population:

  50% of dysvascular amputees die within 5 years and 50% of the survivors lose a portion of the other limb

History and Physical

The beginning of the story

Evaluation of the Patient

Amputation/Surgical History:

- Cause of amputation and duration of treatment/disability prior to amputation
- Hospital course, time frame
- Repeated surgical procedures and complications?
- Wounds and wound care, nutritional status
- Vascular bypass, skin grafts, muscle flaps
- Diagnostic studies (Arterial Doppler, Arteriogram, Cardiac Echo, renal function)

Past Medical/Surgical History

- Cardiac
- Renal
- Pulmonary
- Diabetes
- Neuropathy, Charcot Joint
- Retinopathy/vision
- PVD
- Prior surgeries (vascular, cardiac)

Evaluation of the Patient

Pain History:

- Pain prior to amputation
- Pain related to surgery/procedures
- Phantom sensations (awareness)
- Phantom pain (disturbing)
- Treatment for each of the above
- Is the treatment working?

Evaluation of the Patient

Social History:

- Social support system
- Involvement of support system
- Previous level of ambulation and self-care
  1. When was the last time you walked on two feet?
  2. Could you walk a block outside?
  3. Could you walk up a flight of stairs without stopping?
- Work history
- Home environment/barriers
- Patient concerns about family, friends
- Financial issues/insurance

Evaluation of the Patient

Psychological History:

- Cognitive status
- Prior psychological issues (depression, previous disabilities)
- Current feelings about amputation
- Future concerns about function
- Body image issues
- Concepts about prosthesis
- Previous experience with prosthesis

Evaluation of the Patient

Avocational Activities History:

- Family Responsibilities
- Previous level of ambulation
- Sports / Fitness / Exercise
- Intimacy / Sex
- Driving
- Outdoor activities (swimming)
- Hobbies, future activities

Evaluation of the Patient

Physical Exam of the involved limb:

- Level of amputation (bone length)
- Soft tissue coverage/skin integrity
- Residual limb shape
- Surgical site and wounds (take a picture)
- Skin grafting, scarring, adherence
- Tenderness to palpation
- Sensation throughout

Evaluation of the Patient

Critical Elements of the Physical exam (muscle strength lower limb):

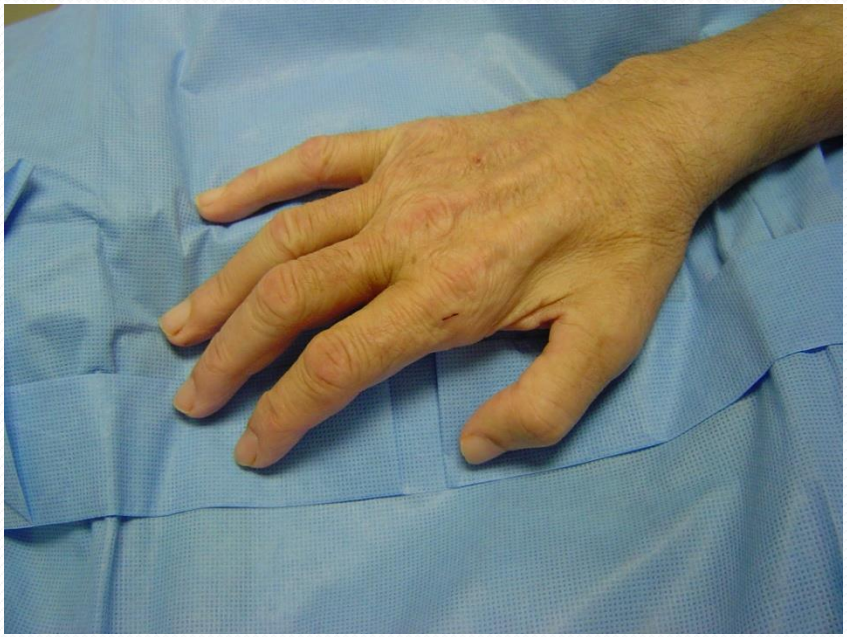
- Hip extensors, abductors (need 4/5 strength)
- Knee flexors, extensors
- Contra-lateral limb (hip ext/abd, knee fl/ext, ankle DF/PF/inv/ever)

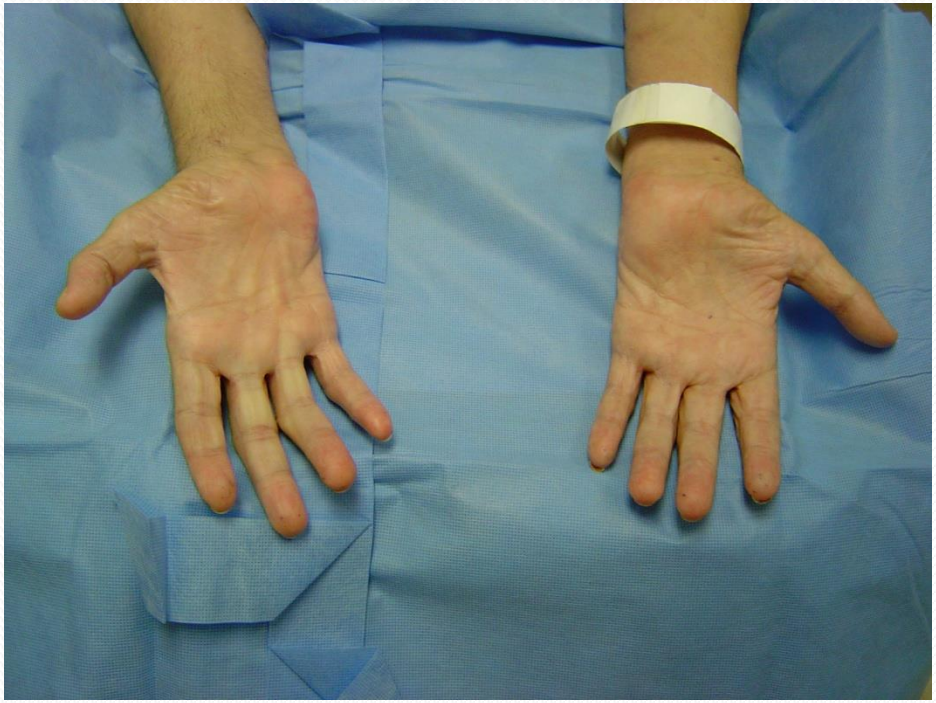
Evaluation of the Patient

Critical Elements of the Physical exam (muscle strength upper limb):

- Upper limbs:
  1. shoulder depressors - pecs and lats
  2. elbow extensors- triceps
  3. grip
  4. hand dexterity (look for intrinsic muscle atrophy or sensory loss from neuropathy))

Inspect the hands





Evaluation of the Patient

Critical Elements of the Physical exam (ROM, sensation):

- Bilateral hips (flexion, extension, abduction)
- Knees (flexion, extension)
- Remaining foot (DF, PF, inv, ever)
- Remaining foot sensation, skin integrity, boney architecture, vascular status

Check the other foot

Other Medical Information

- PT/OT program started? Tolerance to therapy
- Current mobility and self-care status
- Vascular studies of both lower limbs
- Cardiac studies for ejection fraction or evidence of MI, arrhythmia
- Labs including CBC, CMP, HgA1C
- Nutritional status and body weight changes

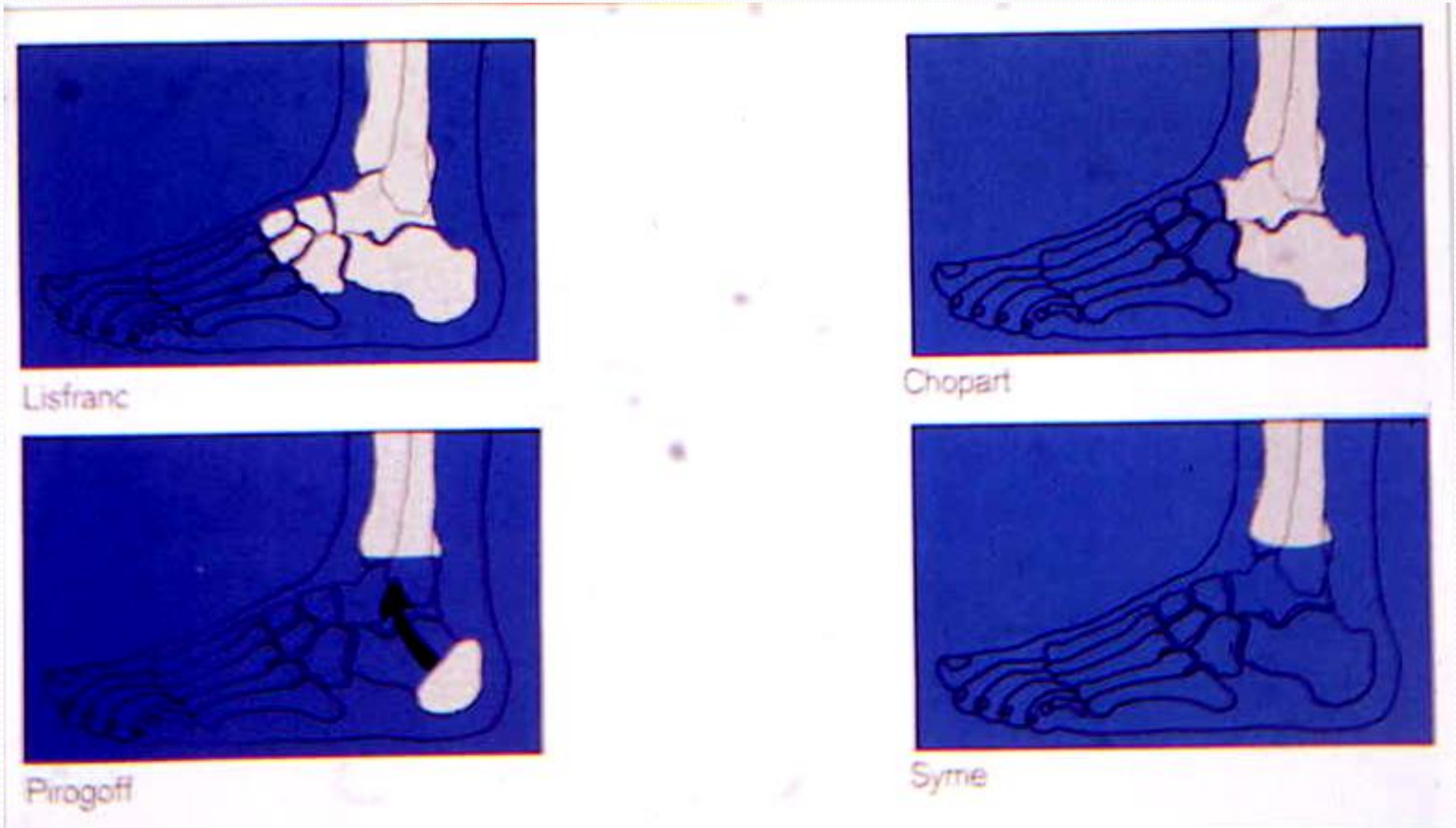
Introduce the P&O Team Concept

- Patient
- Physiatrist
- Prosthetist
- Ped-orthotist
- Physical therapist
- Occupational therapist
- Social services
- Psychologist
- Case manager

Levels of amputation

Trans-met amputation and custom prosthesis

Other Partial Foot Amputations (Lisfranc,Chopart,Syme's)



Lisfranc's Amp and Prosthesis

Traumatic Partial Foot Prosthesis (Silicone)

Choparts amputation and prosthesis

Choparts Amputation
Poor Long-term Outcome due to Plantarflexion Contracture

Choparts Prosthesis to unload and stabilize distal segment

Syme's Amp and Socket design

Recent trans-tibial amputation Ideal length and shape

Bad trans-tibial amputation

X-ray of Recent TTA

TTA and TKR

Short TTA

Traumatic knee dis-articulation

Self-suspending socket design for knee dis-artic

Long trans-femoral amputation

Mid-length trans-femoral amp

Every shape and size

Hemi-scleroderma with Knee Disartic

Hemi-corporectomy

It all comes down to the nitty-gritty of rehabilitation

Key Issues to Successful Rehab

- It is important to evaluate the patient as early as possible following amputation surgery to avoid problems and complications
- The physiatrist should direct the rehabilitation care of the amputee including ordering therapy services, prosthetic prescription, and discharge planning

Review the Rehab Issues and Plans

Education – Pre-prosthetic Program:

- Need for early therapy to mobilize joints and maintain strength
- Regain independence in self-care and mobility
- Residual limb shaping and shrinking
- Pain control
- Psychological issues
- Buddy system with other patients

Clinical Pathway

- Day 0 Amputation surgery
- POD 1-4 Acute hospital, pre-prosthetic PT
- POD 5-21 SAR or home for wound healing and continued pre-prosthetic PT
- POD 21-28 Suture/staple removal followed by casting/fitting of temporary prosthesis
- Weekly assessment by physician

Pre-prosthetic Therapy Program

- Strengthen proximal muscles of upper and lower limbs to prepare for ambulation
- Maintain or improve ROM
- Cardio-vascular conditioning
- Shrink and shape residual limb (ace-wrapping)
- Control pain and desensitize residual limb
- Achieve mobility and self-care
- Educate patient regarding prosthesis

Rehab Options

- Acute Rehab Facility
- Sub-acute Rehab Facility
- Skilled Nursing Facility
- Day Rehab Program
- Outpatient Rehab
- Home Rehab
- No Rehab

Review the Prosthetic Rehab Program and Plans

Education – Prosthesis:

- Explain about fitting/fabricating prosthesis and component selection
- Review prosthetic therapy program
- Explain cosmetic vs. functional issues
- Inquire about insurance coverage for prosthesis
- Investigate patient concerns or misconceptions about prosthesis

When to fit the prosthesis?

- Typically 3 weeks following traumatic amputation and 4-6 weeks following dysvascular amputation
- Usually after sutures/staples removed and wound is healed or near healed
- Proper shape of limb (cylinder shape), distal circumference no more than 1-2 cm larger than PTB size
- Patient can stand and hop in parallel bars

Decision-Making Process for Prosthetic Components

- Patient medical status
- Previous level of function
- Level of amputation
- Anticipated Medicare Functional Level

Medicare Functional Levels

- Level 0 - Patient is non-ambulatory
- Level 1 - Transfers or limited household
- Level 2 - Limited community ambulator
- Level 3 - Unlimited community ambulator
- Level 4 - High energy activities

Prosthetic Rehab Program

- BKA training time: 4-6 weeks outpt. PT
- AKA training time: 6-12 weeks outpt. PT
- Monthly assessment by physician
- Provide permanent prosthesis 3-6 mo. post-op
- Replace permanent prosthesis every 4-5 years
- Annual re-evaluation of function and fit

Review the Rehab Issues and Plans

Long-term Management:

- Lifetime comprehensive management by P&O Team
- Skin tolerance issues (wounds, pain)
- Return to driving
- Return to work/school
- Return to avocational activities

Conclusions

- Ultimately, the patient's use of the prosthesis and functional outcome depend most on good socket fit and proper training
- Proper selection of prosthetic components is based on the patient's functional needs and limitations

The End