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Disclosures

• Matt McLaughlin – no pot of gold, no finances
Many Patients, not Mini Patients

INTRODUCING

Double-Day Junior...

BECAUSE CHILDREN ARE LITTLE ADULTS
Limb Deficiency Clinic

- PM&R Physicians
- Physical Therapist
- Occupational Therapist
- Certified Prosthetists
- Social Work
- >200 patients
Incidence

• 1/3 of all traumatic amputees are pediatrics
• 13-17 yo make up the majority of the population
• Usually more UE than LE
• Power tools, lawn mowers, bicycles


While in the Hospital

- Average length of stay (LOS) was 11.3 days
- Mean of 4.3 procedures and 2.3 surgeries
- Average cost of admission 22,015 USD
- Gunshot wounds were the longest LOS
- 32 extremities attempted salvage, 84% success rate (27)
- Sharp mechanism, smaller area -> better salvage

When does rehabilitation and prosthetic fitting begin?
Surgical Considerations

- Preserve the physis!
- Disarticulation to prevent overgrowth
- Preserve limb shape
- Can ‘be creative’ with soft tissue coverage
- Stabilize joints
- Maintain muscle development

Hypothetical

- How does surgical length vary by age and reason for amputation?

3 year old  17 year old  80 year old
Pre-Prosthetic Care

- HEALING, HEALING, HEALING
- Pre-prosthetic shaping
- Volume control
- Contracture prevention, importance of ROM

Pre-Prosthetic Care

Figure of 8 Method to Wrap your Residual Limb

Before using shrinker

After using shrinker

Hold the bandage roll at the front of your thigh

Keep wrapping until there is no skin showing from your mid-thigh down
Rigid Removable Dressing
Timeline after Amputation

- Multiple questions after amputation from parents
  - When can we get a leg?
  - Why do we need to do therapies?
  - Why do we have one type of prosthesis now and get a new one later?

Questions from kids: Can I get designs on them?
Pediatric Principles

• Aid in meeting developmental milestones
• Functional with/without prosthetic device.
• Manage patient growth
• Pediatric specific amputee problems
• Different causes
• “Don’t keep a good kid down”
Prosthetic Timeline

• Lower extremity occurs when pulling to stand
• Occurs about 11 to 13 months for walking
• Used to assist with expected functional activities
• Knee units earlier and earlier (3ish)
# Energy Expenditure in Adults

<table>
<thead>
<tr>
<th>Level of Amputation (Correlates with traumatic amputee)</th>
<th>Increased Energy Expenditure above normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>BKA</td>
<td>20%–25%</td>
</tr>
<tr>
<td></td>
<td>(Short BKA—40%</td>
</tr>
<tr>
<td></td>
<td>Long BKA—10%)</td>
</tr>
<tr>
<td>BKA + BKA</td>
<td>41% (Gonzalez 1974)</td>
</tr>
<tr>
<td>AKA</td>
<td>60–70%</td>
</tr>
<tr>
<td>AKA + BKA</td>
<td>↑ 118% net cost (Traugh 1975)</td>
</tr>
<tr>
<td>AKA + AKA</td>
<td>&gt;200%</td>
</tr>
<tr>
<td></td>
<td>(260% Huang 1979)</td>
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</tbody>
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(Traugh, 1975; Gonzalez, 1974; Tan, 1998; Huang, 1979)
Pediatric Energy Expenditure

- 73 children from Texas. 10 minute self-selected walking speed.
- 29 Syme, 13 transtibial, 14 knee disartic, 5 transfemoral, 5 hip disarticulation, 7 bilateral amputees.
- Data: VO2, resting HR, walking VO2, walking HR, self-selected walking velocity.

Energy Expenditure Results

- Reduced walking speed transfemoral (80%) and hip disarticulation (72%). VO2 increase 151% and 161% of normal.
- Symes, transtibial and knee disarticulation walked close to the same speed and energy cost in the same age group.
- Less mass to move?

Pediatric Complications

• Terminal overgrowth
• Center of gravity shifts
• Less phantom sensation
• Limb length inequality/growth
• Dermatologic complications (especially puberty)
• Fitting issues, repeat prosthetics
Symes Amputation Growth

Photos courtesy of Heikki Uustal, MD
Van Ness Prosthetic

Photos courtesy of Heikki Uustal, MD
Specialized Prosthetics
Specialized Prosthetics

Gabi Shull
Cancer Survivor, Amputee, National Champion Dancer, National Spokesperson for The Truth 365

Never Give Up on Your Dreams

Gabi Shull
Dancers vs Cancer
Pediatric Amputees

• Less emotional stress than adult population
• More psychological overlay than congenital
• Better coping than expected
• Developmental level, temperament, stressors, coping style, past medical experiences, level of impairment all contribute
• At 8-9, understand limb deficiency more


Quality of Life Outcomes

- Long-term Psychosocial Outcomes Study: Pediatric amputation, disease free
- 85% married or going ‘steady’
- 85% worked at least part time
- 50% had some level of post-high school training
- Overall good adjustment despite medical interventions previously in life

Ecuador
Rehabilitation Mindset