In-service presentation
Kevin Roberts

Osseointegrated transfemoral amputation prostheses
Todays Topic

- Osseointegration for transfemoral amputees
- What is osseointegration
- How can it help above knee amputees
- Typical exercises for this surgery
Osseointegration

• Is the anchorage of an implant into the bone, and the bone tissue grows around the implant.
Osseointegration
Application

- Dental Implants
- Total knee and hip replacement
- For craniofacial prosthesis.
- (ear, nose, etc)
- Hearing devices
- Attachment of prosthetic limbs.
In Physical Therapy

- Gives above knee amputees another option aside from the typical prosthetic
- With physical therapy and surgeries, you will be with the patient for about a year
- Patient will have to work extensively on gait training and specialized loading exercises
Osseointegration

Surgery Stage 1

• The femur and surrounding muscles are prepared.
• The implant which is made of pure titanium is threaded into the medullary cavity of the femur.
• The use of pure titanium has been shown to stimulate stem cells into osteoblasts which anchors the titanium into the bone more effectively.
Healing Stage

- Normally 6 months
- Before any loading can occur the bone must grow into the threads to lock down the titanium implant.
Surgery Stage 2

- The implant is re-exposed
- An abutment is connected to the implant.
- The abutment is a safety that will break instead of the implant if excessive loading occurs.
- The skin is closed around the abutment, it extends outside the leg.
Abutment
Typical Prosthetics

- **Positives**
- No surgery
- **Negatives**
- Slow to don
- Increase/Decrease in bodyweight
- Require sleeve
- Skin irritation
- Pressure
Osseointegrated Prosthetic

- **Positives**
  - Quick to don
  - No socks or sleeves required
  - Don’t have to worry about fit
- **Negatives**
  - Surgery
  - Possibility of loosening
Therapy

• Begins after the second stage of surgery has healed
• Typically 6 months until patient can full weight bear on prosthetic
• Therapy will begin with weight bearing activities to load the implant
• It is a slow process
The first weeks after surgery

- Range of Motion exercises to prevent hip contractures
- Once skin has healed typically 4 to 6 weeks, weight shift training can occur
- Training will start with a short training prosthesis
Weight-Bearing

- Patient will have to learn how to weight bear and weight shift.
- Patients can practice gentle weight bearing and shifting using a scale.
- Patients start at 45lbs twice daily for 30 minutes and move up 20lbs every week.
Weight-Bearing

• The patient will perform this weight shifting exercise until he or she can bear their full weight on the prosthetic without any pain
• During this time a generalized hip ROM and muscle strength routine will be added
Crawling

• After several weeks the patient may begin crawling

• This helps the patient get use to the load that his/her femur will be subject to once they start walking

• It is also a way to exercise the entire body
Resistance with bands

- Usually around the 9 week mark patient may begin band training with the prosthetic

- Thera-band exercises for hip abduction, adduction, flexion and extension

- Helps aid hip strength for future prosthetic
Gait

• Around the 11\textsuperscript{th} week
• Patient can begin gait training with a prosthetic leg
• Start in parallel bars
• Work on donning and doffing prosthetic
• Practice standing w/o assistive device
• Patient needs to use prosthetic twice daily for one hour indoors with bi-lateral axillary crutches PWB
Gait

- After several weeks the patient will increase time spent on prosthetic leg while using crutches
- Gradually increasing weight on prosthetic
- Practice driving
- Walking outdoors
- Up and down stairs
- During this time patient will still be required to train with short training prosthesis
Gait 16-24 weeks

- Patient can begin wearing prosthesis all day
- Walk on slopes and un-even ground
- Use exercise bike
- Training on stairs and curbs
24 Weeks

- Follow up X-Rays
- Team decision regarding walking without assistive devices
QUESTIONS?
Refrences

• “One hundred patients treated with osseointegrated transfemoral amputation prosthesis-Rehabilitation perspective.” JRRD Journal of Rehabilitation Research and Development. VOL. 46, Number 3, 2009. pages 331-344. Kerstin Hagberg, RPT, PhD; Rickard Branemark, MD, PhD.

• “Osseointegration” Rickard Branemark MD, MSc, PhD. Taken from www.rehab.research.va.gov/meet/osseointegration.pdf.

• “Functional outcome of transfemoral amputees fitted with an osseointegrated fixation: Temporal gait characteristics” Laurent Frossard, PhD, Kerstin Hagberg, PhD, Eva Häggström, CPO, David Lee Gow, MSc (Rehabilitation), Rickard Brånemark, PhD, Mark Pearcy, PhDeristics.” Taken from: www.oandp.org/jpo/library/2010_01_011.asp