

The physical therapy treatment of children with rotationplasty: BCCH's experience

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Objectives:

1. Understand the types of rotationplasty
 - a. benefits of procedure
 - b. potential complications of procedure
 - c. physical therapy treatment techniques used during rehab
2. Understand the role of physical therapy throughout continuum of care of a child with rotationplasty
3. Identify potential coping tools for children and adolescents with rotationplasty

Types of rotationplasty

- Rotationplasty procedure dependent on tumor location (Winkleman 1988; Fuchs and Sims 2004)
- ankle acts as the knee e.g. plantar flexion = knee extension
- 3 types:
 - A1 (distal femur)
 - A2 (proximal tibia)
 - BII (proximal femur)



Types of rotationplasty cont.



- type of rotationplasty helps determine muscles action
 - gastroc versus quadriceps dominant
- the long adductors are removed during surgery
- peronei act as proprioceptors (?)
 - PT meets with patients at time of diagnosis (regardless of procedure)

Benefits of rotationplasty

- allows for growth in younger child/adolescent
- foot remains as a weight bearing surface
- phantom pain does not occur*
- single surgical procedure

- benefits

- durable reconstruction with proprioceptive input from foot (Fuchs et al 2003)
- high level of function and excellent quality of life is achievable e.g. sports, normal gait pattern (Veenstra et al 2000; Hillmann et al 2007; Hillmann et al 2000)

Early Complications (Brown 2001)

- Vascular compromise
 - ROM restrictions for first 3-5 days
 - hip flexion < 60 degrees (for Day 1); < 80 (Day 2-7)
 - Doppler monitoring q 15-30' for first night post op and then depending on circulation
- Skin breakdown
 - Toes/dorsum of foot
- Nerve injury

Immediate post operative care (Brown 2001)



- egg crate or appropriate mattress
- patient positioning with toes elevated off of bed
- first 24 hours = day of rest
- active pumping of foot, +/- AAROM hip Abd/Add

Seating

- Wheelchair: adaptation: requires longer support and adequate cushioning on affected side
- ADL assessed and adaptations provided as required to improve independence
 - e.g. bath bench, reacher
- forearm crutches



Post-operative Physical Therapy

- mobilization begins day 2, initially with movement restrictions
 - Hip flexion < 80°
- up to dangle at edge of bed, mobility progressed
- **ACTIVE** ROM of ankle only; AAROM hip
- patient safe on flat and stairs prior to discharge home

Post-operative Physical Therapy

- "my leg doesn't feel backwards"
- glut strengthening begins; prone lying
- neuromuscular retraining begins
 - visual confusion eliminated
 - alphabet range of motion
 - lots of repetition



Physical Therapy Rehabilitation



- mobilization of patient e.g. ADL, curbs, floor to standing
- strengthening, muscle activation, balance (de Visser et al 2001) and gait retraining
- coordination home therapy

Physical Therapy Rehabilitation

□ core strengthening!

- focus on core stability with all ex.
 - hip extension with abduction without posterior pelvic sway
- stimulate anterior thrust on affected side pelvis (*tail wagging the dog)



Prosthetic fitting



- fitting of prosthetic device occurs ~ 6 weeks post op
- Prosthetist should be familiar with rotationplasty
- prosthetic socket type dependent on shape of leg, plantar flexion available, age of child
- receiving prosthesis is important milestone (Forni et al 2012)

Physical Therapy Rehabilitation

- gradual increase in wear time
- gait training with locked knee begins
 - protect soft tissue anastomosis
- hip hiking rather than circumduction to clear foot
- turning, stairs reviewed



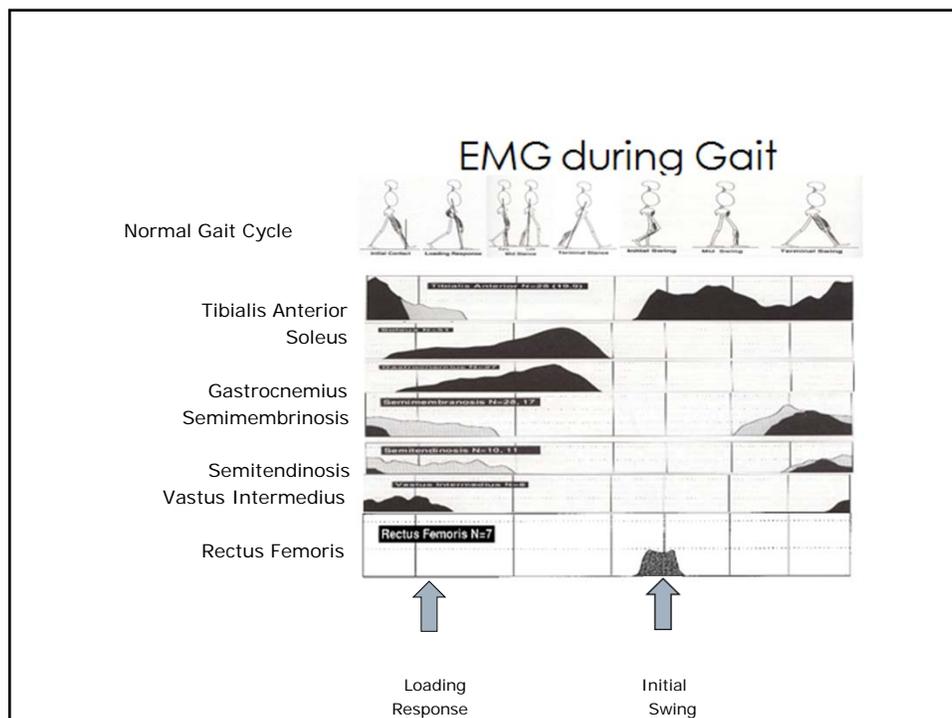
Physical Therapy Rehabilitation

- even weight bearing in stance
- knee unlocked at 1-2 weeks after completion of chemo
- gradual progression of skill acquisition
- eliminate hip hike with emphasis on even stride



Physical Therapy Rehabilitation

- assessed for prosthetic changes as required (height/weight gain)
- patient seen once every 1-2 weeks initially
 - emphasis on strengthening of gluts, ankle musculature, gait and balance retraining, cardiovascular reconditioning, skill acquisition
- normalization of gait takes ~ 2 years children followed through the Sunny Hill Gait Lab (*Curtze, Otten and Postema 2010)



Re-formation of body image

- integration of new body image takes place in stages (Medcalf 1987)
 - initially post op don't want to look at new leg
 - control over movement, acquisition of independent mobility and new skills
 - fitting of prosthesis/first steps
- unlocking of knee and beginning of "normal" walking and integration of sensation (*Curtze, Otten and Postema 2010)

Self esteem

- offer support if from out of town utilizing social media, email etc.
- mentors for new "club members"
- patient to patient advice appears to be more valued
- teen group - provision of age appropriate opportunities to socialize e.g. movies, makeup nights, hockey games
- initially in protective environment (away from home or friends for medical reasons)



Return to "life on the outside"- school

back to
School



- child/family may request community education regarding child's return to class
- parent/school package provided with explanation of: fatigue; potential accommodations (e.g. 2 sets of texts/lockers; $\frac{1}{2}$ days to start; minimizing trip hazards)

-school

- arrange for classes to be grouped into one area/level of school if possible
- at time of return to school prosthetic wear is full time
 - have outward "normal" appearance
- individual education programs (IEP) can include a credit for rehabilitation (PE) during chemotherapy
- PE focus on reintegration
- begin integration of community sports depending on skill level and interest of child
- FATIGUE!!!!

Return to life on the outside -being "me"



- "Teen Adventures" sponsored by "Balding for Dollars"
 - variety of outdoor activities (4-6 days long)
 - e.g. horseback riding; white water rafting; kayaking; surfing; dog sledding; tall ship sailing
- teens complete application form reviewed by committee
- sibs are able to attend
- places teen in safe/ challenging situations with new peer group

-being "me"

- participants required to help cook, clean etc. helping them to attain independence and confidence
- often first time away from home by themselves
- emphasis is NOT group soul searching but outdoor fun

Long term - activity

- when boney union achieved activity level is elevated to match patient desire
- finessing gait/stair climbing/strengthening to meet demands of patients lifestyle allows patient to "blend in"
- high level activity can be achieved
(Hillmann et al 2007; Akahane et al 2007;)

-activity: sport choice

- prosthetic adjustment may include knee hinge brakes to limit hyper ankle flexion
- female patients may require different prosthetic feet to accommodate different heel heights
- snowboarding, skating, cycling, skiing (downhill and cross country), rock climbing, golf, kayaking (Hillman et al 2007; Hopyan et al 2006; Owens et al 2011)

Late effects of treatment

- reduced bone mineral density (Pirker-Fruharf et al 2012)
 - stress fractures not uncommon initially
- minimal degenerative X-ray changes in ankle
- skin callus and blisters on main loading areas of foot (Gebert et al 2006)
- ingrown toe nails

Long term - quality of life

- numerous studies indicate superior QOL for patients with rotationplasty when compared to limb sparing surgery or amputation (above or below knee) (Potsma et al 1992; Zahlten-Hingurange et al 2004)
- job satisfaction and ability to marry are all equal to other forms of reconstruction

- quality of life: Sexuality

Sexuality:

- ❑ 1/3-1/2 reported negative effects on initiating social and/or intimate contacts, body image and sexuality (Veenstra et al 2000)
- ❑ survivors with rotationplasty and amputation have less depressive symptoms, better self-perception and sexual function when compared to other types of limb salvage (Barrera et al 2010)

Thank you!

- ❑ To the kids
- ❑ To the families
- ❑ To the TEAM
- ❑ To you for your interest!!!



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