Rehabilitation Guidelines after Periacetabular Osteotomy (PAO)

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Objectives

- To discuss the patient criteria for selection for a PAO procedure
- Describe the surgical procedures utilized for PAO
- Discuss the rehabilitation guidelines implemented after PAO
HIP PRESERVATION
Classifying Hip Pain

Classifying hip pain:
- Non-hip disorders with referred pain
- Extra-articular hip disorders
- Intra-articular disorders without structural abnormality
- Structural abnormalities
- Advance intra-articular disorders
  - Clohisy et al, 2005
Indications for Hip Preservation Surgery

- Age < 40 yo
- Epiphyseal plates closed
- Acetabular dysplasia present
- Hip flexion ROM > 100°
- OA
  - Mild to moderate OA in those with well preserved hip ROM and joint congruency
    - Clohisy et al, 2005; Pogliacomi et al, 2005
Contraindications for Hip Preservation Surgery

- Lack of congruency between acetabulum and femoral head
- Open physes
- Complete dislocation
- Advanced OA
- Advanced age at which time a THA would give good results
Imaging Indications

- A/P and Lateral Rx Views:
  - Pelvis
    - Increased acetabular retroversion (cross over sign)
      - Normal = 15° - 20° of anteversion
    - Acetabular protrusion

- Measurements:
  - Tonnis angle (AI):
    - Normal < 10°
    - Abnormal ≥ 15°
  - Center edge angle of Wiberg:
    - Normal > 25°
    - Dysplasia < 15°
      - Nunley et al. 2011

Mechlenburg et al. 2007
Labral Involvement

- Almost 50% prevalence of labral tear in those with mild to moderate dysplasia
  - Majority anterior tears
  - Few posterior or lateral tears
    - No isolated posterior or lateral tears
      - McCarthy et al, 2001; Peelle et al, 2005
- Arthroscopic labral debridement:
  - Short term relief
  - Not recommended alone
  - Anterolateral cartilage damage
    - Kain et al, 2011
PAO
What is PAO?

- Augmentation and reorientation of the acetabulum to improve femoral head coverage
- Most commonly used is Bernese PAO, 1983
- Polygon-shaped Acetabular Osteotomy
- Encompasses ischium, pubis, and iliac portions of the pelvis
- Freed osteotomized acetabulum is reoriented in desired position and fixated with cortical screws.
- Restores lateral and anterior center edge angles
  - Pogliacomi et al, 2005
Purpose of PAO Procedure

- Normalize osseous anatomy
- Improve hip biomechanics
- Decrease articular surface overload
- Relieve impingement
- Decrease risk of premature secondary OA

Clohisy et al, 2005
Additional Procedures & Complications

- In addition to the PAO, patients may also undergo:
  - Cam resection
  - Proximal femoral osteotomy
  - Labral repair or debridement

- Complications
  - Transitory lateral femoral cutaneous nerve palsy
  - Malpositioning
  - Nonunion
  - Sciatic nerve lesion
  - Necrosis of acetabular fragment
  - HO
Benefits of PAO

- Abductor, hip flexor & ER sparing
- Preserves the posterior column
- Enables multiplanar corrections
- Preserves acetabular blood supply
- Reliable healing
- Preserves true pelvis

- Accelerated rehabilitation
- Delays need for THA
  - Clohisy et al, 2005; Pogliacomi et al, 2005
- 60% of hips survived avg of 20 years
  - Steppacher et al, 2008
PROTOCOLS
General Guidelines

- **NO:**
  - Significant AROM hip flexion – 8 weeks
  - SLR – 8 weeks
  - Simultaneous hip extension and knee flexion – 8 weeks
  - Driving until FWB
  - No pool until 3 weeks

- Raise toilet seat

- Avoid excessive extension and ER (legs crossed, etc.)

- Do NOT push flexion – 12 weeks
PHASE I (0-6 weeks)
Home Health or HEP

- Precautions:
  - FFWB for 20# x 6-8 weeks
  - PROM/AROM: 3 weeks
    - Flexion: ≤ 90°
    - CPM to 60° for ≥ 4-6 hrs/day for 2-4 weeks
  - Extension: 0-5°
  - IR/ER: 0-20°
  - Abduction: 0-45°

- Ice:
  - Day: 0-7 – All day
  - 7+ – 2-3x/day
PHASE I (0-6 weeks) Cont.
Home Health or HEP

- **Exercises:**
  - Quad and glute sets
  - Isometrics
  - Ankle pumps
  - LAQ
  - Standing HS curl
  - Heel slides to 90°
  - AROM all directions*
  - Upright bike (3 weeks)
  - Standing hip abduction (4 weeks)

- **Stretches:**
  - Non-operative knee to chest stretch
  - Long sit HS
  - Prone knee flexion
  - Progressive “belly” time

- **Manual: Grade I to II mobilizations**
  - AP glide
  - Long axis distraction
Phase I: Criteria for Progression to Phase II

- Low to no pain with ADL’s (≤4/10)

- Pain/pinch free ROM:
  - PROM flexion: > 100°
  - PROM abd: > 40°
  - AROM extension: > 5°
  - Quadruped rock: > 110°

- Muscle strength: Pain free up to 60 reps
  - Prone extension
  - LAQ
  - Standing knee flexion
  - Posterior pelvic tilt
  - Prone glute set
PHASE II (6-8 weeks)
Physical Therapy

- Precautions:
  - PROM/AROM:
    - Within comfort level
    - No IR in flexion
  - WBAT
    - Avoid twisting
PHASE II (6-8 weeks) Cont.

- **Exercises:**
  - Standing hip abduction + resistance (8 weeks)
  - Quadruped rocking
  - Bent knee fall out
  - Plank progression
  - Clams/Sidelying abd
  - Child’s pose
  - Cat/camel
  - Core strengthening
  - Short lever extension
  - Prone IR/ER isometrics

- **Stretching:**
  - All LE flexibility exercises

- **Manual:**
  - + Scar massage/desensitization
Phase II: Criteria for Progression to Phase III

- Low to no pain with ADL’s (≤3/10)
- Pain/pinch free ROM:
  - PROM flexion: > 115°
  - PROM abd: > 45°
  - WFL:
    - ER, extension, quadruped rock
- Muscle strength: Pain free
  - Prone extension
  - Prone IR/ER
  - LAQ
  - Standing knee flexion
  - Standing march to 90°
  - Sidelying abd

- Functional tasks:
  - SL balance for 60’’
  - Ellip x 5’
  - Bike x 20’
PHASE III (8-12 weeks)

- Precautions:
  - ROM:
    - Avoid extremes of ROM in all directions
    - No forced rotation
  - WB:
    - Progress off crutches as tolerated
PHASE III (8-12 weeks) Cont.

- **Exercises:**
  - Hip rotation
  - Stand/sit resisted ER
  - Stool
  - Backwards and side stepping
  - Prone IR/ER
  - Bridge progression
  - Core roll outs
  - Squats/leg press to 45°
  - ¼ Lunges
  - Step ups
  - Heel taps
  - Standing trunk rotation

- **Standing trunk rotation**
- **Proprioception training**
- **Advanced bridging**
- **Cable column hip strengthening**

- **Stretching:**
  - Knee to chest stretch
  - Prone quad stretch

- **Manual: Grade III mobilizations**
  - Inferior, lateral distraction, long axis traction, AP
  - STM: TFL, Psoas
PHASE IV (12-20 weeks)

- Precautions: Avoid forceful ROM, not too deep with TherEx

- Exercises:
  - Dynamic balance drills
  - Hip strengthening is main focus
  - Lunge matrix
  - Tri-planar movements
  - Agility drills
  - Sport specific drills/plyos
  - Gradual hip flexor strengthening

- Manual: Higher grade mobilizations
  - Cont. STM
PHASE V (>20 weeks)
Criteria: Return to Sport/Running

- Full pain free ROM
- Strength testing > 90% of uninvolved side
- Cardio respiratory fitness at pre-injury level
- Completion of sport specific loading and functional training program

Progress:
- Bilateral ➔ unilateral ➔ multiplanar
- Acceleration/deceleration
  - Sagittal ➔ frontal
- Tippet, 2006
THANK YOU!
References


References


- Wells JE. Periacetabular osteotomy protocol handout. 2018;1-3.