Total Hip Arthroplasty

Mercy Orthopedist Types of Approaches

- Mercy Has a total of 16 Orthopedist that perform all three different approaches
  - Posterior
  - Anterior Lateral
  - Direct Anterior

Direct Anterior Hip Replacement

- The anterior approach utilizes an interval between the sartorius and tensor fascia latae. (higher learning curve for orthopedist)
- Unlike the Posterior or Anterior Lateral approaches, the deep hip musculature is spared; and does not have to be reflected off the skeleton and then re-attached.
  - Rate of dislocations
  - Recovery Rate

DAHR Procedure

- The hip is exposed by following a natural plane between the sartorius and tensor fascia latae
  - Avoiding detachment of muscle or tendons from the bone.
- The femoral neck is cut and the arthritic femoral head and neck are removed.
- “Ream” out the arthritic acetabulum.
  - A hemispherical shaped reamer rotates on the end of a shaft. Reamers of gradually increasing diameter accurately shape the bone of the acetabulum to accept the acetabular prosthesis.
- The leg is externally rotated and extended via the table.
  - Progressively larger broaches are inserted into the femoral canal until the hard outer cortical bone is contacted.
Animated video of the DAHR

- [http://www.youtube.com/watch?v=Bwi0i1Etbpl](http://www.youtube.com/watch?v=Bwi0i1Etbpl)

Anterior Hip Precautions

- So, what are the precautions?
  - Avoid extremes in hip extension (past normal gait/stride)
  - No "extremes" in flexion (knee to chest/chest to knee)

- How long do they stay precautions? 8 Weeks

Rehab Advantages- Anterior Hip

- Work into positions normally couldn't with a posterior approach due to difference in dislocation precautions.
- Quad stretching
- Hamstring stretching
- Piriformis stretching
- Stretching into ER

Rehab Precautions- Anterior Hip

- High Frequency of Tendonopathy
- Dialing Back Patients

Will the Direct Anterior Approach be more requested in the CJR Model?

- Less Post-Op Pain
- Quicker Discharge
- Less Blood Loss and Transfusions
- Higher Functional Scores at 1 and 3 Months

Comparison Research


- Retrospective comparative study using MRI
- 25 patients in each group / one year post-op
- DAHR = significantly less pronounced and less frequent:
  - Detachment of the abductor insertion
  - Partial tears and tendinosis of gluteus medius and minimus
  - The presence of peri-trochanteric bursal fluid and fatty atrophy of gluteus medius and minimus
- There was no significant difference in the findings regarding tensor fascia latae between the two approaches.
Comparison Research
Prospective randomized study of two surgical approaches for total hip arthroplasty, **Anterior vs Direct lateral approach**
- One hundred patients / Up to 1 & 2-year follow-up
- Same postoperative protocol
- Functional outcome was assessed pre & post-operatively
- Anterior group demonstrated significantly better improvement in both the mental and physical health dimensions of Short Form-36 and Western Ontario McMaster Osteoarthritis Index compared with direct lateral approach group

Comparison Research
Gait asymmetry following an anterior and anterolateral approach to total hip arthroplasty
Clinical Biomechanics. 25(7):675-80, 2010 Aug. UI: 20542608
- 12 anterior, 11 anterolateral, 10 age matched controls
- DAHR = Improvement in gait symmetry at 6 weeks post-operative, as compared to pre-operative
- No such improvement was observed in patients receiving the anterolateral approach.
- Where as it took 16 weeks following surgery for the anterolateral approach to show improvement in gait.

Neuro Research:
**Thalamic atrophy associated with painful osteoarthritis of the hip is reversible after arthroplasty: a longitudinal study.**
- 16 patients with unilateral right-sided hip pain, before and 9 months after hip arthroplasty.
- Significant differences in brain gray matter volume between healthy controls and patients with painful hip arthritis were seen, specifically, areas of the thalamus.
- Thalamic function includes:
  - Relaying sensation
  - Spatial sense
  - Motor signals to the cerebral cortex
  - Regulation of consciousness, sleep, and alertness
- Conclusion:
  - 9 months after surgery the areas of reduced thalamic gray matter volume were found to have "reversed" to levels seen in healthy controls.
  - These changes reverse after hip arthroplasty and are associated with decreased pain and increased function.

Gluteus Medius Atrophy
Gluteus medius muscle atrophy is related to contralateral and ipsilateral hip joint osteoarthritis.
- Weak Gluteus medius may be the result of ipsilateral osteoarthritis, but may especially predispose the contralateral hip to develop osteoarthritis.
- A weakened gluteus medius lacks the capacity to aid in shock absorption in the load transfer during gait.
- Muscle strengthening is therefore recommended.
Gluteus Medius Research

Persisting Muscle Atrophy Two Years After Replacement of the Hip
UI: 19407289
- Two years, THR vs healthy limb = reduction in the cross-sectional area in hip adductors, gluteus maximus, gluteus medius/minimus.
- Persistent muscle atrophy in muscles acting about the hip two years after THR.
- Impact on the CJR?

Gluteus Medius Research

The Association Between Degenerative Hip Joint Pathology and Size of the Gluteus Medius, Gluteus Minimus and Piriformis Muscles
UI: 19695944
- Glute MED = Atrophy with advanced hip pathology
- Glute MED = Hypertrophy with mild pathology, compared to matched control hips. (?)why?
- Assessment and exercise prescription methods should consider that the response of muscles of the abductor synergy to joint pathology is not homogenous between muscles or across stages of pathology.

Gluteus Medius Research

Electromyographic analysis of gluteus medius and gluteus maximus during rehabilitation exercises
Exercise condition Gluteus Medius
- Side plank abd, DL down 103% of MVIC

Gluteus Medius Research

Electromyographical Analysis of Selected Lower Extremity Muscles During 5 Unilateral Weight-Bearing Exercises
Ayotte et al. J osteo 2007 2234 UI: 10.2519
- Wall Squat 52 86
- Mini-Squat 36 57
- FSU 44 74
- LSU 38 56
- RSU 37 59

Gluteus Medius Research

Randomized controlled trial of abductor muscle damage in relation to the surgical approach for primary total hip replacement: minimally invasive anterolateral versus modified direct lateral approach
- Abductor muscle and tendon damage occurred in both approaches
- The gluteus medius muscle can be spared more successfully via the minimally invasive approach and is accompanied by a better clinical outcome
- Going through the intermuscular plane, without any detachment or dissection of muscle and tendons, truly minimizes perioperative soft tissue trauma
Gluteus Medius Fail...

- Abductor Tendons and Muscles Assessed at MR Imaging after Total Hip Arthroplasty in Asymptomatic and Symptomatic Patients

- 2 asymptomatic versus 22 symptomatic patients had gluteus minimus defects
- 4 asymptomatic versus 24 symptomatic patients had lateral gluteus medius defects
- 0 asymptomatic versus 7 symptomatic patients had posterior gluteus medius defects.

Piriformis Research

- Recruitment and activity of the pectineus and piriformis muscles during hip rehabilitation exercises: an electromyography study.

- Exercise
  - Prone heel squeeze: 34%
  - Single-legged bridge: 34%
  - Double-legged bridge: 18%
  - Traditional hip clam: 15%
  - Resisted knee extension: 16%

Piriformis Failure...

- Piriformis Tendon Repair Failure After Total Hip Replacement

  - 8 of the 10 (80%) repairs failed during the early postoperative period
  - We believe that repair of the piriformis tendon is of no significant benefit to the stability of a total hip replacement joint.

Piriformis Failure...

- Failure of Reinserted Short External Rotator Muscles After Total Hip Arthroplasty

  - >/=2.5 cm indicated failure
  - Of 50 repaired short external rotator muscles, 35 of them, or (70%) failed
    - 26 within the first day
    - 9 within 3 months postoperatively
  - Repair of the short external rotator muscles after total hip arthroplasty contributes little to prevention of hip dislocation.

Piriformis Failure...

- Failure of Capsular Enhanced Short External Rotator Repair After Total Hip Replacement

  - By three months post-op, 15 of 20 (75%) of the capsular enhanced repair of the short external rotators failed
    - 3 within the first day
    - The other 12 within the first 3 months

Clinical Considerations

- How long do we wait to do true resistance training to a repaired rotator cuff tendon?
- How should PT wait to approach true resistance training after a poster or anterior-lateral hip arthroplasty?
Clinical Considerations

• So, why do we give our patients a walker?
  • Reduce falls
  • Improve gait mechanics
  • Take tension off of healing tissues (Respect the Phase of Healing)
    • Piriformis and deep hip rotators
    • Hip abductors

Clinical Considerations

• Apply resistance according to:
  • Physiologic time frames for healing
  • Ability to perform the preliminary movement pattern great
    • Add Load to solid movement patterns
    • Reduce load on dysfunctional movement patterns
  • Build in a logical progression
    • Neurological progression
    • One plane of motion to multiple
    • Incorporate whole body movement, IE Upper Extremity Chops

Clinical Considerations

• So, what are the “best” hip exercises for a total hip patient:
  • Surgical approach?
  • Soft tissues involved?
  • How far out from surgery?
    • 0-6 weeks post surgical?
    • 6-12 weeks post surgical?
    • 12+ weeks?