



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

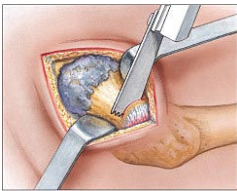

- The anterior approach utilizes an interval between the **sartorius** and **tensor fascia latae**. (higher learning curve for orthopedist)
- Unlike the Posterior or Anterior Lateral approaches, the deep hip musculature is spared; and does not have to be reflected off the skeleton and then re-attached.

 Rate of dislocations
 Recovery Rate



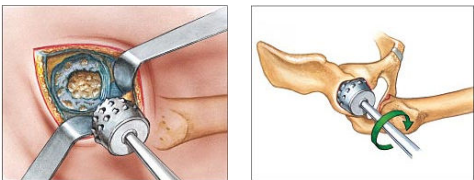

DAHR Procedure

- 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.

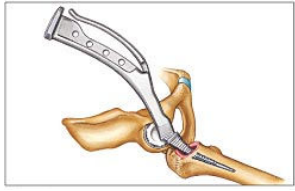

DAHR Procedure

- “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.

DAHR Procedure

- 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>



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?

- **Study of Direct Anterior vs Postero-lateral approach for THA**, *Journal of Arthroplasty*, 2013 October; 28(9):16345-8
- **Less Post-Op Pain**
- **Quicker Discharge**
- **Less Blood Loss and Transfusions**
- **Higher Functional Scores at 1 and 3 Months**



Comparison Research

Soft-tissue changes in hip abductor muscles and tendons after total hip replacement: Comparison between the direct anterior and the transgluteal approaches *Journal of Bone & Joint Surgery - British Volume*. 93(7):886-9, 2011 Jul. UI: 21705558

- 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 tendonitis 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 Journal of Arthroplasty. 25(5):671-9.e1, 2010 Aug. UI: 21705558


- 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. Arthritis Rheum. 2010 Oct;62(10):2930-40. UI: 21705558

- 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



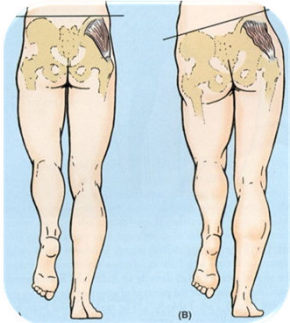

Neuro Research :



- **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 Research

Gluteus medius muscle atrophy is related to contralateral and ipsilateral hip joint osteoarthritis. Int J Sports Med. 2007 Dec;28(12):1035-9. Epub 2007 May 29. UI: 17534787

- 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
 Journal of Bone & Joint Surgery - British Volume. 91(5):583-8, 2009
 May. J Ul: 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
 Grimaldi A, Richardson C, Stanton W, Durbridge G, Donnelly W, Hides J. Manual Therapy. 14(6):605-10, 2009 Dec. Ul: 19695944


- Glute MED = Atrophy with advanced hip joint 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
 Int J Sports Phys Ther. 2011 Sep; 6(3): 206-223. PMCID: PMC3201064

Exercise condition **Gluteus Medius**





- Side plank abd, DL down **103% of MVIC**



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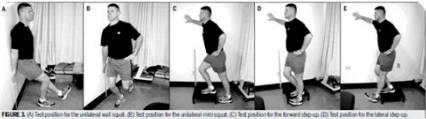
Exercise condition	Gluteus Medius
• Single limb deadlift	56%
• Single limb bridge, stable	54%
• Clamshell (Hip Clam) 1	47%
• Quadruped hip ext, DOM	46%
• Quadruped hip ext, non-DOM	22%

Gluteus Medius Research

Electromyographical Analysis of Selected Lower Extremity Muscles During 5 Unilateral Weight-Bearing Exercises
 Ayotte et al. Jospit.2007.2354 Ul: 10.2519

Muscle	Glut Med	Glute Max
• Wall Squat	52	86
• Mini-Squat	36	57
• FSU	44	74
• LSU	38	56
• RSU	37	59

Gluteus Medius Fail...

- 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** Arch Orthop Trauma Surg. (2011) 131:179-189
- 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** RSNA Radiology. June 2005, Vol. 235, Issue 3
 - 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. Am. J. of Sports Med. 40(7):1654-63, 2012 Jul

Exercise	%MVIC Piriformis
• 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.** Orthop Rev. 1992;21:171-174
 - 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** J Arthroplasty. 2002;17:604-607
 - ≥ 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 Clinic** Orthop Number 420, March 2004:199-204
 - 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?

