Osteoarthritis of the Hip -Conservative to Operative treatment

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Osteoarthritis of the Hip

- Defined as degenerative joint disease with progressive loss of articular cartilage
- Incidence is 88 per 100,000 symptomatic cases per year
 - Less common than osteoarthritis of the knee
 - Incidence slightly higher in females
- Results in pain and stiffness that is slowly progressive
- Most common cause is idiopathic; "wear and tear"
- Many risk factors

The Burden of Hip Osteoarthritis in the US

Musculoskeletal Disease affects quality of life and function

- Adults are living longer due to improvements in medicine. The CDC estimates that between 2005 and 2030, the percentage of the US population aged ≥65 years is expected to increase from 12.9% to 20.0%
- The US Census Bureau has predicted the population will grow 18% between 2000 and 2020 and is projected to reach 400 million by 2043. Of the estimated 78 million baby boomers expected by 2030, >33% will be obese, 50% will have OA, and 60% will have more than one chronic condition
 - The projected number of older adults with arthritis or other chronic musculoskeletal joint symptoms is expected to nearly double, from 21.4 million in 2005 to 41.1 million by 2030. The burden of hip OA is increasing due to the aging population and the obesity crisis; as a result, the need for total hip arthroplasty (THA) is expected to grow 174%
 - 572,000 primary THAs per year by 2030 in the United States
- Persons living with OA tend to have a reduced quality of life and increased mortality compared with persons without OA

Risk factors		
	Modifiable	Non-modifiable
	Post-traumatic	Gender
	Muscle weakness	Increasing age
	Heavy manual labor	Genetics
	High impact sports	Developmental deformities

Ganz et al argued that ≥90% of hip OA could be attributed to an underlying condition, with mechanical factors such as acetabular dysplasia and impingement playing the largest roles

Pathophysiology

- Due to progress loss of cartilage
- Cartilage is a complex structure consisting of water, collagen, and

proteoglycans

- Proteoglycans resist compressive forces
- \circ With aging, the water content, proteoglycan content, and # of chondrocytes decrease
- With increasing inflammation, the synovium becomes thick and hypervascular. Subchondral bone attempts to remodel and becomes sclerotic

Genetics & Anatomy

Genetics:

In a study of Finnish twins, heritability of OA was found to be greater in females than in males

Anatomy differences:

- The articular cartilage of the distal femur is less thick in women than in men
- For a given anteroposterior dimension, the female femur is narrower than the male femur
- There are estrogen receptors in cartilage





Osteonecrosis of the Hip

Causes:

- Idiopathic
- Chronic steroids
- Alcoholism
- Coagulopathies
- HIV proteases
- Post-traumatic
- Transplant recipients

PROGRESSION OF AVN- X-RAYS



Radiographic findings







Presentation

- 1. Pain
 - a. At night, at rest, or during activity
- 2. Functional limitations
 - a. Walking endurance, previous activities, ability to perform ADLs
 - b. Pts typically have difficulty when getting into/out of a vehicle or when putting on shoes and socks
- 3. Stiffness
 - a. Pain leads to avoidance of motion
 - b. Flexion, external rotation contractures
 - c. Adduction contractures
- 4. Mechanical symptoms
 - a. Instability ("leg giving out"), clicking, locking

Presentation

Antalgic gait pattern

Reduction of joint reaction force:

2- Reduction of abductor muscle force:

This could be achieved by reducing the moment arm of the gravitational force through <u>lateral leaning of</u> <u>trunk towards the side of pain or weakness.</u>

- If the lateral trunk lean is due to <u>hip abductor weakness</u>, gait is called **gluteus medius gait**.
- If it is due to <u>hip joint pain</u>, is called **antalgic gait**.



Physical Exam

1. Inspection

- a. Gait
- b. Body habitus
- c. Leg leg discrepancy
- d. Previous incisions or scars
- e. Quality of the skin envelope
- 2. ROM
 - a. Typically limited in internal rotation
 - b. Limited flexion or extension commonly seen
- 3. Neurovascularly exam
 - a. Radicular symptoms, dermatomal sensory loss, or muscle weakness may suggest lumbar spine pathology

Physical Exam

1. Always compare the unaffected side to the affected side

Why?

- Look for limb shortening (typically from contractures)
- Get a sense for what is 'normal'
- Identify those who are symptomatic despite appearance of xrays
- 2. Always examine the lumbar spine

Why?

• Rule out other causes of hip pain





Radiographs

Findings:

- Subchondral sclerosis or cysts
- Joint space narrowing
- Peripheral osteophytes



Treatment options

Conservative:

- 1. Medication
- 2. Activity limitation
- 3. Physical therapy
- 4. Assistive devices
- 5. Weight loss
- 6. Corticosteroid injections
- 7. Alternative treatments
 - a. Viscosupplementation, supplements, manual therapy

Risk Factor	Screening BMI (kg/m2)	Modification diet, exercise, bariatric surgery	
Obesity			
Diabetes	HgbA1C, pre-op glucose	diet, medication	
Metabolic syndrome	HgbA1C, BMI, cholesterol	diet, medication	
Malnutrition	albumin, WBC	diet, underlying etio	
Smoking	history, cotinine serum test	counseling, pharmacologic,	
Chronic Pain	history, urine drug test	counseling, pain management	
Psychiatric	history, PHQ-9 screening	counseling, antidepressants	
Recent Injection	history	delay 3 months	
Age	birthday	young - activities restrictions, wear rates;	
		old - postop complications	
Nasal Colonization	nasal swab	Mupirocin, Chlorhexidine wipes, Vancomycin	

Conservative Treatment options

Medical management of hip osteoarthritis

- <u>NSAIDs</u>
 - Improve short term pain and function in patients with symptomatic OA
 - Must balance benefits with side effects
 - Strong evidence
- Opioids
 - \circ $\,$ No consensus for long term use due to lack of reliable evidence

Preoperative use of opioids before THA

• A total of 389 patients with THA with both preoperative and postoperative PROMs were reviewed: 76 patients with preoperative opioid use (24%) and 237 patients without preoperative opioid use (76%). Patient demographics and clinical information including opioid use, length of stay, and implant information.

Results: Preoperative opioid users were more likely to stay in the hospital longer (P = 0.004) and be discharged to a rehabilitation facility (P = 0.038). Postoperatively, the Physical Function Short Form 10a (P = 0.021) and Patient-Reported Outcomes Measurement Information System Global-10 (P < 0.001 physical, P = 0.001, mental) were significantly lower in the preoperative opioid users. Within groups, both nonusers and preoperative opioid users saw improvements after THA in Hip Disability and Osteoarthritis Outcome Score-Physical Function Short Form (P < 0.001), Short Form 10a (P < 0.001), and Patient-Reported Outcomes Measurement Information System Global-10 (P < 0.001), Short Form 10a (P < 0.001), and Patient-Reported Outcomes Measurement Information System Global-10 (P < 0.001), physical and P = 0.008, mental).

Conservative Treatment options

- Activity limitation
- Physical therapy
- Aquatic therapy

CPG - Strong evidence supports the use of physical therapy as a treatment to improve function and relieve pain for patients with mild to moderate symptoms of OA.

RCT of Aquatic Therapy for Hip and Knee OA

Results

The intervention resulted in less pain and joint stiffness and greater physical function, quality of life, and hip muscle strength. Totals of 72% and 75% of participants reported improvements in pain and function, respectively, compared with only 17% (each) of control participants. Benefits were maintained 6 weeks after the completion of physical therapy, with 84% of participants continuing independently.

Discussion and Conclusion

Compared with no intervention, a 6-week program of aquatic physical therapy resulted in significantly less pain and improved physical function, strength, and quality of life. It is unclear whether the benefits were attributable to intervention effects or a placebo response.

Exercise for Osteoarthritis of the Hip or the Knee

High-quality evidence indicates that land-based therapeutic exercise provides short-term benefit that is sustained for at least two to six months after cessation of formal treatment in terms of reduced knee pain, and moderate-quality evidence shows improvement in physical function among people with knee OA. The magnitude of the treatment effect would be considered moderate (immediate) to small (two to six months) but comparable with estimates reported for non-steroidal anti-inflammatory drugs. Confidence intervals around demonstrated pooled results for pain reduction and improvement in physical function do not exclude a minimal clinically important treatment effect. Since the participants in most trials were aware of their treatment, this may have contributed to their improvement. Despite the lack of blinding we did not downgrade the quality of evidence for risk of performance or detection bias. This reflects our belief that further research in this area is unlikely to change the findings of our review.

Long term effectiveness of exercise therapy

Results

Five high-quality and 6 low-quality randomized clinical trials were included. Strong evidence was found for no long-term effectiveness on pain and self-reported physical function, moderate evidence for long-term effectiveness on patient global assessment of effectiveness, and conflicting evidence for observed physical function. For exercise programs with additional booster sessions, moderate evidence was found for long-term effectiveness on pain, self-reported physical function, and observed physical function.

Conclusion

The positive post-treatment effects of exercise therapy on pain and physical function in patients with OA of the hip and/or knee are not sustained in the long term. Long-term effectiveness was only found for patient global assessment of effectiveness. However, additional booster sessions after the treatment period positively influenced maintenance of beneficial post-treatment effects on pain and physical function in the long term.

Conservative Treatment options

Assistive devices:

Cane or walker



Forces across the hip are best represented by the classic lever diagram

The hip center (*) represents the fulcrum

The two opposing forces are 1) BODY WEIGHT and

2) ABDUCTOR MUSCLES

Note that the lever arm for Body Weight is 2x longer than abductor muscles.... therefore, this force is doubled based on this mechanical advantage



Conservative Treatment options

Weight loss

- In 1985, for states with data, no state had an obesity rate >15%. By contrast, in 2011, no state had an obesity rate <20%, and the regions of the South and Midwest had obesity rates of 29.5% and 29%, respectively
- Obesity is theorized to be a low grade inflammatory state in the body due to excess adipose tissue; this may have implications for osteoarthritis or both non-weight bearing and weight-bearing joints
- Forces across the knee joint have been demonstrated to be three times body weight while walking and up to six times body weight during activities such as stair climbing
- A meta-analysis of observational studies on obesity and OA estimates that half the cases of knee OA in the United States would be avoided if obesity were removed as a risk factor

* There is a Medicare reimbursement penalty for hospitals that do not record core measures such as BMI or provide counseling

Weight loss

- A study of obese adults aged >60 years with knee OA showed that the combination of modest weight loss and moderate exercise provides improvement in function and pain, as well as performance measures of mobility
- Large population studies have shown that weight gain early in life significantly increases the likelihood of eventual arthroplasty
- Another study showed that massive weight loss after bariatric surgery improves pain and function and decreases low-grade inflammation. Bariatric surgery can produce changes in bone metabolism however. Exercise and PT may be preferred
- A large Norwegian study recently showed that exercise does not increase the risk of knee or hip OA at any BMI

CPG - Weight loss may be beneficial in the non-operative management of pain, function, and quality of life in patients with hip OA

Conservative Treatment options

- Corticosteroid injections
- Strong evidence supports the use of intra-articular corticosteroid injections to improve function and reduce pain in short term
- Typically done under imaging guidance as the hip is a deep joint

Conservative Treatment options

Alternative treatments:

- Viscosupplementation Strong evidence does not support the use
- Acupuncture No guideline
- Manual therapy No guideline
- Social support moderate evidence supports that pts with mental health disorders undergoing THA are associated with decreased function, pain relief, and QOL
- Supplements (ie glucosamine) Does not support use
 - \circ $\;$ No benefit compared to placebo

Comparison of manual vs exercise therapy for hip OA

Results

Of 109 patients included in the study, 56 were allocated to manual therapy and 53 to exercise therapy. No major differences were found on baseline characteristics between groups. Success rates (primary outcome) after 5 weeks were 81% in the manual therapy group and 50% in the exercise group (odds ratio 1.92, 95% confidence interval 1.30, 2.60). Furthermore, patients in the manual therapy group had significantly better outcomes on pain, stiffness, hip function, and range of motion. Effects of manual therapy on the improvement of pain, hip function, and range of motion endured after 29 weeks.

Conclusion

The effect of the manual therapy program on hip function is superior to the exercise therapy program in patients with OA of the hip

Surgical Treatment options

Total Hip Arthroplasty

"The operation of the century"





After

Outcomes of THA

- Improved pain
- Improved function
- Increased range of motion
- Longevity:
 - Cemented stem: 90% @ 25 years
 - Porous cup: 95.7% @ 15 years
 - Porous stem: 86.8% @ 15 years

1994 NIH Consensus Statement on THA

THR is an option for nearly all patients with diseases of the hip that cause chronic discomfort and significant functional impairment. In the aggregate, THR is a highly successful treatment for pain and disability. Most patients have an excellent prognosis for long-term improvement in symptoms and physical function. Perioperative complications such as infection and deep venous thrombosis have been significantly reduced because of use of prophylactic antibiotics and anticoagulants and early mobilization.

Before



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