Orthopaedic Hip Pain Management

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Disclosures

- No relevant financial disclosures.

Hip Girdle Pain Differential

- Intra-Articular
  - FAI
  - Dysplasia
  - Labral tear
  - Articular cartilage injury
  - Arthritis
  - Insufficiency fracture
  - Bone Marrow lesion

Hip Girdle Pain Differential

- Anterior
  - Adductor injury
  - Athletic Pubalgia/Sports Hernia
  - Osteitis Pubis
  - Internal Snapping Hip
  - Stress Fracture
  - Hip Flexor/rectus tears
  - Sartorius avulsion

Extra Articular Hip Injuries

- Lateral
  - Greater Trochanteric Pain Syndrome
    - IT Band
    - Trochanteric Bursitis
    - Gluteal tendinopathy
  - Piriformis

Extra Articular Hip Injuries

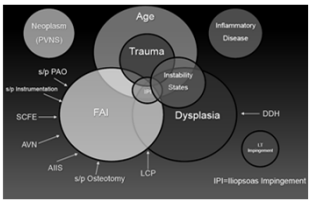
- Posterior
  - Intra-Artic “C-sign”
  - Proximal Hamstring
  - Gluteal muscles
  - Piriformis
  - Sciatic/radicular pain
  - SI joint
  - Lateral Fatigue Pain

Extra Articular Hip Injuries

- Other non-MSK causes of “hip” pain
  - Ob/Gyn
  - Urology
  - Hernia
  - Gastrointestinal
  - Lumbar Radiculopathy

Hip Pain

- Where does hip pain come from?
  - Intra-articular vs extra-articular
  - Younger patients vs older patients
  - Multifactorial



Femoral-Acetabular Impingement

- Combination of dynamic and static forces impact the mechanics of the hip joint
- Anatomic abnormalities of proximal femur or acetabulum lead to repetitive collisions
- Impact at head/neck junction and rim may lead to labral injury, chondral delamination, degenerative cascade
- Labral/cartilaginous injury severity related to duration

Cam Lesion

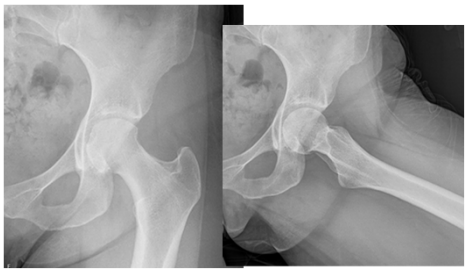
- Loss of Head-Neck offset with asphericity
- More common in young athletic males
- Shear forces on acetabular cartilage where aspherical femoral head impacts
- Flexion-Internal rotation
- Leads to articular cartilage delamination and labral tears

Cam Lesion

Pincer Lesion

- Focal rim lesion or cephalad retroversion of acetabulum
- More common in females
- Repetitive contact stress of normal femoral neck against focal acetabular overcoverage
- Focal rim lesions are different- result from coxa profunda, coxa protrusio, global retroversion or PAO overcorrection

Pincer Lesion



Dysplasia and Ligamentous Laxity

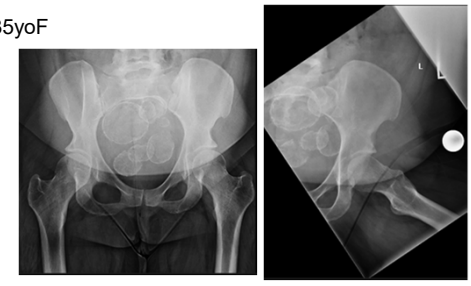
- Exists along a spectrum
- Beighton score for global laxity
- Bony structure can be cause
- Systemic disorders (Ehlers Danlos)

Dysplasia and Ligamentous Laxity

- May lead to cartilage damage and labrum tears of different etiology
- Surgical outcomes globally less beneficial, worse with increasing levels of dysplasia
- Increasing frequency of PAO surgery, as well as combination surgery with increased appreciation of dysplasia issues

Dysplasia and Ligamentous Laxity

- 35yoF



Osteoarthritis

- "Regular" arthritis
- Accumulated degenerative changes
- Typically thinning of cartilage
- May be predisposed by traumatic injuries
- Family history is common

Osteoarthritis

- Typical radiographic signs
  - Joint space loss
    - Best seen on standing radiographs
  - Osteophyte formation
  - Subchondral cysts
  - Subchondral sclerosis

Osteoarthritis

Diagnosis

- History and Physical Exam most important
  - History
    - Acute vs. Chronic
    - Location (ant, sup, post, lateral)
    - Age, Sex, Activity level
    - Family history (RA, early OA)
    - Aggravating factors- sport, sitting, running, etc.
    - Trauma
    - Mechanical symptoms

Diagnosis- Physical Exam

- "C" sign- groin

Diagnosis- Physical Exam

- Active/Passive ROM- Focus on symmetry
- Strength of hemipelvic muscles, abductors
- FABER
- Impingement sign- Flex/IR
- Gait

Diagnosis- Physical Exam

- Pelvis, Lumbar, Radiculopathic Pain
- Audible or Visible Snapping
- Hip range of motion is symmetric
- Provocative tests
  - Negative intraarticular
  - Positive extraarticular
- Selective muscle weakness/dysfunction
- Soft Radiographic Findings

Diagnosis- Imaging

- XR- plain radiographs
- MRI- plain and with arthrography
- CT- possible 3D reconstruction/templating

Diagnosis- Imaging

- Plain Radiographs- multiple views, differing opinions
  - Supine AP Pelvis
  - Cross Table Lateral
  - Frog Leg Lateral
  - False Profile
    - Weight Bearing
    - Anterior C-E angle
    - Occult joint space narrowing

Diagnosis- Imaging

- Can demonstrate
  - OA
  - Dysplasia
  - FAI
  - Acute Fractures

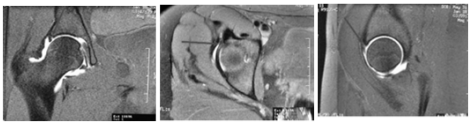
AVN and Secondary OA

Diagnosis- MRI

- Avascular Necrosis
- Stress Fracture
- Tumors and Malignancy
- Cysts- Bone and Paralabral
- Soft Tissue
  - Muscle-Tendon
  - Cartilage
  - Ligamentum Teres

Diagnosis- MRI

- Head/Neck Junction Abnormal
- Anterosuperior Chondral Abnormal
- Anterosuperior Labral Tear

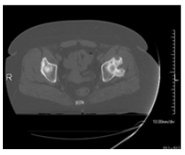


Diagnosis- CT

- Benefits
  - 3D reconstructions
  - Evaluate dysplasia
  - Assess femur and acetabular version
- Risks
  - Radiation exposure
  - Static image of dynamic problem
- Possible to do Position of Discomfort scans (POD)

Diagnosis- CT

- HO



- CAM

Treatment- Nonoperative

- Mainstay of initial treatment algorithm
- Activity Modification
- Ambulation Assistance
- NSAIDS
  - Oral
  - Local via patches or gels
- Possible intra-articular injection
- Glucosamine/Chondroitin
- Therapy

Treatment- Nonoperative

- PT
  - Motion exercises and strengthening
  - Emphasize posture/neuromuscular control
  - Active release therapy
- Injections
  - Diagnostic and therapeutic- confirms intra-articular pathology and suggests improved surgical outcomes
- No good data to support nonop treatment efficacy or alteration of natural history
- Some good guidelines exist for PT protocols

Treatment- Surgical

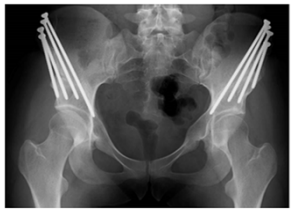
- Individualize treatment based on pattern and extent of pathology
- Address mechanical impingent and the resultant intra-articular pathology
- Goals are to
  - Relieve Pain
  - Improve Function
  - Return to Activity
  - Prevent degeneration of the joint

Treatment- Surgical

- Surgical Dislocation- Ganz
  - Troch osteotomy- Preserve blood supply
  - Circumferential visualization of head/neck junction and acetabular rim
  - Complications include osteotomy nonunion, femoral head osteonecrosis, heterotopic ossification, persistent abductor weakness

Treatment- Periacetabular osteotomy

- Treats impingement from acetabulum retroversion and posterior wall insufficiency and/or dysplasia
- May be combined with arthrotomy or arthroscopy



Treatment- Surgical

- Arthroscopic- Continues to evolve and progress
- Multiple compartments to address and capsulotomy is a concern
- Able to perform significant osteochondroplasty as well as acetabular rim resection and labral repairs
- Many utilize intraop fluoro, some studies on intraop CT

Treatment

- Shared Decision Making
  - Engaging in starting a comprehensive program to utilize PROs along with MD and PT in the same clinical setting to begin discussion with patients and decide upon treatment course
  - Use perspective from multiple parties to make best treatment decisions for patient and track PROs from non-op and surgical managment

Treatment-Surgical

- Total Hip Arthroplasty
  - Very reliable, reproducible results
  - Extremely successful in terms of patient satisfactions and improved QALY
  - Permanent implant
  - Potential for revision in the future

Indications for THA

- Failed conservative management
- Appropriate medical condition
- Tobacco-free
- “Quality of life decision”

Arthroscopy Outcomes

- Majority of studies support surgical intervention in its various forms for relief of pain and improving function
- Open surgery has more major complications
- Arthroscopy had equivalent outcomes with fewer major complications
- Worse outcomes in patients with moderate to severe arthritis regardless of approach

Lateral Pain

- Greater Trochanteric Pain Syndrome
  - Troch bursitis, gluteal tendinopathy/tear, IT band pain
  - Diagnosis: History
    - Lateral sided complaints
    - Lay on side at night
    - Worse with prolonged standing
  - Imaging- Largely normal, can see enthesophytes

Lateral Pain

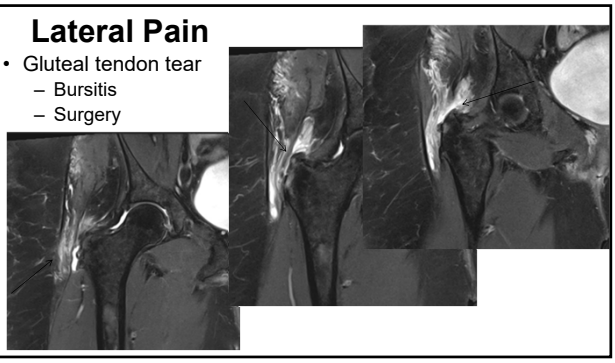
- Greater Trochanteric Pain Syndrome
  - Diagnosis: Physical exam
    - Pain with lateral palpation over GT
    - Pain w ROM especially ER and FABER
    - Weakness or pain with resisted abduction
    - Pain/weakness with single leg stance (stork)
      - Inability to maintain pelvis level

Lateral Pain

- GTPS
  - Non-Op Treatment
    - PT/HEP, tendon loading modification, posture
    - Inject with CS vs PRP (increasing evidence)
    - Tenex
    - ECSWT
  - Surgery
    - Mini open vs scope
    - IT band window +/-
    - Bursectomy

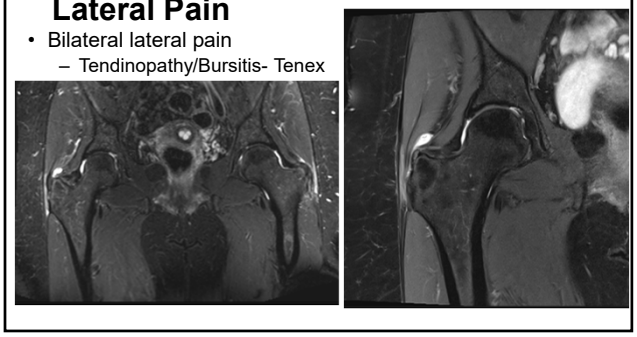
Lateral Pain

- Gluteal tendon tear
  - Bursitis
  - Surgery



Lateral Pain

- Bilateral lateral pain
  - Tendinopathy/Bursitis- Tenex



Conclusions

- FAI is most common indication for hip preservation surgery and most common mechanism for developing early labral/cartilage damage
- THA is a commonly performed procedure with predictable outcomes
- Gluteal tendon pathology treatment is patient-specific and reliable options exist when indicated properly

Rehabilitation Approaches to Address Hip Pain

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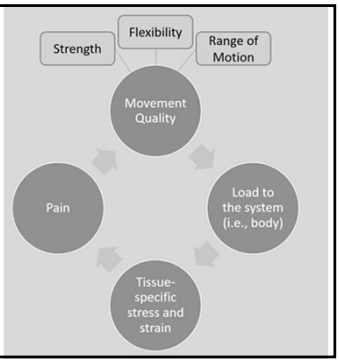
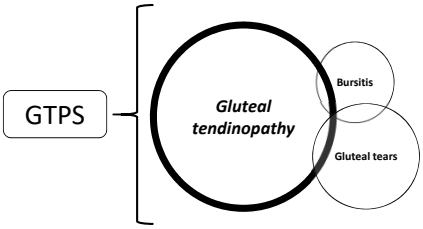
Physical therapy is all about optimizing movement to improve quality of life



Greater trochanteric pain syndrome (GTPS) is the umbrella clinical term



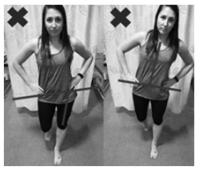
Greater trochanteric pain syndrome is as debilitating as end-stage hip OA

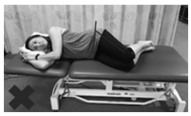
Similar age group, but key clinical features distinguish the conditions

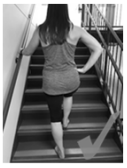
Test	GTPS	OA
ROM	*Minimal*, if any, motion loss	*Significant* motion loss
Pain w/ single leg stance	Lateral	Groin > lateral
Donning shoes/socks	No difficulty, but often painful	Significant difficulty due to motion loss
Gait Mechanics	• More hip adduction and internal rotation motion • Larger hip extension and adduction moments	• More trunk flexion • Ipsilateral lean (associated with hip abductor weakness)

Load modification → adaptation should be 1st line treatment for gluteal tendinopathy

- Patient specific posture/mechanics modifications

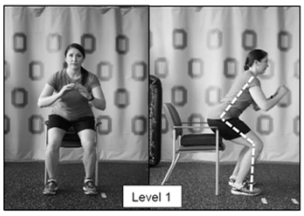






Load modification → adaptation should be 1st line treatment for gluteal tendinopathy

- 'Starter' exercises



Load modification → adaptation should be 1st line treatment for gluteal tendinopathy

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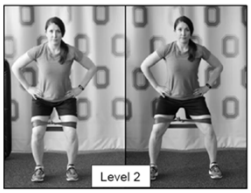


Managing joint pain

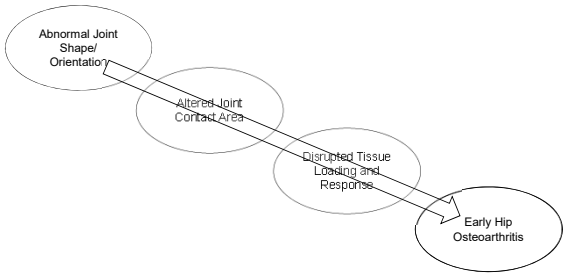
- Stiff joints are often painful joints
  - Manual therapy, low-load/long duration stretching
  - Ensure ADLs 'use' available ROM
- Exercise has antinociceptive effect
  - Individuals with early OA typically do VERY well with light–mod intensity exercise)
- Optimize strength and joint loading
  - Strong, coordinated muscles optimize joint loads
  - Don't let painfree crepitus deter heavy effort strengthening.
  - Include proprioceptive/balance training
  - Modify exercise ROM to minimize joint pain
    - Reduce loading (ie. leg press instead of squats)

Pain monitoring strategies: directing treatment

- "Better, worse, or the same" after multiple reps/sets can help you identify possible cause and inform rehab adjustments
  - Ie. "worse": increasing patellar tendon pain >5/10 by 2nd set of knee extension isotonics. (Solution? Reduce resistance or initiate isometrics)
  - Ie. "better": decreasing patellar tendon pain by 2nd set of knee extension isometrics (Yay! You're an exercise prescription guru!)
- "Don't go above X/10 pain"
  - Gives patients 'safe zone' and some control over what they are/are not willing to do with regard to PT exercises.
- Soreness rules
  - 24-48 hour response to treatment informs load for next treatment

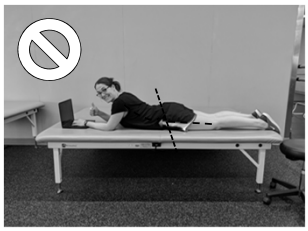
Abnormal structure can increase risk for OA

Ganz 2003; Murphy 1990; Murray 1965; Murray and Duncan 1971; Solomon 1976



Problematic postures and stretches

Prone lying for prolonged periods can increase stress to the anterior hip



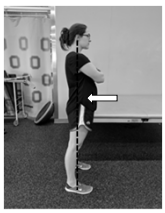
Problematic postures and stretches for those with anterior hip pain



All of these postures and stretches increase hip extension, which can increase anterior joint stress and may increase pain

Axial load as a postural education tool

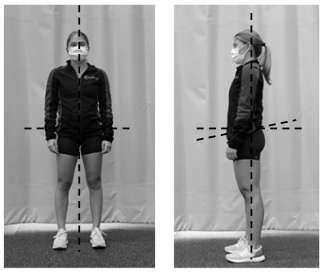
Load applied by the clinician induces 'backward' rotational moment that appears as a posterior trunk lean, anterior/forward translation of the pelvis

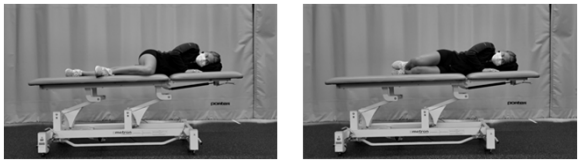
Correction:

Encourage the patient to either "position your shoulders directly above your hips" or "lean forward slightly over your toes"

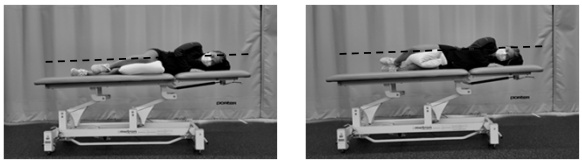
Good standing posture



Problematic sidelying postures



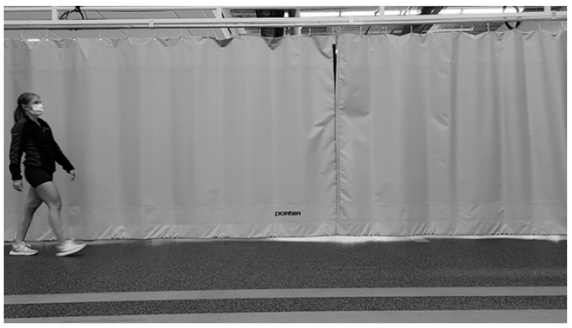
Corrected sidelying postures

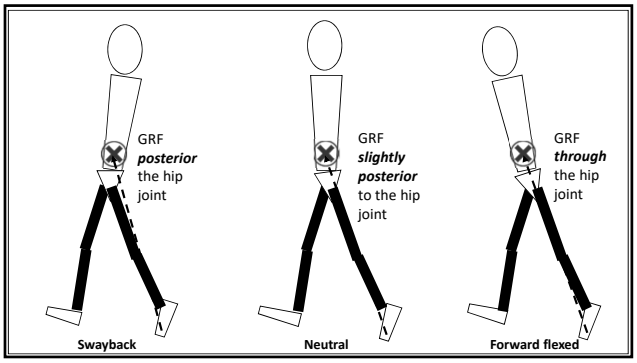


The knee should be 'in plane' with or above the hip

Making changes in quality of movement

example: reducing anterior hip pain during walking



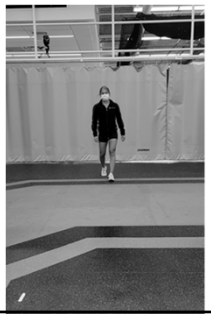


Why does gait quality matter for those with hip joint pain?

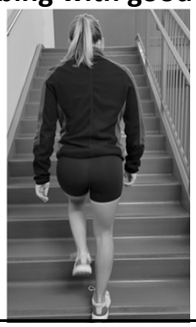
In painfree individuals, we see…	In those with hip pain, we hypothesize….
Muscle weakness of the gluteals and hip flexors *increases* anterior hip joint forces Lewis 2007	Gluteals and hip flexors are often weak Casartelli 2011, Harris-Hayes 2014, Kemp 2014
End range hip extension during gait increases anterior hip joint forces Krebs 1998, Lewis 2010, Stansfield and Nicol 2002	Hip extension motion during gait is reduced, which may be an adaption to avoid pain King et al 2018, BJSM
Increasing ankle push-off can reduce hip joint moments and forces Lewis and Ferris 2008, Lewis and Garibay 2015	Increasing ankle push-off may reduce hip joint pain, via reduced hip moments and forces Lewis and Ferris 2008, Lewis and Garibay 2015

Walking with lateral trunk lean

Walking with lateral trunk lean

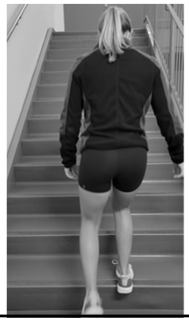


Stair climbing with good mechanics

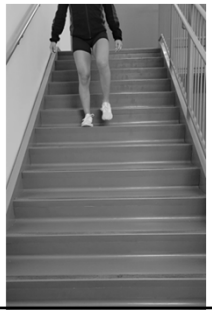


Stair climbing with good mechanics

Stair climbing with poor mechanics



Stair climbing with poor mechanics



References

1. Allison K, Hall M, Hodges PW, et al. Gluteal tendinopathy and hip osteoarthritis: Different pathologies, different hip biomechanics. *Gait Posture*. 2018;61:459-465. doi:10.1016/j.gaitpost.2018.02.011
2. Brown-Taylor L, Wilson J, McNally M, et al. Altered gait mechanics are associated with severity of chondropathy after hip arthroscopy for femoroacetabular impingement syndrome. *Gait Posture*. 2020;77:175-181. doi:10.1016/j.gaitpost.2019.11.003
3. Brown-Taylor L, Pendley C, Glaws K, et al. Associations Between Movement Impairments and Function, Treatment Recommendations, and Treatment Plans for People With Femoroacetabular Impingement Syndrome. *PTJ Phys Ther Rehabil J | Phys Ther*. 2021;101:1-11. doi:10.1093/ptj/pzab157
4. Cibulka MT, Bloom NJ, Enseki KR, Macdonald CW, Woehrle J, McDonough CM. Hip Pain and Mobility Deficits-Hip Osteoarthritis: Revision 2017. *J Orthop Sports Phys Ther*. 2017;47(6):A1-A37. doi:10.2519/JOSPT.2017.0301/ASSET/IMAGES/LARGE/JOSPT-A1-FIG005.JPEG
5. Cook JL, Rio E, Purdam CR, Docking SI. Revisiting the continuum model of tendon pathology: what is its merit in clinical practice and research? *Br J Sports Med*. 2016;50(19):1187-1191. doi:10.1136/bjsports-2015-095422
6. Enseki KR, Kohlrieser D. Rehabilitation following hip arthroscopy: an evolving process. *Int J Sports Phys Ther*. 2014;9(6):765-773. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4223286&tool=pmcentrez&rendertype=abstract
7. Ganz R, Parvizi J, Beck M, Leunig M, Nötzli H, Siebenrock KA. Femoroacetabular impingement: a cause for osteoarthritis of the hip. *Clin Orthop Relat Res*. 2003;(417):112-120. doi:10.1097/01.blo.0000096804.78689.c2
8. Harris-Hayes M, Steger-May K, M. Bove A, Mueller MJ, Clohisy JC, Fitzgerald GK. One-year outcomes following physical therapist-led intervention for chronic hip-related groin pain: Ancillary analysis of a pilot multicenter randomized clinical trial. *J Orthop Res*. 2021;39(11):2409-2418. doi:10.1002/jor.24985
9. Harris-Hayes M, Steger-May K, van Dillen LR, et al. Reduced Hip Adduction Is Associated With Improved Function After Movement-Pattern Training in Young People With Chronic Hip Joint Pain. *J Orthop Sport Phys Ther*. 2018;48(4):316-324. doi:10.2519/jospt.2018.7810
10. Lewis CL, Khuu A, Marinko LN. Postural correction reduces hip pain in adult with acetabular dysplasia: A case report. *Man Ther*. 2015;20(3):508-512. doi:10.1016/j.math.2015.01.014
11. Lewis CL, Sahrmann SA, Moran DW. Anterior hip joint force increases with hip extension, decreased gluteal force, or decreased iliopsoas force. *J Biomech*. 2007;40(16):3725-3731. doi:10.1016/j.jbiomech.2007.06.024
12. Mellor R, Bennell K, Grimaldi A, et al. Education plus exercise versus corticosteroid injection use versus a wait and see approach on global outcome and pain from gluteal tendinopathy: Prospective, single blinded, randomised clinical trial. *BMJ*. 2018;361:1-19. doi:10.1136/bmj.k1662
13. Mosler AB, Kemp J, King M, et al. Standardised measurement of physical capacity in young and middle-aged active adults with hip-related pain: Recommendations from the first International Hip-related Pain Research Network (IHiPRN) meeting, Zurich, 2018. *Br J Sports Med*. 2020;54(12):702-710. doi:10.1136/bjsports-2019-101457
14. Silbernagel KG, Thomeé R, Eriksson BI, Karlsson J, Silbernagel, Karin Gravare; Thomee, Roland; Eriksson BIKJ. Continued Sports Activity, Using a Pain-Monitoring Model, During Rehabilitation in Patients with Achilles Tendinopathy: A Randomized Controlled Study. *Am J Sports Med*. 2007;35(6):897-906. doi:10.1177/0363546506298279