Keep Calm and Stable: Recognise anterior hip instability before it's too late

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BPHTY UQ 2013

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Contents

What is anterior hip instability?

‘Microinstability’ of the femoral head in the anterior direction.

Diverse causes for anterior hip instability include:

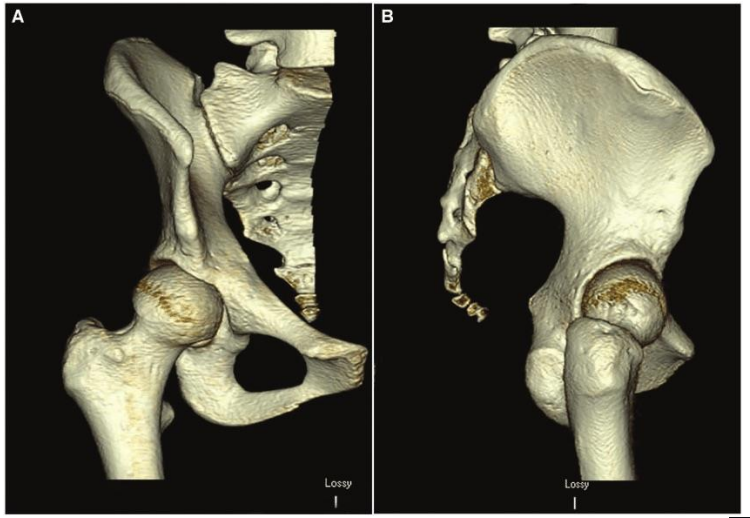
- Acetabular dysplasia
- Capsular laxity (idiopathic, acquired, iatrogenic)

As there are diverse causes of anterior instability identified in the literature – this presentation synthesises literature encompassing acetabular dysplasia, joint laxity and micro-instability.

Kalisvaart., 2015

Acetabular dysplasia

The acetabulum is excessively anteverted and shallow, reducing femoral coverage leading to instability.

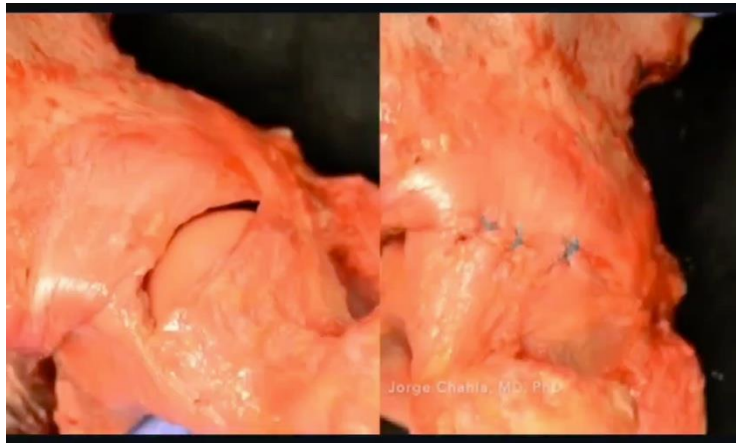


Spiker, 2020

Lax capsule

Structurally normal acetabulum and femoral head.

Excessive laxity of the connective tissue, or tears of the labrum/capsule/ligaments leads to less femoral head stability due to loss of passive suction restraint



Jorge Chahla, MD, PhD (Instagram: chicagosportsdoc)

Factors associated with acetabular dysplasia

First born (RR 1.44)

Swaddling (OR 2.87)

Female (RR 2.54)

Family history (RR 2.54)

Multiple gestation pregnancy

Breech position

Incidence of dysplasia diagnosis increased from 4.9% up to 17.5% with radiographic screening guidelines in Denmark in one year (Møse, 2024)

Hypermobility

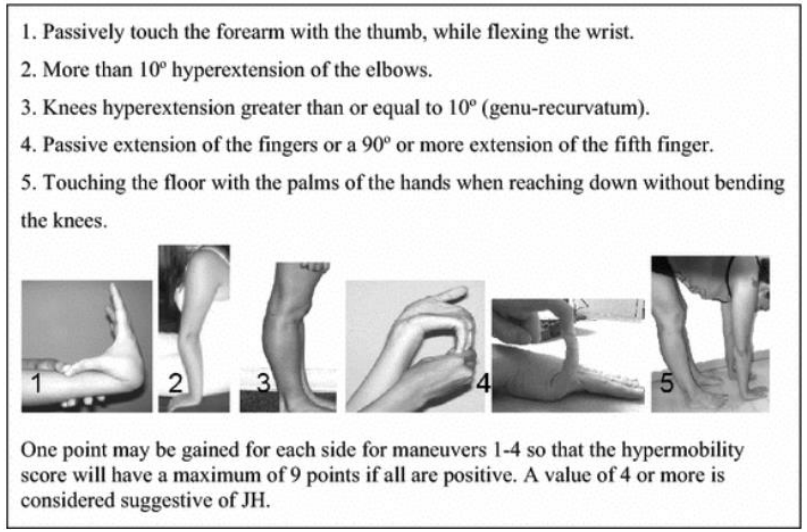
10% of people with generalized joint hypermobility have a formal diagnosis. (Simmonds, 2017)

Incidence may be higher than expected: 1 in 500 people in primary or secondary care in Wales 2019 with hypermobile Ehlers Danlos Syndrome or Hypermobility Spectrum Disorder. (Demmler, 2019)

Up to 30-40% of people visiting secondary pain and musculoskeletal clinics in the UK meet criteria for hypermobility as per the Beighton's scale. (To, 2017; Connelly, 2015)

People with hypermobility tend to have:

- Excessive femoral anteversion
- A thinner hip capsule
- A narrower labrum (Haskel, 2021; Devitt, 2017)



Why do we care?

On average, it takes five years to be diagnosed with hip dysplasia (Nunley, 2011).

Those with hip dysplasia are five times more likely to develop hip OA and need a hip replacement by the age of thirty-five (Bruder, 2024).

49% of all patients under-going a total hip replacement before the age of fifty, had undiagnosed hip dysplasia (Clohisy, 2011).

T.H. Retchford et al.: Can local muscles augment hip stability?

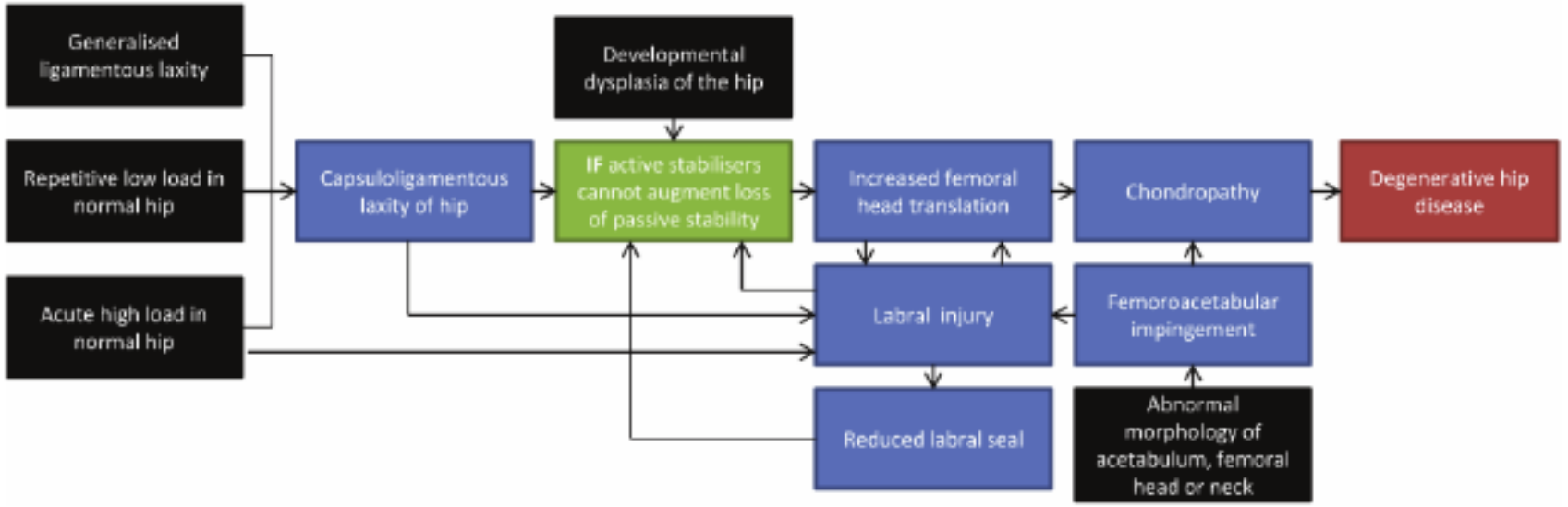


Figure 3. Proposed mechanisms for the development of degenerative hip disease as a result of multi-factorial instability. The black boxes represent the major risk factors. © McGraw-Hill Education Australia, 2012.

Key information from the interview

How do we identify hip instability in the interview? Remembering most people with dysplasia or joint laxity are unlikely to have a formal diagnosis. (Evans, 2024)

Typical patient – young, female, aged 14-35 years. Longstanding activity-related groin pain +/- night pain

Location of pain

- 'C sign', or 'triangulation sign' (Nunley, 2011; Evans, 2024)
- Bilateral symptoms – up to 65% (Evans, 2024)
- Acquired laxity – high level dance, performing arts, tennis, golf, gymnastics (Khanduja, 2023)
- Idiopathic laxity – Beighton's score questions, or other signs including internal/external snapping hip (Jacobsen, 2018)
- Iatrogenic laxity – previous hip arthroscopies

Nociceptive sources:

- Anterior capsule, labrum, iliopsoas, adductors, abductors, rec fem
- Common to have secondary pain from the labrum and tendinopathy. These symptoms lead to a misdiagnosis of FAI syndrome (pain with deep flexion/sitting), or iliopsoas tendinopathy (extension-related pain). (Khanduja, 2023; Enseki, 2023)

Special questions:

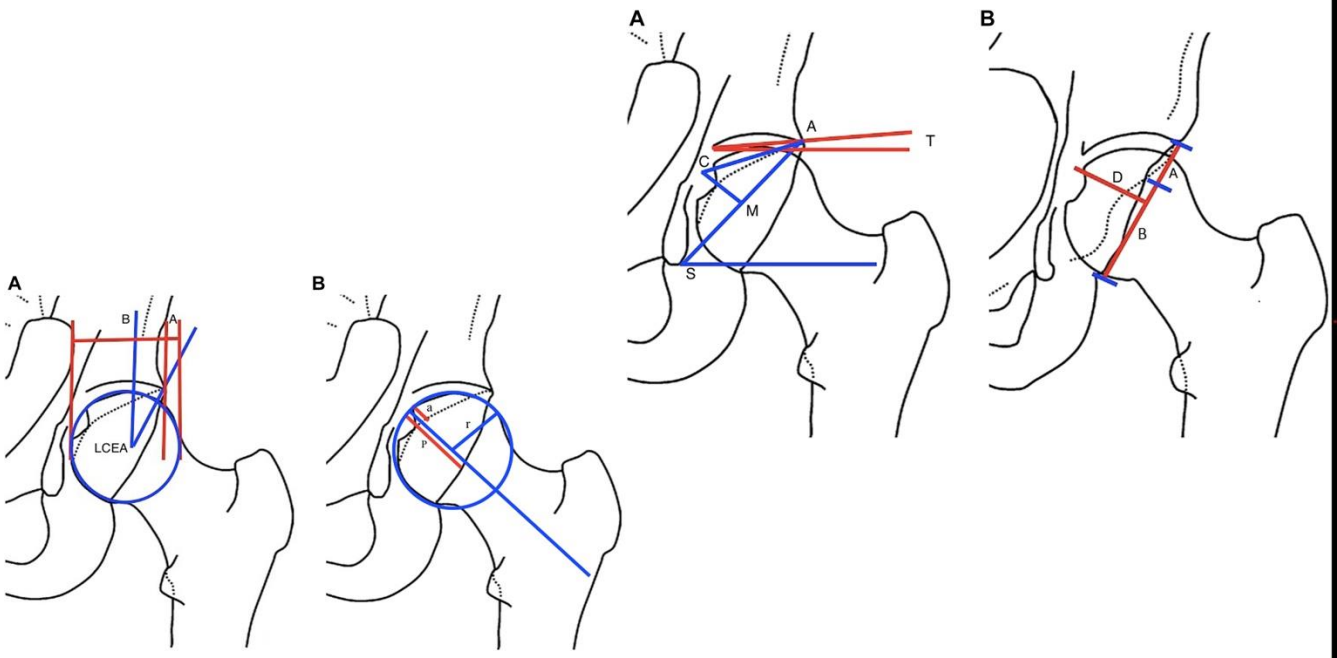
- Joint signs – clicking, clunking, catching are common – 80% of cases.
- Some patient identify a feeling of instability, lack of trust in their leg, but are more likely to note an uncomfortable sensation with the trail leg in lunges, Bulgarian split squats, striding while running (McCurdy, 2021)

Investigations – challenges

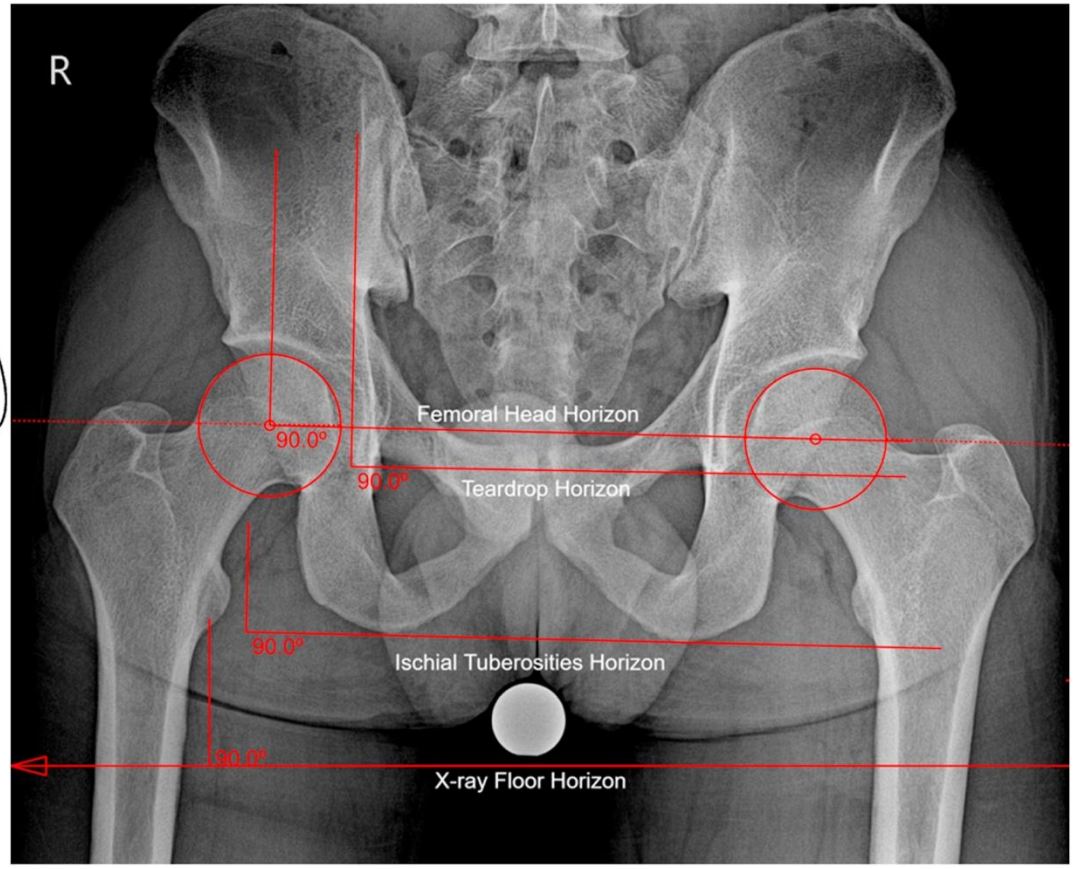
Emerging research regarding which investigations are appropriate when suspecting anterior instability.

X-ray vs MRI vs CT. Supine vs side-lying vs standing. Watch this space. Importantly, a hip can have no bony morphology but is unstable upon physical examination and should not be discounted as stable in the absence of imaging findings.

Acetabular dysplasia



(Wilkin, 2017)



(Nerys-Figueroa, 2025)

Mechanistic factors relating to pain

The femoral head is lateralized, resulting in greater forces at the superior acetabulum and reduced motor arm of the abductors.

Reduced passive stability anteriorly leads to increased load of the hip abductors and hip flexors, and concurrent tendinopathy is common.

Weakness in iliopsoas, hip abductors and external rotators is seen in hip dysplasia and has not been investigated in non-dysplastic causes for anterior instability.

(Harris, 2017; Sørensen, 2018)

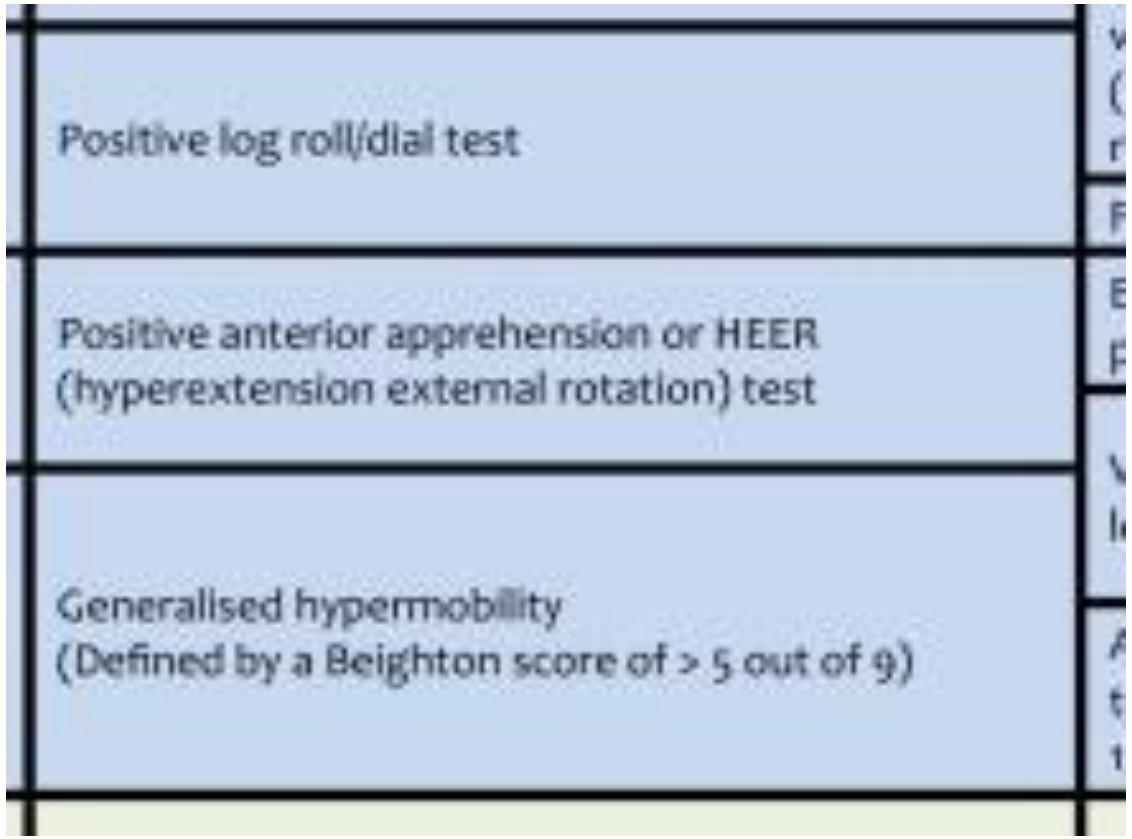
Increased lateral prominence of the greater trochanters may contribute to compressive load on the trochanteric soft tissues, beneath the iliotibial band. Lateral prominence is related to femoral neck-shaft angle, with greater prominence associated with a reduced angle (coxa vara), and greater trochanteric width relative to iliac wing width [23-25].

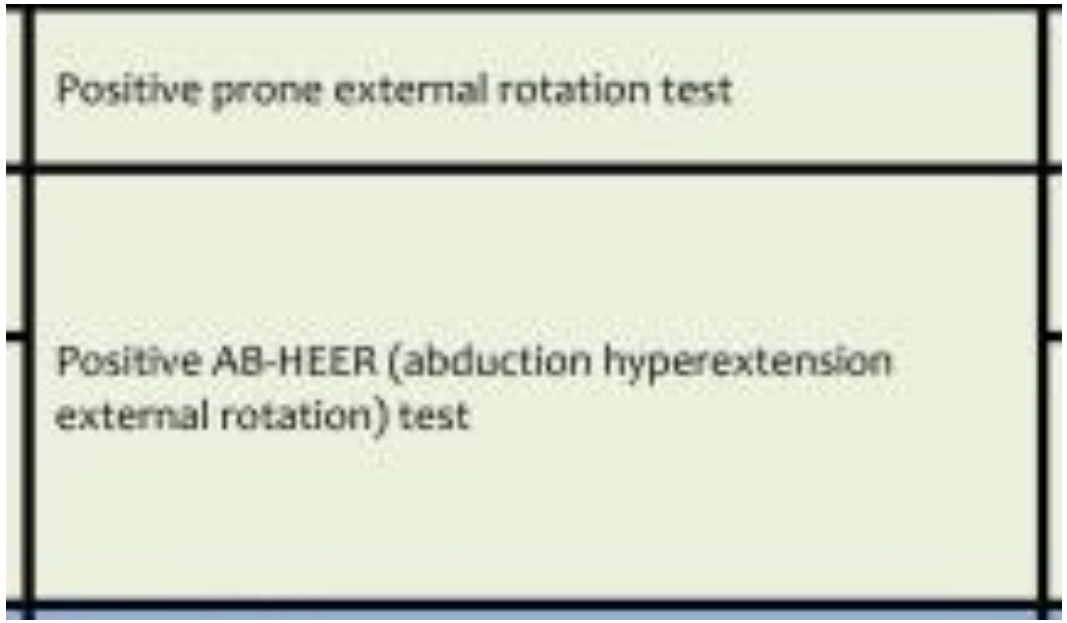
(Grimaldi, 2024)

Delphi consensus – Diagnosis

	PATIENT HISTORY	EXAMINATION	IMAGING	TOTAL
MAJOR FACTOR	Hip pain		Signs of DDH on imaging (Wiberg angle<20° or Tonnis angle>10° or Sharp angle>42°)	(Minimum 6)
	Giving way or a sensation of instability	Positive log roll/dial test	of the femoral head shows subluxation or a sign on a split AP radiograph	
	Prior diagnosis of a connective tissue disorde e.g.: Ehlers-Danos or Marfans syndrome	Positive anterior apprehension or HEER (hyperextension external rotation) test	diological evidence insufficient to explain examination findings of instability	
	No other clear diagnosis that explains the pat signs and symptoms	Generalised hypermobility (Defined by a Beighton score of > 5 out of 9)	sign when the hip is under simple manual dinal traction prior to hip arthroscopy	
MINOR FACTOR	Female gender		ion demonstrated on imaging	
	Symptoms related to activity	Palpation alone insufficient to reproduce all the painful symptoms	Cliff sign seen on plain radiograph of the hip	
	Symptoms gradually getting worse	Positive Impingement test	Retroverted acetabulum indicated by a crossover sign, ischial spine sign or posterior wall sign	
	Prior history of a dislocation/subluxation of the hip	Positive posterior apprehension test	Labral tear seen on MRI arthrography	
	History of an unrepaired hip capsulotomy	Positive prone external rotation test	hows >5mm anterior or posterior joint recess	
	Positive response to the diagnostic intra-articul hip injection	Positive AB-HEER (abduction hyperextension external rotation) test	nterior capsule (<3mm) seen on MRI	
	Patient indulges in a sport which involves significant axial loading at a competitive level e.g: figure skating, tennis, football, baseball, go skating, martial arts, gymnastics or ballet		arthroscopy, after distraction, does the ral head remain >3mm from the acetabular e if the negative intraarticular ure/traction is removed	
TOTAL	(Minimum 4)		imum 4)	Total 12

(Khanduja, 2023)





(Khanduja, 2023)

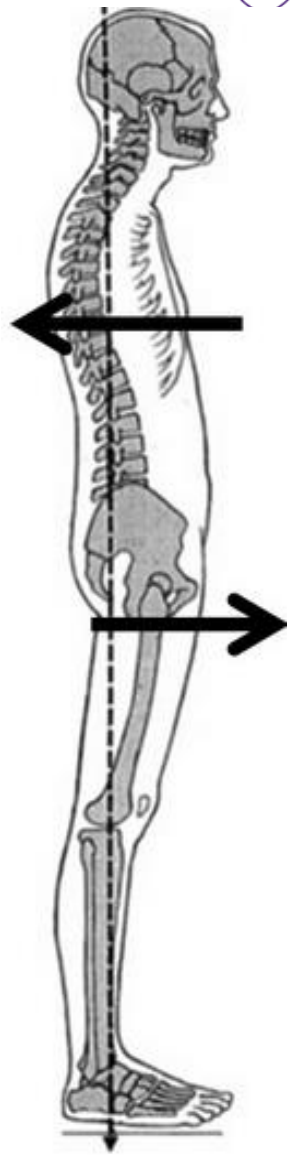
Physical Examination

Key anecdotal differences to observe

Sway back posture – hips anterior to shoulders, posterior pelvic tilt (increased anterior hip loading)

Gait - Protective adjustments may be seen in gait with reduced hip extension through end stance-phase.

Reduced lower limb strength – especially hip external rotators and abductors



Sway-back posture.

https://dralisongrimaldi.com/blog/identifying-joint-hypermobility-syndromes/

Log Roll Test

1. Position the patient in supine, legs extended
2. Internally rotate the leg past neutral
3. Allow the leg to passively relax
4. Measure the angle of the foot to the table (<20deg is significant)

(Kalisvaart, 2015)

Prone External Rotation Test

1. Prone, hip in neutral
2. Full external rotation
3. PA translation of the greater trochanter
4. Positive test: increased movement and re-production of pain

score (95% CI)
Sensitivity: 33.9 (22.1 – 45.7)
Specificity: 97.9 (93.7 – 100.0)
Likelihood ratio: 15.9 (2.2 – 114.2)

(Hoppe, 2017)

Hip Extension-External Rotation (HEER) test

1. Combined hip extension, external rotation
2. Positive test: re-creation of anterior hip pain or apprehension
3. Apply ”relocation” AP of the femoral head, reduced symptoms implicates anterior hip joint over iliopsoas

score. (95% CI)
Sensitivity: 71.0 (59.7 – 82.3)
Specificity: 85.1 (74.9 – 95.3)
Likelihood ratio: 4.8 (2.4 – 9.6)

(Hoppe, 2017)

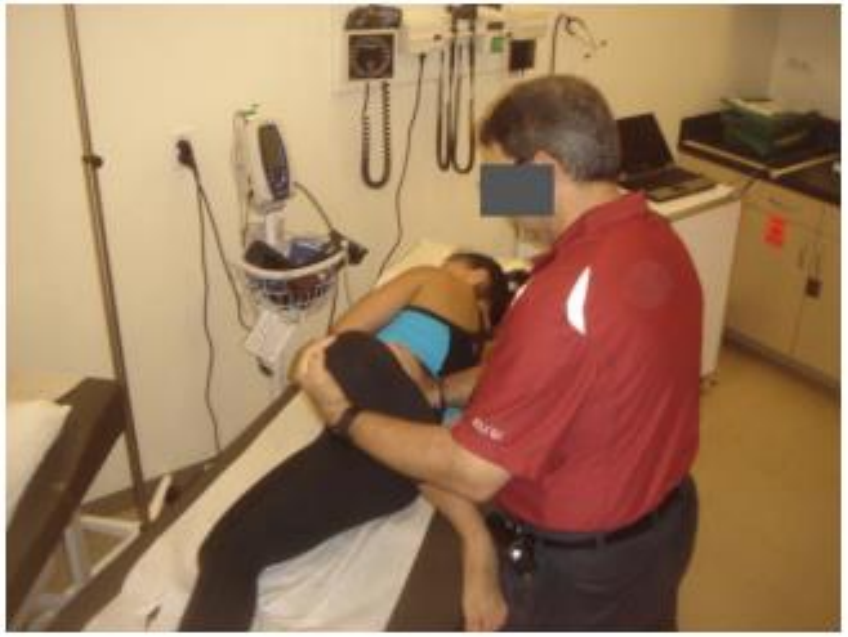
Abduction Hip Extension-External Rotation Test (Ab-HEER)

1. Position in side-lying, abduct the hip 30-45 degrees
2. Extend and externally rotate the hip
3. Place a P-A force through the posterior aspect of the GT
4. Positive test = re-creation of pain+/- apprehension

score (95% CI)
Sensitivity: 80.6 (70.8 – 90.5)
Specificity: 89.4 (93.7 – 100.0)
Likelihood ratio: 7.6 (3.3 – 17.5)

(Hoppe, 2017)

(Kalisvaart, 2015)



(Hoppe, 2017)

Cluster these tests!

Sensitivity and specificity are likely to be valid in this study. However, positive and negative predictive values are impacted by the incidence in population sample, and so, have not been reported in this presentation.

When all 3 tests have positive results, there was a 95.0% chance (95% CI, 90.1%-99.9%) that a patient had an intraoperative diagnosis of anterior hip instability.

TABLE 6
Diagnostic Values for Combinations of Tests for Hip Instability

	Sensitivity (95% CI), %	Specificity (95% CI), %	Likelihood Ratio (95% CI)
≥1 test with positive results	87.1 (78.8-95.4)	78.7 (67.0-90.4)	4.1 (2.2-7.7)
≥2 tests with positive results	67.7 (56.1-79.4)	95.7 (91.7-99.8)	15.9 (4.1-62.5)
All 3 tests with positive results	30.6 (19.2-42.1)	97.9 (94.7-100.0)	14.4 (2.0-104.8)

(Hoppe, 2017)

Treatment

1. Education – avoid sustained combined posterior pelvic tilt and end range hip extension until there is adequate control and strength (no hip flexor stretches!)

2. Address motor control deficits of the deep hip muscles (glute min/med, deep external rotators, iliopsoas).

3. Graded loading of hip muscles in weightbearing for strength and hypertrophy

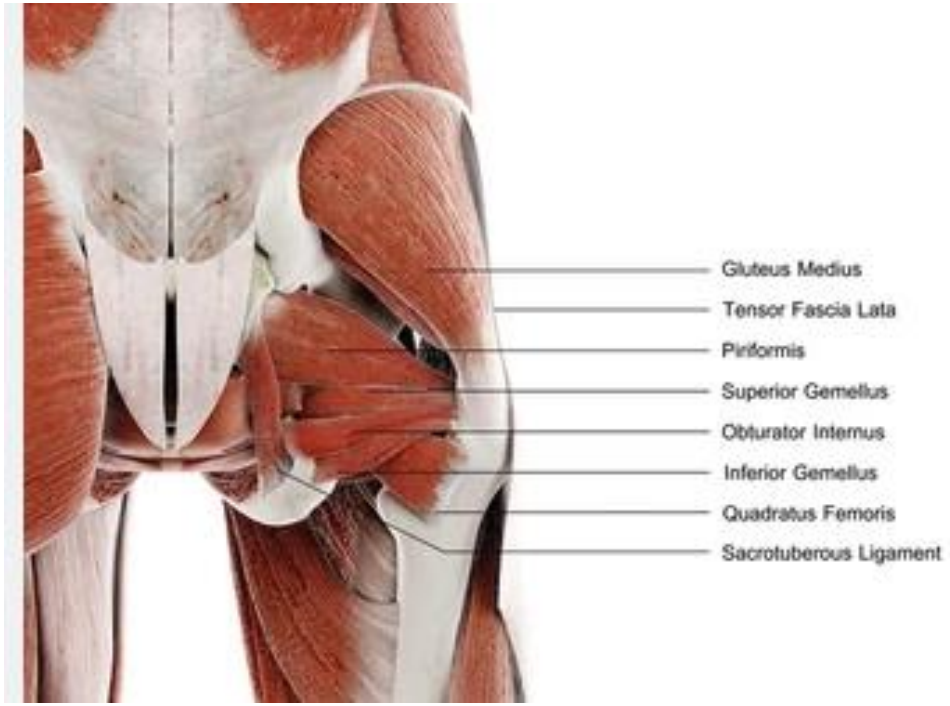
Asymptomatic athletes with hip dysplasia have no significant differences in lower limb strength when compared to athletes without hip dysplasia (O'Brien, 2023).

Strength may be an important factor in managing anterior hip instability.

Real-time ultrasound to guide management

One way to help to provide proprioceptive feedback

Maximise centralisation of the femoral head using the deep external rotators (quadratus femoris, obturator internus, obturator externus and gemelli) and gluteus minimus.



Youtube: @jimmy-peishenwu

Rehabilitation may start with isometric exercises with feedback using palpation or real-time ultrasound

Hip abductors (glute min)

Hip external rotators (quadratus femoris)

Hip flexors (iliopsoas)

Begin loading glute max in appropriate range (avoid posterior pelvic tilt and end-range hip extension

Progress to single-leg, weight-bearing and resisted exercises as motor patterning improves

Progress loading, in line with patient goals.
Retraining motor control for plyometrics as needed
E.G. return to running, sport, physical activity

Take home messages

Think about anterior hip instability in the young population with insidious onset of groin pain.

Conduct a battery of tests to rule-in or rule-out anterior hip instability (don't rely on imaging).

Consider the direction of instability when building a management program – avoiding aggravating positions (no hip flexor stretches).

Address motor control issues using appropriate feedback.

Load up and strengthen, understanding it may take 6+ months to see good changes in strength in the population with longstanding symptoms.

Thank you!

References

Bruder AM, Haberfield MJ, O'Brien MJM, Kemp JL. Women are disproportionately impacted by knee and hip osteoarthritis: why does this happen and how can we address it? Br J Sports Med. 2024;58(14):756-7.

Blajwajs L, Williams J, Timmons W, Sproule J. Hypermobility prevalence, measurements, and outcomes in childhood, adolescence, and emerging adulthood: a systematic review. Rheumatol Int. 2023;43(8):1423-44

Clohisy JC, Dobson MA, Robison JF, Warth LC, Zheng J, Liu SS, et al. Radiographic Structural Abnormalities Associated with Premature, Natural Hip-Joint Failure. J Bone Joint Surg Am. 2011;93(Supplement_2):3-9.

Connelly E, Hakim A, Davenport S, Simmonds J. A study exploring the prevalence of Joint Hypermobility Syndrome in patients attending a Musculoskeletal Triage Clinic. Physiotherapy practice and research. 2015;36(1):43-53.

Demmler JC, Atkinson MD, Reinhold EJ, Choy E, Lyons RA, Brophy ST. Diagnosed prevalence of Ehlers-Danlos syndrome and hypermobility spectrum disorder in Wales, UK: a national electronic cohort study and case–control comparison. BMJ Open. 2019;9(11):e031365-e.

Devitt BM, Smith BN, Stapf R, Tacey M, O'Donnell JM. Generalized Joint Hypermobility Is Predictive of Hip Capsular Thickness. Orthop J Sports Med. 2017;5(4):2325967117701882-.

Enseki KR, Bloom NJ, Harris-hayes M, Cibulka MT, Disantis A, Di Stasi S, et al. Hip Pain and Movement Dysfunction Associated With Nonarthritic Hip Joint Pain: A Revision. J Orthop Sports Phys Ther. 2023;53(7):CPG1-CPG70.

Evans EM, Palmer S, Gambling T, Sparkes V, Allen D. Development of an aid to detect adults acetabular hip dysplasia (the ALPHA alert): A mixed methods study. Musculoskelet Sci Pract. 2024;73:103157-.

Grimaldi A, Mellor R, Nasser A, Vicenzino B, Hunter DJ. Current and future advances in practice: tendinopathies of the hip. Rheumatol Adv Pract. 2024;8(2):rkae022.

Harris MD, MacWilliams BA, Bo Foreman K, Peters CL, Weiss JA, Anderson AE. Higher medially-directed joint reaction forces are a characteristic of dysplastic hips: A comparative study using subject-specific musculoskeletal models. J Biomech 2017;54:80–87.

Haskel JD, Kaplan DJ, Kirschner N, Fried JW, Samim M, Burke C, et al. Generalized Joint Hypermobility Is Associated With Decreased Hip Labrum Width: A Magnetic Resonance Imaging–Based Study. Arthrosc Sports Med Rehabil. 2021;3(3):e765-e71.

Jacobsen JS, Hölmich P, Thorborg K, Bolvig L, Jakobsen SS, Søballe K, et al. Muscle-tendon-related pain in 100 patients with hip dysplasia: prevalence and associations with self-reported hip disability and muscle strength. J Hip Preserv Surg. 2018;5(1):39-46.

Kalisvaart MM, Safran MR. Microinstability of the hip—it does exist: etiology, diagnosis and treatment. Journal of Hip Preservation Surgery. 2015;2(2):123-35.

Khanduja V, Darby N, O'Donnell J, Bonin N, Safran MR. Diagnosing Hip Microinstability: an international consensus study using the Delphi methodology. Knee Surg Sports Traumatol Arthrosc. 2023;31(1):40-9.

Lewis CL, Sahrmann SA, Moran DW. Effect of hip angle on anterior hip joint force during gait. Gait & Posture. 2010;32(4):603-7.

Lewis CL, Sahrmann SA, Moran DW. Anterior hip joint force increases with hip extension, decreased gluteal force, or decreased iliopsoas force. Journal of Biomechanics. 2007;40(16):3725-31.

McCurdy K, Walker J, Kelly C, Polinski M. Hip and Knee Extensor Activation During the Hip Thrust and Rear-Foot–Elevated Split Squat in Trained Females. The Journal of Strength & Conditioning Research. 2021;35(5):1201-7.

Meyer KJ, Chan C, Hopper L, Nicholson LL. Identifying lower limb specific and generalised joint hypermobility in adults: Validation of the lower limb assessment score. BMC Musculoskelet Disord. 2017;18(1):514-

Møse FB, Mohseni S, Borg T. A pilot screening project for the detection of hip dysplasia in young patients. J Hip Preserv Surg. 2024;11(3):176-81.

Nerys-Figueroa J, Kahana-Rojkind AH, Parsa A, Maldonado D, Quesada-Jimenez R, Domb BG. The Measurement of the Lateral Center-Edge Angle Is Underestimated on Radiographs Compared With 3-Dimensional Computed Tomography. Arthrosc Sports Med Rehabil. 2025;7(1):101005.

Nunley RM, Prather H, Hunt D, Schoenecker PL, Clohisy JC. Clinical Presentation of Symptomatic Acetabular Dysplasia in Skeletally Mature Patients. J Bone Joint Surg Am. 2011;93(Supplement_2):17-21.

O'Brien MJM, Kemp JL, Semciw AI, Mechlenburg I, Jacobsen JS, King MG, et al. Football Players With Hip Dysplasia: The Relationship Between Muscle Strength, Functional Performance, Self-reported Sport and Recreation, Cartilage Defects, and Sex. A Cross-sectional Study. J Orthop Sports Phys Ther. 2023;53(10):626-33

O'Brien MJM, Wallis AK, Heerey JJ, Lisa Urup T, Mechlenburg I, Jacobsen JSS, et al. Athletes with hip dysplasia: current understanding, management and future directions. Br J Sports Med. 2025:bjsports-2024-108777

Retchford TH, Crossley KM, Grimaldi A, Kemp JL, Cowan SM. Can local muscles augment stability in the hip? A narrative literature review. J Musculoskelet Neuronal Interact. 2013;13(1):1-12

Santore RF, Gosey GM, Muldoon MP, Long AA, Healey RM. Hypermobility Assessment in 1,004 Adult Patients Presenting with Hip Pain: Correlation with Diagnoses and Demographics. J Bone Joint Surg Am. 2020;102(Suppl 2):27-33.

Simmonds J. Generalized joint hypermobility: a timely population study and proposal for Beighton cut-offs: Beighton cut-offs for generalized joint hypermobility. 2017.

Sørensen H, Nielsen DB, Jacobsen JS, Søballe K, Mechlenburg I. Isokinetic dynamometry and gait analysis reveal different hip joint status in patients with hip dysplasia. HIP Int 2018;29:215–221.

Spiker AM, Fields KG, Nguyen JT, Wong AC, Sink EL. Characterization of version in the dysplastic hip and the need for subsequent femoral derotational osteotomy after periacetabular osteotomy. J Hip Preserv Surg. 2020;7(3):575-82.

To M, Simmonds J, Alexander C. Where do People with Joint Hypermobility Syndrome Present in Secondary Care? The Prevalence in a General Hospital and the Challenges of Classification. Musculoskeletal Care. 2017;15(1):3-9.

Wilkin GP, Ibrahim MM, Smit KM, Beaulé PE. A Contemporary Definition of Hip Dysplasia and Structural Instability: Toward a Comprehensive Classification for Acetabular Dysplasia. The Journal of Arthroplasty. 2017;32(9, Supplement):S20-S7.