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Assessment and treatment of hip pain in young and middle-aged adults

A Prof Joanne Kemp

PhD, APA Sports Physiotherapist

@JoanneLKemp

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Sport and Exercise Medicine Research Centre

How should we assess hip pain?

Overview

1. Diagnosis
    a. Subjective exam
    b. Screen for red flags
    c. Exclude lumbar spine and pelvis
    d. Differential diagnosis using special tests
    e. Evaluation of imaging
        a. X-ray
        b. MRI
2. Evaluation of impairments (planning targeted management)
    a. Strength
    b. ROM
    c. Functional performance

PART 1: DIAGNOSIS

[CLINICAL COMMENTARY]

KRISTIAN THORBORG, MSportsPhysio, PhD[1] • MICHAEL P. REIMAN, PT, DPT[2] • ADAM WEIR, MBBS, PhD[3,4]
JOANNE L. KEMP, PT, PhD[5] • ANDREAS SERNER, PhD[4] • ANDREA B. MOSLER, PT, MAppSc (Sports Physio)[4] • PER HÖLMICH, MD, DMSci[1]

Clinical Examination, Diagnostic Imaging, and Testing of Athletes With Groin Pain: An Evidence-Based Approach to Effective Management

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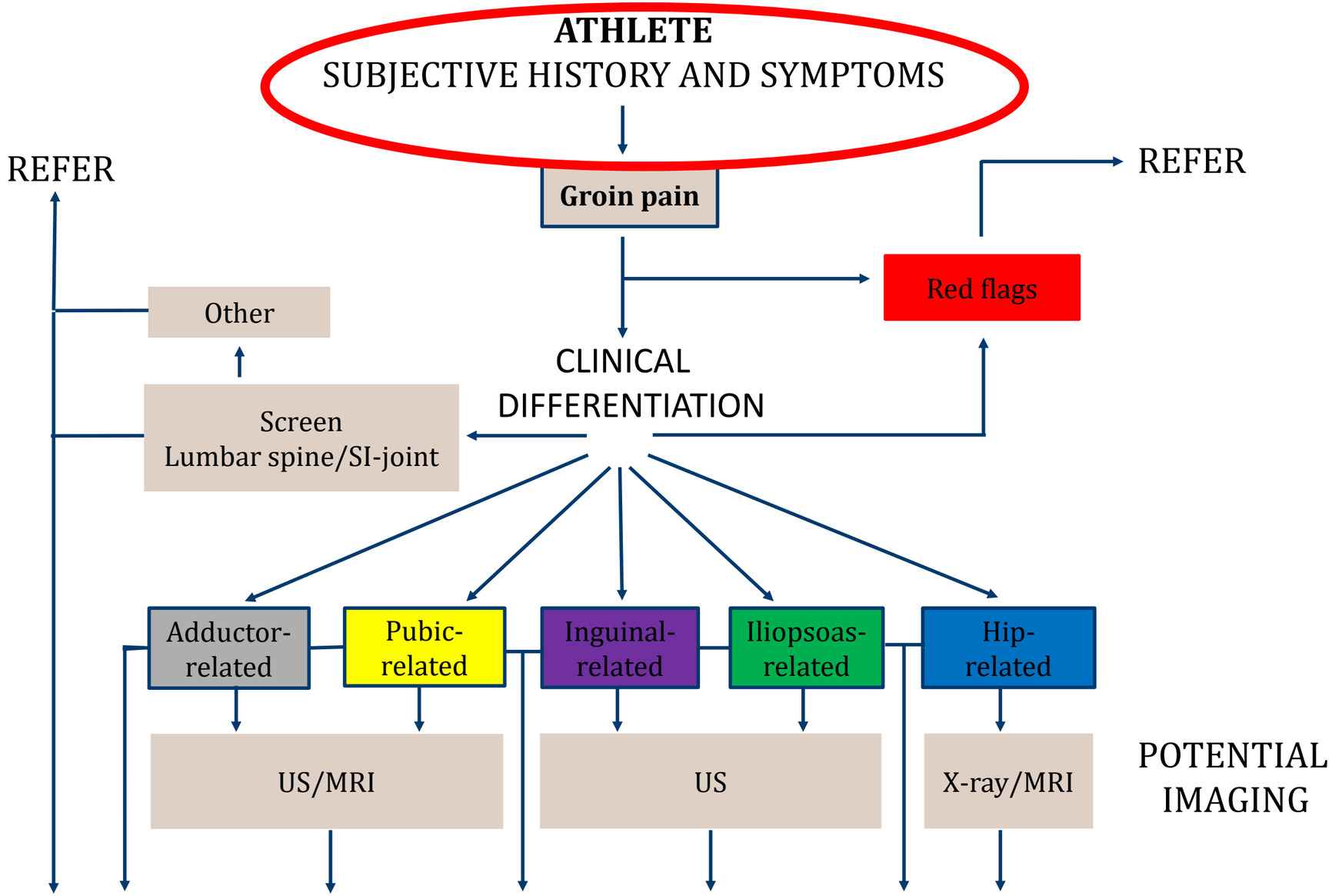


Thorborg et al JOSPT 2018

Subjective exam

Key components (not exhaustive list…)

Mechanism of injury

- Acute vs chronic

Sex

- male pelvis skeletally immature until 25+ years - apophysitis including ASIS, AIIS, pubic)

Age

- Hip pain/groin entities common 20-30 years
- Hip OA in 35+ years

Type of sport

- kicking sports more common cause hip pain
- Endurance sports cause stress fractures

Thorborg et al JOSPT 2018, Reiman 2017

Key components (not exhaustive list…)

Teenage sporting history

- increased joint loads during skeletal growth related to cam morphology development

Family history of hip pain

- Genetic relationship with cam FAI

Previous history hip pain

- especially SCFE, Perthes, DDH

Pain at rest, night, prolonged stiffness

- Synovitis/inflammatory conditions

Thorborg et al JOSPT 2018, Reiman 2017

Key components (not exhaustive list…)

Length of time sitting

- FAI syndrome is a position-related condition

Clicking, locking, catching, giving way

- Consider intra and extra-articular conditions

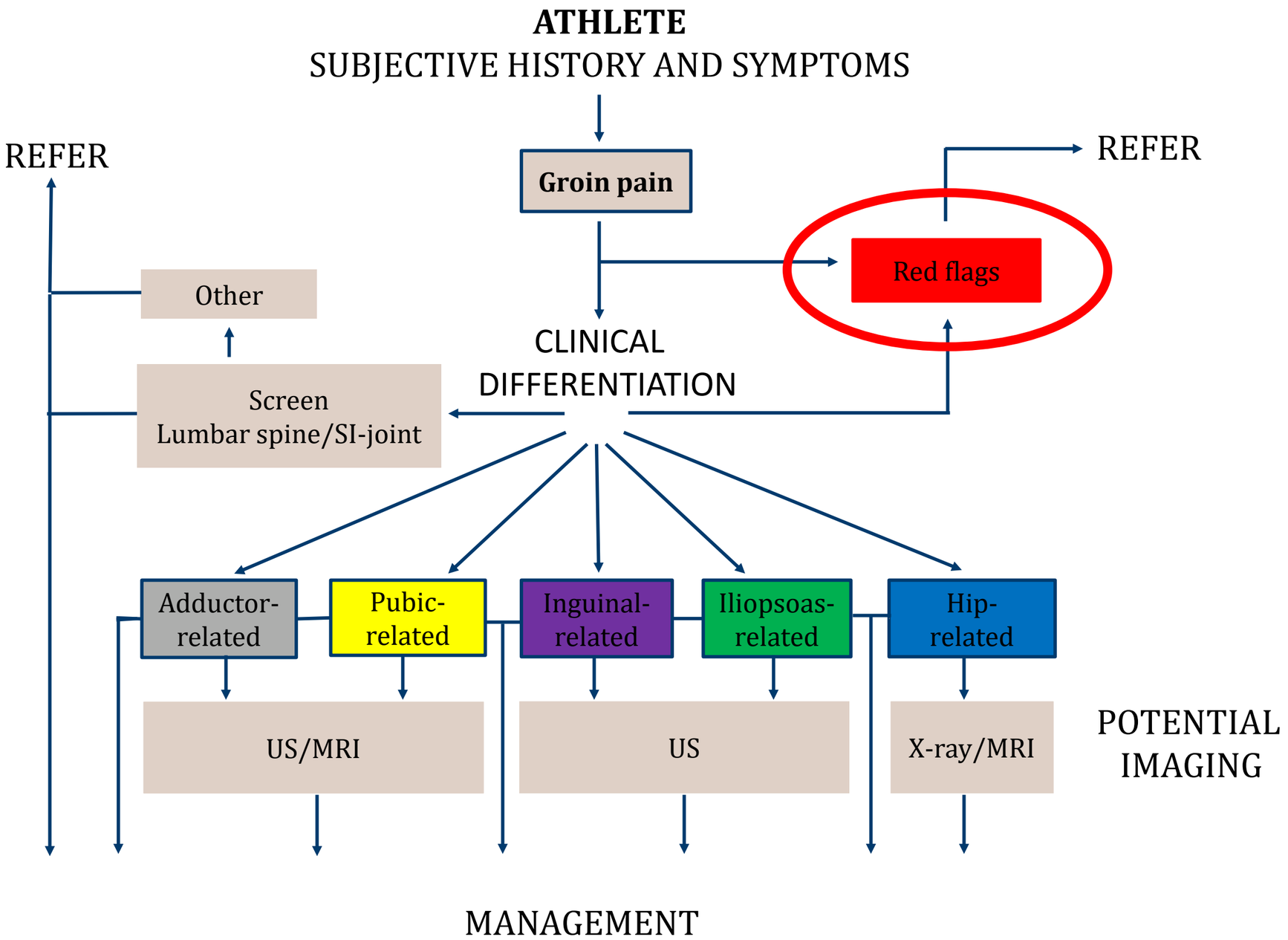
Pain on twisting (may also be mechanism if sudden onset)

- Consider labral tear, lig teres tear)

Illness/other injury/loading history

Behaviour of symptoms - Mechanical?

Thorborg et al JOSPT 2018, Reiman 2017



Thorborg et al JOSPT 2018

Screen for red flags

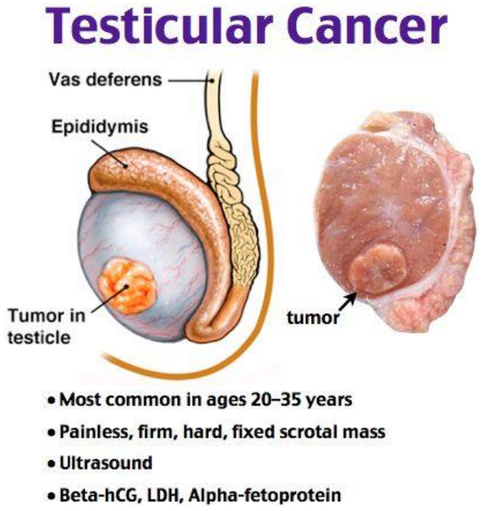
Key components - subjective

History of cancer
- prostate, breast, gynae – all metastasise to hip
- testicle

Female sex
- Gynaecological causes of pain – ask about cycle

Unexplained weight loss
- Cancer

Burning with urination
- UTI



Thorborg et al JOSPT 2018, Reiman 2017

Key components - subjective

Change in bowel habits

- cancer or other bowel disease

Alcohol abuse

- AVN

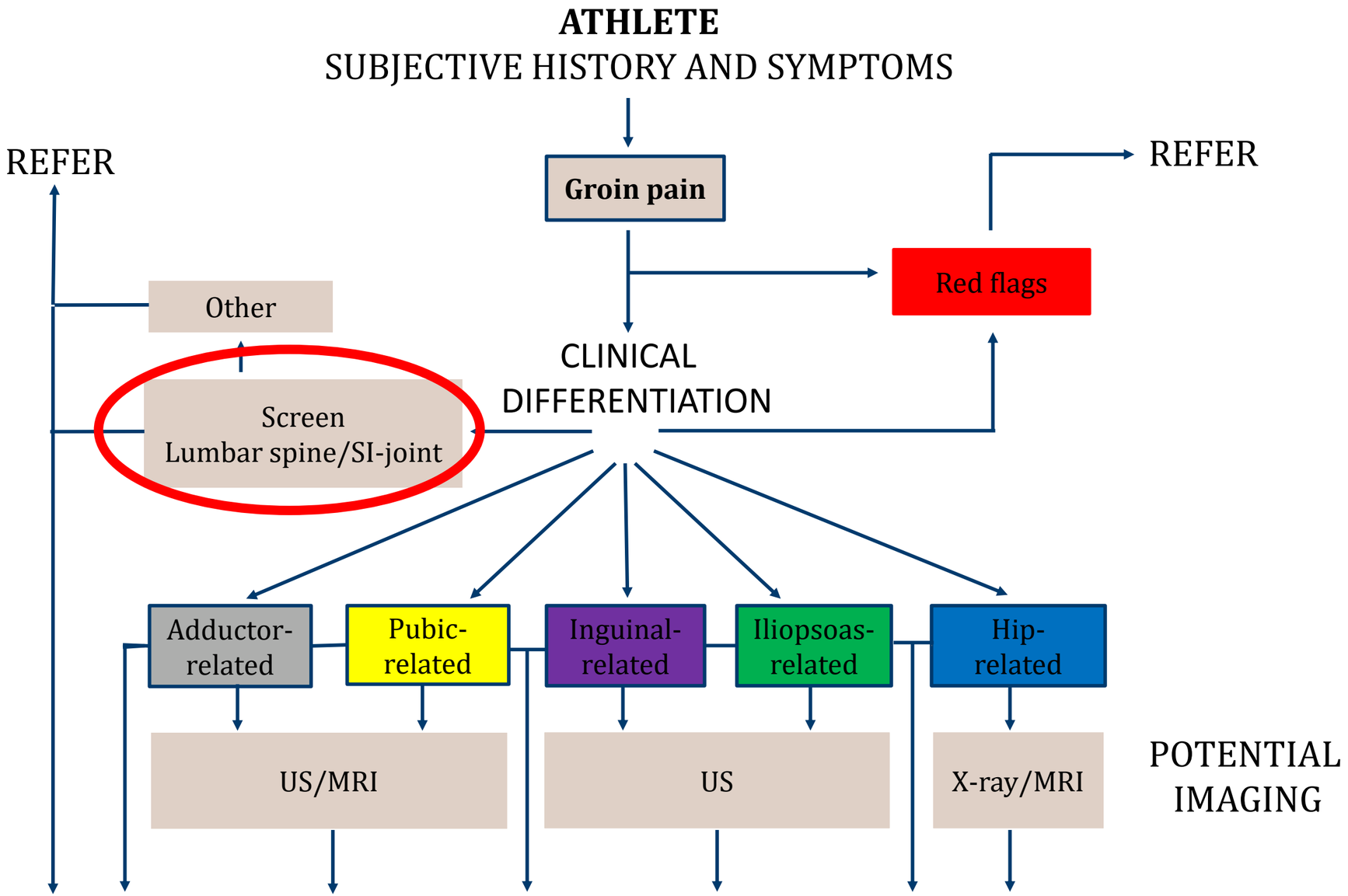
Corticosteriod exposure

- AVN, stress fractures

Acute pain

- with fever infection

Thorborg et al JOSPT 2018, Reiman 2017



Thorborg et al JOSPT 2018

Exclude lumbar spine and pelvis

Hip or spine?

Walking with limp

- 7x more likely hip than spine

Pain in groin/anterior hip

- 7x more likely hip than spine

Reduced hip IR ROM

- 14x more likely hip than spine

Thorborg et al JOSPT 2018, Reiman 2017

Hip or spine?

No change in symptoms with repeated lumbar movement

- SN 92% ruling out lumbar spine

Negative extension/rotation lumbar spine

- SN 100% ruling out lumbar spine

Negative SLR

- SN 97% ruling out lumbar spine

Negative slump test

- SN 87% ruling out lumbar spine

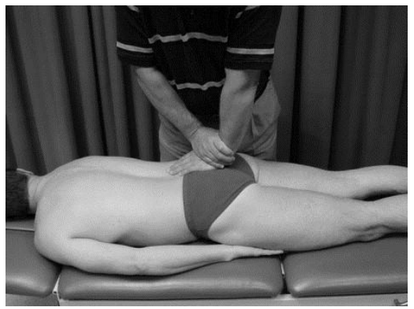
Thorborg et al JOSPT 2018, Reiman 2017

Hip or SIJ?

Negative thigh thrust

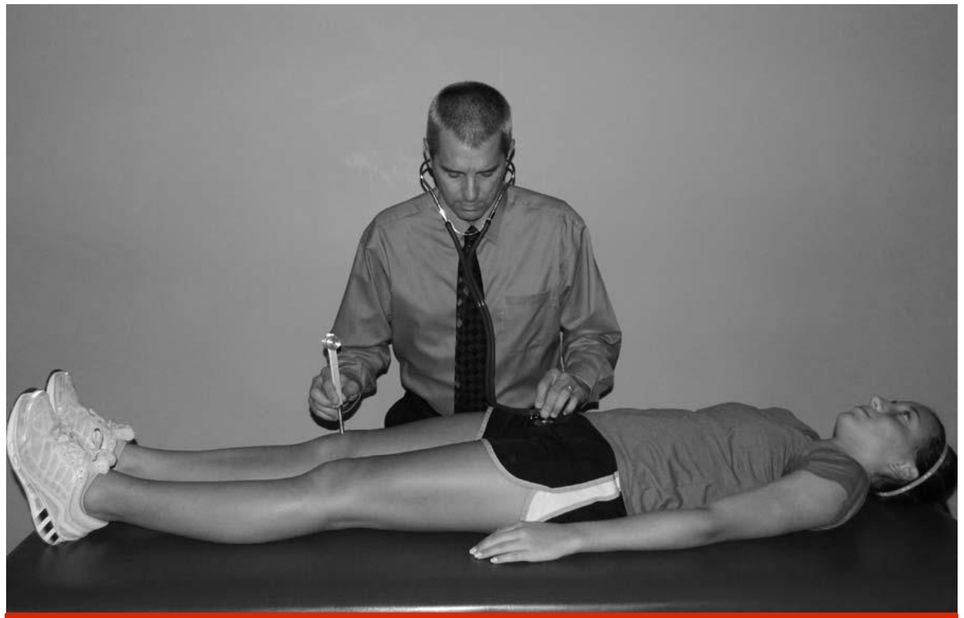
- SN 88% ruling out SIJ

If +ve, combine with…



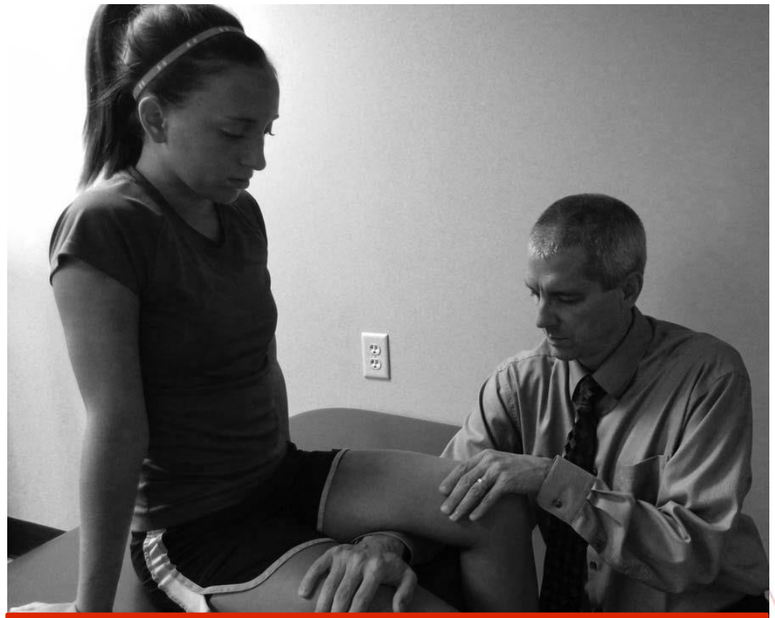
Thorborg et al JOSPT 2018, Reiman 2017, Laslett 2005

Hip or femoral bone stress?



Pubic percussion test[52]

Sn 95%, -LR 0.07



Fulcrum test[52]

Sn 93%, -LR 0.09

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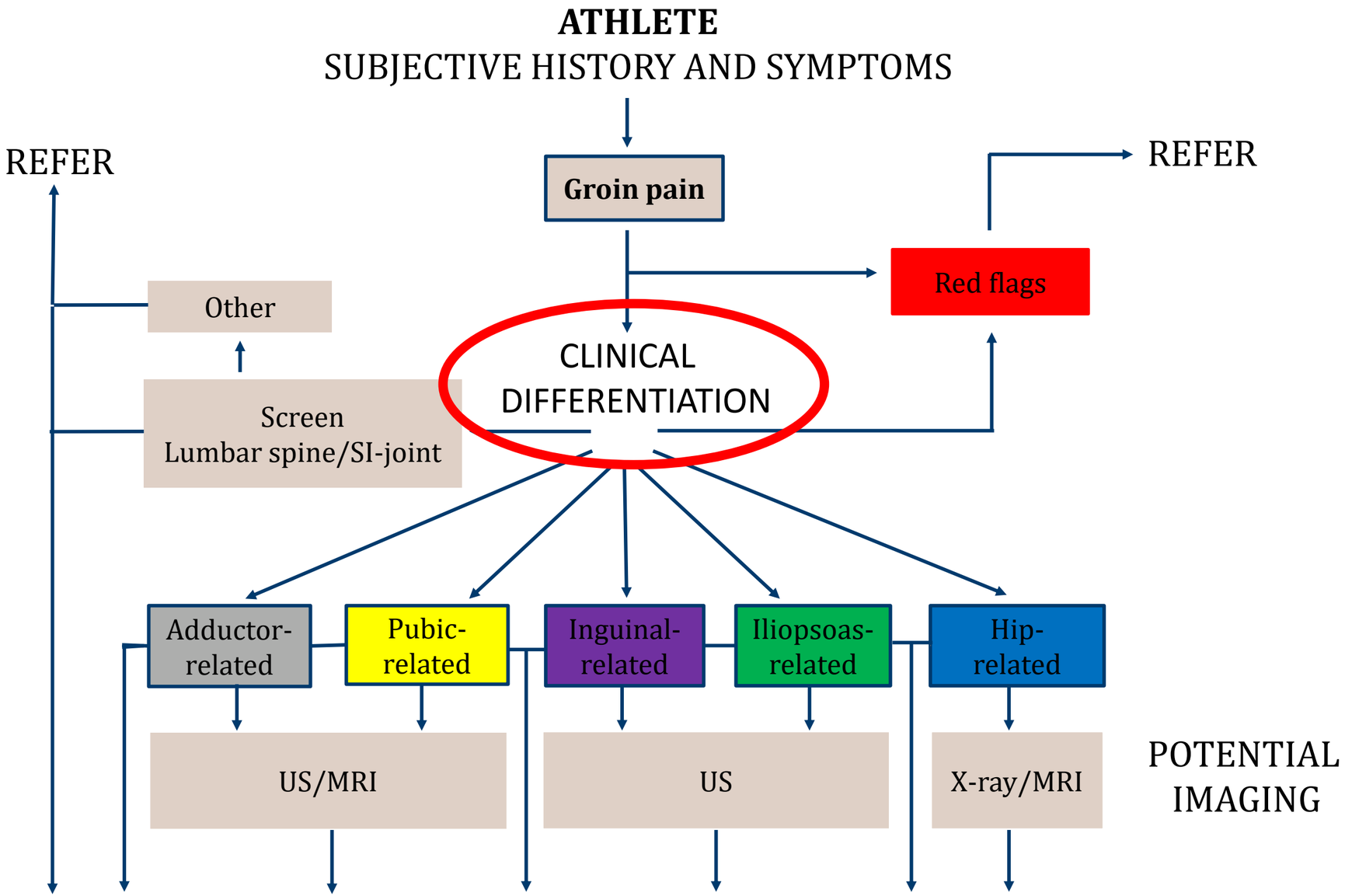
Reiman et al,



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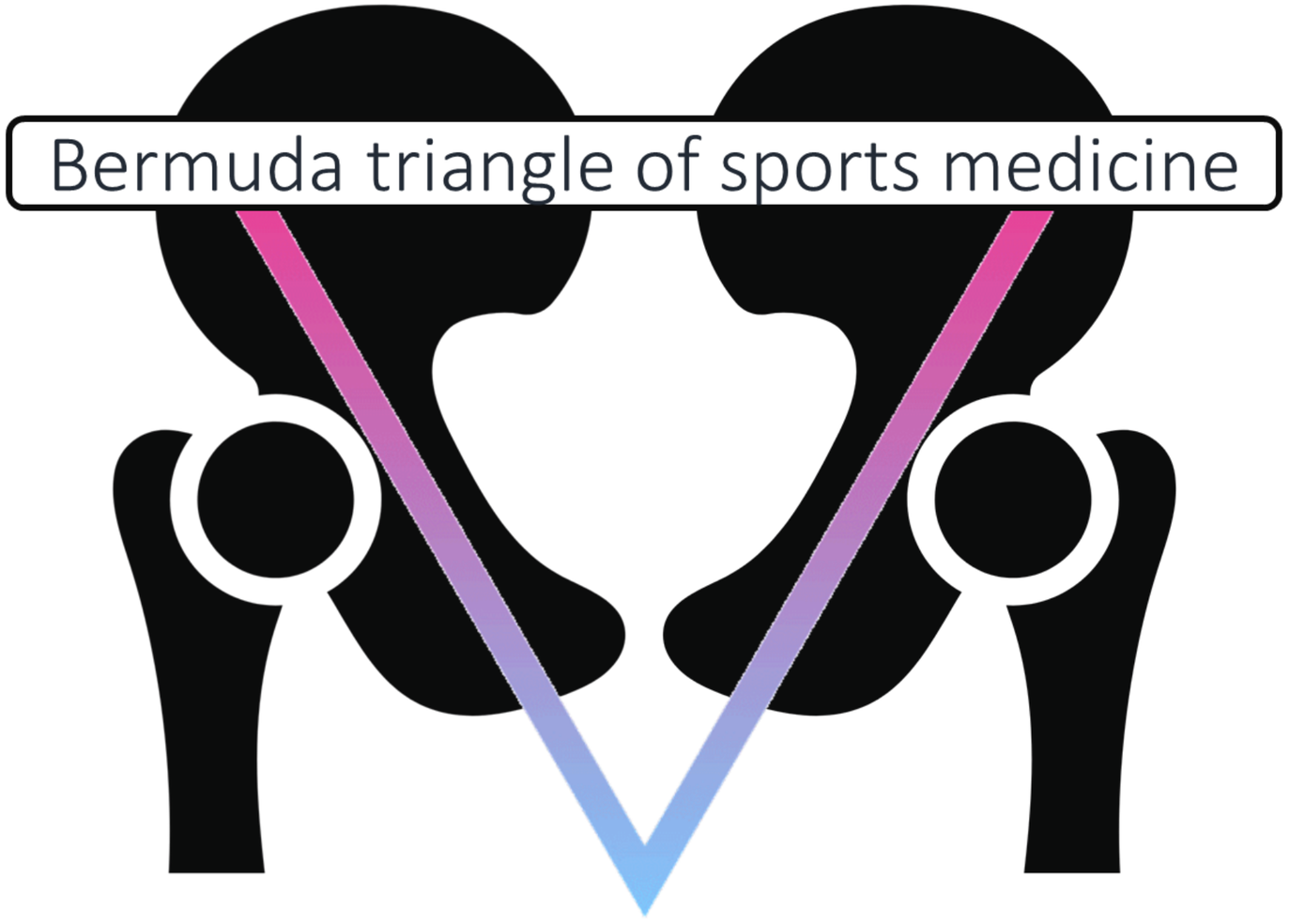
Thorborg et al JOSPT 2018

Differential Diagnosis



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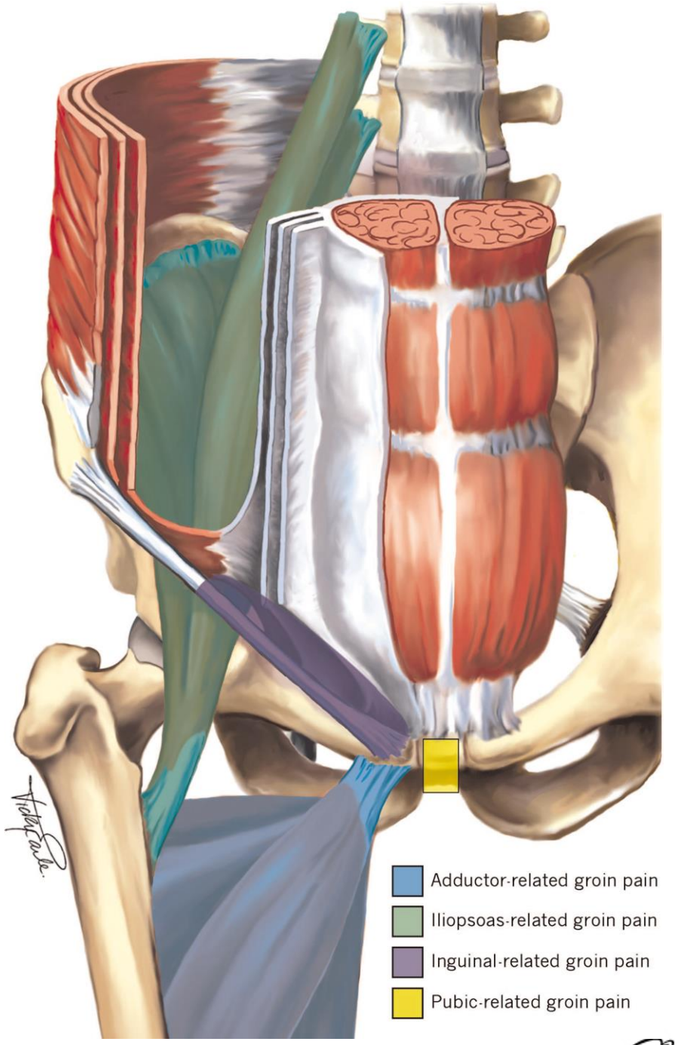
Clinical groin pain entities

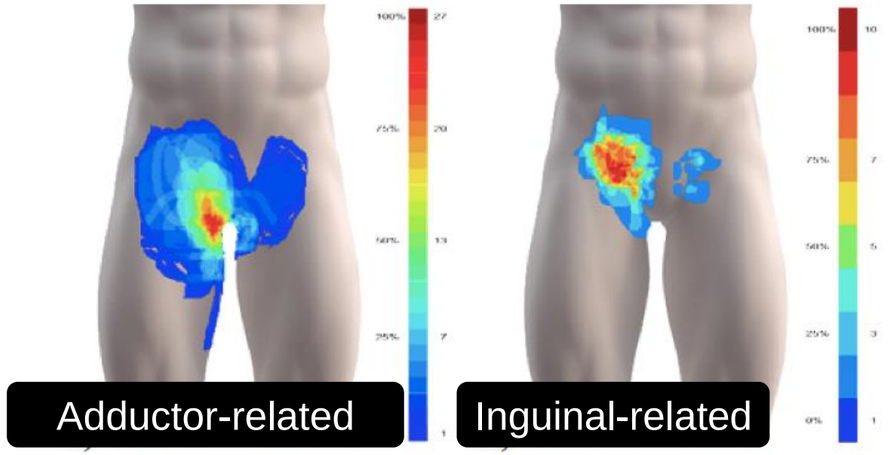


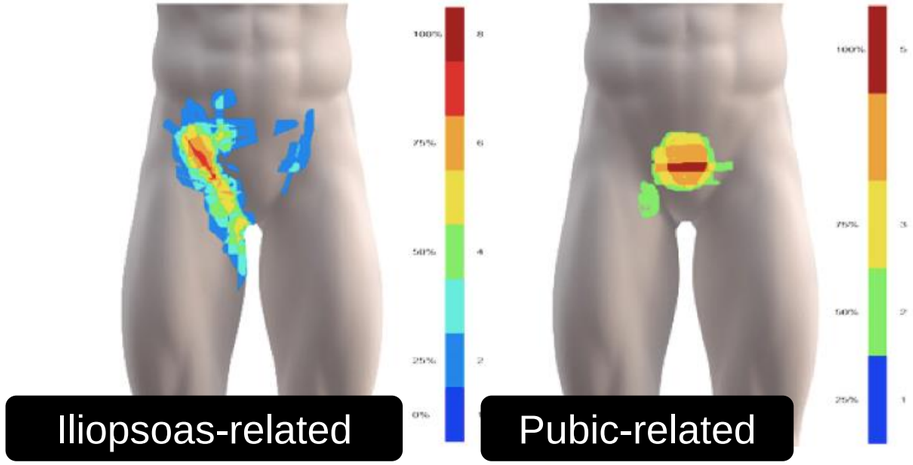
- **Long-standing groin pain**
- **Clinically-based classification system, not diagnostic criteria**
  - High prevalence of groin/hip imaging findings in athletes
  - No gold standard for diagnosing groin pain in athletes
- **Pain should be reported in the affected region that often worsens with exercise**

Key tools to assist in diagnosis

1. Pain location
2. Palpation
3. Special tests

Pain location





Digital body mapping of pain quality and distribution in athletes with longstanding groin pain.

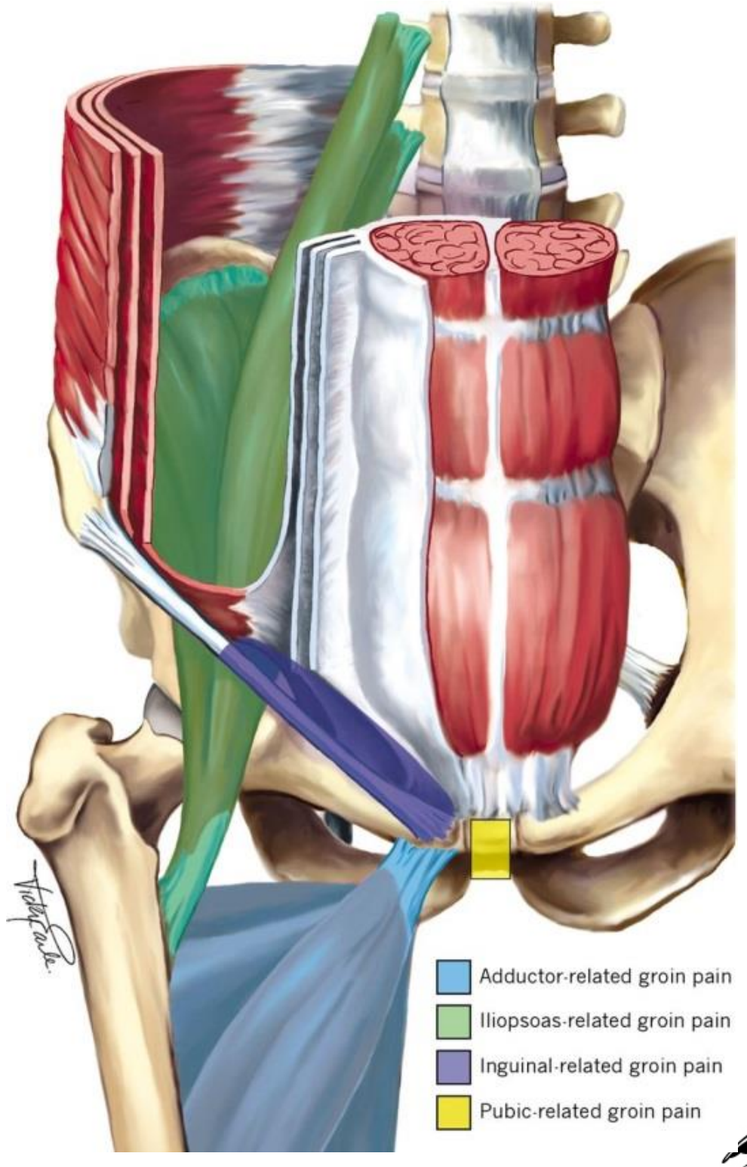
Andreas Serner (Andreas.serner@fifa.org)
Aspetar Orthopaedic and Sports Medicine Hospital

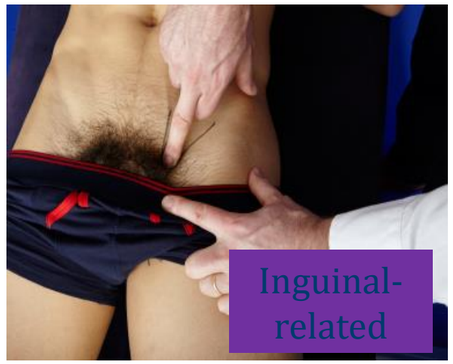
burning (101), dull/aching (90), pain (89), throbbing (87), tingling (84), electric (84), stabbing (62), and numbness (34) differed $\chi^2(7) = 14.638$, $p=0.041$.

there was no significant difference in pain descriptor frequency between adductor-, inguinal-, or iliopsoas-related groin ($p=0.893$).

Thorborg et al JOSPT 2018, Reiman 2017

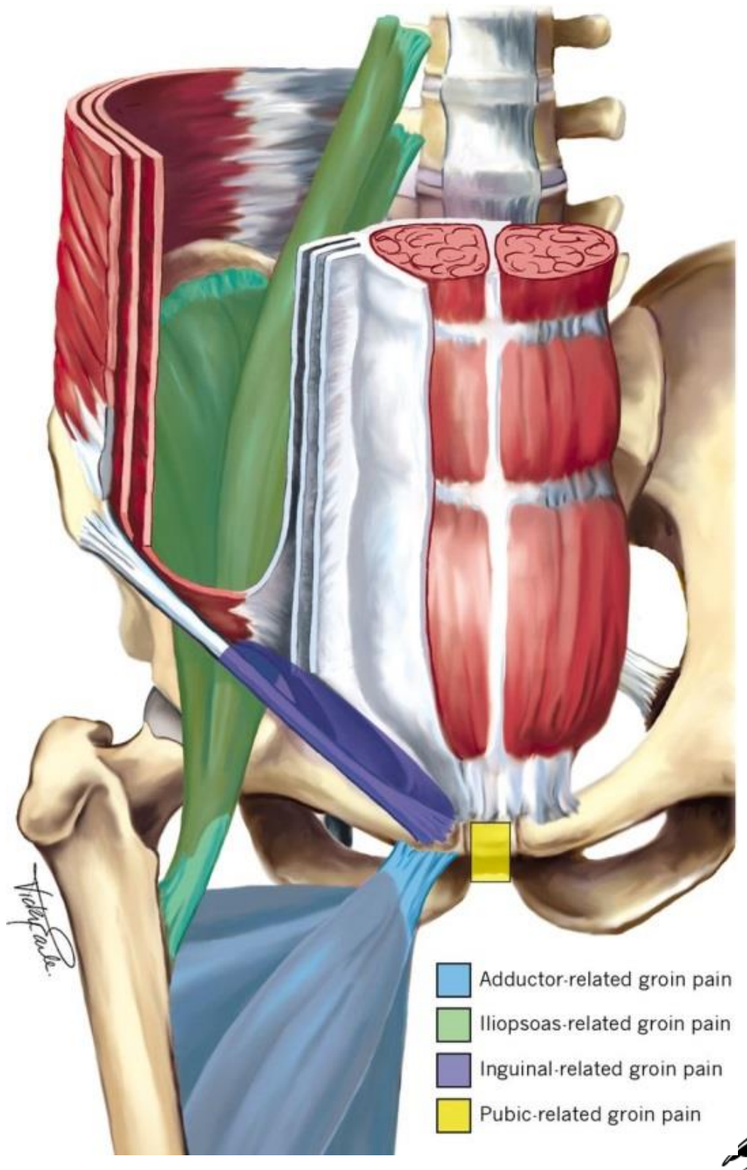
Palpation

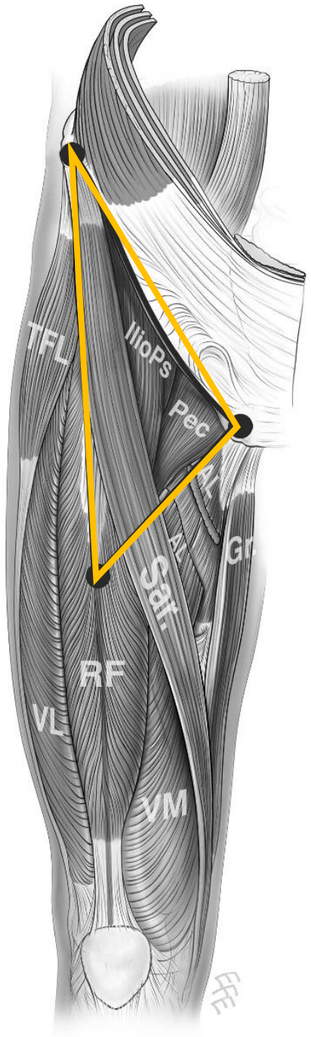




Thorborg et al JOSPT 2018

Palpation

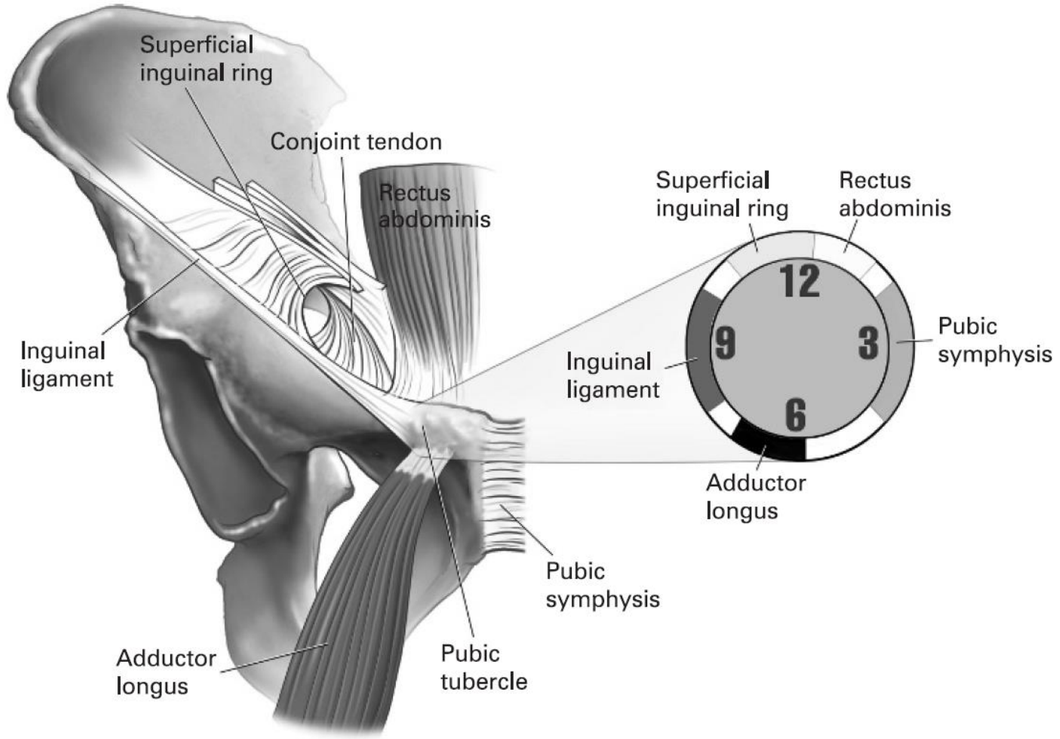




EDITOR'S CHOICE

The groin triangle: a patho-anatomical approach to the diagnosis of chronic groin pain in athletes

E C Falvey,[1,2] A Franklyn-Miller,[2] P R McCrory[1]

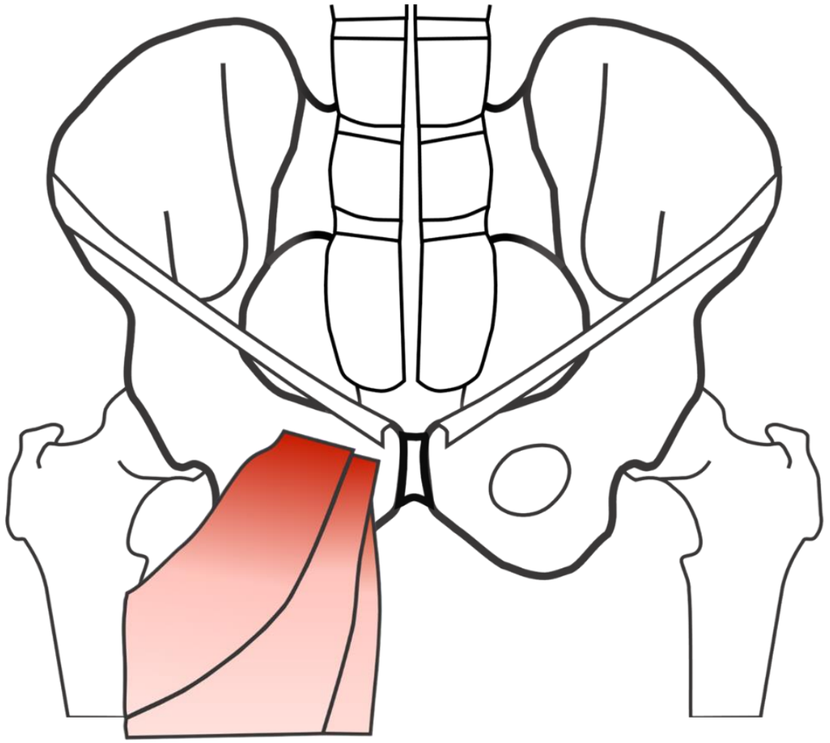


Thorborg et al JOSPT 2018

Adductor-related groin pain

- Local tenderness of the adductors
- Pain on resisted adduction testing

Adductor-related groin pain



Prospective cohort[1,2,9]
(time-loss injury)

63-68%

Cross-sectional[10-14]
(longstanding hip & groin pain)

12-69%

1. Werner et al, 2018
2. Mosler et al, 2017
9. Werner et al, 2009
10. Falvey et al, 2016
11. Holmich et al, 2007
12. Bradshaw et al, 2008
13. Rankin et al, 2015
14. Taylor et al, 2018

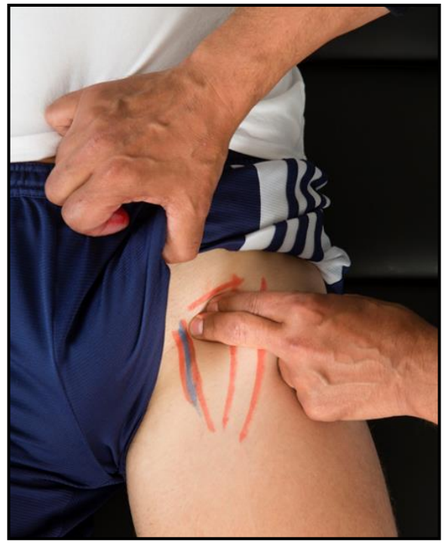
Iliopsoas-related groin pain

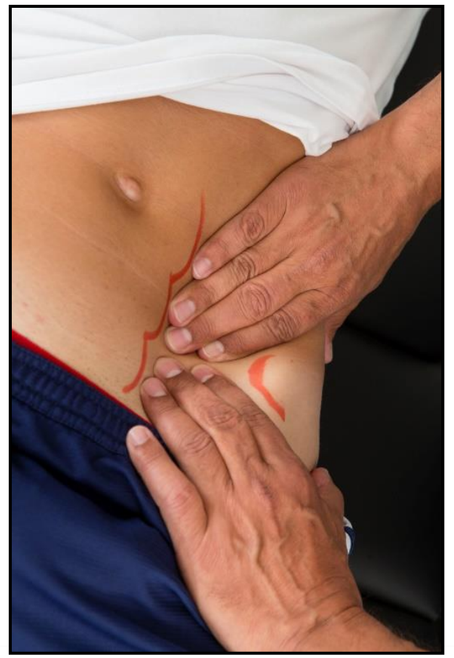
- Local tenderness of the iliopsoas

More likely if pain on:

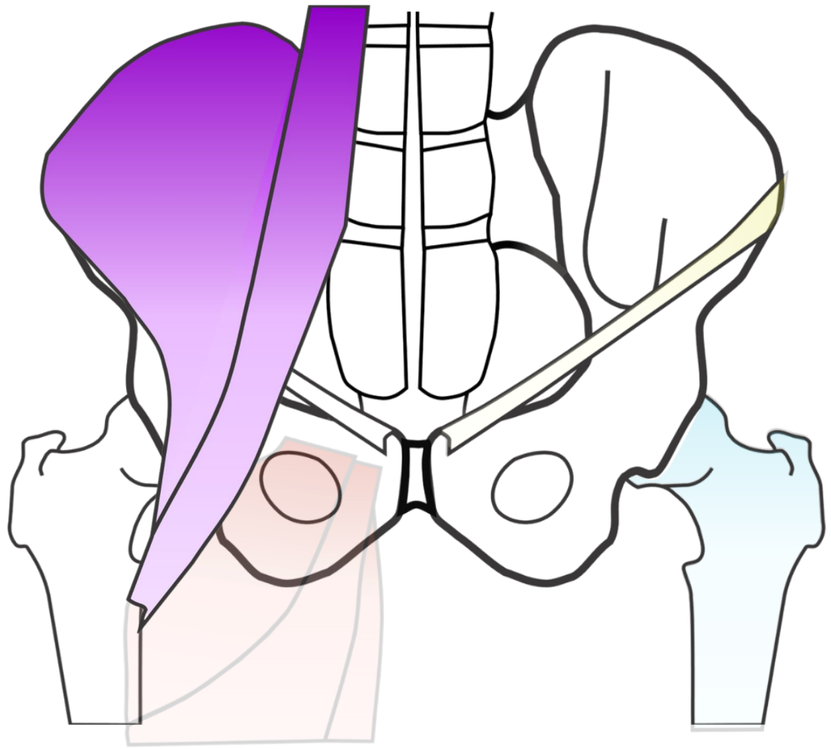
a) **Resisted hip flexion**

b) **Hip flexor stretching**





Iliopsoas-related groin pain



Prospective cohort[1,2,9]
(time-loss injury)

8-12%

Cross-sectional[10,11,13,14]
(longstanding hip & groin pain)

0-32%

1. Werner et al, 2018
2. Mosler et al, 2017
9. Werner et al, 2009
10. Falvey et al, 2016
11. Holmich et al, 2007
13. Rankin et al, 2015
14. Taylor et al, 2018

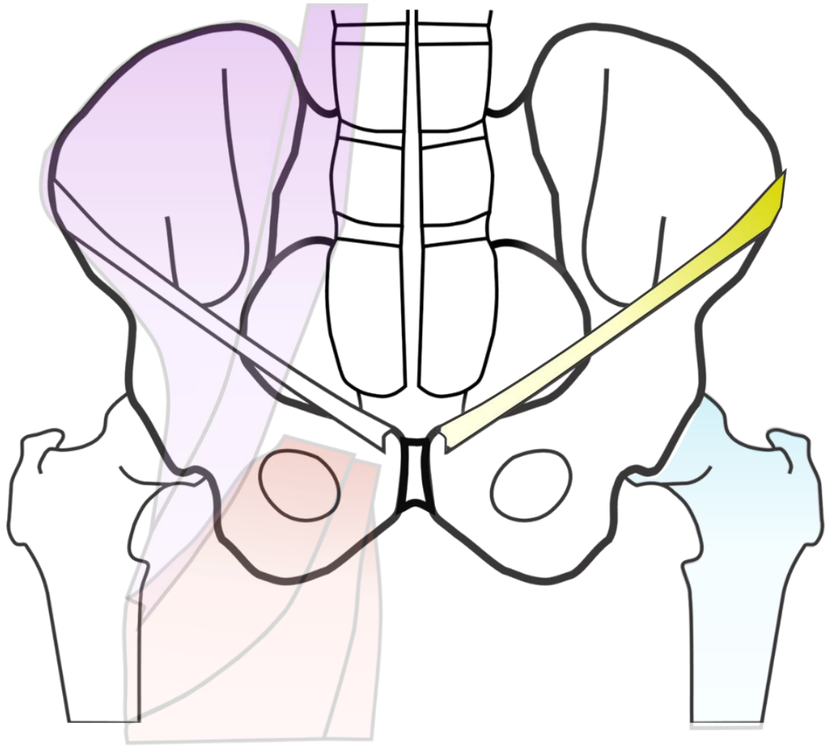
Inguinal-related groin pain

- Pain in the inguinal canal region
- Tenderness of inguinal canal
- No palpable inguinal hernia

More likely if pain on:

- valsalva/cough/sneeze
- resisted abdominal contraction

Inguinal-related groin pain



Prospective cohort[1,2,9]
(time-loss injury)

3-8%

Cross-sectional[10,11,13,14]
(longstanding hip & groin pain)

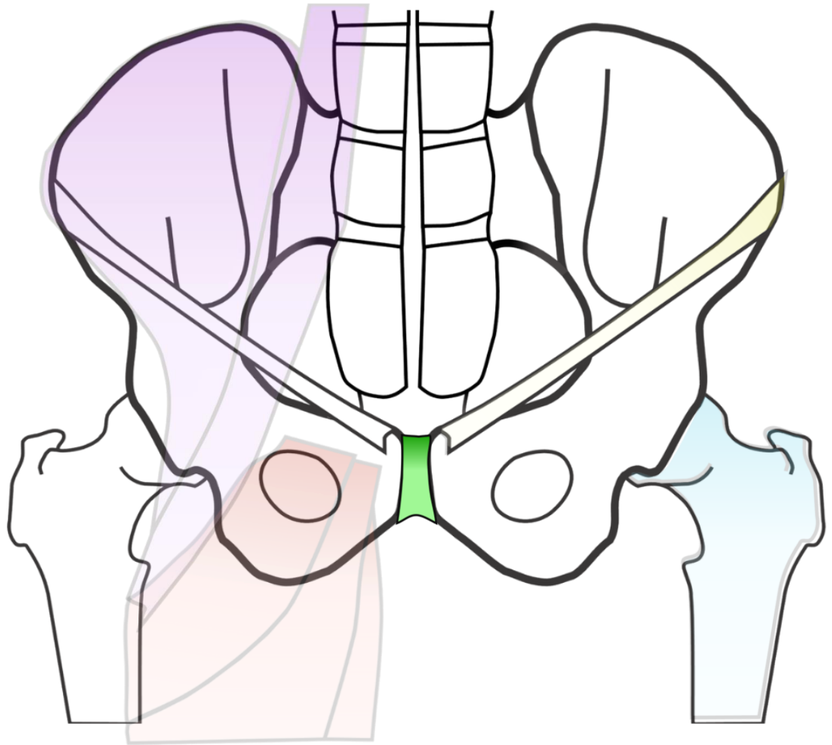
0-57%

1. Werner et al, 2018
2. Mosler et al, 2017
10. Falvey et al, 2016
11. Holmich et al, 2007
13. Rankin et al, 2015
14. Taylor et al, 2018

Pubic-related groin pain

- Tenderness of pubic symphysis and adjacent bone
- No specific resistance test

Pubic-related groin pain



Prospective cohort[1,2]
(time-loss injury)

2-9%

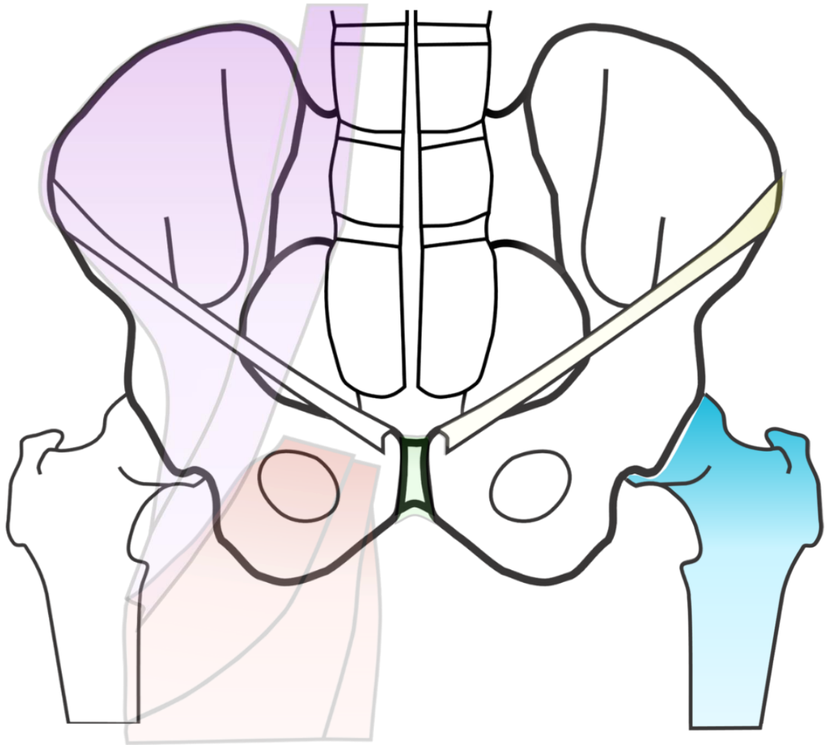
Cross-sectional[10,11,13,14]
(longstanding hip & groin pain)

6-77%

1. Werner et al, 2018
2. Mosler et al, 2017
10. Falvey et al, 2016
11. Holmich et al, 2007
13. Rankin et al, 2015
14. Taylor et al, 2018

Hip-related pain - Special tests

Hip-related pain



Prospective cohort[1,2]
(time-loss injury)

1-5%

Cross-sectional[10-14]
(longstanding hip & groin pain)

5-40%

Review

Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis

Michael P Reiman,[1] Adam P Goode,[1] Eric J Hegedus,[2] Chad E Cook

Consensus statement

Consensus recommendations on the classification, definition and diagnostic criteria of hip-related pain in young and middle-aged active adults from the International Hip-related Pain Research Network, Zurich 2018

Michael P Reiman ,[1] Rintje Agricola,[2] Joanne L Kemp ,[3] Joshua J Heerey ,[3] Adam Weir,[4,5] Pim van Klij ,[2] Ara Kassarjian,[6,7] Andrea Britt Mosler ,[3] Eva Ageberg ,[8] Per Hölmich,[9] Kristian Marstrand Warholm ,[10] Damian Griffin,[11,12] Sue Mayes,[3] Karim M Khan ,[13] Kay M Crossley ,[3]

Diagnostic accuracy of clinical tes of hip femoroacetabular impinge a systematic review with meta-ar

M P Reiman,[1,2] A P Goode,[1] C E Cook,[1] P Hölmich,[3,4] K Thorborg[3,5]

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/bjsports-2014-094302).

ABSTRACT

Background Surgery for hip femoroacetabular impingement/acetabular labral tear (FAI/ALT) is exponentially increasing despite lacking investigation of shown in the USA.[8] Given that differential diagnosis for the patient presenting with hip or groin pain is still suggested to be a diagnostic challenge,[9] focus on proper diagnosis would seem warranted. A sig-

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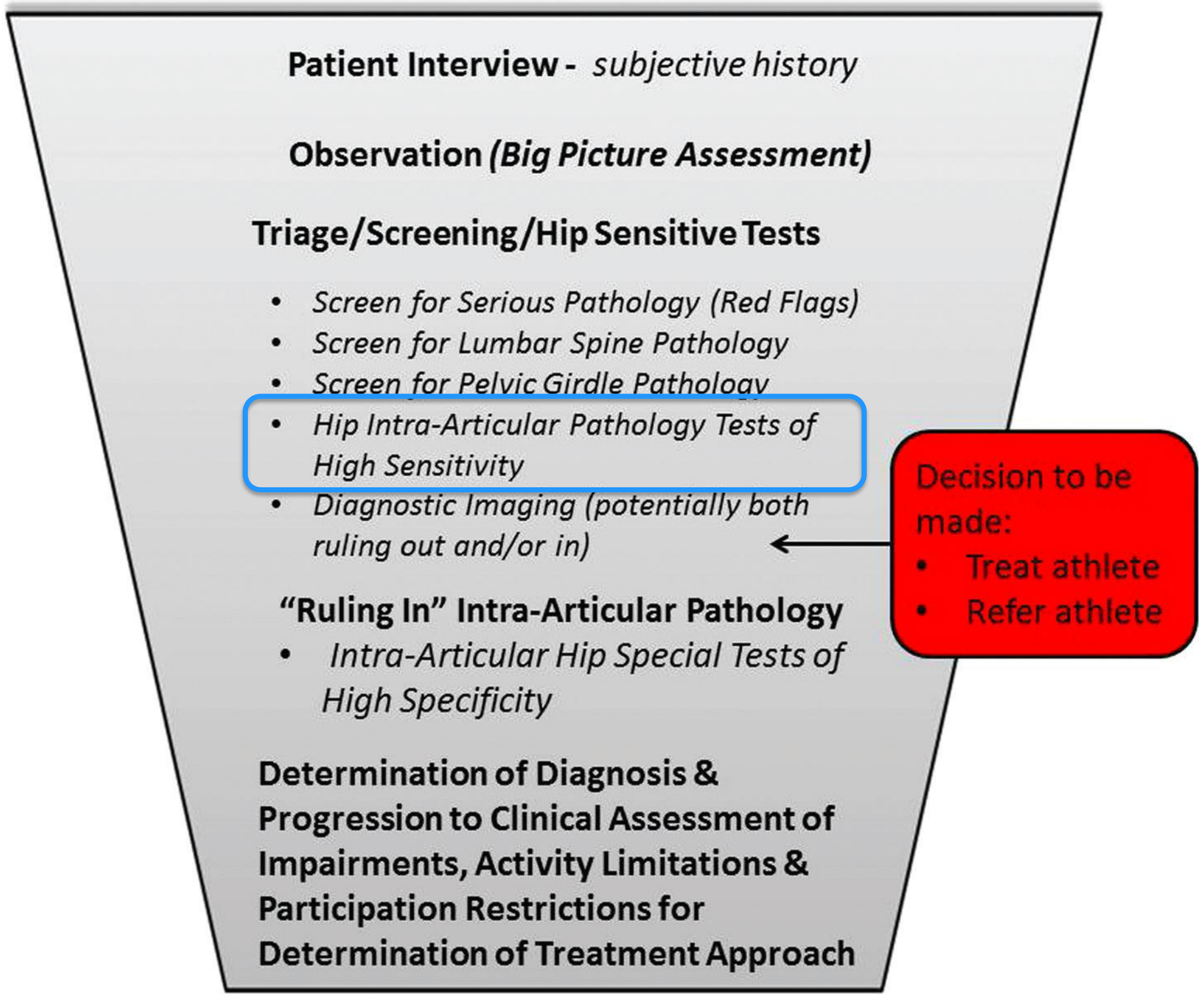

Patient Interview - subjective history
Observation (Big Picture Assessment)
Triage/Screening/Hip Sensitive Tests
Screen for Serious Pathology (Red Flags)
Screen for Lumbar Spine Pathology
Screen for Pelvic Girdle Pathology
Hip Intra-Articular Pathology Tests of High Sensitivity
Diagnostic Imaging (potentially both ruling out and/or in)
"Ruling In" Intra-Articular Pathology
Intra-Articular Hip Special Tests of High Specificity
Determination of Diagnosis & Progression to Clinical Assessment of Impairments, Activity Limitations & Participation Restrictions for Determination of Treatment Approach
Decision to be made:
Treat athlete
Refer athlete

FADIR (Flexion, Adduction, IR) ✓

Sensitivity = 94 to 99
Specificity = 5 to 25

FADIR is a good test to rule people out as not having FAI (low risk of false negatives)

BUT

FADIR is not a good test to rule people in as having FAI (high risk of false positives)

Thorborg et al JOSPT 2018, Reiman 2017

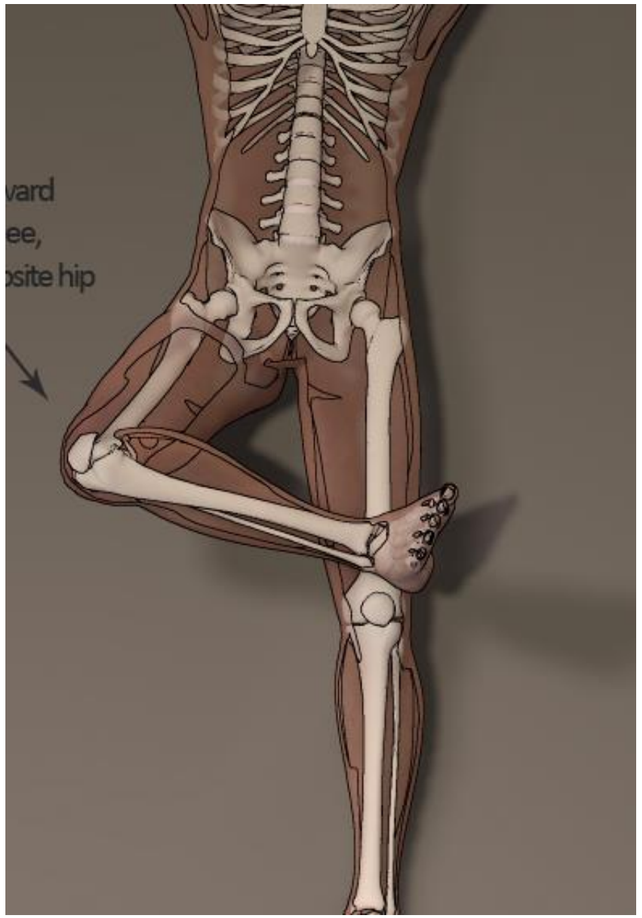
FABER (Flexion, Abduction, ER) X

Sensitivity = 42 to 60
Specificity = 18 to 75

FABER is a poor to fair test to rule people out as not having FAI (high risk of false negatives)

AND

FABER is a poor to fair test to rule people in as having FAI (high risk of false positives)



Thorborg et al JOSPT 2018, Reiman 2017

Flexion IR overpressure

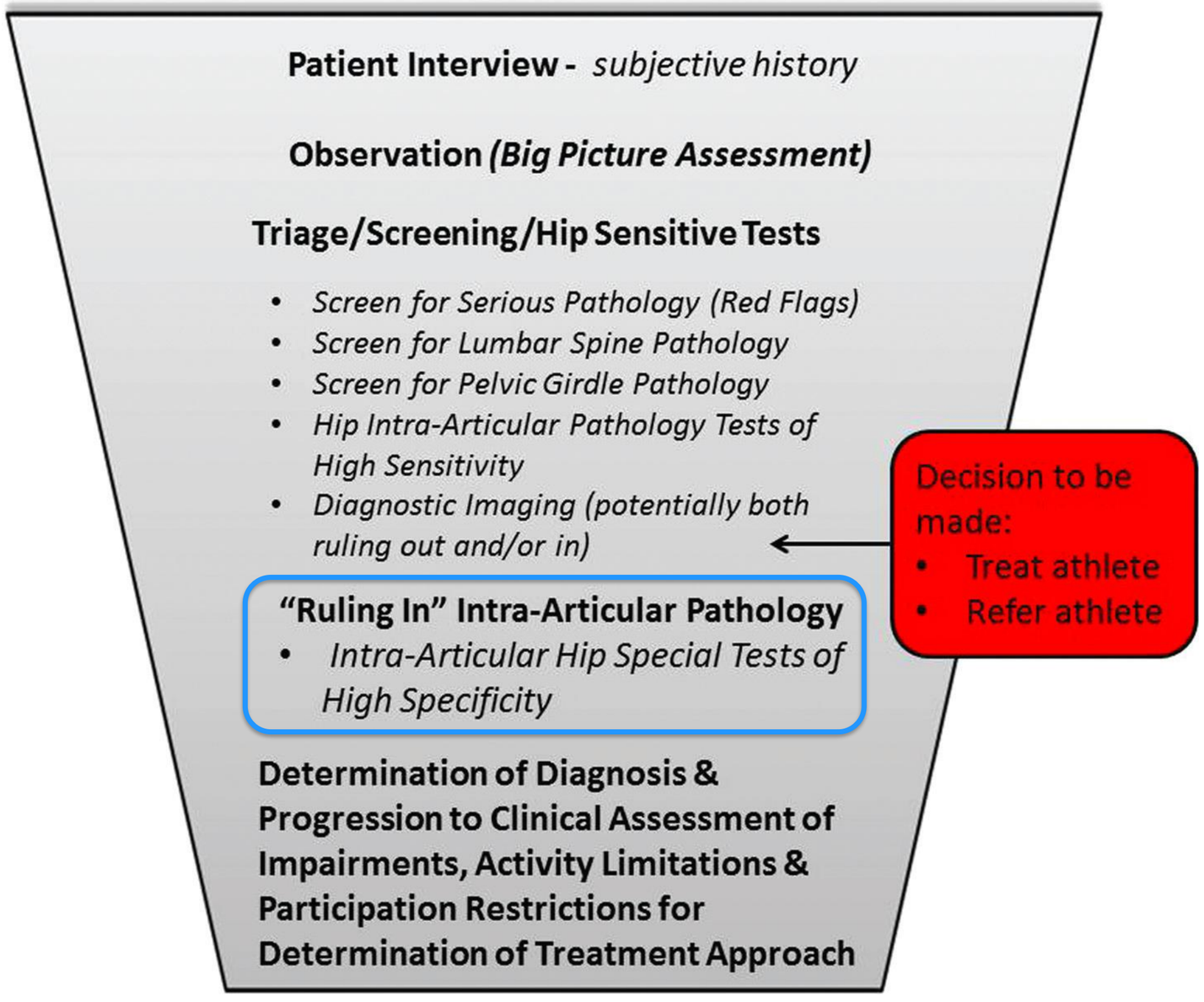
Sensitivity = 70 to 98
Specificity = 8 to 43

Flex/IR OP is an good to excellent test to rule people out as not having FAI
(low risk of false negatives)

BUT

Flex/IR OP is a poor to fair test to rule people in as having FAI (high risk of false positives)

Thorborg et al JOSPT 2018, Reiman 2017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Prone Internal rotation

? Limited evidence

Sensitivity = 29 (13-44)
Specificity = 94 (86-100)

Prone IR is a good test to rule people in as having FAI syndrome (low risk of false positives)

BUT

Prone IR is not a good test to rule people out as not having FAI (high risk of false negatives)

Pålsson et al, 2020

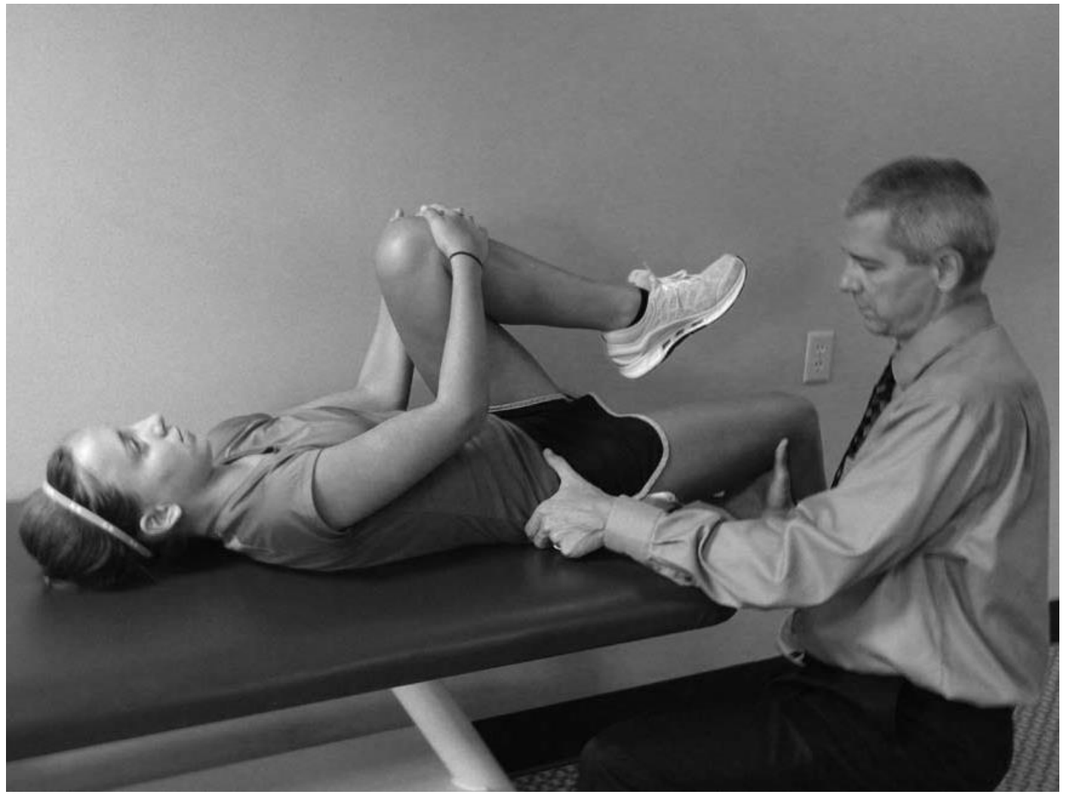
Thomas test

? Limited evidence

Sensitivity = 89%
Specificity = 92%

Thomas test is a good test to rule people out and in as having a labral tear

(low risk of false positives and negatives)



Reiman 2017

Ligamentum teres test

? Limited evidence

Sensitivity = 90%
Specificity = 85%

Ligamentum teres tear test is a good test to rule people out and in as having a ligamentum teres tear

(low risk of false positives and negatives)

Hip instability – Prone Instability Test

? Limited evidence

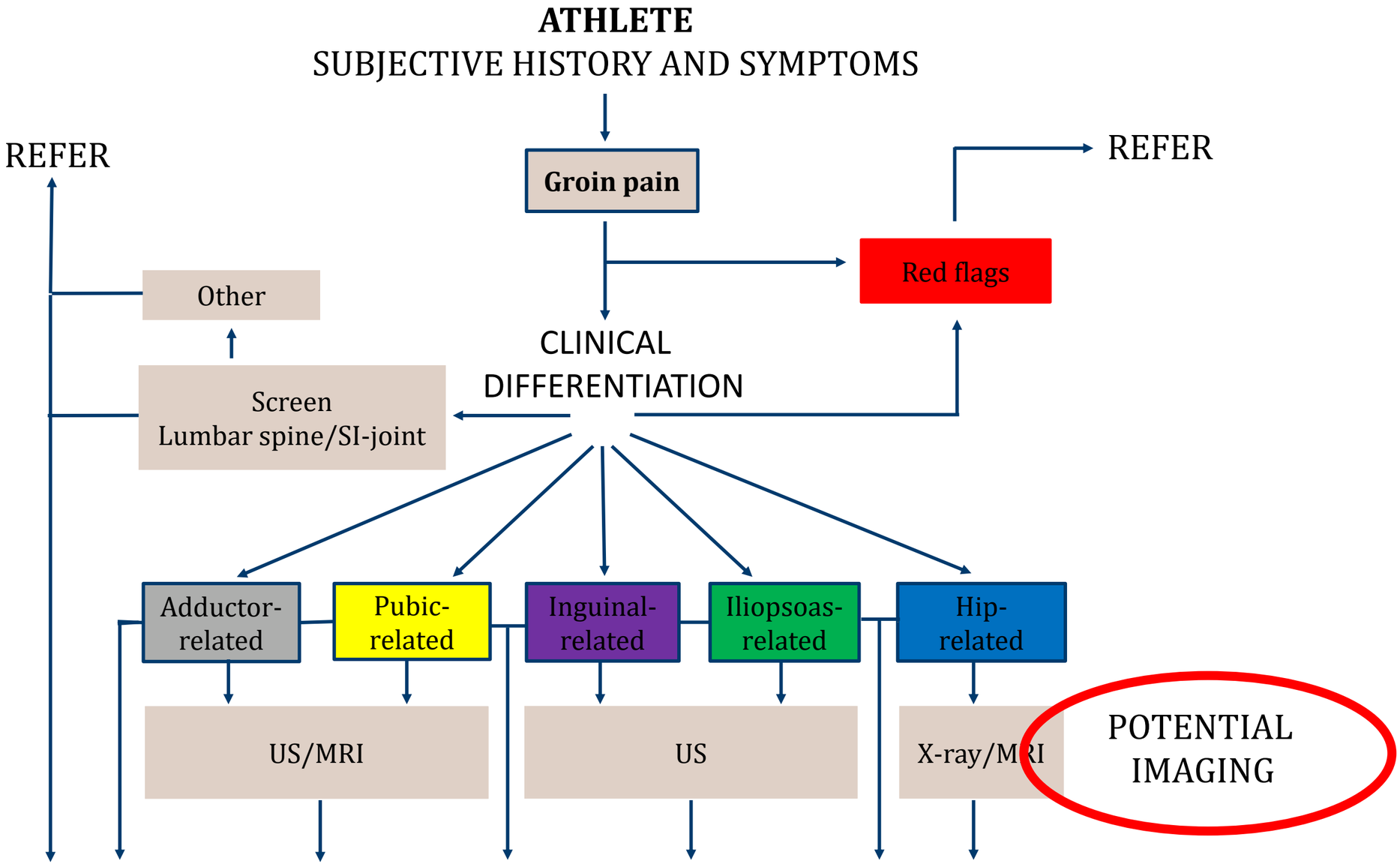
Sensitivity = 98%
Specificity = 34%

Prone instability test is a good test to rule people in as having hip instability
(low risk of false positives)

BUT

It is not a good test to rule people out as not having instability (high risk of false negatives)

Reiman 2019, Hoppe 2017



Thorborg et al JOSPT 2018

PART 2: EVALUATING IMPAIRMENTS

Measuring strength

What strength to measure?

Strength deficits exist in people with hip/groin pain

- Hip abd/adduction
- Abdominals/back extensors

Consider all hip movement planes

- Isometric/eccentric (> adductor-related groin pain)

Objective measurements of hip strength are preferred

- Hand-held dynamometry
- Sphygmomanometer (only adduction)

Thorborg et al JOSPT 2018

What strength to measure?

Measure all hip strength measures at initial assessment (will change, aids compliance)

Measure adduction, abduction, extension at regular intervals (6-8 weeks)

Measure most impaired measure at each session

Thorborg et al JOSPT 2018

What strength to measure?

Strength results can be compared with[17]

- Normative values for specific populations (sports)
- Unaffected limb (if unilateral pain)

Consider agonist/antagonist values

Numerical pain rating scale (0-10) for each test

Changes/differences in muscle strength (all planes) >15% can reliably measured[17]

Thorborg et al JOSPT 2018

What strength to measure?

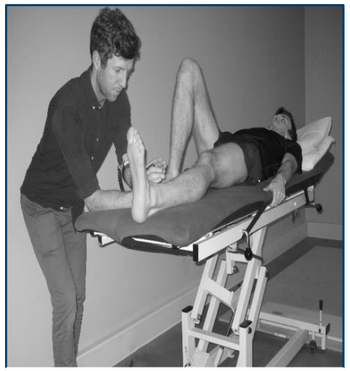
- **Strength deficits exist in athletes with hip/groin pain**
  - Hip abd/adduction
  - Abdominals/back extensors

- **Consider all hip movement planes[17]**
  - Isometric/eccentric (> adductor-related groin pain)

- **Objective measurements of hip strength are preferred**
  - Hand-held dynamometry
  - Sphygmomanometer (only adduction)

What strength to measure?

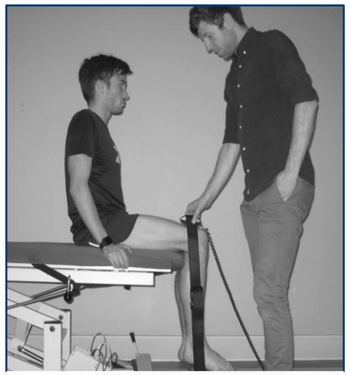
Iso Abd



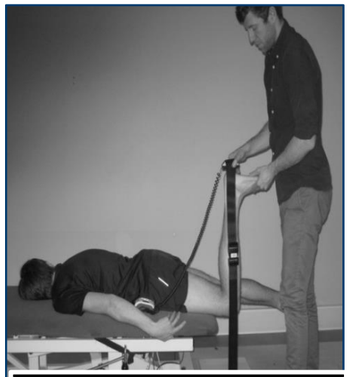
Iso Add

Iso ER

Iso IR

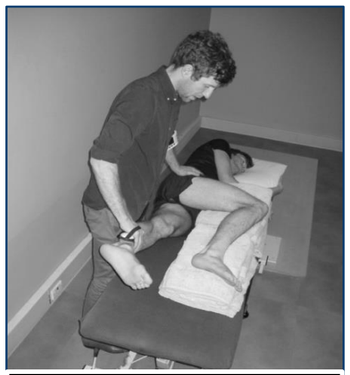


Iso Flex



Iso Ext

Ecc Abd



Ecc Add

Strength values (soccer players)

Adductor strength

- Isometric: 2.45 N.m/kg (dominant=non-dominant)
- Eccentric: >2.8 N.m/kg (dominant>non-dominant)

Abductor strength

- Isometric: 2.35 N.m/kg (dominant=non-dominant)
- Eccentric: >2.5 N.m/kg (dominant=non-dominant)

Adductor/Abductor ratio

- Isometric: Ratio 1.05 (adductors 5% stronger)
- Eccentric: Ratio >1.10 (adductors >10% stronger)

Thorborg et al, 2011, Thorborg et al, 2011, Mosler et al, 2017

Strength values (soccer/AF players)

Flexion strength

- Isometric 90˚: 1.04 N.m/kg

Extension strength

- Isometric: 1.52 N.m/kg

Flexion/extension ratio

- Isometric: Ratio 0.70 (extensors 30% stronger)

Bonello et al, 2022

Strength values (non-athletes)

Adductor strength

- Isometric: ≈1.6 N.m/kg (dominant=non-dominant)

Abductor strength

- Isometric: ≈1.5 N.m/kg (dominant=non-dominant)

Adductor/Abductor ratio

- Isometric: Ratio 0.9 (abductors 10% stronger)

Kemp et al, 2013

Strength values (non-athletes)

Flexion strength

- Isometric 90˚: 1.5 N.m/kg

Extension strength

- Isometric: 1.52 N.m/kg

flexion/extension ratio

- Isometric: Ratio 1.0 (flexors=extensors)

Kemp et al, 2013

Measuring ROM

What ROM to measure??

Athletes with hip/groin pain have deficits in hip ROM[21]

IR and BKFO ROM deficits are evident in athletes with hip/groin pain

ROM

- Flexion (active)
- IR/ER in 90 (passive)
- BKFO

Mosler et al, 2022,
Mosler et al, 2015

What ROM to measure??

Hip flexion

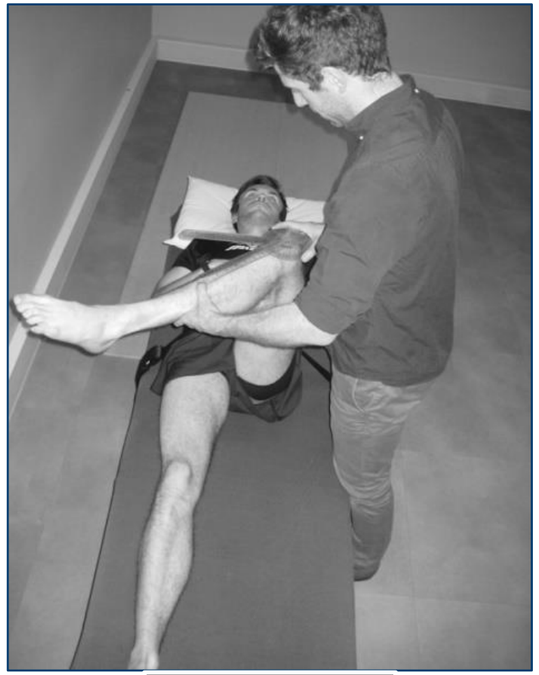
- At start & end of each treatment as closely predicts outcome, sensitive to change

Hip IR ROM

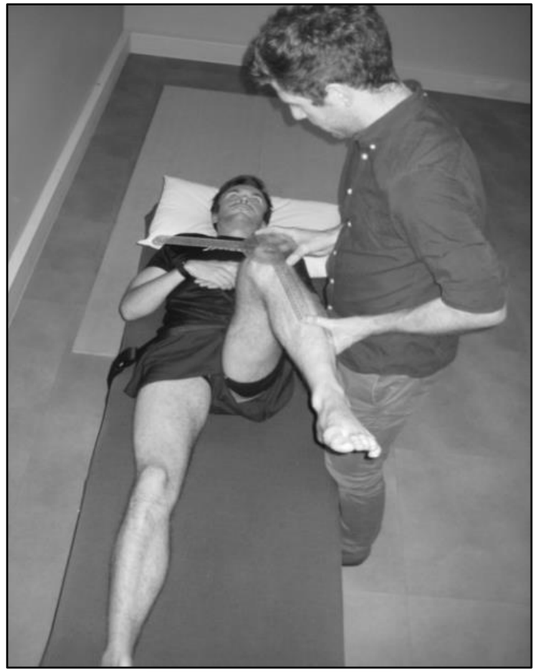
- At initial assessment only for diagnosis, it will not change with treatment

Bent knee fall out

What ROM to measure??

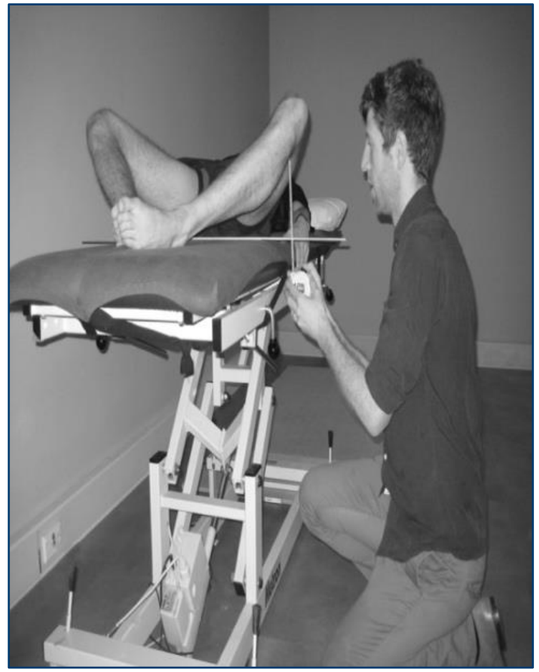


ER in 90



IR in 90

Flexion



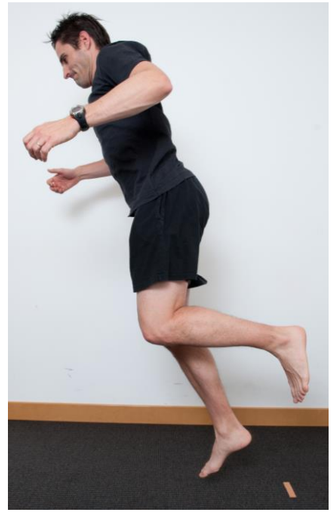
BKFO

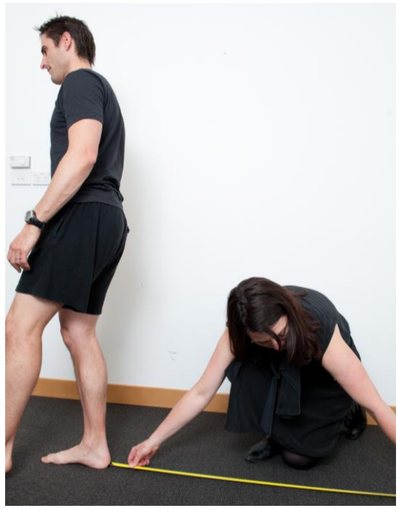
Measuring function

What functional tests to measure?

- **Side bridge**
- **Single leg hop**
- **Single leg rise**

At initial assessment and regular follow-up interval, including prior to return to sport (using cut offs)





Assessing contributing factors

Assessing contributing factors

Muscle length

- Hip flexors, adductors, hamstrings, calf

Lower limb kinetic chain function

- Ankle DF ROM
- Calf strength
- Quads strength
- Hamstring strength

Developing a strength intervention for hip pain

Strength and conditioning principles[11]

Number of reps and sets

Rest between reps and sets

Load applied

Time under tension

Progressive strength program starting with low load, safe positions progressing to high load challenging positions

Allowed to progress when VAS <20mm and Borg perceived exertion ≤5 (moderate)

[11] Toigo and Boutellier 2006

Progressive strength - adduction

1

2

3

4

5

6

Progressive strength - abduction

1

2

3

Progressive strength - extension

1

2

3

4

Progressive strength - flexion

1

2

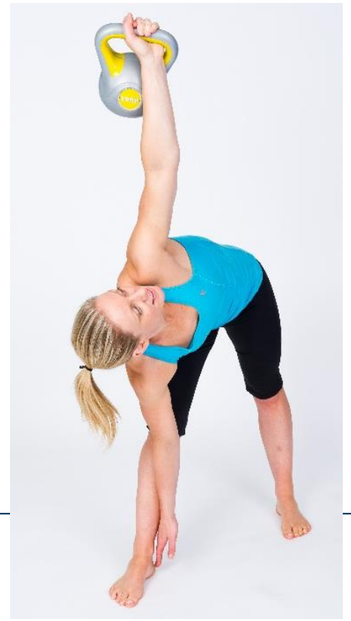
3

Progressive strength – trunk

1

2

3



4

5

Retrain both sides

Watch overactivity in hip flexors

(avoid crunches and sit ups)

Focus on endurance

Movement retraining in hip/groin pain interventions

Managing RISK

Physical Therapy in Sport 29 (2018) 79–83

Contents lists available at ScienceDirect

Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsp

Managing RISK when treating the injured runner with running retraining, load management and exercise therapy

Reduce the overall load (pain-free targeted exercise)

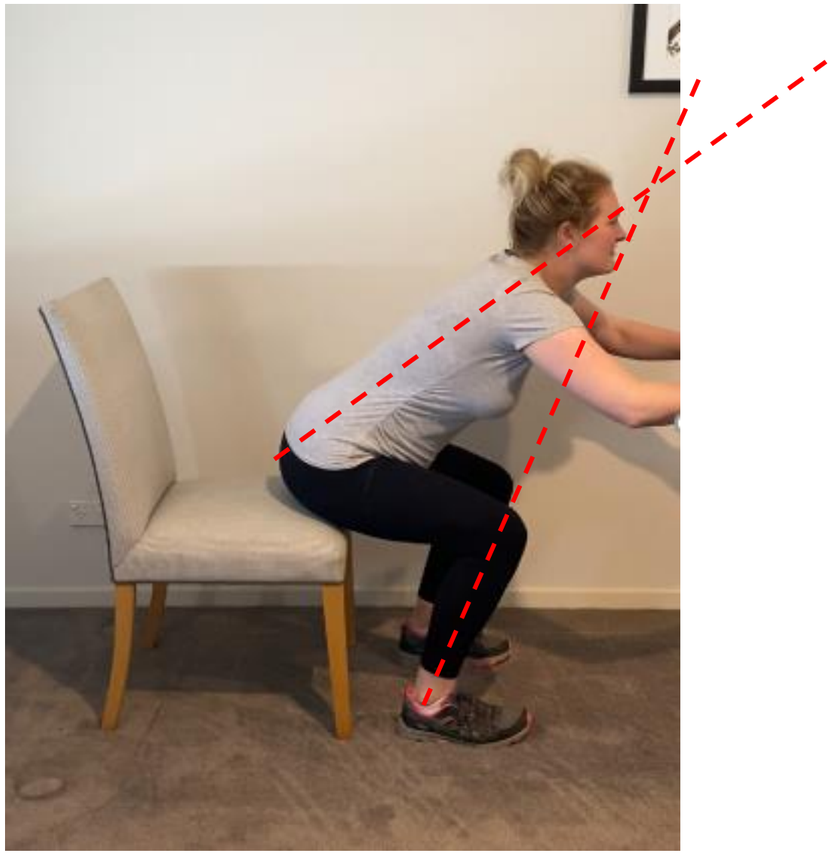
Improve capacity to attenuate loads (strength training, graduated loading)

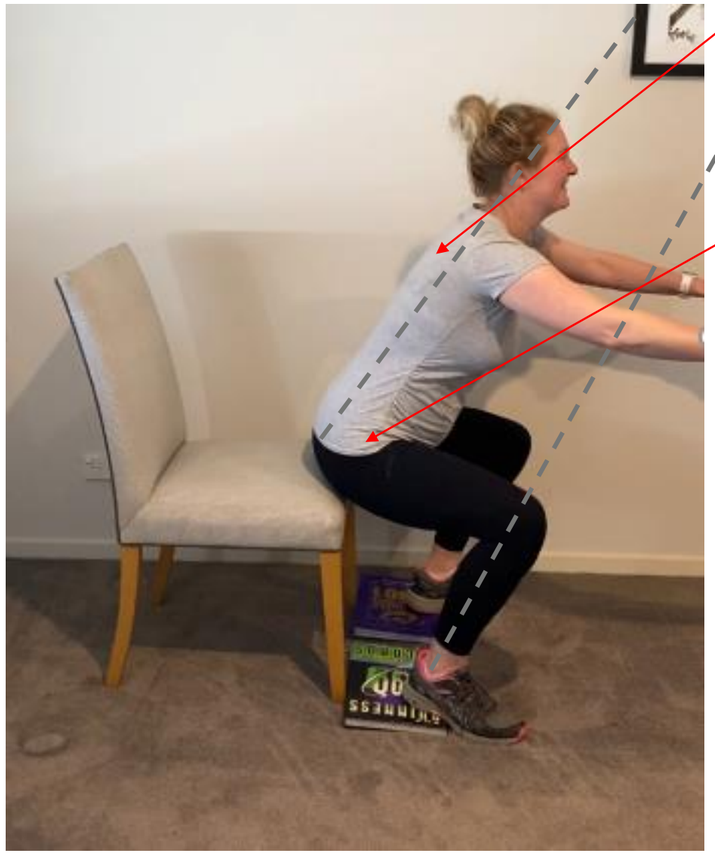
Shift loads (movement retraining to redistribute loads away from painful tissues)

Keep adapting to the goals/capacity of the athlete (RTS requirements)

Shifting loads – Sagittal plane mechanics

"Chest up, tailbone under"





Increased thoracic extension

Decreased anterior pelvic tilt and peak hip flexion ROM

Shifting loads – Frontal/transverse plane mechanics

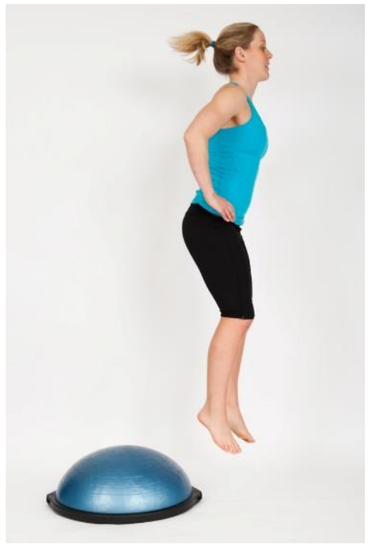
Pain

Pain

No Pain

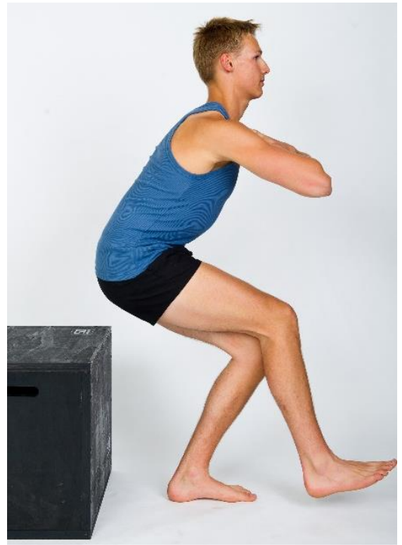
Addressing kinetic chain impairments

Addressing kinetic chain impairments



Addressing kinetic chain impairments




Case study

Case

28 year old semi-elite middle distance runner

12/12 Hx R hip/groin pain after collision with large dog (forced in add/IR)

Now cannot walk without pain

MRI = large superior acetabular cartilage defect

Case

How would you assess to confirm a diagnosis?
What would you do for this patient who wants to remain active++?
What would be the rehab program and what physiological/biomechanical considerations would there have to be?
What manual therapy would be required to facilitate this, if anything?
What potential further investigations would you order? Why?