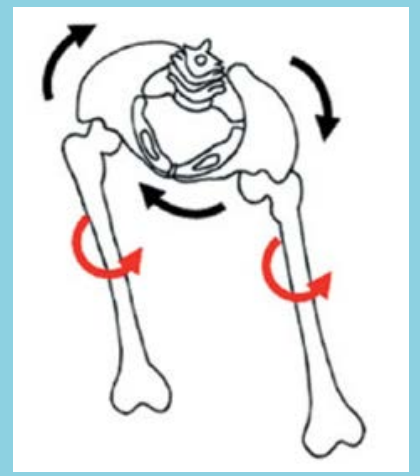
Femoroacetabular Impingement: Fact, Fallacy, and Future.



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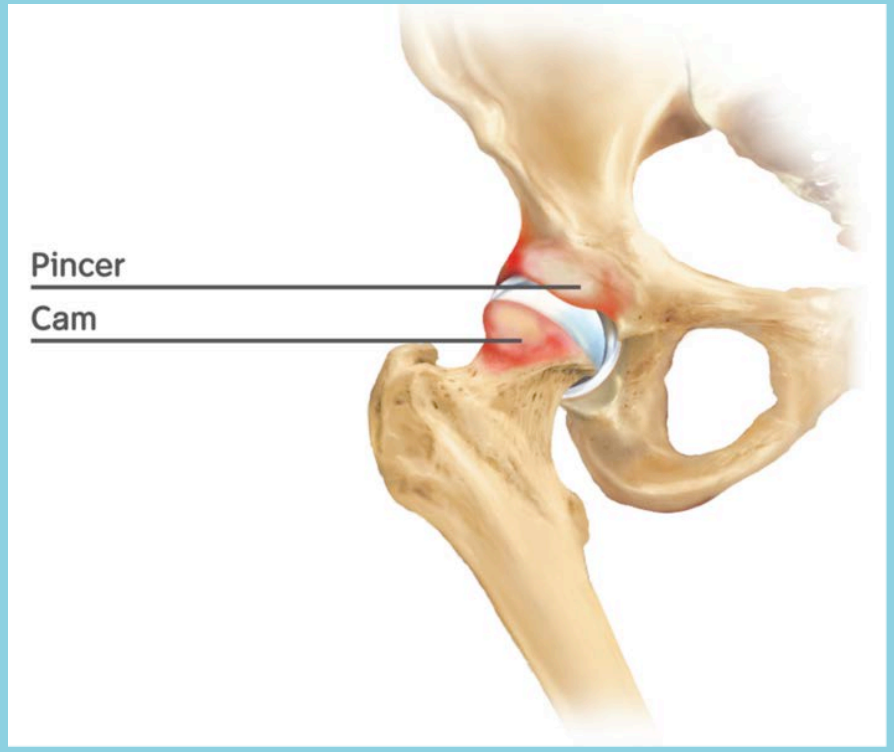
Conflict of Interest Statement

I have no actual or potential conflict of interest in relation to this presentation.

Learning Objectives

1. Recognize the biomechanics of lumbo-pelvic-femoral dysfunction and its interrelationship to femoroacetabular impingement.
2. Assess structural influences and dysfunctional movement patterns related to femoroacetabular impingement.
3. Apply effective management strategies to restore appropriate lumbo-pelvic-femoral biomechanics across the right and left side.

FEMOROACETABULAR IMPINGEMENT (FAI)



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FEMOROACETABULAR IMPINGEMENT (FAI)

2 Distinct Types (Ganz et al., 2003):

-Abnormally shaped femoral head contacts normal acetabulum -“cam”

-Normal femoral head contacts abnormally shaped acetabulum-”pincer”

- **“Cam” more common in males**
- **“Pincer” more common in females**

FAI CLINICAL PRESENTATION

- Most often in Athletes
- Soccer, FB, Dancers, Hockey
- Anterior Groin Pain Exacerbated By Hip Flexion
  - Difficulty putting on shoes/socks
  - Prolonged sitting, getting in/out of car. Sharp Pain with 90 Flexion and Internal Rotation= Impingement Sign
  - Locking, catching, and giving way (Labral Tear?)
  - Reduced range of Internal rotation
  - Positive Hip Impingement test (Hip Scour Test)

FACT OR FALLACY

FACT

Information that can be verified or proven

Research, (Statistics) might also be considered to be factual

All facts are not created equal

FALLACY

Determine if the information is truly “cause and effect” or simply observed correlations

“Correlation does not equal causation”

Are the correlations legitimate “Do they make sense?”

PREVALENCE

There were 3 independent observers who retrospectively analyzed the 939 AP pelvic radiographs (1878 hips) of patients aged 18 to 50 years who did not have hip symptoms and who were not professional athletes. (Morales-Avalos, et al., 2021)

The mean age of the population was 31.0 ± 9.2 years, and 68.2% were male. The prevalence of the cam-type variant was 29.7% (558/1878), and that of the pincer-type variant was 24.3% (456/1878). (Morales-Avalos et al., 2021)

This syndrome affects a significant proportion of patients presenting with hip pain, with approximately 61 % of individuals reporting hip discomfort in the absence of osteoarthritis (OA) being diagnosed with FAI. (Mohammed et al., 2024)

FAI can occur at any stage of life, but is most common in people between 20 and 40 years of age, with a prevalence between 10% and 15%. (Pennock et al., 2018; Hale et al., 2012)

The prevalence of FAI radiological signs in the general population is estimated at between 23 and 67%. (Salas et al., 2020)

FAI was found among 1/3 of soccer players with no hip complaints. (Bezuglov et al. 2025)

LABRAL TEARS

96% of cadavers studied had a gross labral tear (Seldes et al., 2001)

53 of 55 hips

74% anteriorsuperior quadrant

89% of asymptomatic individuals 16 yrs of age or older had labral tears 56% under 16 years of age had labral tears. (Briggs et al 2017)

Participants who participates in their sport 9 years or greater were 5 times more likely to have a labral tear (Briggs et al. 2017)

86-94% of labral tears occur anteriorly (McCarthy et al., 2001, Mintz et al., 2005)

Hip labral tears are found in 22-25% of individuals with hip pain (Berthelot et al., 2023)

Hip arthroscopy in patients with FAI and labral pathology increased by 85% between 2011-2018 in United States (Zusmanovich et al., 2022)

ARTHROSCOPY → THA

68.4 % of hip arthroscopies for osteoarthritis were converted to THA within 2 years 3.7 times greater chance of having a hip replacement revision (Malahias et al., 2021)

Individuals with FAI and OA had a higher rate (37.3%) of conversion to THA than individuals with FAI alone 9.7% (Lei et al., 2019)

Individuals 40-59 years of age had 617 hip arthroscopic surgery and 58 later had converted to THA (Allahabadi et al., 2020)

81% of middle-aged women who had FAI developed OA by 10 years; 33% had end stage OA and had THA (Agricola et al., 2024)

The percentage increase in the number of THA among individuals aged 45-54 increased 205% from 2000-2010 (from 17,000 to 51,900) (Wolford et. al., 2015)

HIP ARTHROSCOPY
(Adelstein et al., 2025)

- A study using the TriNetX/U.S. Collaborative Networks database found a 97% increase in hip arthroscopy cases in the U.S. between 2015 and 2023.
- In 2015, there were 1,236 hip arthroscopies in the database, compared to 2,427 in 2023.
- Annual database incidence of hip arthroscopy is projected to more than double by 2030, exceeding 4,800 cases.
- A notable percentage of patients (17%) developed osteoarthritis (OA) after hip arthroscopy, with 9.8% requiring conversion to total hip arthroplasty (THA) within 5 years.
- Conversion to THA was more common in patients older than 30 at the time of their hip arthroscopy.

Arthroscopy and FAI

- Continues to escalate with 25-fold increase from 2006-2013 with further rises anticipated (Cvetanovich, 2016; Khan et al., 2016)
- Patients >40 have a higher rate (2.63 times greater) of converting to a THA after hip arthroscopy revision surgery (Maldonado et al., 2023)
- 78% of hips had feature change 2 years past FAI surgery suggesting future OA (Heerey et al. 2024)

HIP ARTHROSCOPY & FAI

While a large percentage of patients with abnormal morphology remain asymptomatic, although a definitive treatment algorithm for FAI syndrome has yet to be delineated, the use of joint-preserving surgery (i.e. hip arthroscopy) to address the osseous impingement and the resultant periarticular structural damage has increased over the last 2 decades. (Dancy et al. 2025)

The management of FAI has advanced radically over the last few years and hip arthroscopy has gained a leading role (Migliorini et al., 2025)

1,799 patients, hip arthroscopy led to statistically better short-term function versus conservative treatment for FAI (Ramadanov et al.. 2025)

HIP ARTHROSCOPY & FAI
(Zusmanovich et al. 2022)

- 35,966 arthroscopies were identified between 2011 and 2018 from a randomly selected sample of 30 million orthopedic patients from the PearlDiver Mariner dataset.
- The incidence increased by 85% from 2011 to 2018 (7.31 cases vs 13.54 cases per 100,000 patients). The distribution of the age of patients undergoing hip arthroscopy was bimodal with the mode of each peak at 18 years old and 42 years old, respectively. Females underwent surgery more frequently (67.9%) than males (32.1%)

HIP ARTHROSCOPY
(Adelstein et al., 2025)

- The increasing understanding and treatment of hip pathologies like labral tears and femoroacetabular impingement (FAI) have likely contributed to the rise in hip arthroscopy utilization.
- Advances in surgical techniques and imaging technologies have also played a role.
- The prevalence of hip arthroscopy is highest in young adult female patients, while the incidence is greatest in younger adolescent female patients.
- Overall, the evidence suggests a strong upward trend in hip arthroscopy use in the United States, which is expected to continue for the foreseeable future.

FAI & OSTEOARTHRITIS

FAI has the potential to increase cartilage degeneration and ultimately lead to the development of osteoarthritis of the hip. Early intervention, either prophylactic or therapeutic, can prevent the progression of osteoarthritis and the need for artificial hip replacement (Cheney et al., 2021; Aiyer et al., 2020)

The absolute risk of FAI for development of hip OA was high (81%), with 33% developing and end stage hip OA within 10 years (Agricola et al., 2024)

1870 participants mean age of 32.2 had a post operative diagnosis of hip OA within 2 years (Rhon et al., 2019)

FAI is thought to be responsible for up to 50% of all hip osteoarthritis (Gatz et al., 2020)

TOTAL HIP ARTHROPLASTY

- **Increasing evidence that FAI predisposes to the development of DJD of the hip (Ganz et al. 2003; Beck et al. 2005)**
- **The percentage of THA's being performed on patients younger than 60 is 40% and increasing steadily. (Liu et al., 2015; Daras et al., 2009)**
- **The 2024 report includes more than 3.1 million total hip and total knee arthroplasty procedures performed at 1,447 institutions in all 50 states and the District of Columbia between 2022 and 2023, according to a press release from the AAOS. (American Joint Replacement Registry 2024)**

-1.9 million TKA
-1.2 million THA

Future Trends

	2020	2025	2030	2040
Predicted THA	498,000	652,000	850,000	1,429,000
Percent Increase Based Off 2014 data	34%	75%	129%	284%

Nationwide Inpatient Sample

Singh et al. 2019

Based off 2019 Medicare data

28.84% increase of THA every 5-year period after 2020

2019 Medicare data showed THA 35% of TJA performed

Shichman et al. 2023

	2040	2060
Projected THA	719,364	1,982,099

RADIOLOGY & FAI

Many patients have radiographic signs and findings indicative of FAI even when they do not exhibit symptoms.

Radiographic evidence of FAI was found in 78% of the contralateral hips in patients with a painful hip. only 26% had bilateral symptoms. (Gomez Verdejo et al., 2024)

- 32 % of asymptomatic soccer players demonstrated FAI. 27.7% pincer, 11.7% cam, and 6.4% mixed. 67% showed signs of OA (Bezuglov et al., 2025)
- 25% of asymptomatic young adults in general population have radiological evidence of FAI. (Cicuttini et al., 2017)

RADIOLOGY & FAI

- Care must be taken not to overcall FAI on the basis of imaging findings.
- Morphologic abnormalities associated with cam and pincer femoroacetabular impingement are common.
- Advancements in hip arthroscopy have seemed to overshadow conservative medical management of FAI.
- Diagnostic imagery is a valuable tool for surgeons in diagnosing and treating FAI, yet there is still significant variability in the utilization and interpretation of such findings. (Peters, 2017)

RADIOLOGY & FAI

- 76.8% of asymptomatic hips had 2 or more MRI changes indicative of FAI. (Yepez et al., 2017)
- 5,192 hips indicated 25% of men and 10% women had radiologic evidence of FAI (Raveendran et al., 2018)
- Bilateral FAI may be observed in about 1/3 patient's most patient with unilateral, symptomatic FAI and radiographic diagnosis of bilateral FAI became symptomatic relatively quickly in most of them, Underwent, subsequent surgical intervention in the contralateral hip (Azoy et al. 2019)

2016 Warwick Agreement of FAI
Griffin et al., 2016

- 22 Member panel (9 countries, 5 different specialties)

3 Distinct criteria were recommended for FAI diagnosis:

SYMPTOMS (Groin pain and mechanical symptoms)

CLINICAL SIGNS (Special tests and Limited motions)

DIAGNOSTIC IMAGING (MRI's, X-Rays)

(108 studies)

92% of studies reviewed revealed that one diagnostic modality was reported in diagnosis of FAI

Only 56% of the studies utilized the combination of symptoms, clinical signs, and diagnostic imaging. (Peters et al. , 2017)

PELVIC POSITION & FAI

- The position of the pelvis influences acetabular orientation (Islam et al., 2013)
- Dynamic changes in pelvic tilt significantly influence the functional orientation of the acetabulum and must be considered when diagnosing and treating FAI. (Ross et al., 2014)
- Dynamic anterior pelvic tilt results in early occurrence of FAI in the arc of motion, while posterior pelvic tilt results in later occurrence of FAI. (Ross et al., 2014)
- A history of spine surgery predicts a poor outcome after hip arthroscopy. (Feingold et al., 2019)
- Posterior pelvic tilt allowed for increased impingement-free ROM in subjects with FAI (Kuhns et al., 2025)

PELVIC POSITION

- (Bagwell et al. 2016)
  - For every 5° of anterior pelvic tilt there was a 1.2°-1.6° increase in internal rotation.
  - For every 5° of posterior tilt there was 1.2°-1.6° increase in external rotation.

Conclusion

Altered pelvic control or positioning in the sagittal plane has the potential to influence transverse plane motion of the femur.

Special attention should be paid to the resting position the pelvis in the sagittal plane (Ludwig et al., 2023)

The role of the pelvis in the sagittal plane has been an area of increased interest in recent years. The investigation of spinal pelvic parameters, including pelvic tilt, and pelvic incidence influences how patients can distribute weight across their axial and appendicular skeletons. (Gowd, 2025)

PELVIC INCIDENCE

It is defined as the angle between a line perpendicular to the sacral endplate at its midpoint and a line connecting that point to the center of the femoral heads.

It is a key factor in determining lumbar lordosis and overall spinal alignment.

The greater pelvic incidence the greater the lumbar lordosis. Patient with low pelvic incidence are theorized to compensate with increased forward tilt of the pelvis this most likely results in over coverage and impingement of the hip joint. (Gowd et al., 2025, Gomez Verdejo et al., 2024)

Alterations in pelvic tilt influence clinical hip ROM, anterior pelvic tilts have shown to reduce available ROM at the hip until impingement occurs. (Suits, 2021)

Pelvic tilt increases the risk of impingement and alters impingement type. (Palit et al., 2025)

Acetabular labral tears are associated with high pelvic incidence with or without FAI morphology. (Kwon et al., 2022)

After hip arthroscopy patients with high pelvic incidence greater than 60°, exhibited lower passive range of motions. (Torabian et al., 2024)

ACETABULAR RETROVERSION
WHAT IS IT?

- When the alignment of the acetabulum does not face the normal anterolateral direction but inclines more posterolaterally
- The retroverted orientation may give rise to problems of impingement between the femoral neck and anterior acetabulum (Reynolds et al., 1999)
- Essentially an over-coverage of the acetabulum over the femoral head
- Increased anterior pelvic tilt should be considered when diagnosing and treating individuals with hip pain, as symptoms may be related to the functional position of the pelvis (Brekke et al., 2021)

ACETABULAR RETROVERSION

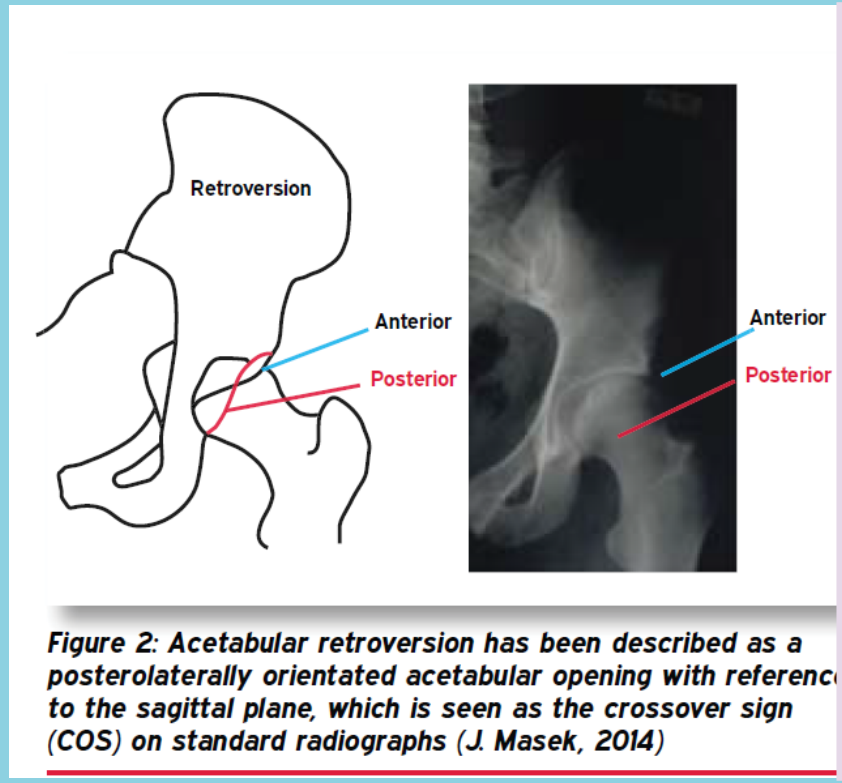


Figure 2: Acetabular retroversion has been described as a posterolaterally orientated acetabular opening with referenc to the sagittal plane, which is seen as the crossover sign (COS) on standard radiographs (J. Masek, 2014)

ACETABULAR RETROVERSION

- Acetabular retroversion has recently been suspected of being an important factor in the development of FAI and hip osteoarthritis (Cibulka, 2013)
- Changes in acetabular orientation can occur with alterations in pelvic tilt (anterior/posterior) and pelvic rotation (left/right) (Cibulka, 2013)
- Asymmetry between the left and right innominate bones change pelvic tilt and rotations (Cibulka, 2013)

ACETABULAR RETROVERSION PREVALANCE

The COS was present in 55% of hips when supine and 30% when standing. (Verhaegen et al., 2024)

Individuals in the general population had unilateral 24% or bilateral 18% retroversion. (Brekke et al., 2021)

ACETABULAR RETROVERSION PREVALANCE

- The high incidence of acetabular retroversion might not differ in frequency between asymptomatic and symptomatic individuals with FAI. (Wassilew et al., 2013)

LEFT VS.RIGHT
BY THE NUMBERS

Table 1. Categorization of Femoroacetalbular Impingement (FAI) according to Ages

Variable	10s	20s	30s	40s	50s	60s	70s	Total
Sex (male:female)	15:7	86:16	41:32	62:39	27:20	9:6	1:1	247:115
Hip (right:left)	22 (15:7)	102 (62:40)	73 (45:28)	101 (63:38)	47 (33:14)	15 (9:6)	2 (2:0)	362 (229:133)
Type of FAI								
Cam	15	57	37	57	21	4	0	191
Pincer	4	33	19	24	15	3	0	98
Mixed	3	12	17	20	11	8	2	73

Values are presented as number.

Table 3. Categorization of Sports according to Ages

Variable	10s	20s	30s	40s
Hips with FAI	22	102	73	101
Hips related to sports	12 (54.5)	63 (61.8)	33 (45.2)	34 (33.7)
Sports				
Soccer	0	28 (44.4)	13 (39.9)	3 (8.8)
Martial arts	9 (75.0)	20 (31.7)	7 (21.2)	4 (11.8)
Hiking	0	0	3 (9.1)	5 (14.7)
Others	3 (25.0)	15 (23.8)	10 (30.3)	22 (64.7)

Values are presented number (%).
FAI: femoroacetalbular impingement.

(20's)	(30's)	(40's)
62% had Right FAI	45% had Right FAI	63% had Right FAI
40% had Left FAI	28 had Left FAI	38% had Left FAI

Lee et al., 2016 (Hip and Pelvis)

LEFT VS. RIGHT
BY THE NUMBERS

(Noiger et al., 2010)
53% Right 47% Left 22% bilateral

(Levy et al., 2015)(Frontiers in Surgery)

391 hips
193 (49.4%) isolated right hip impingement
151 (38.6 %) isolated left hip impingement
47 (12%) bilateral impingement

FAI
FACT OR FALLACY

- Not all individuals with FAI morphology will have symptoms or develop OA.
- FAI is a complex condition: It involves both anatomical changes and individual factors that influence symptom development and progression.
- While FAI is a risk factor for OA, it is not the sole cause.
- Preventive strategies and treatment should be individualized and consider a broader range of factors beyond just the bony morphology.
- Not All FAI Leads to OA.
- However, not everyone with these morphological changes will develop symptoms.
- It is challenging to predict who with FAI morphology will develop symptoms or OA, and how quickly.

FAI
FACT OR FALLACY

- The presence of FAI or labral tears in patients with hip pain doesn't automatically mean these findings are the *cause* of the pain.
- Imaging findings alone may not be sufficient for diagnosis.
- Impingement (FAI), a condition where the bones of the hip joint don't fit together perfectly, can cause damage to the labrum (the cartilage ring around the hip socket), potentially leading to labral tears.
- While FAI is a frequent cause of labral tears, it's not the only one, and the presence of FAI morphology or a labral tear on imaging does not automatically translate to symptomatic FAI or the need for immediate surgical intervention.
- Hip arthroscopy is the *only* effective treatment for FAI.
- Not all Left AIC patterned individuals with lumbo-pelvic-femoral pathomechanics will develop FAI.

WHAT IS THE NEXT STEP?

- Care must be taken not to exaggerate FAI on the basis of imaging findings.
- The literature fails to substantiate that imbalances in the lumbo-pelvic-femoral complex are present in individuals with FAI.
- Furthermore, it fails to differentiate structural imbalances in regards to the left and right sides of the human body.

What Is the Next Step?

Do not convince 2/3 of the population that they have a pathologic condition, when clearly they do not. (Reiman & Thorberg, 2016)

Treatment planning must remain an individual process, referring back to the whole clinical picture, which includes physical assessment combined with diagnostic imaging.

-Symptoms

-Clinical Signs

-Imaging

PRI PROPOSED MECHANISMS OF FAI

PRI PROPOSED MECHANISM OF FAI

The left pelvis is anteriorly tipped and forwardly rotated.

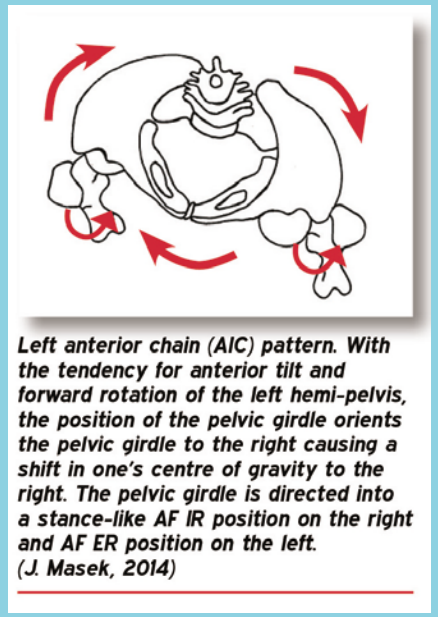
The forwardly rotated left innominate causes the lower spine to orient to the right with the upper spine to the left.

This directional, rotational influence on the low back, pelvis, and spine to the right, mandates compulsive compensatory movement in one or more areas to include the: femurs, the thoracic rib cage, humeral glenoids, and cervical-cranial-mandibular complex.

The greatest impact is on rib alignment and position, therefore influencing breathing patterns.

Left AIC Myokinematic Relationships

- Left AIC patterned individuals are positioned in a state of Right AF IR and left AF ER
  - Left hemi-pelvis is positioned in a state of flexion, abduction and external rotation
  - Right hemi-pelvis is positioned in a state of extension, adduction, and internal rotation.



Left anterior chain (AIC) pattern. With the tendency for anterior tilt and forward rotation of the left hemi-pelvis, the position of the pelvic girdle orients the pelvic girdle to the right causing a shift in one's centre of gravity to the right. The pelvic girdle is directed into a stance-like AF IR position on the right and AF ER position on the left.
(J. Masek, 2014)

Masek, J. Femoroacetabular impingement: mechanisms, diagnosis and treatment options using Postural Restoration (Part 3) Co-Kinetic Journal 2015; 68 (April) 18-25.

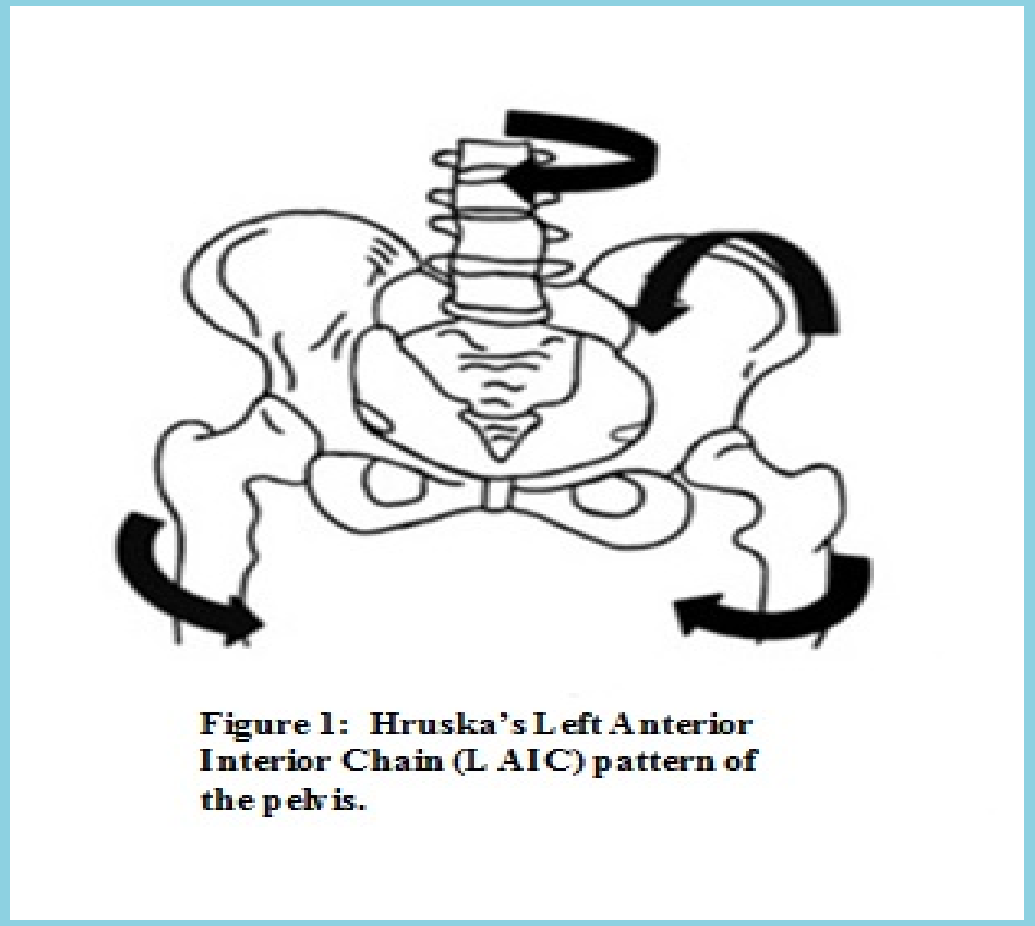
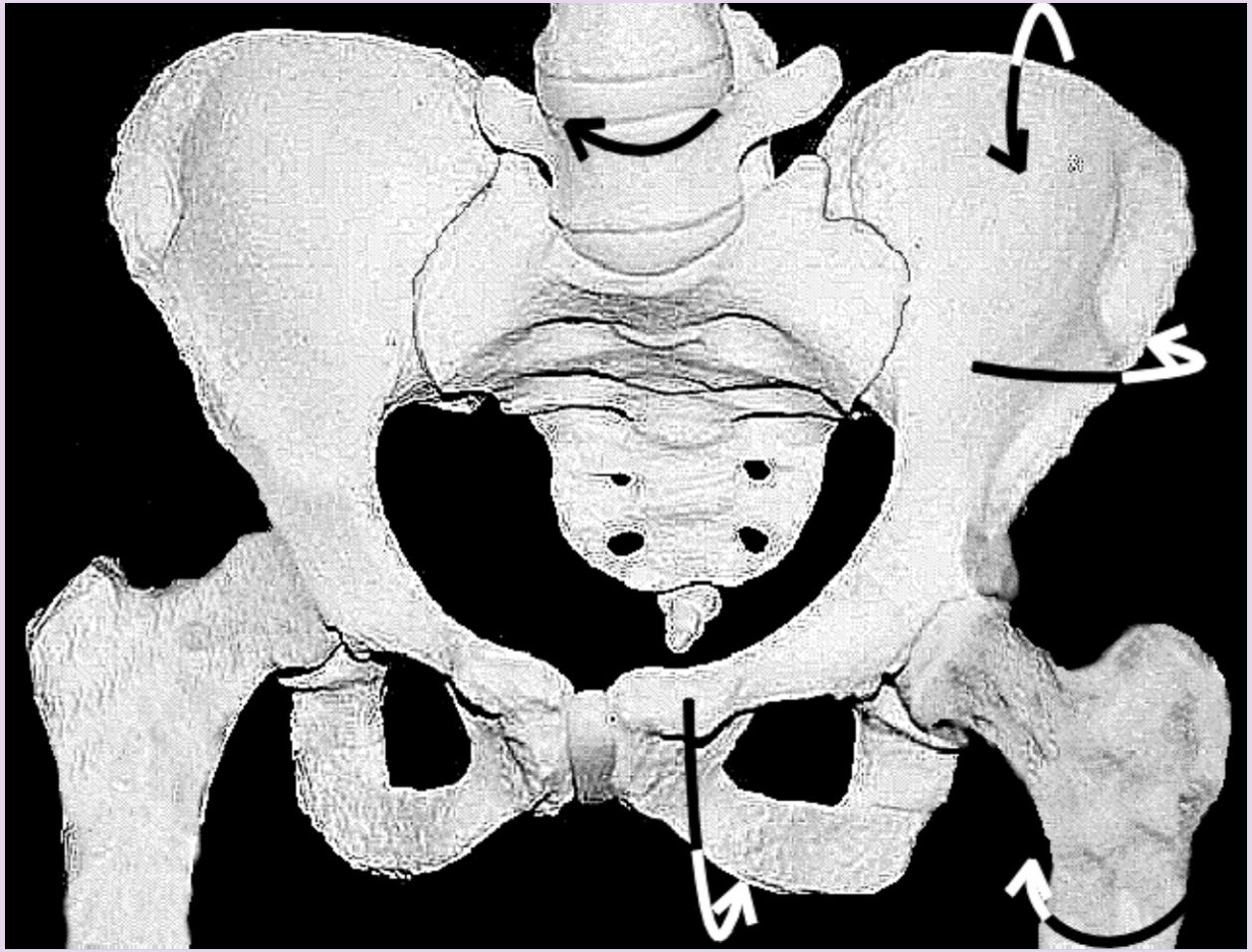


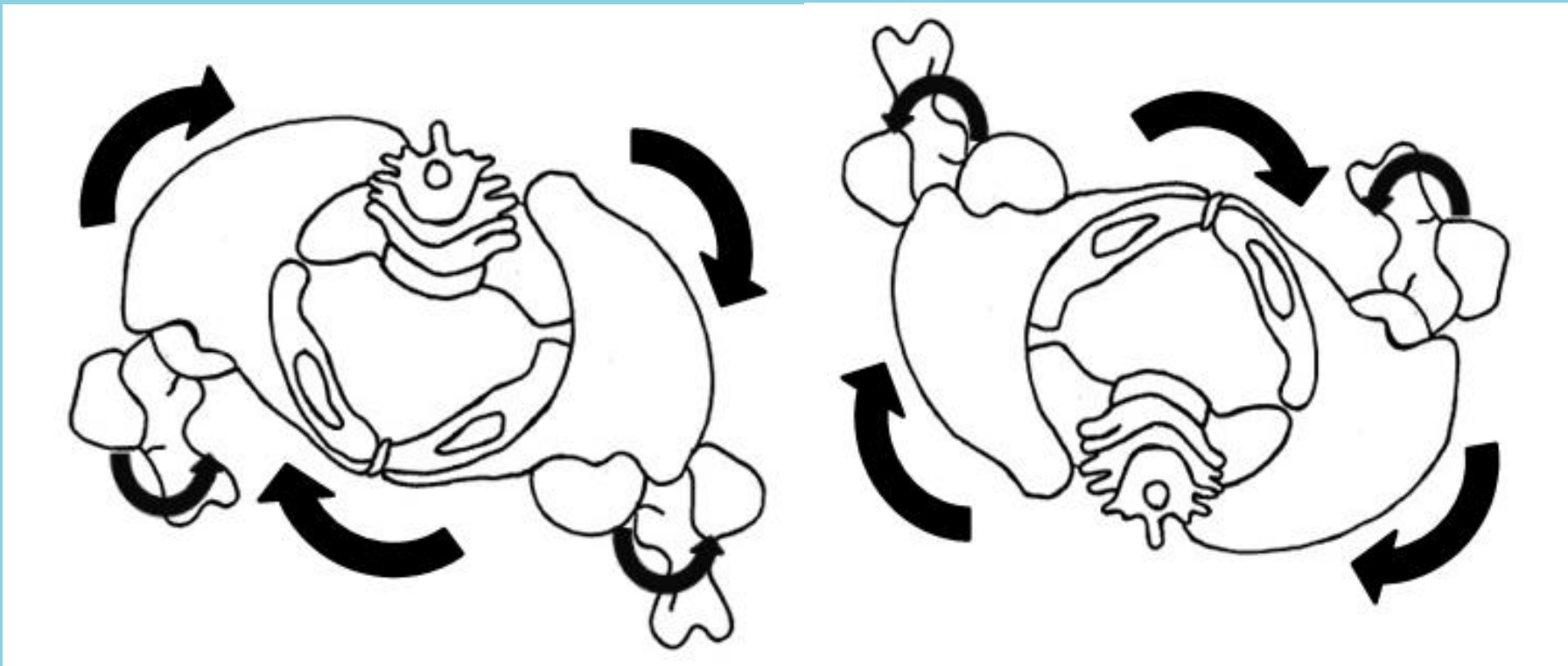
Figure 1: Hruska's Left Anterior Interior Chain (L AIC) pattern of the pelvis.

Masek, J. Femoroacetabular impingement: mechanisms, diagnosis and treatment options using Postural Restoration (Part 3) Co-Kinetic Journal 2014; 68 (April) 18-25.

Anterior View of an Anterior & Forward Positioned Left Innominate with Accompanying Right Sacral Torsion



THE PROBLEM



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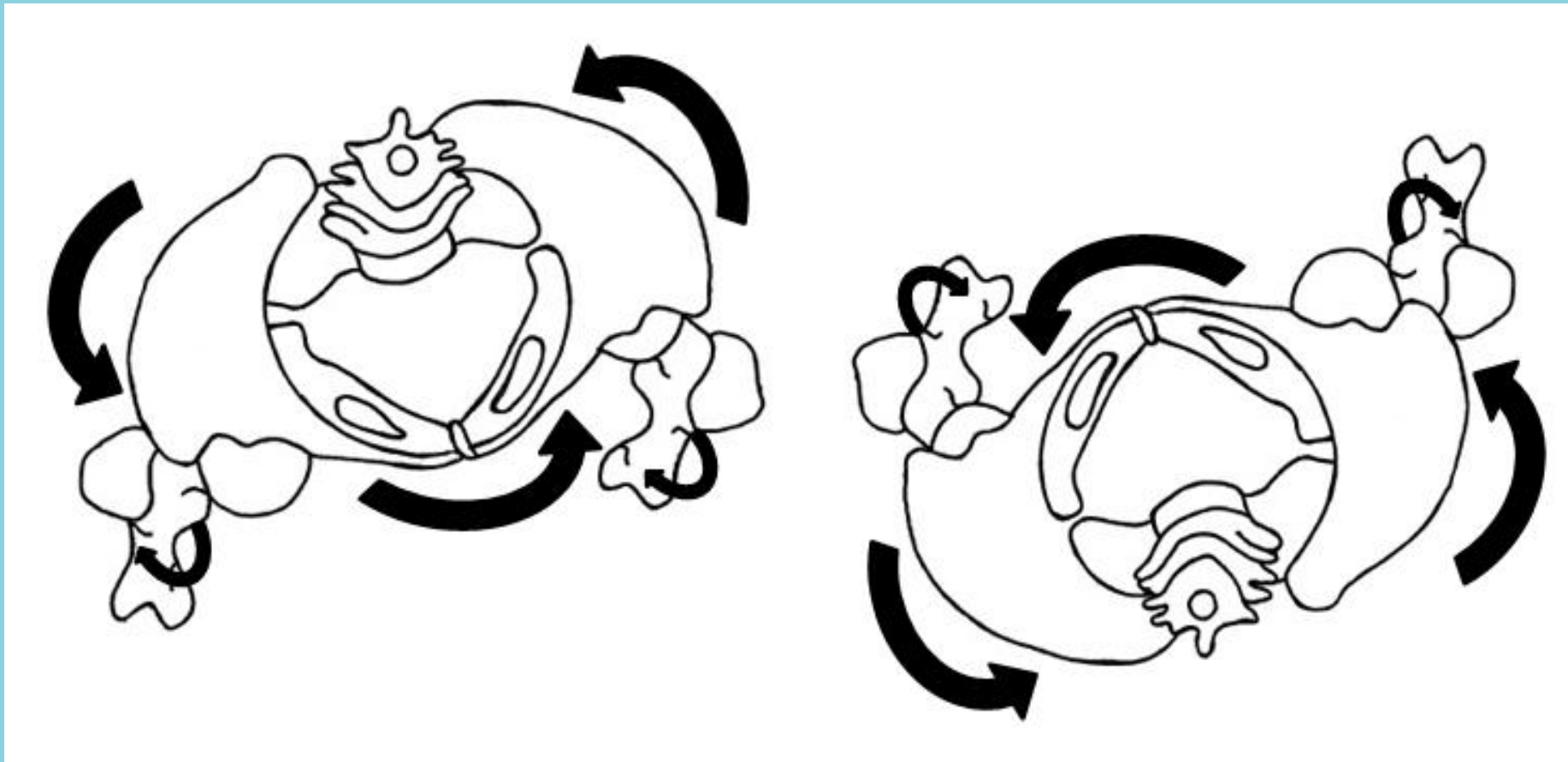
THE ULTIMATE GOAL!!



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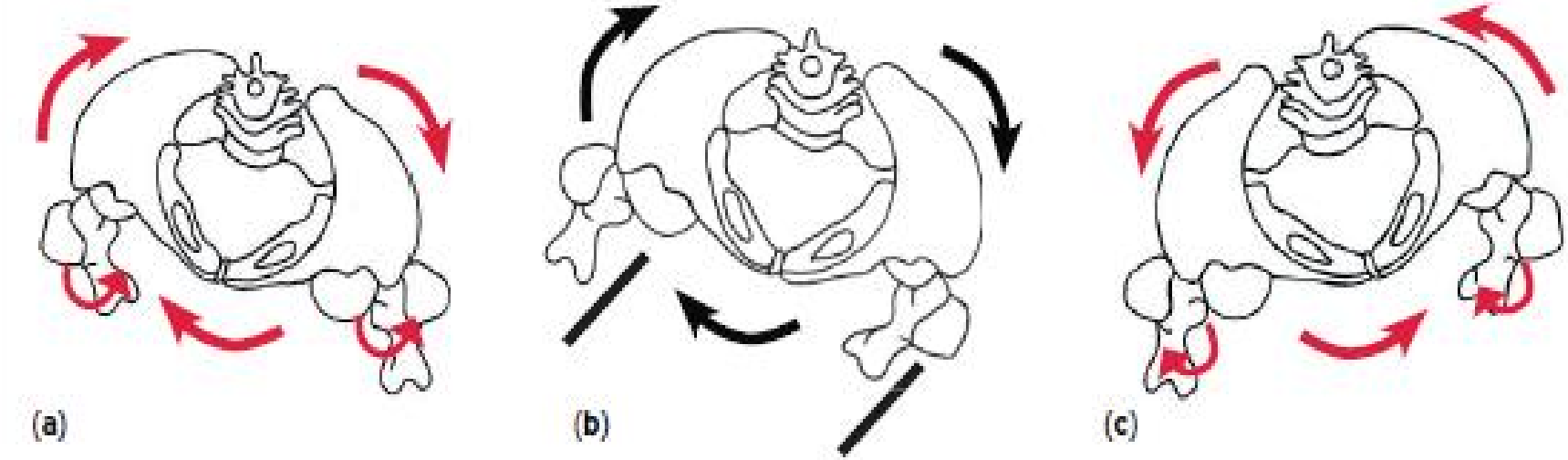

Figure 4: (a) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right compensatory femoral internal rotation. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left compensatory femoral external rotation. (b) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right femur orientated outwardly. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left femur orientated inwardly. (c) Right hemi-pelvis positioned anteriorly, abducted and exteranally rotated with right compensatory femoral external rotation. Left hemi-pelvis positioned posteriorly, adducted, and internally rotated with left compensatory femoral internal rotation. (J. Masek, 2014)

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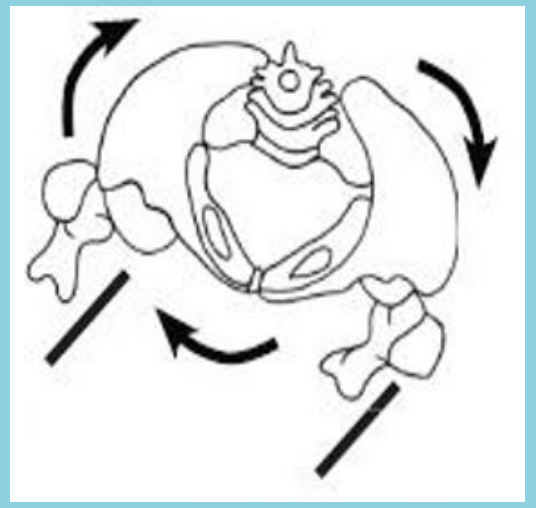
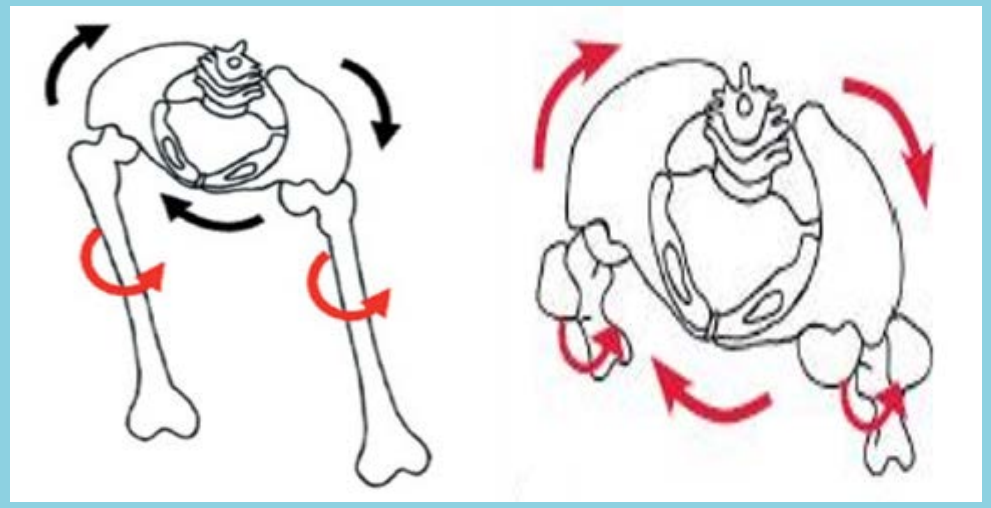
ORIENTATION



COMPENSATION



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FAVORABLE STANDING POSITION IS ON THE RIGHT LEG WHILE ROTATING THEIR UPPER BODY TO THE LEFT

EXCESSIVE OR LIMITED STRAIGHT LEG RAISE

ANTERIOR PELVIC TILT'S INFLUENCE ON HAMSTRINGS

NEUTRAL PELVIS

NORMAL LORDOTIC CURVE
OF
LOWER BACK

RESTING LENGTH
OF
HAMSTRINGS
(NORMAL)

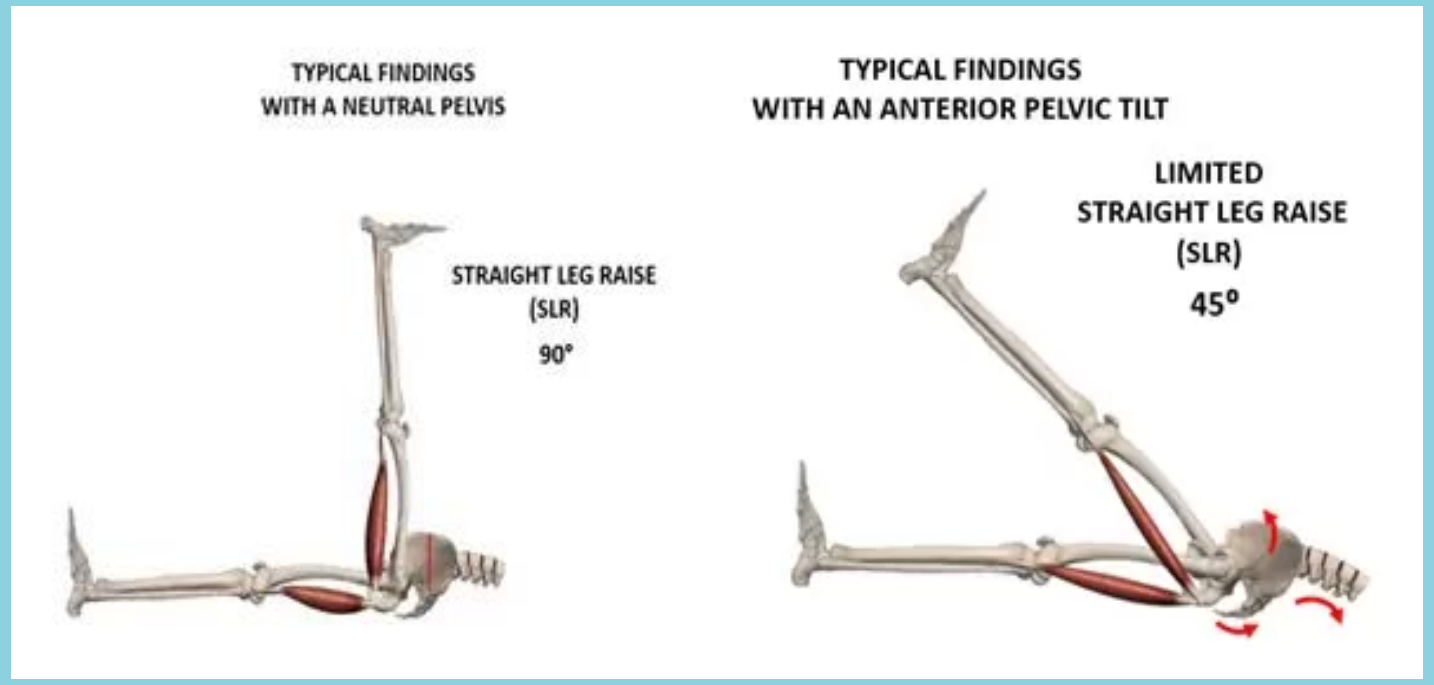
ANTERIOR PELVIC TILT

INCREASED ARCH
OF
LOWER BACK
(LORDOSIS)

LENGTHENED HAMSTRINGS

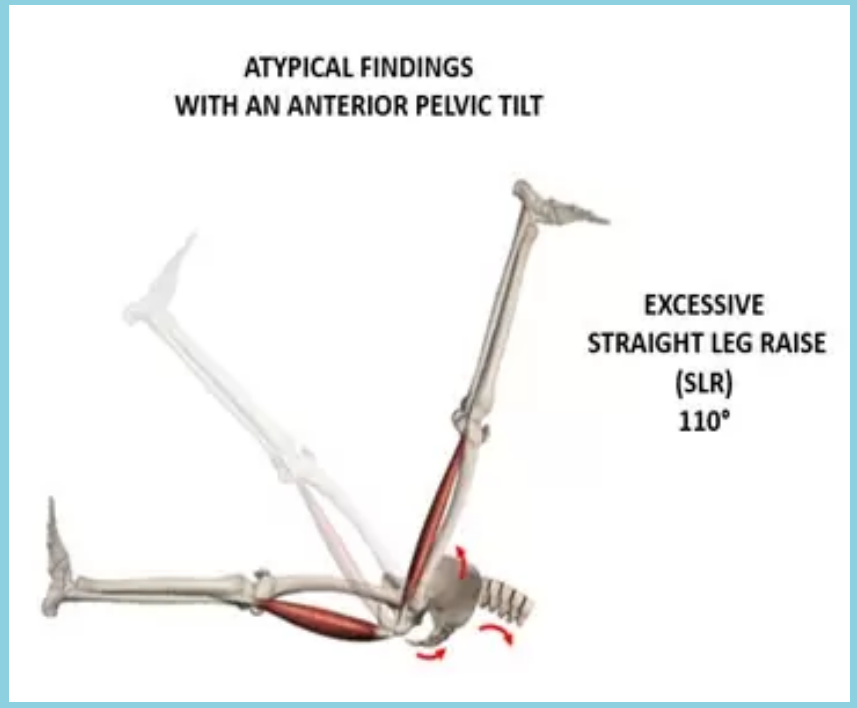
ANTERIOR PELVIC TILT'S INFLUENCE ON SLR

Think back to the anterior pelvic tilt which places our lower back in an arched position, or an increase in lumbar lordosis. When the clinician lifts the leg to assess the straight leg raise, the hamstring becomes taut at an earlier point then it should because the muscle is already pre-tightened due to the position of the pelvis (anterior pelvic tilt). In other words, the leg won't go as far because it's already being stretched before it even moves. This limited leg raise would be expected and typical for a pelvis that is tilted forward without an actual change to the hamstring muscle length.



ANTERIOR PELVIC TILT'S INFLUENCE ON SLR

If the hamstring muscle actually becomes overstretched, the leg raise will look excessive but there is often still a sense of hamstring "tightness" at a position that would not be considered normal. This muscle is now actually long and weak and its ability to "tighten" enough to control the anterior tilt of the pelvis is severely limited and the anterior tilt and its associated symptoms, including lower back pain, will be harder to manage. This is an atypical finding of an anterior pelvic tilt and much harder to manage.



ASYMMETRICAL FEMORAL-ACETABULAR ROTATION

ADDUCTION DROP TEST
EXTENSION DROP TEST

Figure 5: Positive left-side adduction drop test. (J. Masek, 2014)

Figure 6: Positive left-side extension drop test. (J. Masek, 2014)

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INCREASED LEFT FA ER

Figure 7: Increased seated left-side femoral acetabular external rotation (FA ER). (J. Masek, 2014)

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ABDUCTION RAISE TEST

Right: Positive

Left: Negative

Figure 10: Decreased right-side passive abduction. (J. Masek, 2014)

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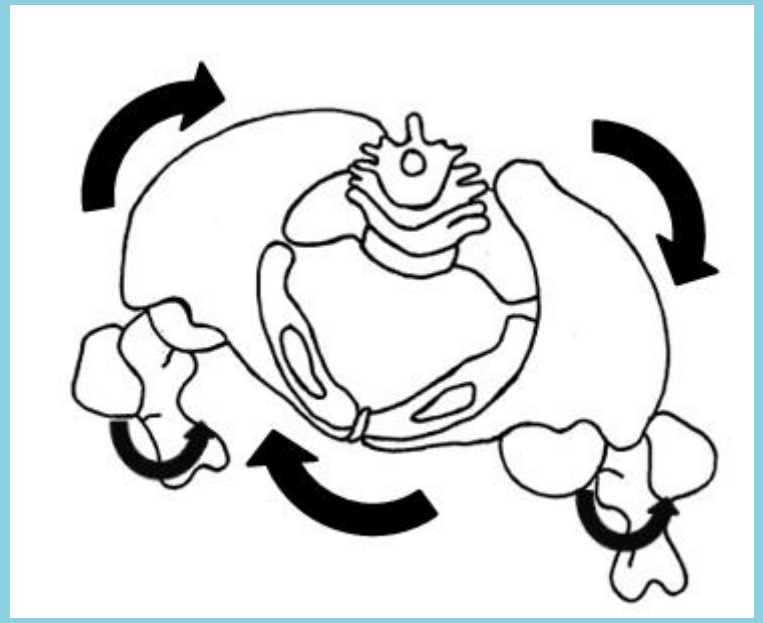
ANTEROSUPERIOR ACETABULAR-FEMORAL IMPINGEMENT (ASAF)

Most often on the left side when patient attempts to shift or pull femur into the acetabulum with the ischiocondylar adductor



ASAF (Cam)

- Left anterosuperior acetabular femoral impingement
- Due to the flexed, abducted, and externally rotated left hemi-pelvis there is accompanying extension, adduction and internal rotation weakness
- Occurs secondary to passive internal orientation of femur secondary to acetabular position and/or as a result of compensatory activity of the external rotators to orientate the femur towards midline
- There is recurring contact between the anterior femoral head-neck region and the anterior aspect of the acetabular rim and/or labrum during extreme flexion and internal rotation

ASAF (CAM) CONTRIBUTING FACTORS

Anteriorly rotated, forwardly positioned innominate with accompanying lax iliofemoral, pubofemoral ligament, restricted ischiofemoral ligament.

Long and weak adductors, overactive FA external rotators and abductors

Weak AF extensors and overactive FA hip flexors as FA IR's (TFL)

ASAF (CAM) TEST RESULTS

+ ipsilateral Adduction Drop Test

+ or - ipsilateral Extension Drop Test

+ ipsilateral FABER

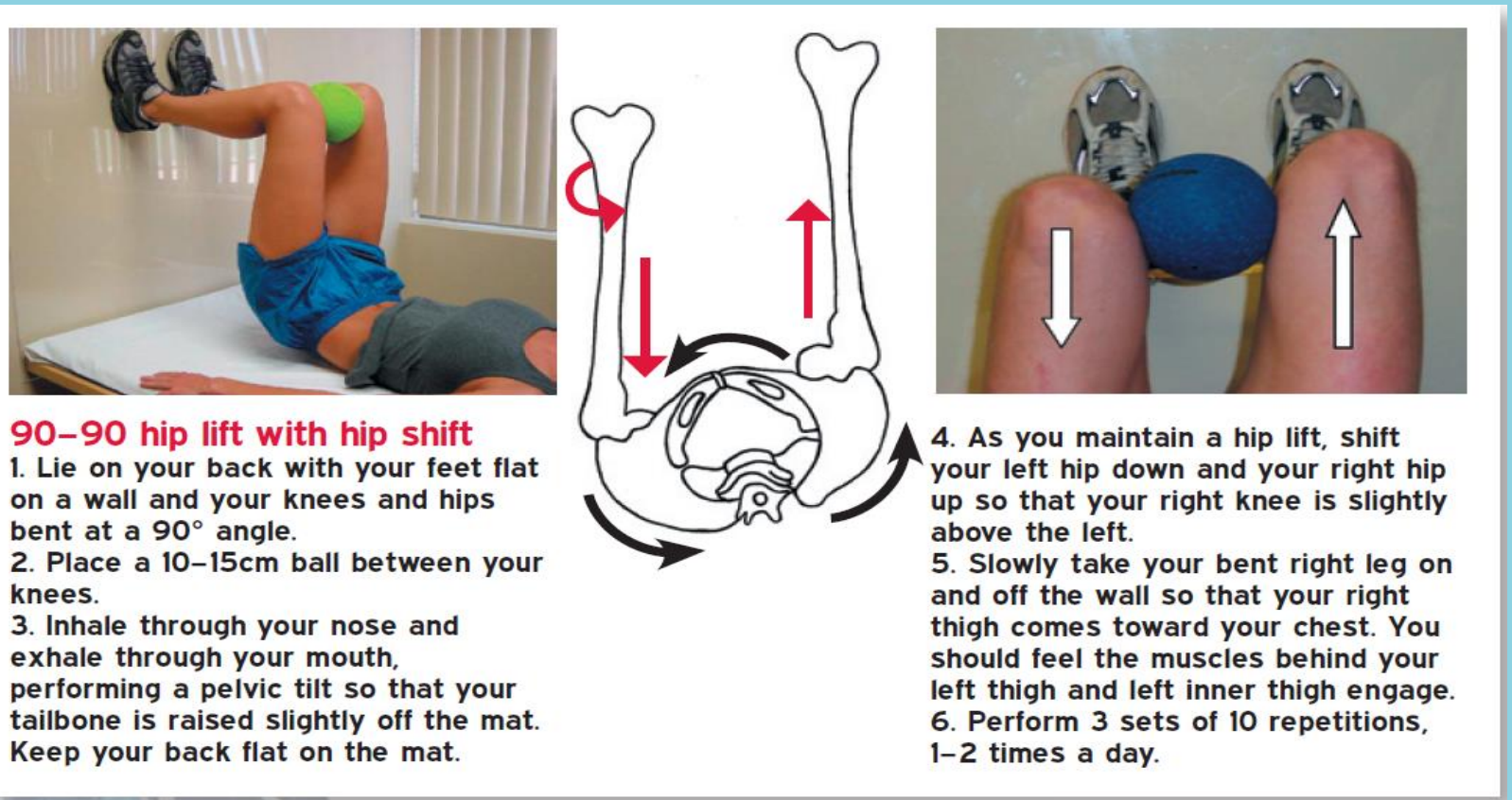
Increased ipsilateral seated FA ER

Increased or decreased ipsilateral FA flexion

ASAF (Cam)

- Left anterosuperior acetabular femoral impingement
- Due to the flexed, abducted, and externally rotated left hemi-pelvis there is accompanying extension, adduction and internal rotation weakness
- Occurs secondary to passive internal orientation of femur secondary to acetabular position and/or as a result of compensatory activity of the external rotators to orientate the femur towards midline
- There is recurring contact between the anterior femoral head-neck region and the anterior aspect of the acetabular rim and/or labrum during extreme flexion and internal rotation

ASAF MANAGEMENT



90–90 hip lift with hip shift

1. Lie on your back with your feet flat on a wall and your knees and hips bent at a 90° angle.
2. Place a 10–15cm ball between your knees.
3. Inhale through your nose and exhale through your mouth, performing a pelvic tilt so that your tailbone is raised slightly off the mat. Keep your back flat on the mat.
4. As you maintain a hip lift, shift your left hip down and your right hip up so that your right knee is slightly above the left.
5. Slowly take your bent right leg on and off the wall so that your right thigh comes toward your chest. You should feel the muscles behind your left thigh and left inner thigh engage.
6. Perform 3 sets of 10 repetitions, 1–2 times a day.

Figure 4: Exercise for left AF IR with concomitant left FA IR. (Postural Restoration Institute, 2015. Image used with permission)

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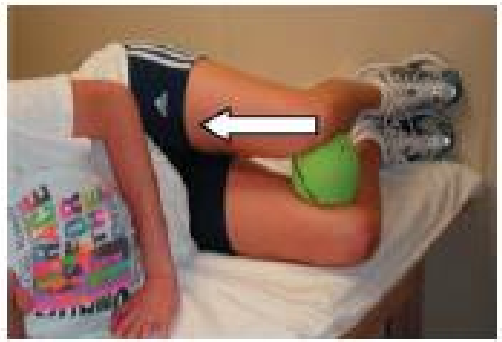
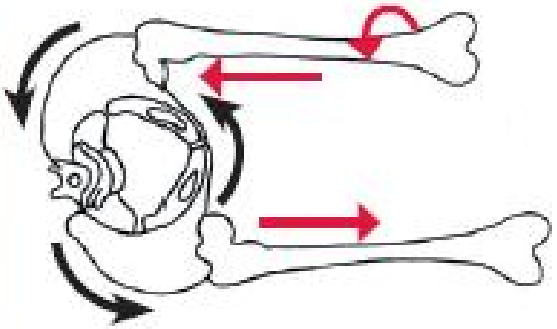
ASAF MANAGEMENT





Right side-lying supported left gluteus medius exercise

1. Lie on your right side with your feet on a wall, hips and knees at a 90° angle and your back rounded.
2. Place your lower arm or a pillow under your head and upper hand on the floor in front of you to help stabilise your trunk.
3. Place a 10–15cm ball between your knees.
4. Push your right foot into the wall.
5. Slide or shift your left hip back as far as you can without arching your back.
6. Press your left knee down into the ball. You should feel your left inner thigh engage.
7. Rotate your left thigh 'in' by lifting your left lower leg towards the ceiling. You should feel your left outside hip (buttock) engage.
8. Hold this position for 4–5 deep breaths, inhaling through your nose and exhaling through your mouth.
9. Relax and repeat 4 more times.

Figure 6: Exercise for left AF IR with concomitant left FA IR. (Postural Restoration Institute, 2015. Image used with permission)

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ASAF MANAGEMENT

Side-lying
respiratory scissor slides

1. Lie on your right side with your hips and knees bent at a 90° angle, and place a ball between your knees.
2. Press your right foot slightly into the wall.
3. Inhale through your nose and gently slide your left leg back without letting your trunk rotate back.
4. Exhale through your mouth as you gently push your left knee down into the ball.
5. Inhale again and slide your left leg back further.
6. Exhale and squeeze into the ball again.
7. Repeat this sequence until you have taken a total of 4–5 breaths, in through your nose and out through your mouth.
8. Relax and repeat 4 more times.

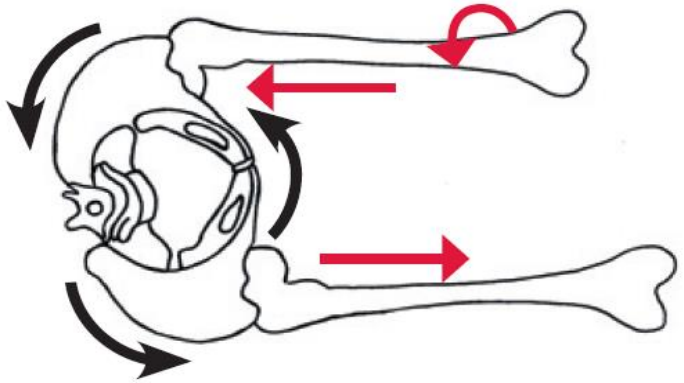

Figure 5: Exercise for left AF IR with concomitant left FA IR. (Postural Restoration Institute, 2015. Image used with permission)

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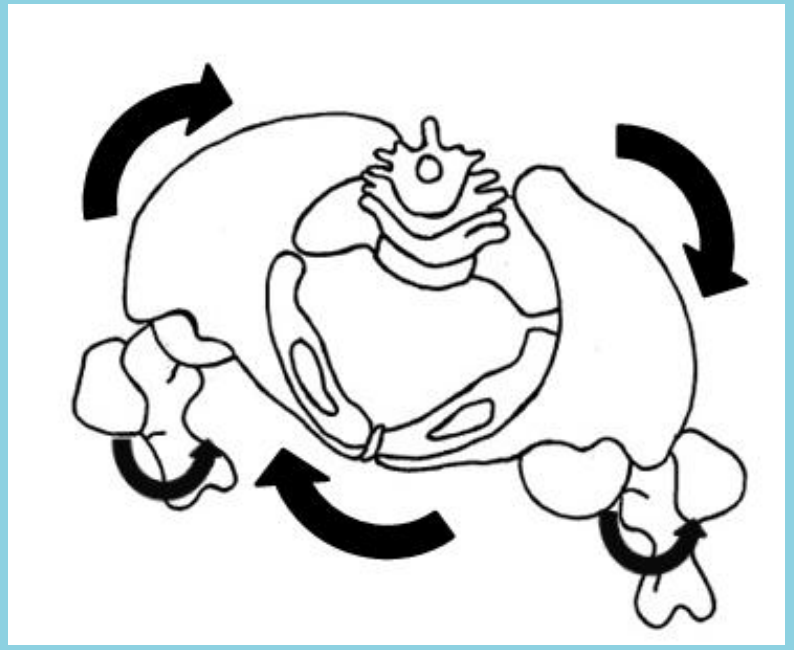
ANTEROMEDIAL FEMORAL-ACETABULAR IMPINGEMENT (AMFA) "PINCER"

Most often on the right side when the patient attempts to IR the femur in the seated position or with posterior translation of the femoral head in flexion



AMFA “PINCER”

- Due to the extended, adducted, and internally rotated right hemi-pelvis there is accompanying flexion abduction and external ration weakness.
- This occurs as a result of he passively internal orientation of the femur secondary to the acetabular position.
- Therefore there is compensatory and/or lack of external rotators to orientate the femur towards midline due the acetabular position of the right hemi-pelvis
- Thus the right femur will “impinge” on the anterior, superior and medial acetabular rim upon FA ER.

AMFA CONTRIBUTING FACTORS

Posterior capsular instability

Weak inferior glute max fiber

Lax ischiofemoral ligament

Restricted iliofemoral and pubefemoral ligament

Short pectineus, adductor magnus and brevis

AMFA “PINCER” TEST RESULTS

Decreased ipsilateral seated FA ER

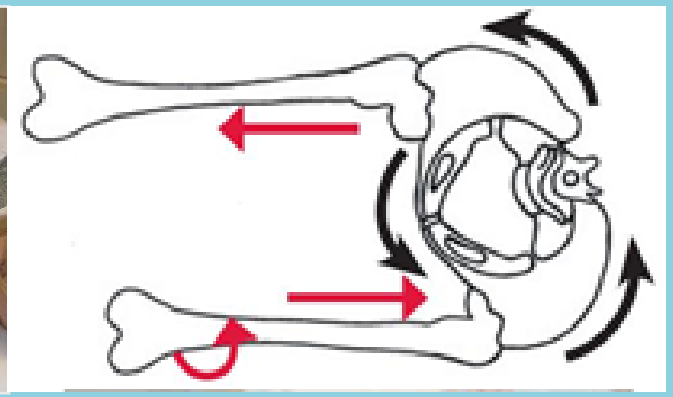
Increased ipsilateral seated FA IR

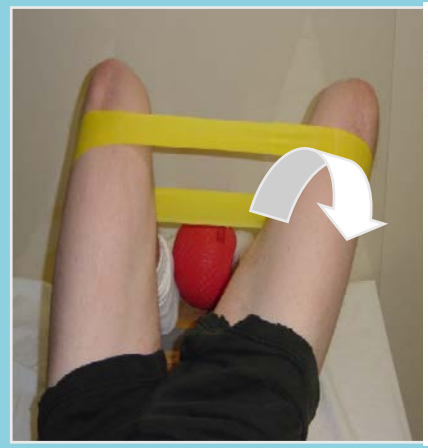
Possible posterior hip subluxation (snapping hip)

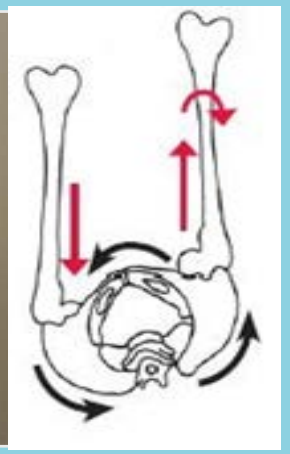
+ and painful Step Down Test on a 6” step when shifted in ipsilateral AF IR

Decreased ipsilateral passive FA abduction

AMFA Management







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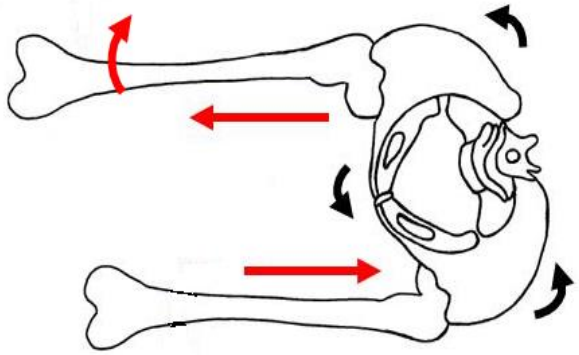
Increased activity of ipsilateral FA abduction with concomitant contralateral FA adduction

AMFA Management



Left side-lying resisted right gluteus maximus exercise

1. Lie on your left side with your hips and knees bent at a 60–90° angle.
2. Place your ankles on top of a 7.5–12.5cm bolster and place your feet firmly on a wall.
3. Place tubing around both thighs slightly above your knees.
4. Shift your right hip forward until you feel a slight stretch or pull in your left outside hip.
5. Keeping your feet on the wall, raise your right knee keeping it shifted forward. You should feel your right outside hip (buttock) engage.
6. Hold this position while you take 4–5 deep breaths, in through your nose and out through your mouth.
7. Relax and repeat 4 more times.

Figure 7: Exercise for left AF IR with concomitant right FA ER. (Postural Restoration Institute, 2015; image used with permission.)

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AMFA Management

Supine hook-lying resisted right gluteus maximus exercise

1. Lie on your back and place your feet on a 5cm block against the wall.
2. Place a band around your knees and a ball between your ankles.
3. Inhale through your nose and exhale through your mouth, performing a pelvic tilt so that your tailbone is raised slightly off the mat. Keep your back flat on the mat.
4. Maintaining a pelvic tilt, shift your left knee down below the level of your right. You should feel your left inner thigh engage.
5. Keeping your left inner thigh engaged and your right foot flat on the block, turn your right knee out. You should feel your right outside hip (buttock) engage.
6. Hold this position while you take 4–5 breaths, in through your nose and out through your mouth.
7. Relax and repeat 4 more times.

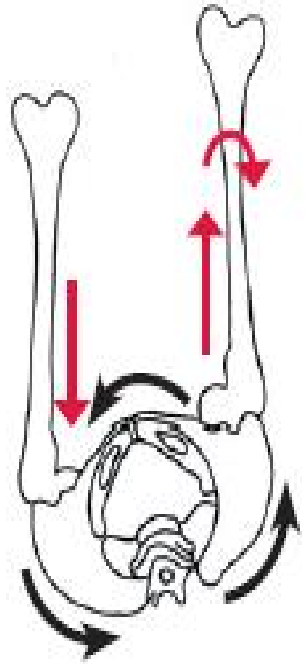

Figure 10: Exercise for left AF IR with concomitant right FA ER. (Postural Restoration Institute, 2015; image used with permission.)

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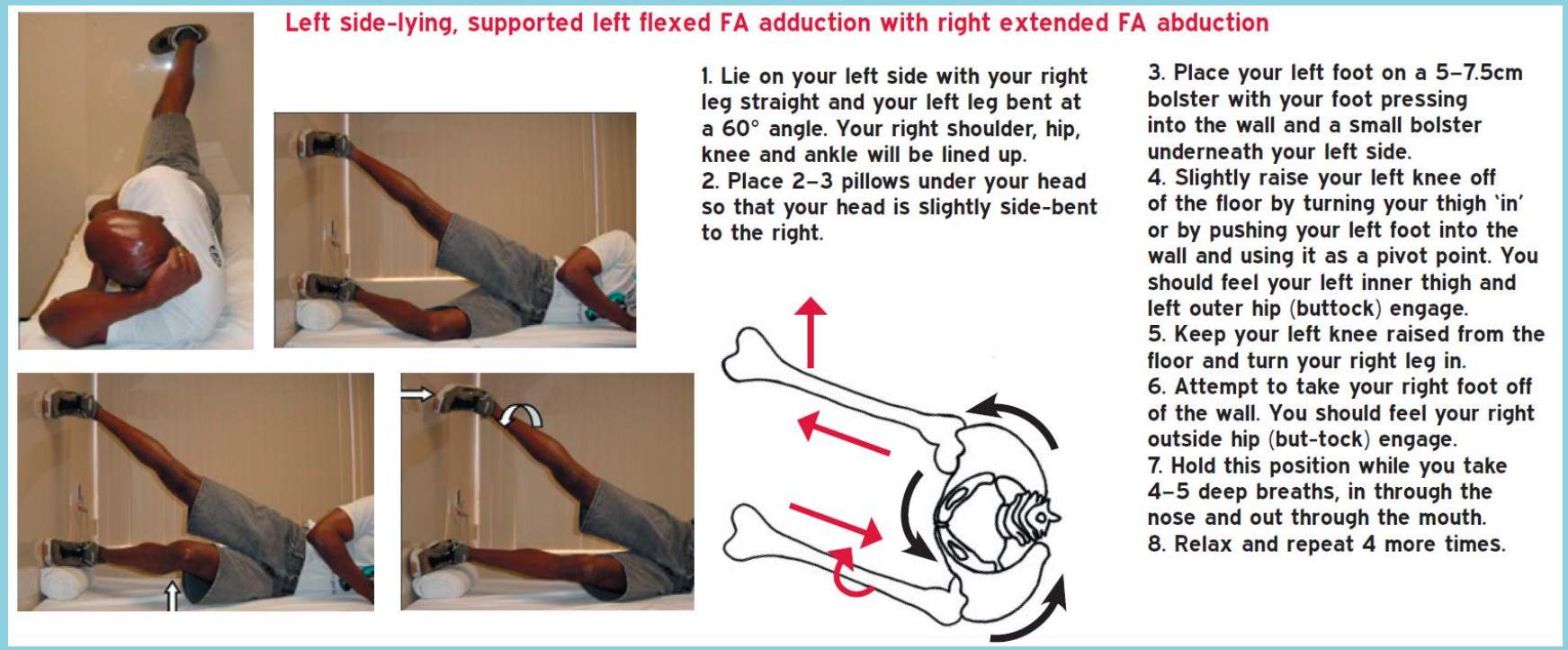
AMFA Management



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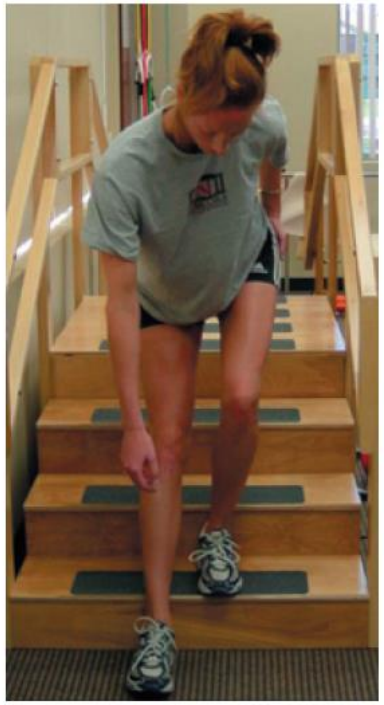
Retro stairs exercise

1. Stand with your heels placed in front of 15cm stairs and point your toes forward.
2. Advance your left foot on the first step keeping your feet neutral or parallel with each other.
3. Shift your hip back and to the left as you place your weight through your left mid-foot/heel. Your zipper line should be lined up over your left great toe. Keep your left knee pulled in slightly.
4. Keep your back rounded.
5. Begin lifting your right leg to the step keeping your weight shifted over to the left. You should be using your left leg to advance yourself to the next step by pushing slowly through your left mid-foot/heel.
6. Continue to advance up the stairs until you have completed 1 flight always leading with your left foot. You should feel your left outer hip (buttock) engage.
7. Relax and perform 1–2 more flights (10–12 steps).



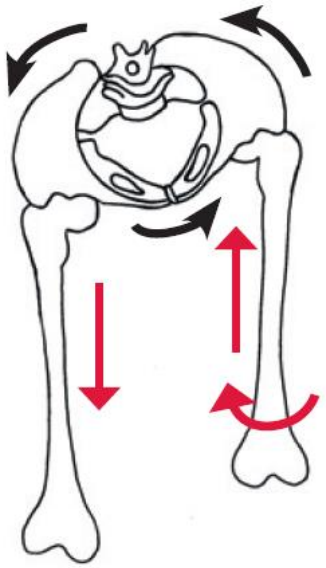


Figure 8: Single-leg dynamic stance with left AF IR and concomitant left FA IR. (Postural Restoration Institute, 2015; image used with permission.)

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Standing supported left AF IR exercise with resisted right FA abduction

1. Place your left foot on a 5–15cm step. Keep your weight through your left mid-foot/heel.
2. Place a band around both of your ankles.
3. Place your left foot on the first step and position it slightly behind your right foot.
4. Shift your left hip back and bend your left knee as you pull your left knee in slightly. You should feel the muscles on your left outer hip (buttock), left inner thigh and the front of your left thigh engage.
5. Side-bend your trunk to the left, feeling your left abdominals engage.
6. Maintaining the above position, raise your right foot off the floor and turn your right ankle out to the side finding contact with your right shoe arch.
7. Slowly squat down by bending your left knee as you bring your right foot out to the side, always keeping your right foot lower than your left.
8. You should feel your left outside hip (buttock), left inner thigh, front of your left thigh and your right outside hip (buttock) engage as you 'dip' your right foot down and out to the side.
9. Hold this position while you take 4–5 deep breaths, in through your nose and out through your mouth.
10. Relax and repeat this sequence 4 more times.

Figure 13: Single-leg dynamic stance exercise for left AF IR with concomitant left FA IR and right FA abduction. (Postural Restoration Institute, 2015; image used with permission.)

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Standing supported right gluteus maximus exercise with resisted left proximal hamstring and left knee flexion

1. Anchor tubing around a stable structure and place the other end around your left thigh.
2. Place a 6.5–12.5kg ankle weight around your left ankle.
3. Place your hands on the surface in front of you and round your back.
4. Turn your right foot in at a 45° angle. Maintaining contact with your right shoe arch, shift your body weight onto your right leg. Do not lock your right knee straight, rather keep it slightly bent.
5. Hike your left leg up as if you were pulling your left foot out of mud. You should feel your left inner thigh and your right outside hip (buttock) engage.
6. Slightly pull back your left leg without using your back.

7. Keeping your left thigh pulled back, slightly bend your left knee. You should feel the back of your left thigh engage.
8. Hold this position while you take 4–9. Relax and repeat 4 more times.

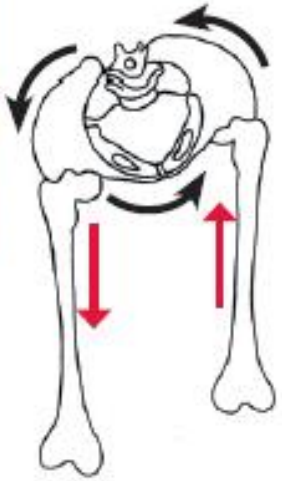

Figure 11: Exercise for right AF ER with left AF IR (Postural Restoration Institute, 2015; image used with permission.)

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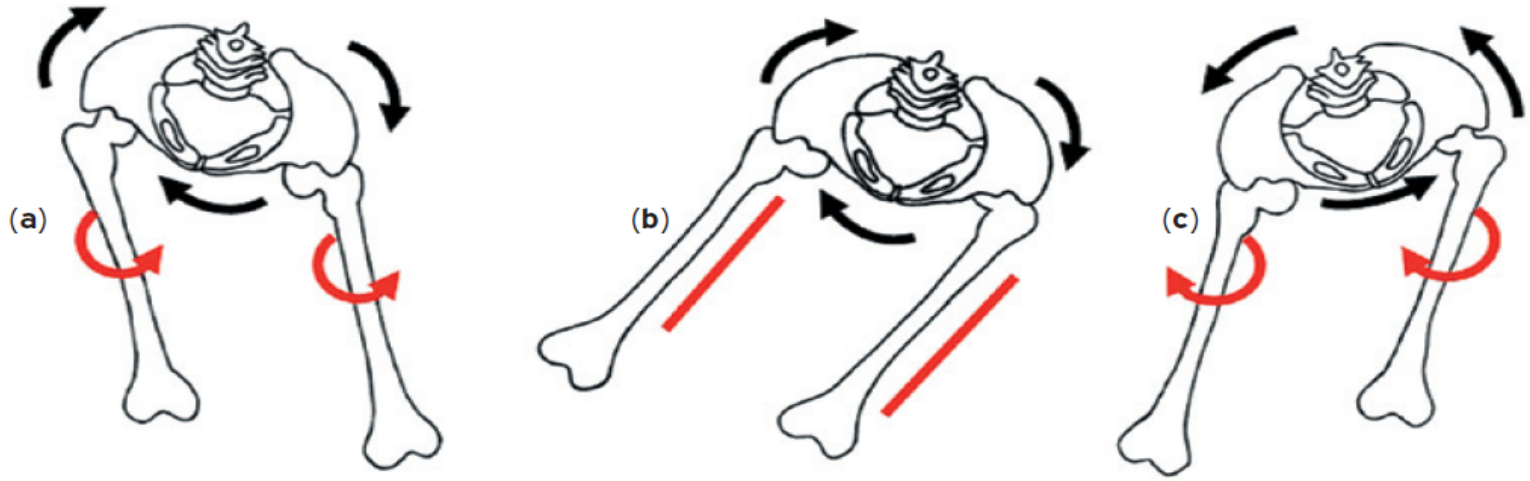
PROBLEM **GOAL**



(a) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right compensatory femoral internal rotation. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left compensatory femoral external rotation. (b) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right femur orientated outwardly. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left femur orientated inwardly. (c) Right hemi-pelvis positioned anteriorly, abducted and externally rotated with right compensatory femoral external rotation. Left hemi-pelvis positioned posteriorly, adducted, and internally rotated with left compensatory femoral internal rotation.

Figure 3: Left AIC and the effect on the pelvis and femur positioning. (J. Masek, 2015)

Masek J. Femoroacetabular Impingement Mechanisms, Diagnosis and Treatment Options Using Postural Restoration: Part 2. Sport Ex Med. 2015;65:18-25.

PROBLEM **GOAL**

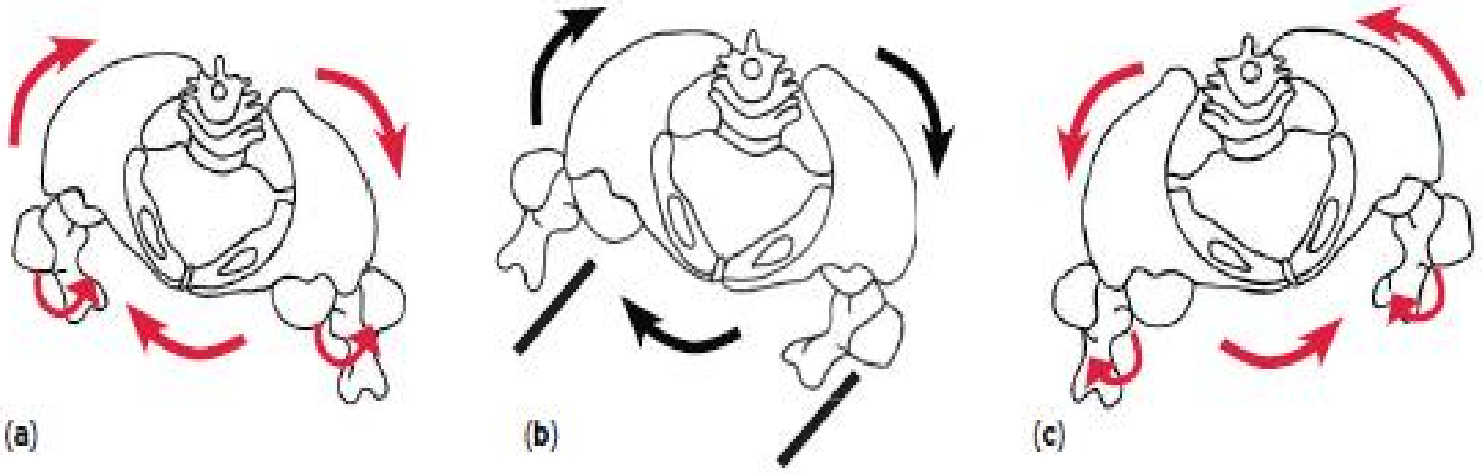


Figure 4: (a) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right compensatory femoral internal rotation. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left compensatory femoral external rotation. (b) Right hemi-pelvis positioned posteriorly, adducted, and internally rotated with right femur orientated outwardly. Left hemi-pelvis positioned anteriorly, abducted and externally rotated with left femur orientated inwardly. (c) Right hemi-pelvis positioned anteriorly, abducted and exteranally rotated with right compensatory femoral external rotation. Left hemi-pelvis positioned posteriorly, adducted, and internally rotated with left compensatory femoral internal rotation. (J. Masek, 2014)

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THINK SIMPLE!

1. **RESTORE SAGITTAL PLANE**
2. **RESTORE FRONTAL PLANE**
3. **RESTORE TRANSVERSE PLANE**

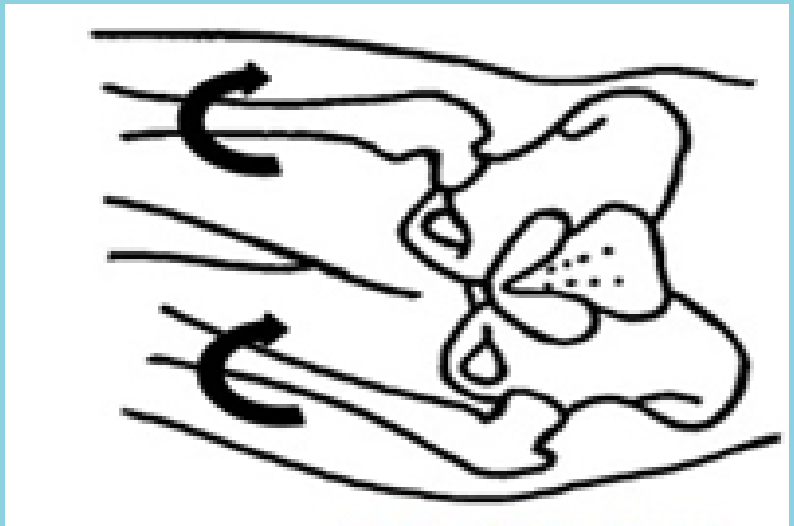
SAGITTAL PLANE

RESTING LENGTH OF HAMSTRINGS (NORMAL)

LENGTHENED HAMSTRINGS

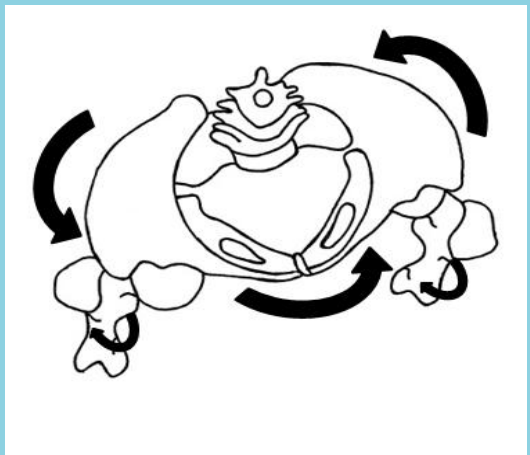
- In the sagittal plane, attention must be given to the left hamstring to restore pelvic position in the sagittal plane

FRONTAL PLANE



- In the frontal plane, emphasis is placed on the left adductor and right gluteals
- Left adductor “**pulls**” pelvis to left! Right gluteal “**pushes**” pelvis to left!

TRANSVERSE PLANE



- The right gluteus maximus assists in obtaining acetabular femoral external rotation “AF ER” on the right side
- The left adductor obtains “AF IR” on the left side
- The left gluteus medius and ischiocondylar adductor on the left assist in femoral acetabular internal rotation “FA IR”

TAKE HOME MESSAGE

- The patterns of pathology regarding impingements differ considerably from right to left and require a different pathomechanical explanations and management considerations.
- The goal of treatment in symptomatic patients with FAI is the restoration of the anatomy as close to normal as possible while removing mechanical factors contributing to abutment of the femoral head and/or neck and the acetabular rim.

THANK YOU!!
QUESTIONS?

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