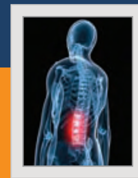


CHAPTER 14

Corrective Strategies for Lumbo-Pelvic-Hip Impairments

OBJECTIVES *Upon completion of this chapter, you will be able to:*

- Understand basic functional anatomy for the lumbo-pelvic-hip complex.
- Understand the mechanisms for common lumbo-pelvic-hip complex injuries.
- Determine common risk factors that can lead to lumbo-pelvic-hip complex injuries.
- Incorporate a systematic assessment and corrective exercise strategy for lumbo-pelvic-hip complex impairments.

Introduction

The lumbo-pelvic-hip complex (LPHC) is a region of the body that has a massive influence on the structures above and below it. The LPHC has between 29 and 35 muscles that attach to the lumbar spine or pelvis (1,2). The LPHC is directly associated with both the lower extremities and upper extremities of the body. Because of this, dysfunction of both the lower extremities and upper extremities can lead to dysfunction of the LPHC and vice versa.

REVIEW OF LPHC FUNCTIONAL ANATOMY

As previously stated, the LPHC has a great influence on the rest of the kinetic chain. There are many bones, joints, and muscles involved in the dysfunction of the LPHC; however, the purpose of this section is to provide a general review of the most pertinent structures. This is not intended to be an exhaustive and detailed review.

Bones and Joints

In the LPHC region specifically, the femur and the pelvis make up the iliofemoral joint and the pelvis and sacrum make up the sacroiliac joint (Figure 14-1). The lumbar spine and sacrum form the lumbosacral junction (Figure 14-1). Collectively, these structures anchor many of the major myofascial tissues that have a functional impact on the arthrokinematics of the structures above and below them.

Above the LPHC are the thoracic and cervical spine, rib cage, scapula, humerus, and clavicle. These structures make up the thoracolumbar and cervicothoracic junctions of the spine, the scapulothoracic, glenohumeral, acromioclavicular (AC), and sternoclavicular (SC) joints (Figure 14-2).

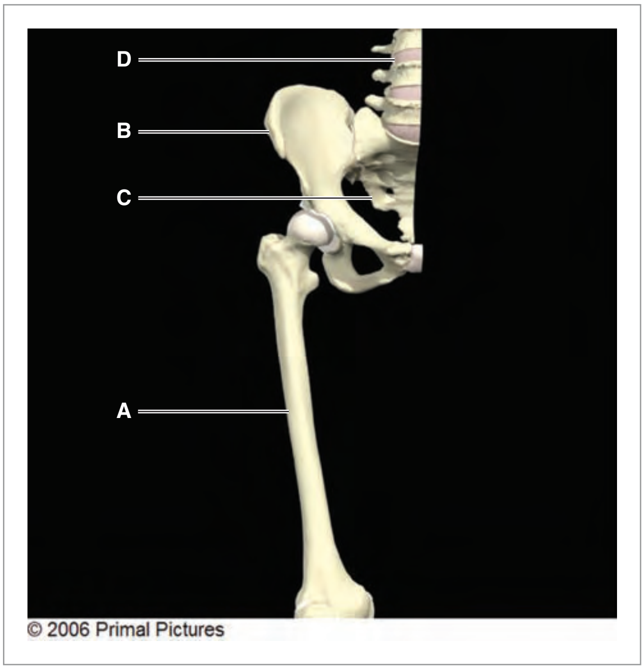


Figure 14.1 Bones of the LPHC. (A) Femur. (B) Pelvis. (C) Sacrum. (D) Lumbar spine.

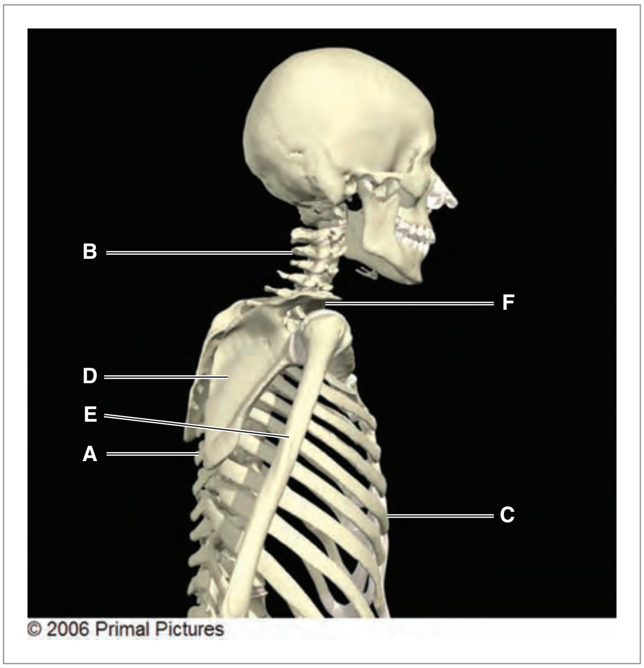


Figure 14.2 Bones above the LPHC. (A) Thoracic spine. (B) Cervical spine. (C) Rib cage. (D) Scapula. (E) Humerus. (F) Clavicle.

As mentioned in earlier chapters, below the LPHC, the tibia and femur make up the tibiofemoral joint, and the patella and femur make up the patellofemoral joint (Figure 14-3). The fibula is also noted as it is the attachment site of the biceps femoris, which originates from the pelvis.

Also mentioned in previous chapters, the tibia, fibula, and talus help to form the talocrural (ankle) joint (Figure 14-4). Collectively, these structures anchor the myofascial tissues of the LPHC such as the biceps femoris, medial hamstring comoplex, and rectus femoris. These bones and joints are of importance in corrective exercise because they will also have a functional impact on the arthrokinematics of the LPHC.

Muscles

There are a number of muscles in the upper and lower extremities whose function may be related and have an effect on the LPHC (Table 14-1). As with

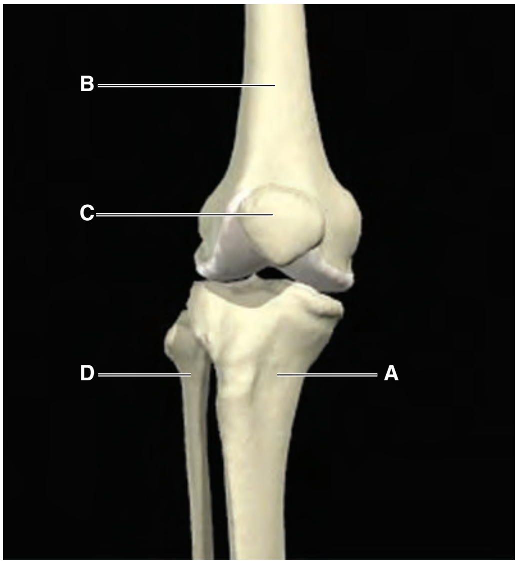


Figure 14.3 Bones below the LPHC. (A) Tibia. (B) Femur. (C) Patella. (D) Fibula.

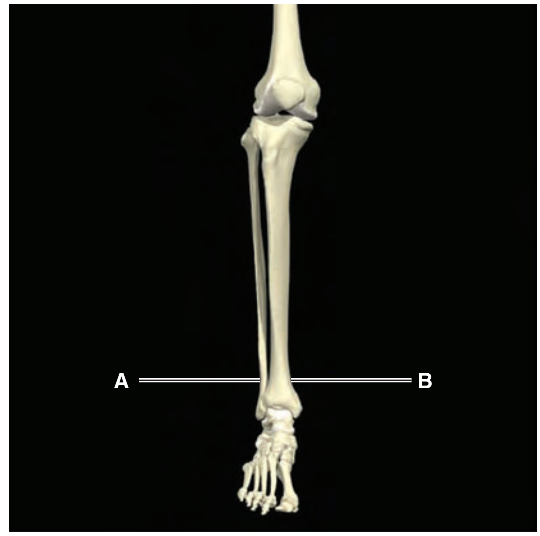


Figure 14.4 Bones below the LPHC (con't). (A) Distal Fibula. (B) Distal Tibia.

all muscles, it is important to restore and maintain normal range of motion and strength as well as eliminate any muscle inhibition to ensure joints are operating optimally (3–5). See chapter two for a detailed review of the location and function of these muscles.

Table 14.1 KEY MUSCLES ASSOCIATED WITH THE LPHC

• Gastrocnemius/soleus	• Erector spinae
• Adductor complex	• Intrinsic core stabilizers
• Hamstring complex	• Latissimus dorsi
• Hip flexors	• Tensor fascia latae/IT-band
• Abdominal complex	• Gluteus medius and maximus

COMMON LPHC INJURIES AND ASSOCIATED MOVEMENT DEFICIENCIES

Many of the common injuries associated with the LPHC include low-back pain, sacroiliac joint dysfunction, and hamstring complex, quadriceps, and groin strains (Table 14-2). However, the body is an interconnected chain, and compensation or dysfunction in the LPHC region can lead to dysfunctions in other areas of the body (3–8). Moving above the LPHC, common injuries are often seen in the cervical-thoracic spine, ribs (9–11), and shoulder (12–14), which can stem from dysfunction in the LPHC. Moving below the LPHC toward the knee, common injuries include patellar tendinosis (jumper's knee) and iliotibial band (IT-band) tendonitis (runner's knee) (15–17) as well as anterior cruciate ligament (ACL) tears (18,19). At the foot and ankle, common injuries that can stem from LPHC dysfunction include plantar fasciitis, Achilles tendinopathy, and medial tibial stress syndrome (20,21).

Table 14.2 COMMON INJURIES ASSOCIATED WITH LPHC IMPAIRMENT

Local Injuries	Injuries Above LPHC	Injuries Below LPHC
Low-back pain Sacroiliac joint dysfunction Hamstring complex, quadriceps, and groin strains	Shoulder and upper-extremity injuries Cervical-thoracic spine Rib cage	Patellar tendonitis (jumper's knee) IT-band tendonitis (runner's knee) Medial, lateral, and anterior knee pain Chondromalacia patellae Plantar fasciitis Achilles tendonitis Posterior tibialis tendonitis (shin splints)

Figure 14.5 Excessive forward lean.

Applying this concept practically, if the ankle is restricted and unable to move during the descent of a squat, the hip will be required to move more (relative flexibility) (22). If there is a lack of sagittal plane dorsiflexion at the ankle owing to an overactive or tight gastrocnemius and soleus, the LPHC will be forced to increase forward flexion to alter the body's center of gravity to maintain balance (Figure 14-5). The underactivity of the erector spinae and gluteus maximus to maintain an upright trunk position produces the compensation of an excessive forward lean.

The gluteus maximus and latissimus dorsi along with the thoracolumbar fascia work synergistically to form the posterior oblique subsystem (Figure 14-6) (23,24). As a compensatory mechanism

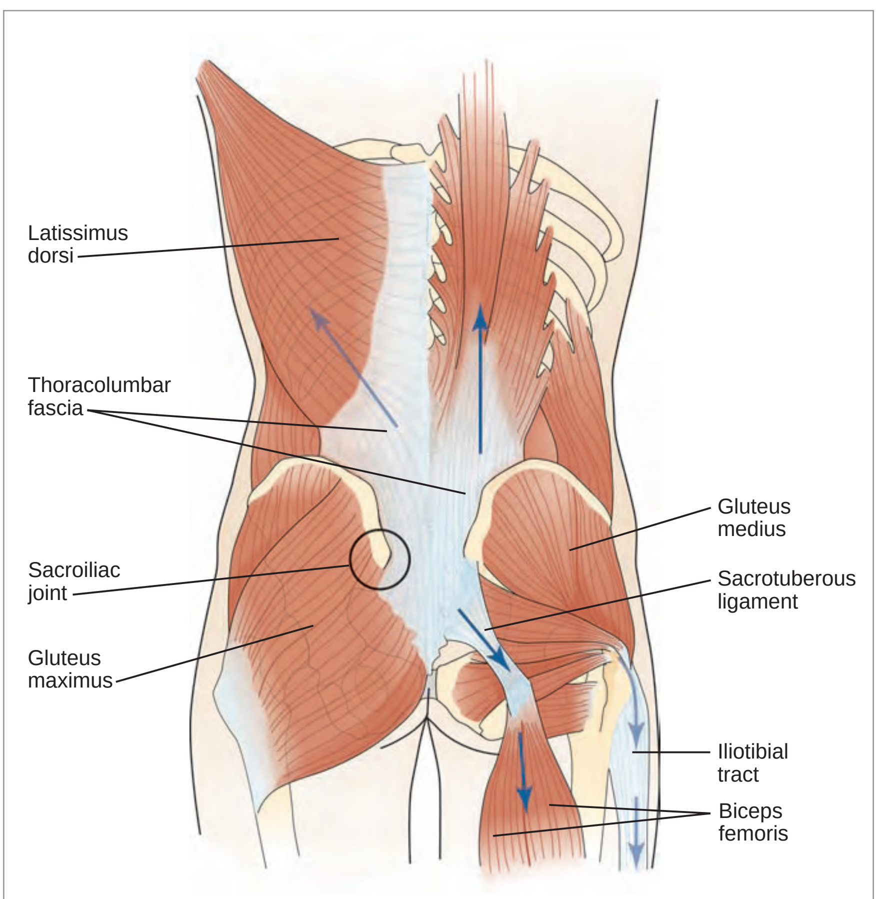


Figure 14.6 Posterior oblique subsystem.

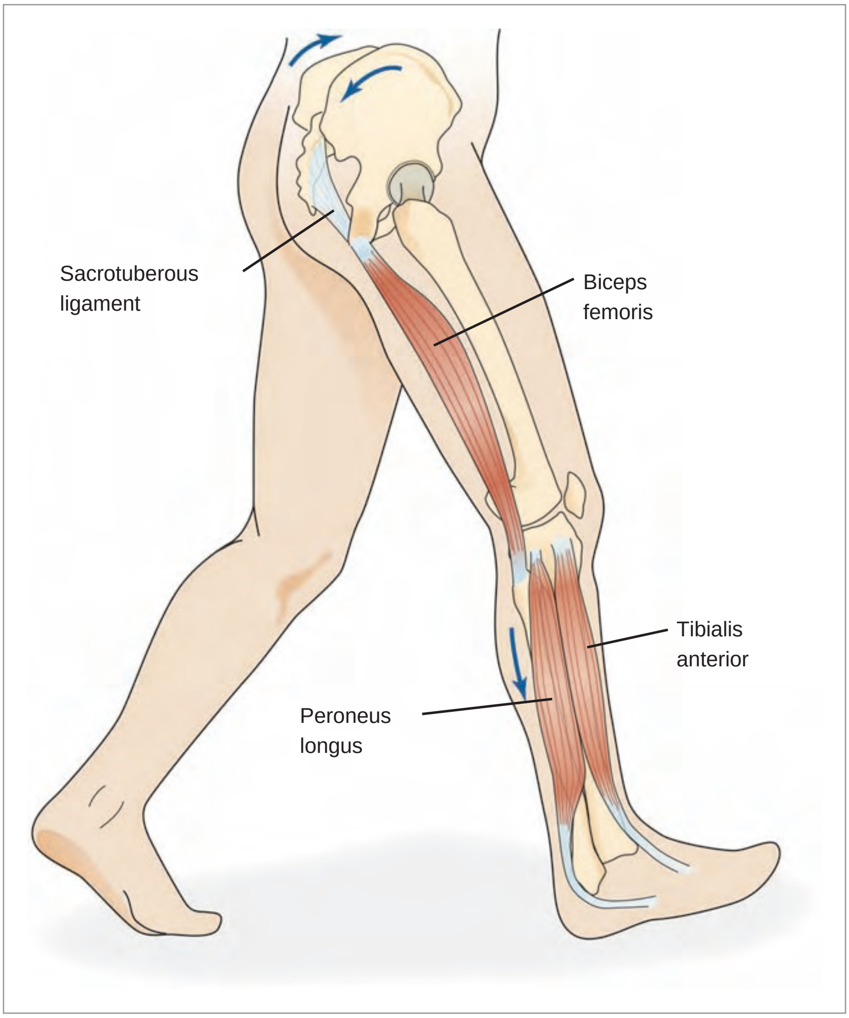


Figure 14.7 Deep longitudinal subsystem.

for the underactivity and inability of the gluteus maximus to maintain an upright trunk position, the latissimus dorsi may become synergistically dominant (overactive or tight) to provide stability through the trunk, core, and pelvis (4). Because the latissimus dorsi crosses the inferior angle of the scapulae and inserts onto the humerus it can alter the rotation of the scapula and instantaneous axis of rotation of the humeral head within the glenoid fossa (4).

The erector spinae, sacrotuberous ligament, biceps femoris, peroneus longus, and anterior tibialis work synergistically to form the deep longitudinal subsystem (Figure 14-7) (23,25,26). With both the anterior tibialis and erector spinae working at a submaximal level, the biceps femoris may become overactive to help maintain stability of the LPHC (4,27). This, however, will alter the position of the pelvis and sacrum and affect the sacroiliac and iliofemoral joints. The latissimus dorsi may also become overactive or tight to provide stability through the pelvis and extension of the spine for the inability of the erector spinae to maintain an upright trunk position. The latissimus dorsi attaches to the pelvis and will anteriorly rotate the pelvis, which causes extension of the lumbar spine (4,27).

From an injury perspective, the increased hip or spinal flexion can lead to excessive stress being placed on the low back, resulting in low-back pain. It can also lead to increased stress in the hamstring complex and adductor magnus, which may be trying to compensate for a weakened gluteus maximus and erector spinae complex to stabilize the LPHC, and result in hamstring complex and groin strains (4). The rectus femoris, being one of the primary hip flexors, tends to be overactive in this scenario. This can decrease its ability to lengthen during functional movements and lead to quadriceps strains as well as knee pain. As mentioned earlier, overactivity or tightness of the latissimus dorsi can affect the shoulder and upper extremities leading to a variety of shoulder and upper-extremity injuries (4,27).

GETTING YOUR FACTS STRAIGHT

Spine Stability Controversy

Exercises to improve spine stability are widely used in rehabilitation and prevention programs. However, there is ongoing debate on which muscles or muscle groups (local or global) to address as well as exercise goals during spine stability training. This is in part because of the assumption that intervertebral stability is automatically achieved and that exercises should focus on improving lumbopelvic stability to achieve spine stability.

There are two primary differences in the approaches toward spine stability training. First, there are differences in the target muscle groups for the prescribed exercises, specifically, exercises for local versus global musculature (1). Second, there are differences in the type of exercises performed in terms of exercises geared toward improving strength and power (abdominal bracing) versus exercises that focus on improving neuromuscular control (abdominal drawing-in maneuver).

The traditional approach to spine stability training uses exercises that focus on the global stabilizers, but not the local stabilizers. This is primarily based on research that suggests that the global muscles are most important for spine stability (2,3). However, this research assumes that intervertebral stability is achieved. As discussed, both local and global muscles contribute to spine stability. Therefore it is critical that exercises for spine stability address both local and global stabilizers. Thus, both bracing and drawing-in can ultimately improve spine stability.

Because drawing-in can influence both intervertebral stability and lumbopelvic stability and because lumbopelvic stability is dependent on intervertebral stability, use of the drawing-in maneuver to train the local muscles and improve intervertebral stability may be considered the starting point for a spine stability training program, then progressing to abdominal bracing.

1. Richardson CA, Jull GA. Muscle control-pain control. What exercises would you prescribe? *Man Ther* 1995;1(1):2–10.
2. Grieve GP. Lumbar instability. *Physiotherapy* 1982;68(1):2–9.
3. McGill SM. Low back stability: from formal description to issues for performance and rehabilitation. *Exerc Sport Sci Rev* 2001;29(1):26–31.

(*Text continues on page 314*)

ASSESSMENT AND CORRECTIVE EXERCISES FOR LPHC IMPAIRMENTS

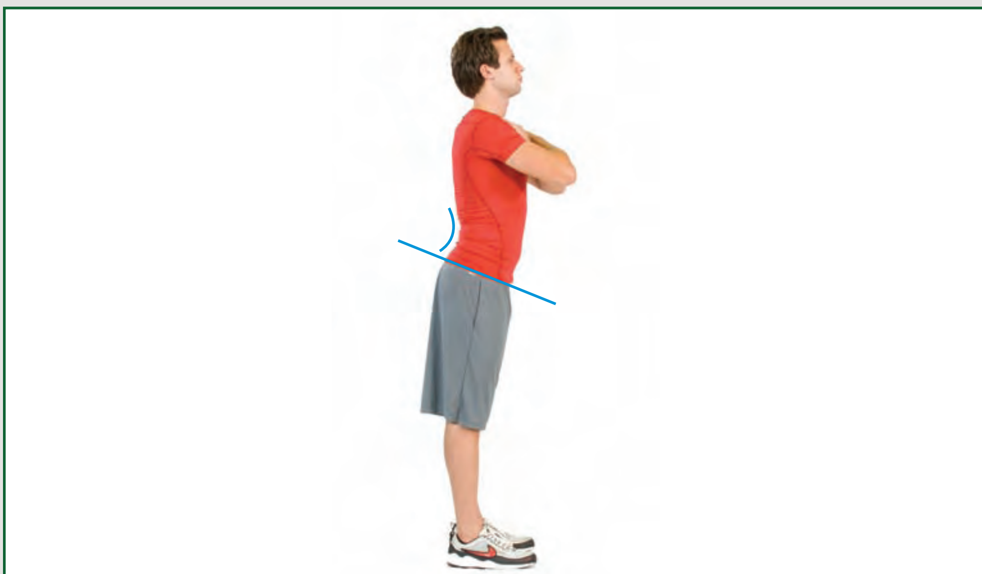
SYSTEMATIC PROCESS TO DETERMINE LPHC IMPAIRMENTS

Because of the freedom of movement at the LPHC and its association with the upper and lower extremities, there are a number of key elements to assess for LPHC dysfunction. This section will review key areas to be assessed when performing an integrated assessment for LPHC impairments.

STATIC POSTURE

A key static postural distortion syndrome to look for to determine potential movement dysfunction at the LPHC is the lower crossed postural distortion syndrome. As mentioned in chapter five, this is characterized by an anterior pelvic tilt (excessive lumbar extension). This position of the pelvis and lumbar spine can place excessive stress on the muscles and connective tissue associated with the LPHC during dynamic movement.

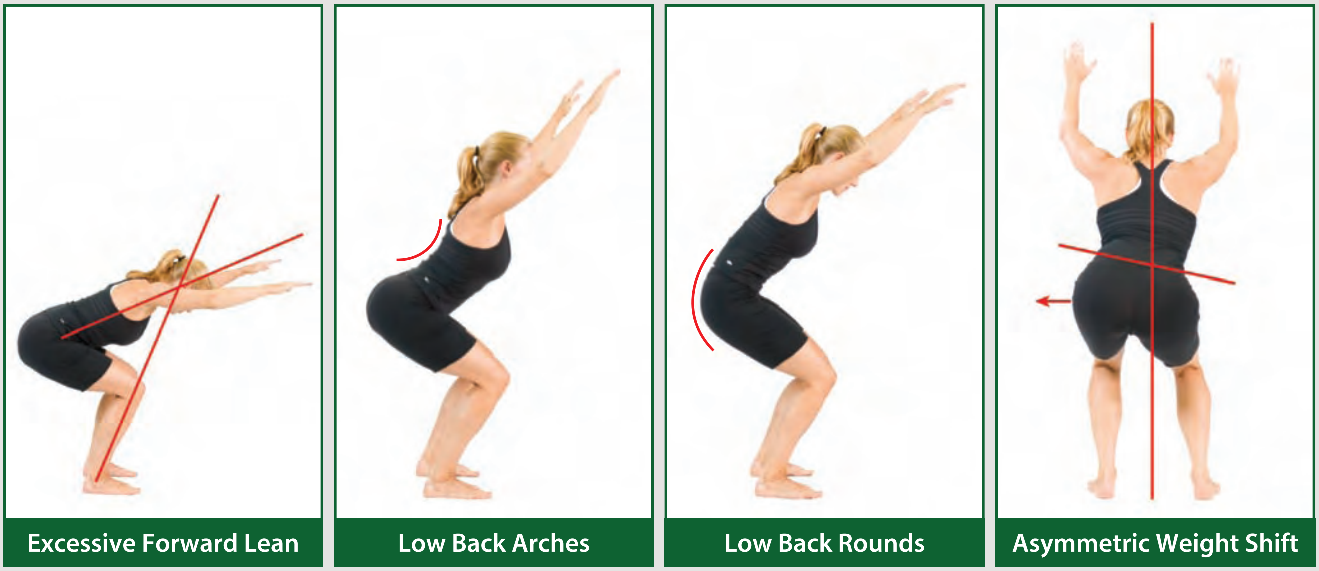
Lower Crossed Syndrome



TRANSITIONAL MOVEMENT ASSESSMENTS

There are several LPHC compensations to look for when performing an overhead squat assessment. As outlined in chapter six, these compensations include excessive forward lean, arching of the low back, rounding of the low back, and an asymmetric weight shift. The table below provides a review of the potential overactive and underactive muscles for each compensation.

Overhead Squat LPHC Movement Compensations



SUMMARY OF LPHC OVERHEAD SQUAT MOVEMENT COMPENSATIONS			
Compensation	**Potential Overactive Muscles**	**Potential Underactive Muscles**	**Potential Injuries**
Excessive forward lean	Soleus Gastrocnemius Hip flexor complex Abdominal Complex	Anterior tibialis Gluteus maximus Erector spinae Intrinsic core stabilizers	Hamstring complex, quadriceps, and groin strain Low-back pain
Low back arches	Hip flexor complex Erector spinae Latissimus dorsi	Gluteus maximus Hamstrings Intrinsic core stabilizers	
Low back rounds	Hamstring complex Adductor magnus Rectus abdominis External obliques	Gluteus maximus Erector spinae Intrinsic core stabilizers Hip flexor complex Latissimus dorsi	
Asymmetrical weight shift	Adductor complex, TFL, (on the side of the shift) Gastrocnemis/soleus, piriformis, biceps femoris, gluteus medius (on side opposite of shift)	Gluteus medius (on side of shift) Anterior tibialis, Adductor complex (on side opposite of shift)	Hamstring complex, quadriceps, and groin strain Low-back pain Sacroiliac joint pain

When performing a single-leg squat, some key compensations to look for would include the knee moving inward and inward or outward trunk rotation as well as the hip hiking and dropping. The table also provides a review of potential overactive and underactive muscles for each compensation.

Continued on page 298

Single-leg Squat LPHC Movement Compensations

Torso Rotated Inward

Torso Rotated Outward

Hip Hiked

Hip Dropped

SUMMARY OF LPHC SINGLE-LEG SQUAT MOVEMENT COMPENSATIONS

Compensation	Potential Overactive Muscles	Potential Underactive Muscles
Hip hike	Quadratus lumborum (opposite side of stance leg) TFL/gluteus minimus (same side as stance leg)	Adductor complex (same side as stance leg) Gluteus medius (same side as stance leg)
Hip drop	Adductor complex (same side as stance leg)	Gluteus medius (same side as stance leg) Quadratus lumborum (same side as stance leg)
Inward trunk rotation	Internal oblique (same side as stance leg) External oblique (opposite side of stance leg) TFL (same side as stance leg) Adductor complex (same side as stance leg)	Internal oblique (opposite side of stance leg) External oblique (same side as stance leg) Gluteus medius/maximus (same side as stance leg)
Outward trunk rotation	Internal oblique (opposite side of stance leg) External oblique (same side as stance leg) Piriformis (same side as stance leg)	Internal oblique (same side as stance leg) External oblique (opposite side of stance leg) Adductor complex (opposite side as stance leg) Gluteus medius/maximus (same side as stance leg)

DYNAMIC MOVEMENT ASSESSMENTS

Dynamic movement assessments can also help to determine whether LPHC movement deficiencies exist while performing more dynamic movements such as gait (chapter six).

When performing a gait assessment, observe the individual's LPHC for excessive arching and excessive pelvic rotation as well as hip hiking. These compensations could be indicative of poor neuromuscular control of the LPHC and will need to be addressed in the corrective exercise program.

LPHC Compensations During Dynamic Movement Assessment

Low Back Arches

Excessive Pelvic Rotation

Hip Hike

RANGE OF MOTION ASSESSMENTS

The range of motion (ROM) assessments performed for LPHC impairments will be dependent on the compensations seen during the overhead squat assessment. The table provides a summary of key joints to be measured on potential observations on the basis of the movement compensation(s) seen in the movement assessment. See chapter seven to view proper execution of these assessments and average ROM values.

Continued on page 300

POTENTIAL ROM OBSERVATION	
Compensation	**Potential ROM Observation**
Excessive forward lean	Decreased ankle dorsiflexion Decreased hip extension Decreased hip internal rotation
Low back arches	Decreased hip extension Decreased shoulder flexion Decreased hip internal rotation
Low back rounds	Decrease knee extension Decreased hip internal rotation
Asymmetric weight shift	Decreased hip abduction (same side of shift) Decreased dorsiflexion (opposite side of shift) Decrease knee extension (opposite side of shift) Decreased hip extension (opposite side of shift) Decreased hip internal rotation (opposite side of shift)

STRENGTH ASSESSMENTS

As with the ROM assessments, the manual muscle tests that are selected will also be dependent on the compensations seen during the overhead squat assessment. The table provides a summary of key muscles to be tested on the basis of the movement compensation(s) seen in the movement assessment. See chapter eight to view proper execution of these assessments.

POTENTIAL STRENGTH OBSERVATION	
Compensation	**One or More of the Following Muscles Test "Weak"**
Excessive forward lean	Anterior tibialis or gluteus maximus
Low back arches	Gluteus maximus, hamstring complex, or abdominal complex
Low back rounds	Gluteus maximus or hip flexors
Asymmetric weight shift	Anterior tibialis or adductors (opposite side); gluteus medius (same side)

SYSTEMATIC CORRECTIVE EXERCISE STRATEGIES FOR LPHC IMPAIRMENTS

The following section provides sample programming strategies using the Corrective Exercise Continuum for LPHC impairments. The photos provided illustrate the exercises that can be done for each component of the continuum to help address the issue of LPHC impairments as they relate to the overhead squat assessment (excessive forward lean, low back arches, low back rounds, and asymmetric weight shift). Which exercises are used will be dependent on the findings of the assessments and the individual's physical capabilities (integration exercises).

LPHC IMPAIRMENT: EXCESSIVE FORWARD LEAN

Step 1: Inhibit Key regions to inhibit via foam rolling include the gastrocnemius/soleus and hip flexor complex (rectus femoris).

Self-Myofascial Release

Gastrocnemius/Soleus

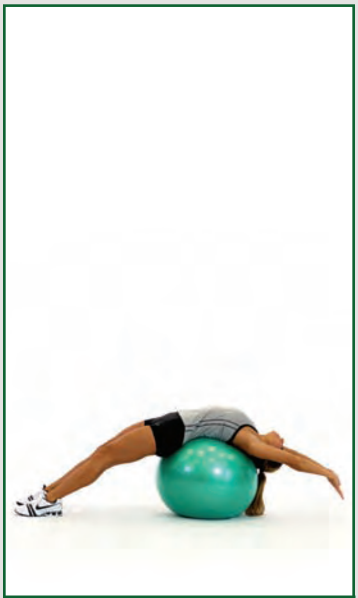
Hip Flexor (Rectus Femoris)

Step 2: Lengthen Key lengthening exercises via static and/or neuromuscular stretches include the gastrocnemius/soleus, hip flexor complex and abdominal complex.

Static Stretches

Gastrocnemius/Soleus

Hip Flexor



Abdominal Complex

Continued on page 302

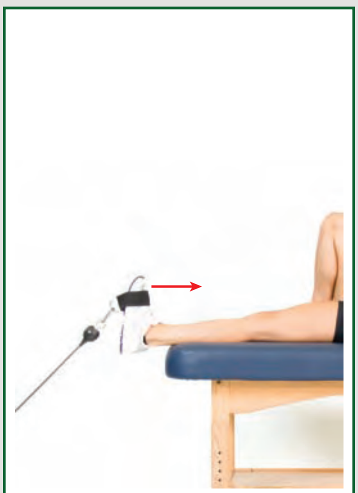
Neuromuscular Stretches

Gastrocnemius/Soleus

Hip Flexor

Step 3: Activate Key activation exercises via isolated strengthening exercises and/or positional isometrics include the anterior tibialis, gluteus maximus, erector spinae, and intrinsic core stabilizers.

Isolated Strengthening Exercises



Anterior Tibialis

Gluteus Maximus

Erector Spinae (Floor Cobra)

Intrinsic Core Stabilizers
(Quadruped Arm/Opposite Leg Raise)

Positional Isometrics

Anterior Tibialis

Gluteus Maximus

Step 4: Integration

An integration exercise that could be implemented for this compensation could be a ball squat to overhead press. This exercise will help teach proper hip hinging while maintaining proper lumbo-pelvic control. Adding the overhead press component will place an additional challenge to the core. The individual can then progress to step-ups to overhead presses (sagittal, frontal, and transverse planes), then to lunges to overhead presses (sagittal, frontal, and transverse planes), and then to single-leg squats to overhead presses.

Integrated Dynamic Movement

Ball Squat to Overhead Press (Start)

Ball Squat to Overhead Press (Finish)

Continued on page 304

SAMPLE CORRECTIVE EXERCISE PROGRAM FOR LPHC IMPAIRMENT: EXCESSIVE FORWARD LEAN			
Phase	**Modality**	**Muscle(s)**	**Acute Variables**
Inhibit	**SMR**	Gastrocnemius/soleus Hip flexor complex	Hold on tender area for 30 seconds
Lengthen	**Static stretching** OR **NMS**	Gastrocnemius/soleus Hip flexor complex Abdominal complex	30-second hold ***OR*** 7–10-second isometric contraction, 30-second hold
Activate	**Positional isometrics** AND/OR **isolated strengthening**	Anterior tibialis Gluteus maximus Erector spinae Core stabilizers	4 reps of increasing intensity 25, 50, 75, 100% ***OR*** 10–15 reps with 2-second isometric hold and 4-second eccentric contraction
Integrate*	**Integrated dynamic movement**	Ball wall squat with overhead press	10–15 reps under control

***NOTE:** If client is not initially capable of performing the integrated dynamic movement exercise listed he or she may need to be regressed to a more suitable exercise.

LPHC IMPAIRMENT: LOW BACK ARCHES

Step 1: Inhibit Key regions to inhibit via foam rolling include the hip flexor complex (rectus femoris) and latissimus dorsi.

Self-Myofascial Release

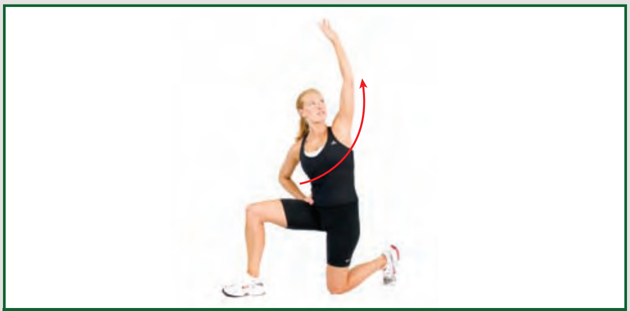
Hip Flexor (Rectus Femoris)

Latissimus Dorsi

Step 2: Lengthen

Key lengthening exercises via static and/or neuromuscular stretches include the hip flexor complex, erector spinae, and latissimus dorsi.

Static Stretches

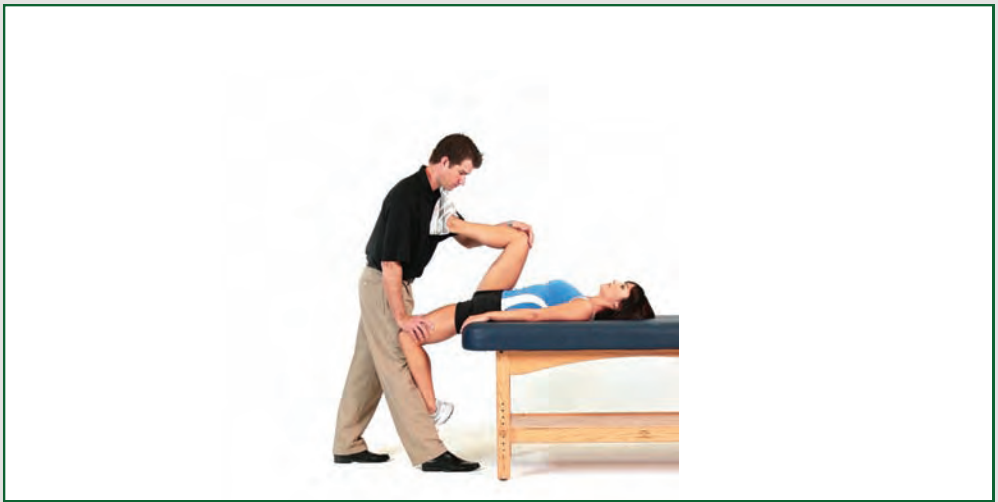


Hip Flexor

Erector Spinae

Latissimus Dorsi

Neuromuscular Stretches



Hip Flexor

Continued on page 306

Step 3: Activate Key activation exercises via isolated strengthening exercises and/or positional isometrics include the gluteus maximus and abdominal complex.

Isolated Strengthening Exercises

Gluteus Maximus (Ball Bridge)

Abdominal Complex (Ball Crunches)

Positional Isometrics

Gluteus Maximus

Abdominal Complex

Step 4: Integration An integration exercise that could also be implemented for this compensation could also be a ball squat to overhead press and use the same integrated progression that was provided for the excessive forward lean programming.

SAMPLE CORRECTIVE EXERCISE PROGRAM FOR LPHC IMPAIRMENT: LOW BACK ARCHES

Phase	Modality	Muscle(s)	Acute Variables
Inhibit	**SMR**	Hip flexor complex Latissimus dorsi	Hold on tender area for 30-seconds
Lengthen	**Static stretching** OR **NMS**	Hip flexor complex Latissimus dorsi Erector spinae	30-second hold ***OR*** 7–10-second isometric contraction, 30-second hold
Activate	**Positional isometrics** AND/OR **isolated strengthening**	Gluteus maximus Abdominal complex/intrinsic core stabilizers	4 reps of increasing intensity 25, 50, 75, 100% ***OR*** 10–15 reps with 2-second isometric hold and 4-second eccentric contraction
Integrate*	**Integrated dynamic movement**	Ball wall squat with overhead press	10–15 reps under control

***NOTE:** If client is not initially capable of performing the integrated dynamic movement exercise listed he or she may need to be regressed to a more suitable exercise.

LPHC IMPAIRMENT: LOW BACK ROUNDS

Step 1: Inhibit Key regions to inhibit via foam rolling include the hamstring complex and adductor magnus.

Self-Myofascial Release

Hamstring Complex

Adductor Magnus

Continued on page 308

Step 2: Lengthen

Key lengthening exercises via static and/or neuromuscular stretches include the hamstring complex and adductor magnus.

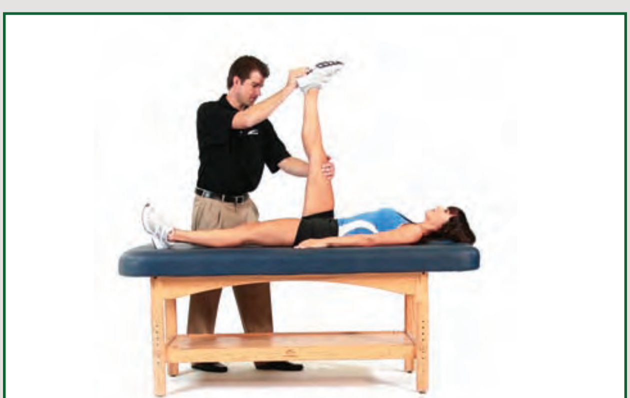
Static Stretches

Hamstring Complex

Adductor Magnus

Abdominal Complex

Neuromuscular Stretches



Hamstring Complex

Adductor Magnus

Step 3: Activate Key activation exercises via isolated strengthening exercises and/or positional isometrics include the gluteus maximus, hip flexors, and erector spinae.

Isolated Strengthening Exercises


Gluteus Maximus (Ball Bridge)


Hip Flexors


Erector Spinae (Floor Cobra)

Positional Isometrics


Gluteus Maximus


Hip Flexors

Continued on page 310

Step 4: Integration

An integration exercise that could also be implemented for this compensation could also be a ball squat to overhead press and use the same integrated progression that was provided for the excessive forward lean programming.

SAMPLE CORRECTIVE EXERCISE PROGRAM FOR LPHC IMPAIRMENT: LOW BACK ROUNDS

Phase	Modality	Muscle(s)	Acute Variables
Inhibit	**SMR**	Hamstring complex Adductor magnus	Hold on tender area for 30 seconds
Lengthen	**Static stretching** OR **NMS**	Hamstring complex Adductor magnus	30-second hold ***OR*** 7–10-second isometric contraction, 30-second hold
Activate	**Positional isometrics** AND/OR **isolated strengthening**	Gluteus maximus Hip flexors Erector spinae	4 reps of increasing intensity 25, 50, 75, 100% ***OR*** 10–15 reps with 2-second isometric hold and 4-second eccentric contraction
Integrate*	**Integrated dynamic movement**	Ball wall squat with overhead press	10–15 reps under control

***NOTE:** If client is not initially capable of performing the integrated dynamic movement exercise listed he or she may need to be regressed to a more suitable exercise.

LPHC IMPAIRMENT: ASYMMETRIC WEIGHT SHIFT

Step 1: Inhibit

Key regions to inhibit via foam rolling include the same-side (side toward shift) adductors and TFL/IT-band and the opposite side (side away from shift) piriformis and bicep femoris. The gastrocnemius and soleus can also play a major factor in this compensation as well. As the client descends into the squat, if one of the ankle joints lacks sagittal plane dorsiflexion, this forces the body to shift away from the restricted side and move to the side capable of greater motion. For example, if the left ankle is restricted, it can force the individual to the right to find that ROM.

Self-Myofascial Release

Same-Side Adductors

Same Side TFL/IT-Band

Self-Myofascial Release

Opposite Side Gastrocnemius/Soleus

Opposite Side Piriformis

Opposite Side Biceps Femoris

Step 2: Lengthen

Key lengthening exercises via static and/or neuromuscular stretches include the same-side adductors and the opposite side gastrocnemius/soleus, TFL/IT band, biceps femoris, and piriformis.

Static Stretches

Same-Side Adductors

Same Side TFL

Opposite Side Gastrocnemius/Soleus

Continued on page 312

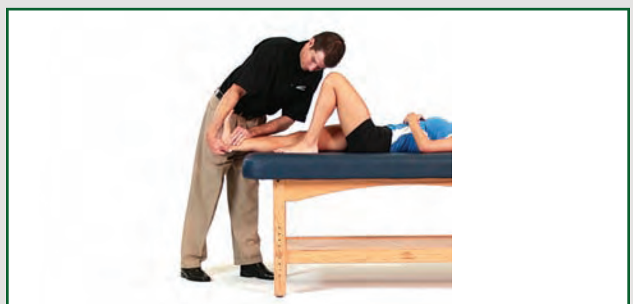
Static Stretches

Opposite Side Piriformis

Opposite Side Biceps Femoris

Neuromuscular Stretches

Same Side Adductors



Opposite Side Gastrocnemius/Soleus

Opposite Side Piriformis

Opposite Side Bicep Femoris

Step 3: Activate

Key activation exercises via isolated strengthening exercises and/or positional isometrics include the same-side gluteus medius and the opposite side adductor complex.

Isolated Strengthening Exercises

Same Side Gluteus Medius

Opposite Side Adductor Complex

Positional Isometrics

Same-Side Gluteus Medius

Opposite Side Adductor Complex

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Step 4: Integration An integration exercise that could also be implemented for this compensation could also be a ball squat to overhead press and use the same integrated progression that was provided for the excessive forward lean programming.

SAMPLE CORRECTIVE EXERCISE PROGRAM FOR LPHC IMPAIRMENT: ASYMMETRIC WEIGHT SHIFT

Phase	Modality	Muscle(s)	Acute Variables
Inhibit	**SMR**	Adductors and TFL/ IT-band (same side) piriformis, bicep femoris and gastrocnemius/soleus (opposite side)	Hold on tender area for 30 seconds
Lengthen	**Static stretching** OR **NMS**	Adductors and TFL (same side) piriformis, gastrocnemius/soleus and biceps femoris (opposite side)	30-second hold ***OR*** 7–10-second isometric contraction, 30-seconds hold
Activate	**Positional isometrics** AND/OR **isolated strengthening**	Gluteus medius (same side) Adductors (opposite side)	4 reps of increasing intensity 25, 50, 75, 100% ***OR*** 10–15 reps with 2-seconds isometric hold and 4-second eccentric contraction
Integrate*	**Integrated dynamic movement**	Ball wall squat to overhead press	10–15 reps under control

***NOTE:** If client is not initially capable of performing the integrated dynamic movement exercise listed he or she may need to be regressed to a more suitable exercise.

SUMMARY • The LPHC operates as an integrated functional unit, enabling the entire kinetic chain to work synergistically to produce force, reduce force, and dynamically stabilize against abnormal force. In an efficient state, each structural component distributes weight, absorbs force, and transfers ground reaction forces. This integrated, interdependent system needs to be appropriately trained to enable it to function efficiently during dynamic activities. Because of the many muscles associated with the LPHC, dysfunction in this region can potentially lead to dysfunction in both the upper and lower extremities, and dysfunction in either the upper or lower extremities can lead to LPHC dysfunction. For this reason it becomes a crucial region to assess and will most likely be a region that will need to be addressed in most individuals with movement deficits.

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