



CLINICAL EXERCISE SPECIALIST MANUAL

A Fitness Professional's Guide
to Training People with
CHRONIC DISEASE

J. DANIEL MIKESKA DHSc

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**A FITNESS PROFESSIONAL'S GUIDE TO
EXERCISE AND CHRONIC DISEASE**

BY J. DANIEL MIKESKA, DHSC

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CHAPTER 19

COMMON HIP DYSFUNCTIONS

By the end of this chapter you will understand:

- Anatomy
- Pathologies
 - Gluteal Trochanteric Pain Syndrome and Trochanter Bursitis
 - IT band friction syndrome
 - Osteoarthritis
 - Hip replacement
 - Piriformis syndrome
- Treatment options
 - Early intervention
 - Exercise intervention
 - Mobility/stability
 - Movement
 - What to avoid

Anatomy

Similar to the shoulder, the hip is a ball and socket joint with three degrees of freedom that allows movement in all planes of motion. The hip joint is formed from the proximal head of the femur and the pelvic acetabulum. Also similar to the shoulder, the acetabulum has a ring of fibrous cartilage, the *acetabular*

labrum, which adds depth to the hip socket and provides stability for weight bearing movements. Figure 19.1 diagrams the hip socket, and Table 19.1 details the movements of the hip and its involved muscles.

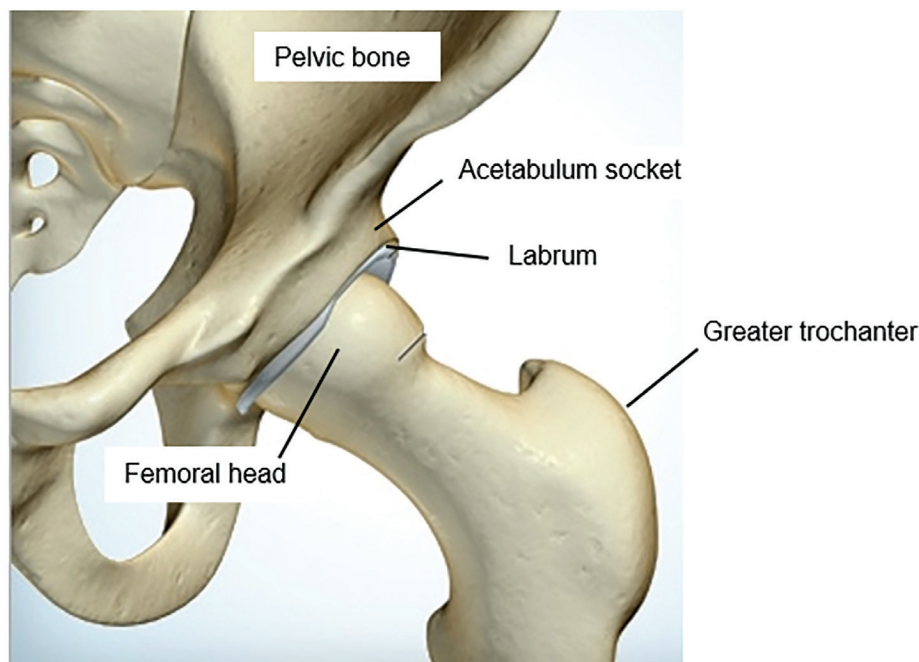


Figure 19.1 Diagram of the hip

Table 19.1

Movements of the hip and the involved muscles

Movement	Involved Muscles
Flexion	iliopsoas, rectus femoris, sartorius, pectineus
Extension	gluteus maximus and hamstrings: semimembranosus, semitendinosus, and biceps femoris
Abduction	gluteus medius, gluteus minimus, piriformis and tensor fascia latae
Adduction	adductors longus, brevis and magnus, pectineus and gracilis
Lateral rotation	biceps femoris, gluteus maximus, piriformis, assisted by the obturators, gemilli and quadratus femoris
Medial rotation	anterior fibers of gluteus medius and minimus, tensor fascia latae

(Cheatham, 2015; Mallow & Nazarian, 2014):

Gluteal Trochanteric Pain Syndrome and Trochanter Bursitis

Common hip conditions are trochanteric pain syndrome, iliotibial (IT) band friction syndrome (ITBFS), and arthritis that may lead to hip replacement. The trochanters are two bony protuberances toward the top of the femur and serve as sites for muscle attachment. The greater trochanter is at the junction of the neck and shaft of the femur. The muscles that insert on, or near the greater trochanter are the gluteus medius and minimus, piriformis, obturator externus, and obturator internus. Greater trochanteric pain syndrome (GTPS) refers to hip pain such as bursitis and tendonitis (Cheatham, 2015; Mallow & Nazarian, 2014).

Trochanteric bursa are located on the lateral side of the greater trochanter and provide protection for the gluteus medius and minimus, the IT band, and the tensor fascia lata (TFL). Trochanteric bursitis is inflammation of the bursa between the greater trochanter and the gluteus medius and IT complex. Inflammation can be caused by age, an accident or trauma, repetitive movements such as running or kicking, as well as structural and muscular dysfunctions. Trochanteric bursitis can often result in low back pain, pain radiating down the lateral aspect of the thigh to the knee, pain when walking, and pain when lying on the effected side. Reduced strength and range of motion have also been associated with trochanteric bursitis. It is now known that extreme cases of trochanter inflammation may be the result of tears in the gluteus minimus and medius; similar to rotator cuff tears that lead to tendinopathy (Cheatham, 2015; Mallow & Nazarian, 2014).

Due to the many reasons for hip pain, it is strongly recommended a client with hip pain get a clinical diagnosis prior to beginning an exercise program. Hip pain may be the result of:

- Gluteus medius dysfunction, gluteus medius or gluteus minimus tendinopathy
- Piriformis tendinopathy
- Iliotibial tract friction syndrome
- Trochanteric bursitis
- Piriformis syndrome
- Osteoarthritis
- Acetabular labral tear
- Femoral neck fracture
- Iliopsoas tendinopathy
- Hernia
- Intervertebral disk disease
- Lumbosacral dysfunction or disease
- Lumbosacral spine sprain or strain
- Sacroiliac joint injury or dysfunction
- Referred pain from intra-abdominal processes

Iliotibial Band Friction Syndrome

The IT band is a thick portion of lateral fascia of the upper leg that crosses over the hip and knee joints and overlays the greater trochanter. It originates at the iliac crest and inserts at the lateral condyle of the tibia and helps with movement and stability in the lower extremity as shown in Figure 19.2 (Lavine, 2010; Hyland & Varacallo, 2018). Because of the anatomical structuring of the IT band, it is presumed Iliotibial band friction syndrome (ITBFS) is an overuse injury caused by repetitive tightening of lateral fascia resulting in a compressive force to IT band connective tissue.

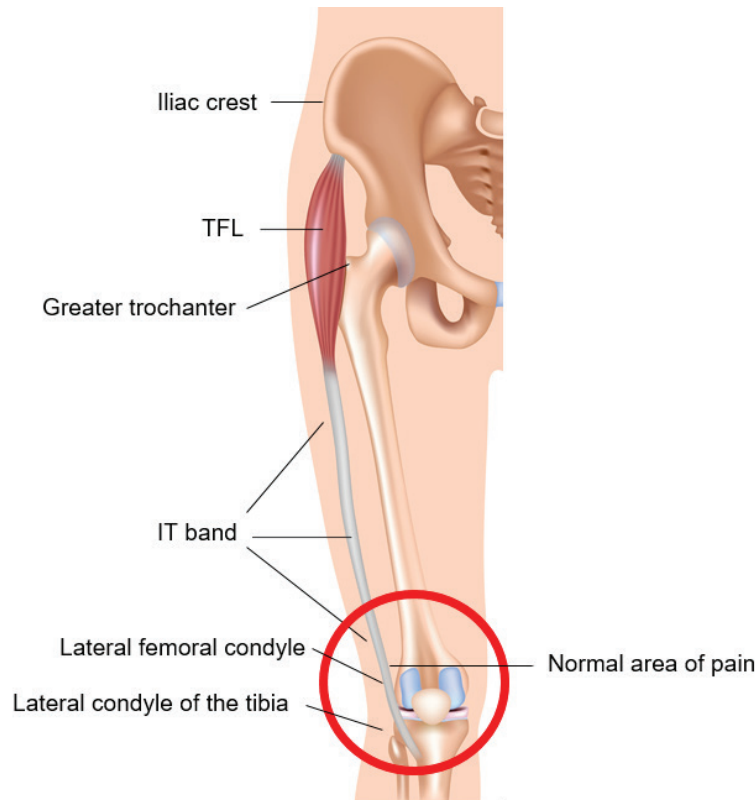


Figure 19.2 IT band syndrome.

ITBFS is the most common knee injury reported in runners, but also common in cyclists. Because ITBFS often manifests as pain originating from the lateral femoral condyle (figure 19.2), it was originally thought to be an overuse injury related to repetitive movement of the knee; however, it is now thought ITBFS could be caused by repetitive movement of the hip, its actual pathology is unknown (Cheatham, 2015; Lavine, 2010). What is known are heavy landing forces, increased knee internal rotation, and quadriceps that are comparatively stronger or more active than the same side hamstrings are biomechanical factors associated with ITBFS. Pain or tenderness may be gradual, starting at the knee and working up the lateral aspect of the thigh, and there may also be a snapping or popping at the knee during extension and flexion. Restorative exercise recommendations for GTPS and ITBFS are in Table 19.3.

Osteoarthritis

Osteoarthritis (OA) is a degenerative disease that develops when the cartilage and supporting joint structures deteriorate. It is estimated over 31 million American adults suffer from OA, with age as the single most determining factor. Although it is thought everyone over the age of 60 suffers from OA in at least one joint, it is known 70% of people over the age of 65 suffer from OA (Cibulka et al., 2009). Additionally, OA is more prevalent in people who suffer from other chronic disease (Arthritis Foundation, n.d.):

- 49% of adults with heart disease have arthritis
- 47% of adults with diabetes have arthritis
- 31% of adults who are obese have arthritis

OA effects an entire joint from increased tensile loads on the joint capsule, and compressive forces on the remaining cartilage. Obesity, genetic anomalies, leg length discrepancy, hip dysplasia, cysts, bone spurs, a limited range of motion (ROM), and muscle weakness are associated with hip OA. Weak core musculature, abductors, and gluteus medius can cause muscle imbalances and dysfunction and may lead to a Trendelenberg gait pattern, an abnormal gait characterized by a hip drop or trunk lean (Cibulka et al., 2009). A deep aching pain during weight bearing activities, joint stiffness in the morning or after a period of inactivity, and joint instability are classic signs of hip OA. These indications can also be attributed to other conditions such as bursitis, stress fracture, muscle or labral tears, piriformis syndrome, or sacroiliac joint dysfunction; therefore, it is imperative a client seeks medical permission prior to an exercise program. Due to deficits in proprioception, stability and balance training should be included in any restorative exercise program for a client with hip OA. A list of interventions for hip OA are in Table 19.3.

Hip Replacement

It is estimated more than 300,000 total hip replacements or total hip arthroplasty (THA) are performed each year in the United States on patients age 45 and older. There are approximately 2.5 million adults in the United States living with a total hip replacement (Maradit Kremers et al., 2015; Wolford, Palso, & Bercovitz, 2015). Although the most common cause for THA is OA, rheumatoid arthritis, bone fractures, or other neurological or muscular disorders are also reasons for replacement. The main goal of THA is to reduce pain and improve quality of life.

Primary THA involves removing the damaged femoral head and replacing it with a metal stem with a ball on the end that is inserted into the femur; a metal or plastic socket replaces the damaged acetabulum. In a partial hip replacement, the femur side is replaced, but not the hip socket. For younger patients, bone resurfacing or remodeling is often performed, allowing a patient a number of years before needing a THA. Clients who have comorbidities such as osteoporosis, joint ligament laxity, or an infection are usually not eligible for hip replacement surgery.

Primary hip replacement is usually performed using a posterior-lateral approach, an anterior-lateral approach, or a direct anterior approach (Chetham, 2015; Ritterman & Rubin, 2013). The posterior-lateral approach disrupts the external rotators (piriformis, gemelli, obturators, quadratus femoris), while the anterior-lateral approach disrupts the gluteus minimus and medius, and the abductor muscles. The direct anterior approach is becoming popular as it spares all of the involved muscles and nerves. Each approach has restrictions, and movements and activities to avoid are listed in Table 19.3.

Piriformis Syndrome

Piriformis syndrome is pain of the hip or buttock that may radiate down the posterior thigh and lower leg (Tonely et al., 2010). The piriformis is a flat, triangular shaped muscle that sits deep to the gluteal muscles with its origin at the ilium and the 2nd and 4th sacral vertebrae, and insertion at the greater trochanter as seen in Figure 19.2 (Dey, Das, & Bhattacharyya, 2013; Hicks & Varacallo, 2018; Huber & Palmer, 2018). The piriformis is mostly used for external rotation at the hip, but assists in hip flexion, abduction, and internal rotation when the hip is flexed to 90 degrees (Boyajian-O'Neill, McClain, Coleman, & Thomas, 2008; Huber & Palmer, 2018).

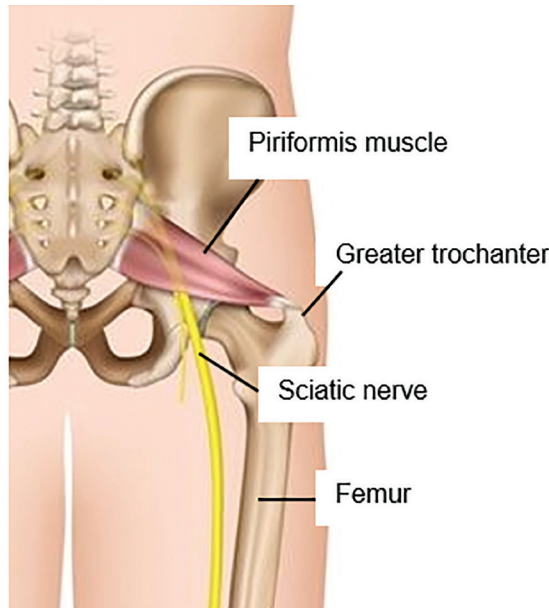


Figure 19.3 Diagram of the piriformis muscle

In most people, the sciatic nerve runs inferior to the piriformis muscle; however, in 12-22% of the population, the sciatic nerve runs through, or splits, the piriformis. Pain from this anatomical arrangement is known as primary piriformis syndrome and is responsible for approximately 15% of diagnosed piriformis syndrome cases (Boyajian-O'Neil et al., 2008; Dey et al., 2013). Secondary piriformis syndrome is caused by macro-trauma to the buttocks or micro-trauma caused by repetitive movements such as running, or sitting on a hard surface (fat wallet syndrome), which leads to inflammation, and poor blood flow to the tissue. The inflamed piriformis muscles then compress the sciatic nerve against the pelvis. Piriformis syndrome is thought to be responsible for up to 6% of low back pain, discussed further in Chapter 22. Symptoms, contributing factors, and risk factors are detailed in Table 19.2.

Table 19.2

Symptoms, contributing factors, and risk factors for piriformis syndrome

Symptoms	Contributing factors	Risk factors
Pain with sitting, standing, or lying longer than 15 to 20 minutes	Excessive contraction of the piriformis muscle	Previous trauma
Radiating pain from sacrum through gluteal area and the posterior aspect of thigh	Weak or lengthened piriformis muscle	Sitting for long periods on hard surfaces
Pain improves with movement and worsens while sedentary	Spasm or repetitive contracture	Anatomical variations of the piriformis
Pain moving into an upright position	Trauma to buttocks or surrounding tissue which may have occurred several years previously	Leg length discrepancy,
Pain does not go away when position is changed	Inflammation	Lumbar hyperlordosis

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Contralateral sacroiliac pain	Asymmetrical pelvis,	Repetitive physical activities
Difficulty walking	Core instability	Conditions that cause spasticity
Numbness in foot	Sacroiliac joint or pelvic malalignment	Total hip replacement
Weakness in same side lower extremity	Excessive localized pressure—mostly from sitting	Females are at higher risk due to Q-angle
Abdominal, pelvic, and inguinal pain	SI joint inflammation	Middle age
Pain with bowel movements	Myositis ossificans (bone in the muscle)	
Tenderness of muscle or surrounding tissue		
Limited medial rotation on same side		
Atrophy of the gluteal muscles		
Dey et al., 2013; Huber & Palmer, 2018		

Early, conservative treatment relieves symptoms in almost 80% of diagnosed cases (Boyajian-O'Neill et al., 2008; Dey et al., 2013). As with all hip injuries, a medical diagnosis should rule out conditions presenting with similar manifestations such as spinal stenosis, spondylolisthesis, disc herniation, pelvic fracture, or internal disorders such as endometriosis or renal stones (Huber & Palmer, 2018). Activities can resume when there is a pain-free range of motion with increased strength on the affected side (Hicks & Varacallo, 2018). Restorative exercise recommendations are detailed in Table 19.3.

Table 19.3

Restorative exercise recommendations for common hip injuries

Condition	Early intervention	Mobility/Stability	Movement	Avoid
Trochanteric bursitis and Iliotibial band friction syndrome	Physical therapy Anti-inflammatories Steroids Surgery	Static stretching, PNF, and myofascial release of the hamstrings and gluteus medius OKC exercises Side lying clams Adduction and abduction	Progressive functional exercises to improve ADLs, core, and balance Wall squats Leg press Multi-directional lunges Side steps Start in bi-lateral stance Followed by staggered and monopod while decreasing stability	Activities that aggravate the condition

Total hip arthroplasty				
Posterior-lateral	Improve strength Improve ROM Stretching and myofascial release Check with physician and physical therapist to determine appropriate course of action	Restore strength, proprioception, and neuromuscular control Stretching to mild or moderate discomfort Static PNF SMR Focus on the glutes, IT band, hamstrings, and quads OKC strengthening with light weights or bands	Focus on core, lumbo-pelvic-hip complex with functional movements Sit-to-stand Stairs Bending Balance progression Low-load, non-weight bearing cardiovascular conditioning appropriate for deconditioned client	Hip flexion > 90 degrees Adduction past midline I/R past neutral High impact activities E/R combined with flexion Adduction past midline I/R past neutral High impact activities Hyperextension E/R High impact activities
Anterior-lateral				
Direct anterior				
Piriformis syndrome	Ice Rest NSAIDs Steroid injections	Stretches that involve hip and knee flexion, hip adduction, and internal rotation Corrective exercises to address faulty movement patterns Core stabilization exercises Bridges with abduction Clam shells	Hip adductor strengthening Squats with abduction Side steps (tube walks) Multi-planar lunges Functional movements to incorporate ADLs	Aggravating movements until there is a pain free ROM and unilateral strength
Aronen & Lorenz, 2015; Cheatham, 2015; Cibulka et al., 2009; Dey et al., 2013; Huber & Palmer, 2018; Lavine, 2010; Jogi, Overend, Spaulding, Zecevic, & Kramer, 2015; Mallow & Nazarian, 2014; Ritterman & Rubin, 2013; Tonely et al., 2010				

Discussion and application

1. What is the difference between a sprain and a strain, how can these be avoided, and what is the protocol in dealing with a sprain or strain?
2. What are some common hip dysfunctions, and what are the goals for restorative exercise for each. Describe examples of exercises to consider and avoid.

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