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Idiopathic Pelvic Girdle Pain as it Relates to the Sacroiliac Joint

Treatment of Idiopathic Posterior Pelvic Girdle Pain Utilizing a Global Movement Assessment

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Abstract

Treatment of posterior pelvic girdle pain, including pain generated from the sacroiliac joint [SIJ], can be challenging because the pain can become chronic. A treatment plan targeting only the painful area with isolated treatments such as injection, medication, modalities, or therapy is limited. Globally assessing the patient's kinetic chain is imperative. Identifying a patient's movement impairments within the context of the kinetic chain allows target areas leading to pain in the posterior pelvic region, including the SIJs, to be identified. Before starting an exercise program, the Movement Assessment Tests-7 (MAT-7) can be used to screen the spine, SIJs, and major joints of the extremities to identify movement impairments. Tests that comprise the MAT-7 are comprehensive yet efficient, requiring the patient to pass basic movements before progressing to more advanced movements. This allows the MAT-7 to be tailored to patients of any age or skill level. Using the MAT-7, the provider can identify the most difficult movement a patient does well, which is the starting point from which to progress a patient's therapeutic exercise program. Based on the MAT-7 screen, active therapeutic exercises are prescribed, targeting the movement impairments identified. As a patient advances through their exercise program, the MAT-7 can be applied to reassess a patient's success with the treatment plan and identify any additional target areas. This movement assessment treatment approach is reproducible, teachable, and applicable to not only posterior pelvic and SIJ pain, but also to pain in the spine and other major joints of the extremities.

Introduction

Treatment of posterior pelvic pain including the sacroiliac joint (SIJ) requires discussion and understanding of how to physically examine this complex area. Evaluation of the SIJ has included two different sets of valuable tests: tests that identify restrictions of movement at the ilium and sacrum and pain provocation tests that suggest the SIJ is a component of the patient symptom complex. The modified Gillet's and contralateral Gillet's, seated forward flexion test, and standing forward flexion test all identify iliosacral movement restrictions and asymmetries of motion.[1] However, the work of Dreyfuss and colleagues prospectively looked at the incidence of false-positive screening tests.[2] They found that 20% of asymptomatic patients had one or more of these tests (seated flexion, standing flexion, and Gillet tests) that were positive. Hence a single positive test does not identify SIJ pain. Various physical examination SIJ provocation tests have been found to be helpful in assessing SIJ pain; these include the distraction, thigh thrust, Gaenslen, compression, or sacral thrust.[3] When two out of four of these tests are positive, there is a sensitivity of .88 and specificity of .78 (positive likelihood ratio [LR] of 4.00 and negative LR of .80) for the SIJ being a source of pain. When three out of five of the SIJ provocation tests are positive, there is a sensitivity of .94 and specificity of .78 (positive LR of 4.29 and negative LR of .80) for the SIJ being a source of pain. If all five of these provocation tests are negative, then the clinician can rule out the SIJ as a source of pain. Although these tests are helpful in assessing the posterior pelvic region and SIJ, they do not encompass a global movement assessment nor do they identify the functional biomechanical deficit in the kinetic chain that needs to be treated for eventual posterior pelvic and SIJ pain relief. The purpose of this review is to describe the use of a global movement assessment through the Movement Assessment Test-7 (MAT-7) and its

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ability to guide the clinician's treatment plan for the patient who presents with posterior pelvic girdle pain including the SIJ(s).

Assessment

The MAT-7 are screening tests that assess the functional kinetic chain.[1,4–7] These tests were inspired by Gary Gray, PT[8–12] and Stuart McGill, PhD,[13,14] musculoskeletal experts who have published literature on numerous functional movement tests. To get a baseline on a patient's functional kinetic chain, the MAT-7 can be used as a gateway to this functional assessment. Physiatrists interview and assess a patient from a holistic perspective; therefore, along with traditional orthopedic and neurologic tests, a physiatrist's examination needs to evaluate a patient's functional movements in multiple planes and positions. This will give the physiatrist a complete understanding of a patient's musculoskeletal symptoms and allow for identification of the functional biomechanical deficits that are contributing to their symptoms. Overall, the MAT-7 helps to identify the most challenging exercise a patient performs well as a baseline for where to start an exercise program and where to begin a patient's reassessment as they are monitored through their exercise program.

The MAT-7 entails a sequence of movements within each of the seven tested areas, and patients who are able to pass more basic movements are progressed to more advanced movements. The first test category is the squat (Figures 1A, B, and 2A–2C). The squat is progressed from a squat in double-leg stance (Figure 1A) to a squat in single-leg stance (Figure 1B) and then to a squat in single-leg stance with hip airplane (Figure 2A-2C). The squat tests, when not able to be performed correctly, indicate inhibition or weakness of the core musculature, gluteal musculature, or a joint dysfunction at the lower extremity joints, including the SIJs. The second test category includes the balance-reach, step-up, step-down, and jump-down tests (Figures 3A, B, 4, and 5). This category allows the practitioner to assess the three-dimensional (3D) eccentric and dynamic control of lower extremity movements or displacement of the patient's center of mass. This category is progressed from the anterior and

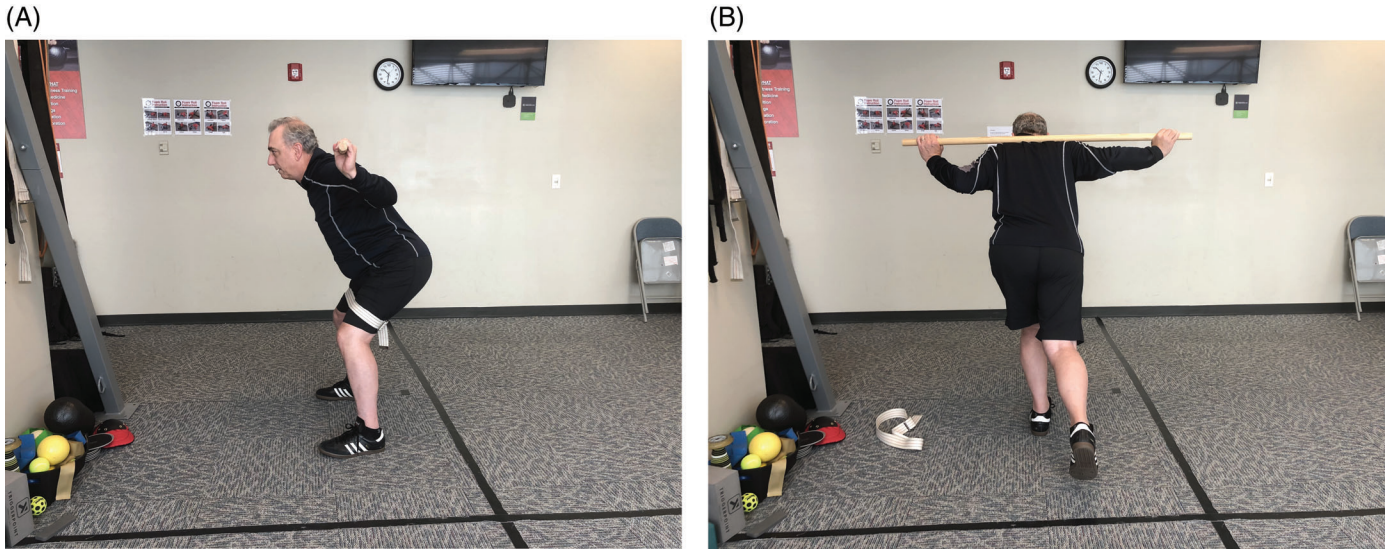

Figure 1. (A) The basic squat with hip hinge, bend the bar, and belt tweaks. (B) The single-leg squat with bend the bar tweak and posterior reach.

Figure 2. (A-C) The hip airplane with internal and external hip rotations.

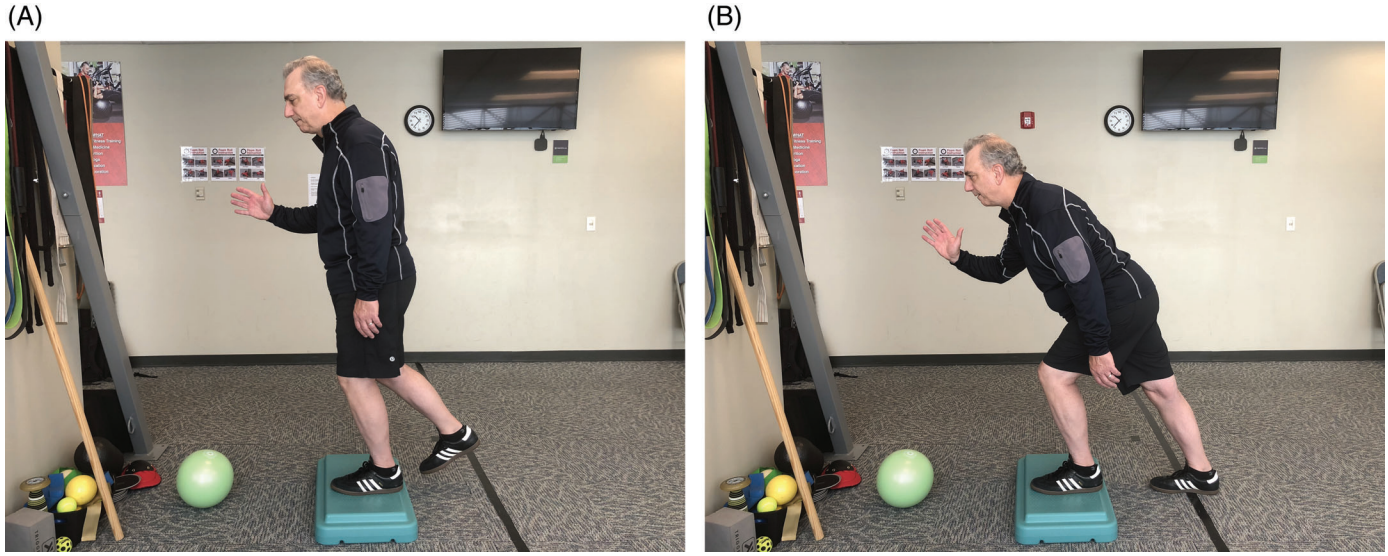

Figure 3. (A & B) Posterior step-down in runner's posture.

posterior direction (Figure 3A, B) to the medial (Figure 4) and then to posteromedial rotational. The last part of this category includes jump-downs from a 12-inch box, where the patient is progressed from double-leg to single-leg to single-leg with landing where the opposite foot would land (Figure 5). In terms of the proper progression, if a patient is not able to do a proper double-leg squat, then the patient would not be challenged with the exercises in Figures 1B, 2A-C, 3A, B, 4, and 5, as these exercises all rely on single-legged abilities.

Core stability is vital for efficient biomechanical function to maximize force generation and minimize joint loads in all types of activities.[15] Evaluation of the core should be dynamic, including assessment of the specific functions, such as trunk control over the planted leg, and directions of motions in three planes. The third category of tests within the MAT-7 involves multiplanar core and extremity range of motion (ROM) testing. Core and extremity ROM testing is progressed from the sagittal to the frontal and then to the transverse planes. Eccentric control of the core is then tested in the fourth category and progressed from the sagittal (Figure 6A, B) to the frontal (Figures 7A-C) and then to the transverse (Figure 8) planes. The tests assessing eccentric control of the core can identify if the patient can control their motion by moving eccentrically in all three planes. If one or more planes show a deficit, this indicates relative instability in that motion plane, which then helps to direct treatment. Figures 9A and B show an example of application of eccentric control of the core to throwing a baseball.

In the baseball population, the relationship between scapular and hip stabilizers has been assessed.[16,17] For example, decreases in hip abduction strength have been

Figure 4. Medial step-down with upper extremity ball to hip reach.

Figure 5. Jump-down with right lower extremity landing where the left lower extremity usually lands.

Figure 6. (A & B) Eccentric control of core - sagittal plane.

Figure 7. (A-C) Eccentric control of core - frontal plane.

seen in 49% of athletes that have arthroscopically been diagnosed with posterior superior hip labral tears.[17] Scapular-hip reaction is assessed in the fifth category

Figure 8. Eccentric control of core - transverse plane.

and progressed from the sagittal (Figure 10A, B) to the frontal (Figure 11A, B) and then to the transverse (Figure 12A, B) planes. The scapular-hip reaction tests evaluate the hip-core-scapular connections in coordinated 3D motion testing. The sixth category is the unloaded foot-ankle (Figures 13 and 14 A-C). The first metatarsophalangeal (MTP) joint (Figure 13) is tested by dorsiflexion. Normal first MTP dorsiflexion is at least 65 degrees. Then talar rock is tested with the heel in neutral (Figure 14A). Finally, talar tilt is tested by everting and inverting the subtalar joint with the heel in an inverted and everted position (Figure 14B,C). Performing unloaded foot-ankle tests, as opposed to the loaded positions, assesses the effect that tight muscles might have in the loaded positions. If short muscles are a contributor, when the foot-ankle joints are unloaded, these joints will show significant improvements in ROM without their muscular influence. If no change in ROM is noted, it would suggest there is a joint restriction.

The final category of testing involves the prone plank (Figures 15–18A, B, and 19), side bridge and planks (Figures 20–23), and supine bridge (Figures 24–27)

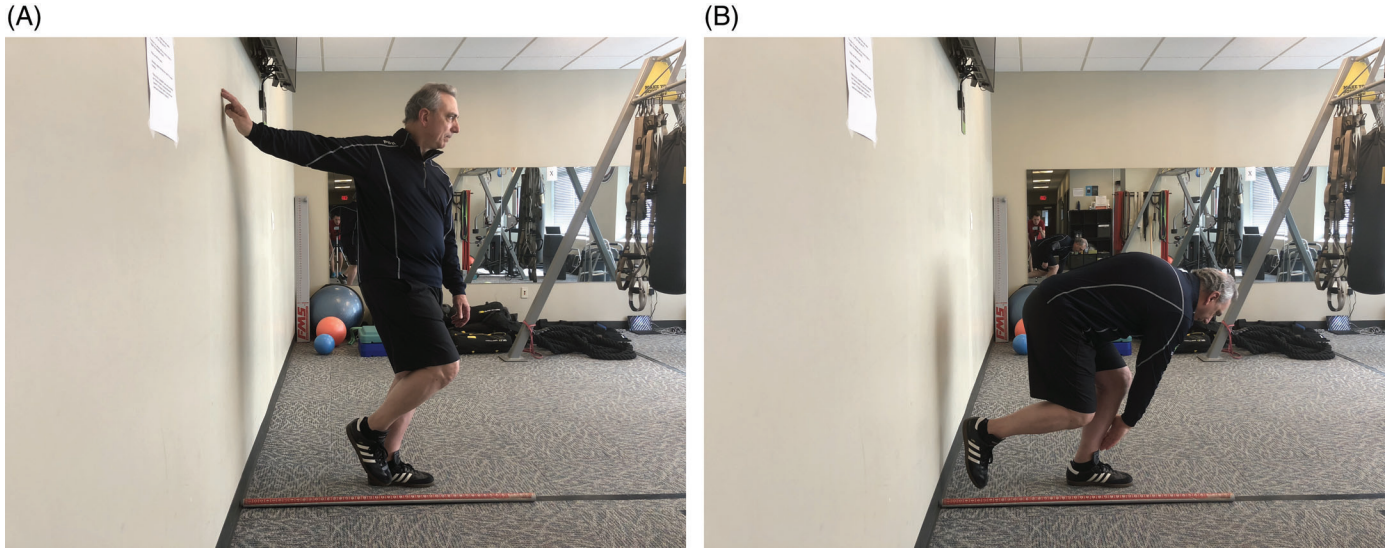

Figure 9. (A & B) Eccentric control of core - sagittal plane for pitcher.

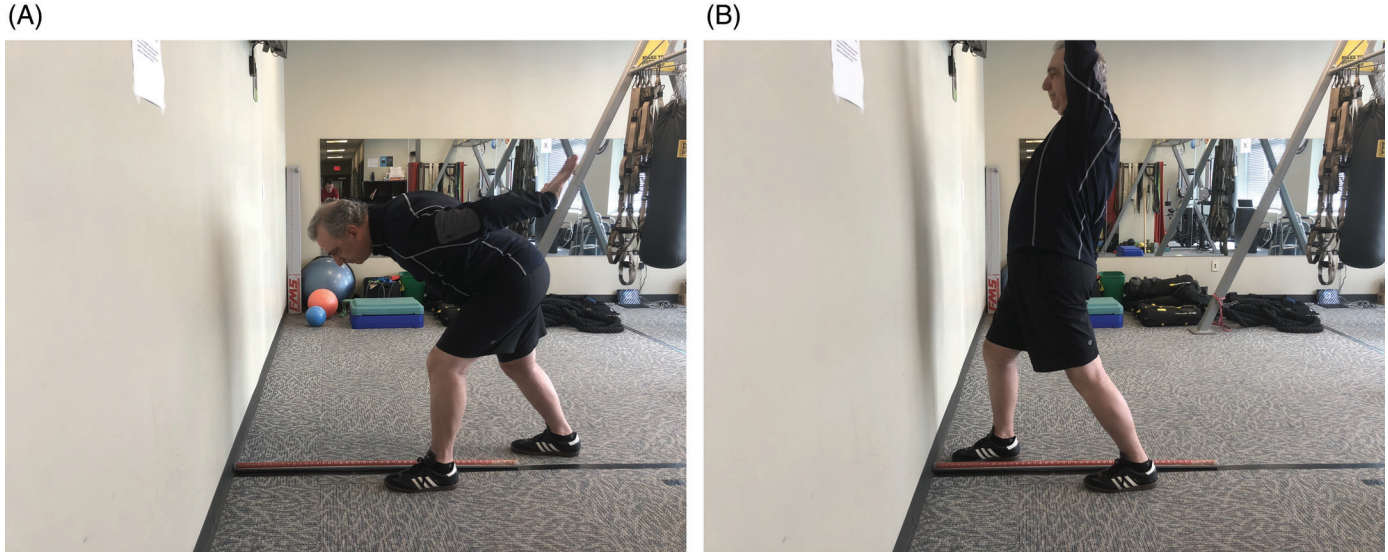

Figure 10. (A & B) Scapular reaction - sagittal plane.

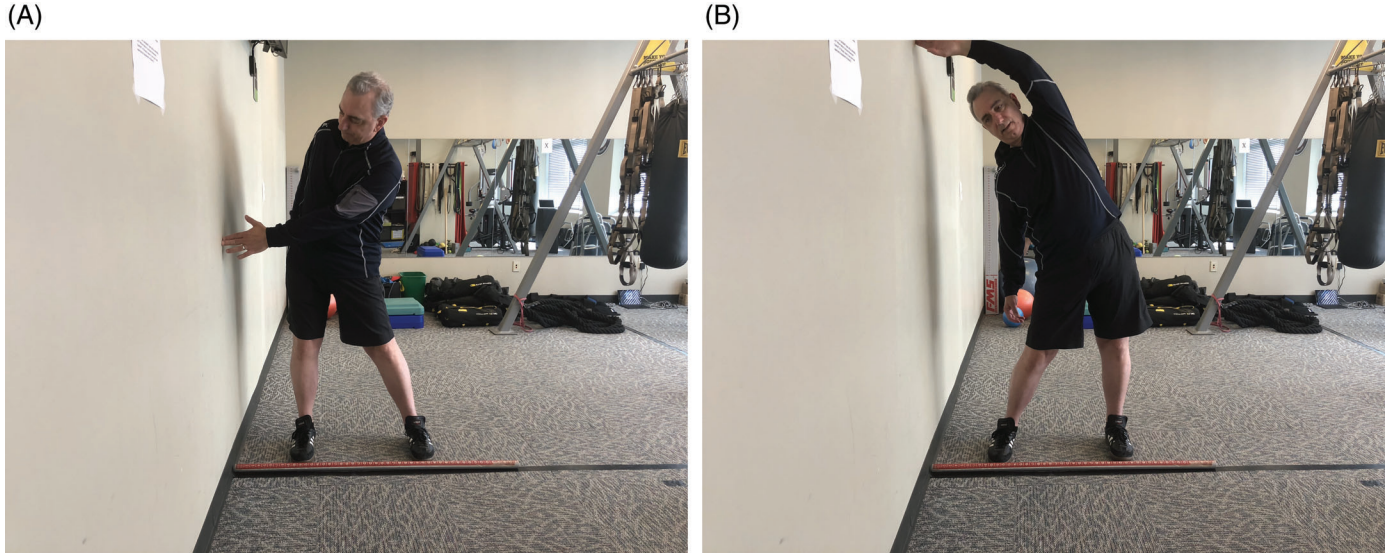

Figure 11. (A & B) Scapular reaction - frontal plane.

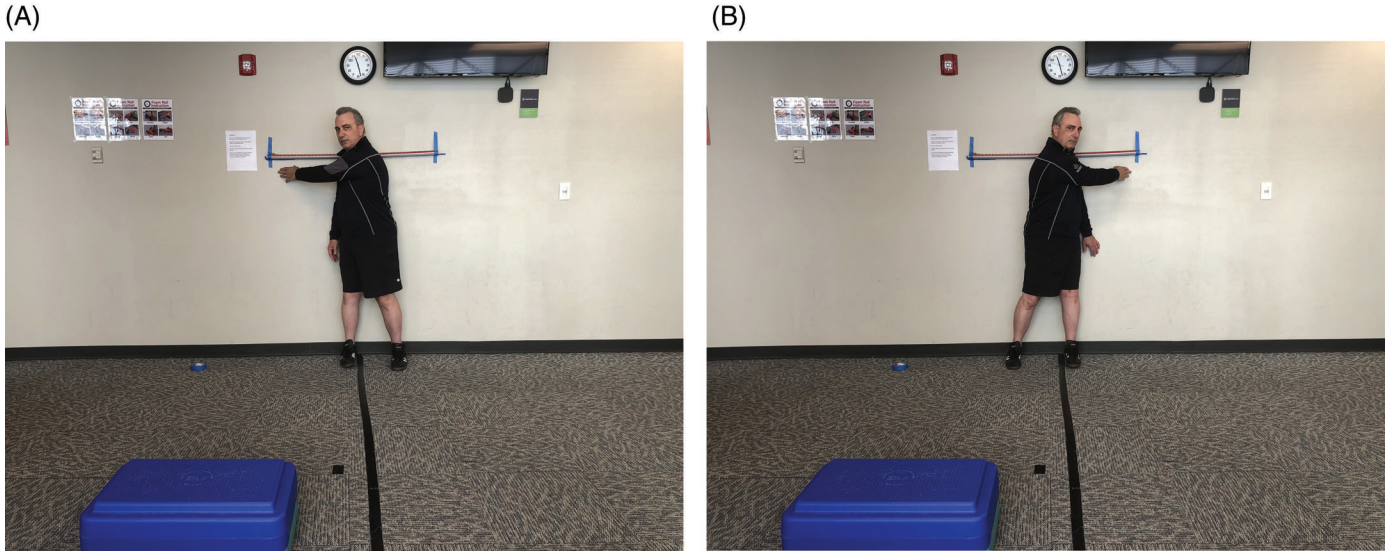

Figure 12. (A & B) Scapular reaction - transverse plane.

progressions. In this category of testing, it is essential for the practitioner to use fingertips to palpate a patient's abdominal, paraspinal, quadratus lumborum, and gluteal muscles to ensure these muscles are active. In addition, by utilizing fingertips to palpate a patient's musculature, the practitioner can externally cue a patient to maximally activate muscles that are inappropriately relaxed. The patient should be able to hold a prone plank, side bridge to both the left and right, and supine bridge for 60 seconds with good contraction of core and gluteal muscles. The patient is started with 10-second holds for 6 reps and then progressed as needed for activity or sport. The bridges and planks tests assess the isometric strength and endurance of the core that is necessary to attain proximal stability for distal extremity mobility and force distribution.

Figure 13. Unloaded foot and ankle - first metatarsophalangeal joint dorsiflexion.

Clinical Application and Limitations

The MAT-7 is a functional movement assessment system that can be very helpful in a complete assessment of a patient's posterior pelvic pain, including SIJ pain. However, the MAT-7 has limitations. This system is applicable to a physiatry practice because the movement assessments are within the basic principles of movement assessment that are, in part, a component of core curriculum for physiatrists. However, considerable training time is needed to learn the MAT-7, and diligence is necessary for implementing this functional assessment into a routine assessment of patients in clinic. Additionally, there is no current scoring system in place to score a patient's movement within the MAT-7. However, a similar scoring system to Gray Cook's Functional Movement Screen, which uses a scoring system from zero to three (0 = pain with pattern regardless of quality; 1 = unable to perform pattern; 2 = perform pattern with compensation/imperfection; 3 = perform pattern as directed), could be a consideration.[18,19] Finally, no validity or reliability studies have been completed to support the utilization of the MAT-7.

Despite the numerous tests that assess movement of the ilium and sacrum, there is still a missing link when it comes to a global assessment for evaluating the entire functional kinetic chain, in particular, how assessment tests for the functional kinetic chain drive the treatment

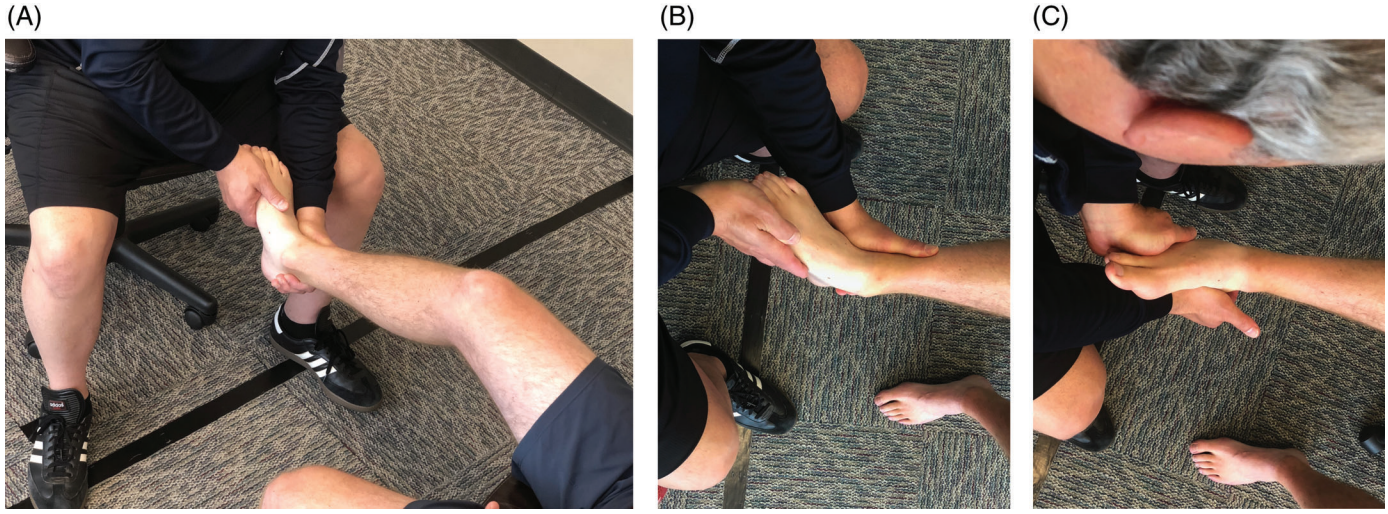

Figure 14. Unloaded foot-ankle exam. (A) Heel in neutral with talar rock. (B) Heel everted [subtalar joint eversion and inversion (not shown)]. (C) Heel inverted [subtalar joint inversion and eversion (not shown)].

Figure 15. Prone plank - level I.

Figure 16. Prone plank - level II.

Figure 17. Prone plank - level III alternate leg raises.

plan for pain in the posterior pelvis, including the SIJ. Although it has limitations, the MAT-7 allows the clinician to bridge the gap between SIJ movement tests and provocation tests and helps to identify the functional biomechanical deficit[s] that in turn direct specific treatments. For example, in a patient with unilateral posterior pelvic girdle pain found to have SIJ pain, the usual care may include a combination of steroid and anesthetic SIJ injection that gives the patient good relief for 2-3 mo. However, if the symptoms return, then it is possible that a functional biomechanical deficit was not identified and adequately treated, which would have provided longer-term relief. In this instance, for example, a functional assessment exam like the MAT-7 might identify an inhibition pattern of the gluteal muscles and an ankle joint dysfunction that lead to that gluteal muscle inhibition. It is important for a functional assessment system

(A)

(B)

Figure 18. (A & B) Prone plank - level IV stir the pot - upper extremity move ball clockwise and counter clockwise.

Figure 19. Prone plank - level V - alternate lower extremity raises.

Figure 20. Left side bridge - level I.

Figure 21. Left side plank - level II.

Figure 22. Left side plank - level III.

Figure 23. Left side plank - level IV.

Figure 24. Supine bridge - level I upper extremities on floor. Level II upper extremities crossed (not shown).

Figure 25. Supine bridge - level III - alternate lower extremity raises.

Figure 26. Supine bridge - level IV.

Figure 27. Supine bridge - level V.

to have applicability to a wide range of patients. The progression component of the MAT-7 allows for this functional movement assessment system to be applied to all ages and activity levels.

References

1. Geraci MC, McAdam FB, Alleva JT. Physiatric physical examination of the spine and its functional kinetic chain. In: Cole AJ, Herring SA, eds. *The low back pain handbook: a practical guide for the primary care clinician*. 2nd ed. Philadelphia, PA: Hanley & Belfus/Mosby; 2002.
2. Dreyfuss P, Dryer S, Griffin J, Hoffman J, Walsh N. Positive sacroiliac screening tests in asymptomatic adults. *Spine [Phila Pa 1976]*. 1994; 19(10):1138-1143.
3. Laslett M, Aprill CN, McDonald B, Young SB. Diagnosis of sacroiliac joint pain: validity of individual tests and composites of tests. *Man Ther*. 2005;10:207-218.
4. Geraci MC. Rehabilitation of pelvis, hip and thigh injuries in sports. *Phys Med Rehabil Clin North Am*. 1994;5:157-173.
5. Geraci MC. Rehabilitation of the hip, pelvis and thigh. In: Kibler WB, Herring SA, Press JM, Lee PA, eds. *Functional rehabilitation in*

sports and musculoskeletal injuries. New York, NY: Aspen Publishers, Inc; 1998.
6. Geraci MC. Overuse injuries of the hip and pelvis. *J Back Musculoskeletal Rehabil*. 1996;6:5-19.
7. Geraci MC, Brown W. Evidence-based treatment of hip and pelvic injuries in runners. *Phys Med Rehabil Clin North Am*. 2005;16(3): 711747.
8. Gray G, Team Reaction. *Lower Body Functional Profile*. Adrian, MI: Wynn Marketing; 1995.
9. Kinzey SJ, Armstrong CW. The reliability of the star-excursion test in assessing dynamic balance. *J Orthop Sports Phys Ther.* 1998;27(5): 356-360.
10. Hertel J, Miller SJ, Denegar CR. Intratester and intertester reliability during the Star Excursion Balance Tests. *J Sport Rehabil*. 2000;9: 104-116.
11. Olmsted LC, Carcia CR, Hertel J, Shultz SJ. Efficacy of the star excursion balance tests in detecting reach deficits in subjects with chronic ankle instability. *J Ath Training*. 2002;37: 501-506.
12. Plisky PJ, Rauh MJ, Kaminski TW, Underwood FB. Star Excursion Balance Test as a predictor of lower extremity injury in high school basketball players. *J Orthop Sports Phys Ther.* 2006;36:911-919.
13. McGill SM. Low back exercises: evidence for improving exercise regimens. *Phys Ther.* 1998;78:754-765.
14. McGill SM. Low back exercises: prescription for the healthy back and when recovering from injury. *Resource manual for guidelines for exercise testing and prescription, American College of Sports Medicine*. 3rd ed. Baltimore: Williams and Wilkins; 1998.
15. Kibler WB, Press J, Sciascia A. The role of core stability in athletic function. *Sports Med*. 2006;36(3):189-198.
16. Burkhart SS, Morgan CD, Kibler WB. Shoulder injuries in overhead athletes—The "dead arm" revisited. *Clin Sports Med*. 2000;19: 125-158.
17. Oliver GD, Weimar WH, Plummer HA. Gluteus medius and scapula muscle activations in youth baseball pitchers. *J Strength Cond Res*. 2015;29:1494-1499.
18. Teyhen DS, Shaffer SW, Lorenson CL, et al. The functional movement screen: a reliability study. *J Orthop Sports Phys Ther.* 2012; 42:530-540.
19. Schneiders AG, Davidsson A, Horman E, Sullivan SJ. Functional movement screen normative values in a young, active population. *Int J Sports Phys Ther.* 2011;6:75-82.

Disclosure

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