Exercise Technique

The Exercise Technique Column provides detailed explanations of proper exercise technique to optimize performance and safety.

COLUMN EDITOR: Jay Dawes, PhD, CSCS*D, NSCA-CPT*D, FNSCA

Single-Leg Glute Bridge

Kelcy Tobey, BS[1] and Jonathan Mike, PhD, CSCS*D, NSCA-CPT*D, USAW[2]
[1]Human Performance, Lindenwood University, St. Charles, Missouri; and [2]School of Kinesiology, University of Southern Mississippi, Hattiesburg, Mississippi

ABSTRACT

THE SINGLE-LEG GLUTE BRIDGE IS A VARIATION OF THE BARBELL HIP THRUST THAT INVOLVES UNILATERAL HIP EXTENSION. GLUTE BRIDGE EXERCISES ARE USED AS A MEANS OF STRENGTHENING THE HIP EXTENSORS: THE GLUTEAL AND HAMSTRING MUSCLE GROUPS. IN ADDITION TO ACTIVATING THE POSTERIOR MUSCULATURE OF THE HIP, SINGLE-LEG GLUTE BRIDGES REQUIRE STABILIZATION OF BOTH THE HIP ABDUCTORS AND CORE MUSCLES THROUGH ISOMETRIC CONTRACTION. BECAUSE STRONG GLUTEAL AND HAMSTRING MUSCLE GROUPS ARE IMPERATIVE IN LATERAL STABILIZATION AND EXPLOSIVE LINEAR MOVEMENT, THE SINGLE-LEG GLUTE BRIDGE IS BENEFICIAL TO THE GENERAL POPULATION AND ATHLETES IN A VARIETY OF SPORTS, SUCH AS SOCCER, FOOTBALL, AND RUGBY.

Address correspondence to Jonathan Mike, jonathannoahmike@hotmail.com.

INTRODUCTION

Both the core and posterior musculature of the hip are important aspects in power development for athletes. Although many exercises exist for developing glute power, unilateral exercises are often left out. Exercises such as the single-leg glute bridge incorporate activation of stabilizing muscles in addition to the many agonistic muscles at work. There are as many benefits to including the single-leg glute bridge to one's workout, as there are variations to the movement.

MUSCLES USED

For the single-leg glute bridge, all 3 gluteal muscles are activated. The gluteus maximus acts as a hip extensor and lateral rotator of the thigh. Regarding the gluteus medius and minimus, both muscles abduct the thigh, whereas various fibers of each muscle laterally and medially rotate the thigh, depending on the degree of hip flexion (3,5). Additionally, the tensor fasciae latae acts as a stabilizer by counterbalancing the hip's lateral rotators. With respect to the hamstrings, the biceps femoris extends the hip and laterally rotates the thigh, whereas the semimembranosus and semitendinosus contribute to hip extension, as well as counteract the lateral rotation of the biceps femoris (13). The hamstrings also function to flex the knee. Despite the flexion in the knee that occurs during this exercise, slight knee extension is involved through the rectus femoris and vastus muscles. The core stabilizers, lumbar erector spinae and lumbar multifidus, are also involved (2,3,9).

BENEFITS

Strength and stability in the core of the body, defined as the spine, hips and pelvis, proximal lower limbs, and abdominal structures, provides an optimal platform through which distal limbs can function (7). As such, muscle strength and power of the hips and pelvis are critical components of the overall impact of both resistance training and athletic performance in a multitude of sports. For example, weightlifting, the squat, and the deadlift all require extensive strength and power through hip extension. This incorporates the gluteal and hamstring musculature. It has been postulated that the hip thrust has been a successful exercise for its emphasis on gluteal development and hip extensor strength in sports actions (1); however, many variations also exist.

The single-leg glute bridge is a unilateral variation of the barbell hip

thrust. This movement isolates the concentric motion of hip extension while recruiting the stabilizing glute medius and minimus, as well as the core muscles (2,3,9). A study conducted by McCurdy et al. reported that short-term, unilateral, lower-body exercises are as beneficial as the bilateral counterparts in untrained individuals (12). Another study by Jones et al. observed muscle activation and testosterone response during the bilateral back squat versus the unilateral pitcher squat. Results indicated that, although the absolute workload was lower in the pitcher squat, muscle activation and testosterone responses were not significantly different between the 2 lower-body exercises (6). Although the training protocols in the studies did not include the single-leg glute bridge, we contend that the unilateral aspect of the single-leg glute bridge will be just as beneficial as its bilateral counterpart. Therefore, numerous benefits exist for adding the single-leg glute bridge in a strength and conditioning program for able-bodied athletic and clinical populations.

Because of the positioning of the single-leg glute bridge, certain hip muscles are emphasized. Previous research has reported that the gluteus maximus produces its greatest force when the hips are in a flexed position (i.e., bottom of the movement) (3). Although the hamstrings are an important part of hip extension, their involvement in the movement can be reduced by flexing the knee. Because the semitendinosus and semimembranosus are biarticulate muscles (crossing 2 joints), their force contribution can be reduced when the joints are closer together, resulting in shortened length of the muscle. This is known as active insufficiency (15). By removing the influence of the semimembranosus and semitendinosus in hip extension, there exists a greater reliance on gluteal activation during the concentric action of the single-leg glute bridge.

Unlike the barbell hip thrust, the single-leg glute bridge's unilateral component elicits additional stimuli from stabilizing muscles within the hip. In addition to extending the hips, the gluteus maximus laterally rotates the hip. It has been theorized that, with excessive lateral rotation of the thigh, the musculature responsible for this (i.e., the gluteus maximus and other lateral rotators) will shorten. As a result, the muscles will no longer be at an advantageous length to provide force through hip extension (3). To counteract this excessive lateral rotation, the gluteus medius, gluteus minimus, and the tensor fascia latae are activated. During the stance phase of walking (a unilateral movement), the gluteus medius and minimus abduct the stance leg, thereby preventing a contralateral drop in the hip of the swing leg (3). Although the force of the single-leg glute bridge is vertical compared with a horizontal force (as seen in walking), there may be an increased need in stability of the gluteus medius and minimus to maintain optimal hip placement throughout the movement. Other stabilizers include the lumbar erector spinae and the lumbar multifidus, which have shown higher activation than the rectus abdominis and external obliques in the single-leg glute bridge (9). By training the musculature about the hip and within the core, proper biomechanical movement is ensured, which, in turn, reduces the chance of injury.

The single-leg glute bridge may improve other essential qualities of a client's or athlete's program. For example, a part of most strength and conditioning programs is some variation of the squat. Without proper glute activation, squat form is compromised, therefore compromising an athlete's performance, as well as joint integrity. It is our contention that core strength, hip stabilization, and glute activation gained from the single-leg glute bridge is likely to transfer over to stability and power in the squat and other movements requiring posterior strength.

An important aspect when looking at hip involvement throughout movement in sports performance is the hip-to-knee extensor ratio. Hip extensor strength has been noted to improve vertical jump and reduce knee injury during running performance (8,16). Lees et al. found that maximal vertical jump is attained through higher force production by the hip extensor muscles (8). In regard to running, an upright running posture relies on a reduced hip-to-knee extensor ratio, which may lead to overuse injuries of the knee (16,17). This posture is associated with hip extensor weakness, whereas those with greater hip extensor strength demonstrated a more forward leaning posture (16). Therefore,

Figure 1. (A) Starting position on bench before elevation of the left leg. (B) Elevation on the left leg; descent phase of single-leg glute bridge. (C) Full lockout position of single-leg glute bridge.

increasing the strength of the posterior musculature can both improve and protect athletes throughout sports performance.

TECHNIQUE

STARTING POSITION

Begin position seated on the ground with the upper back against a padded bench for support just below the scapula. This point of contact should not change throughout the duration of the movement. The arms may either span the width of the bench for added stability or folded across the chest, depending on personal preference.

Next, shift the feet toward the glutes and drive the heels into the ground. While pushing through the heels of the feet, extend the hips so that the torso and thighs form a straight line from the shoulders to the knees, parallel to the ground (Figure 1A). Knees should be flexed so that the shins are perpendicular to the ground, and the shin and thigh form a 90° angle at the knee. Adjust feet as necessary to attain this positioning.

The spine and the hips should remain in relatively neutral alignment at the start position of the single-leg glute bridge.

Once a stable position has been achieved, lightly shift the weight into the right heel without adducting the right thigh. Keep the hips fully extended and slowly raise the left heel off the floor by flexing the left thigh at the hip. Throughout the duration of the movement, the left hip should remain flexed as if pulling the knee toward the chest.

THE DESCENT PHASE

While maintaining a neutral lumbopelvic region, sink hips directly toward the ground by flexing at the right thigh. Hips should be flexed at an angle slightly greater than 90° with glutes remaining off the ground. Care should be taken that this movement originates at the hips, rather than the lumbar spine. A slight arch is normal,

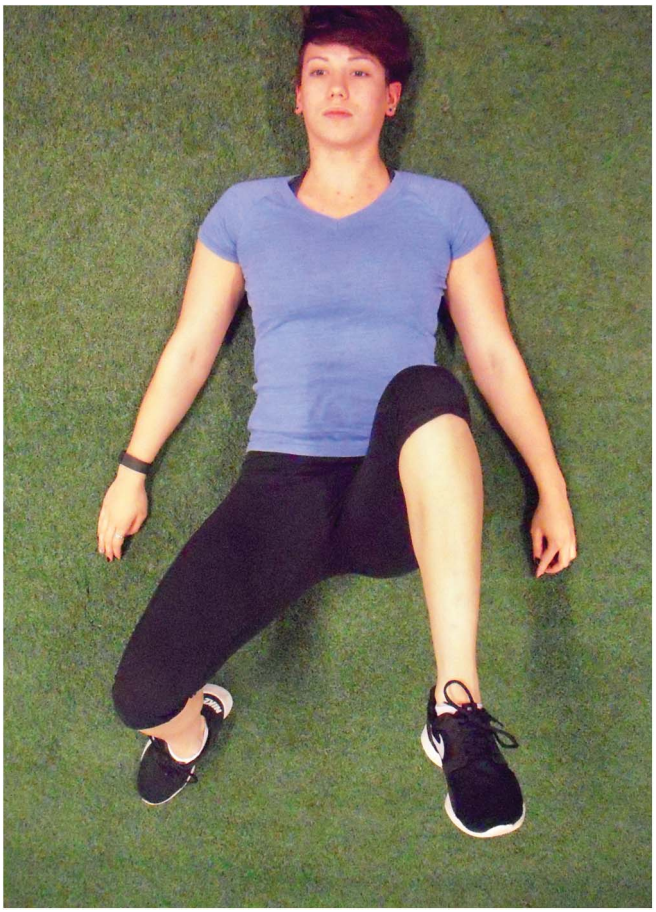

Figure 2. Shoulders and foot placed on ground with the right knee abducted and the right foot externally rotated, while the left foot is elevated off the floor.

Figure 3. Starting position of single-leg glute bridge with kettlebell placed directly over the right hip.

but flexion at the hips should not originate from overarching (greater than approximately 30°) of the lumbar spine. The shoulders will remain in contact with the bench at their original positioning without excessive movement or sliding (Figure 1B).

To avoid the right knee falling in excessive valgus positioning, weight should be displaced over the entirety of the right foot, with slight emphasis in the heel. The foot can either be pointed directly forward or slightly externally rotated. During the eccentric phase, an emphasis should be placed on engaging the right hip abductors and right glute to avoid excessive adduction (thigh moving in toward midline) of the right hip.

Clients and athletes are encouraged to breathe normally during reduced loading patterns (i.e., bodyweight and lighters loads), while bracing when approaching maximal loading sets and repetitions.

THE ASCENT PHASE

As soon as desired hip flexion is attained in the right hip, drive weight through the heel of the right foot and engage the hip extensors. The right heel should push down and away from the glutes. While simultaneously contracting the right glute, hips will drive upward and toward the head in a curvilinear motion.

Hips will extend to a full lockout position, maximizing hip extension. The objective is to achieve full hip extension with little to no lumbar spine involvement (Figure 1C).

Once this phase has been completed, the hips return slowly to the loaded phase of the movement (i.e., starting position). To complete 1 set, repeat the exercise on the opposite leg.

VARIATIONS

It is important to note that many variations of this exercise exist with numerous progressions and regressions. Clients and athletes should follow a logical approach to challenge themselves when deciding which variations to include in their exercise routine. For example, with beginners, it is best to start with both the shoulders and the feet on the ground. To maximize gluteal function, we

Figure 4. Starting position of single-leg glute bridge with barbell placed across both hips.

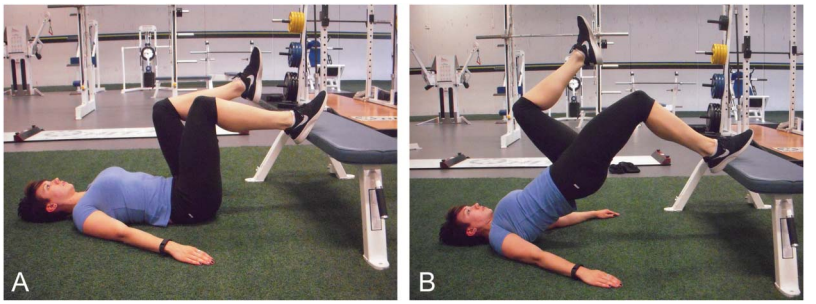

Figure 5. (A) Bottom position of foot elevated single-leg glute bridge with the right foot placed along the edge of the bench. (B) Lockout position of foot elevated single-leg glute bridge with the right foot placed along the edge of the bench. For added instability, place the foot in TRX band.

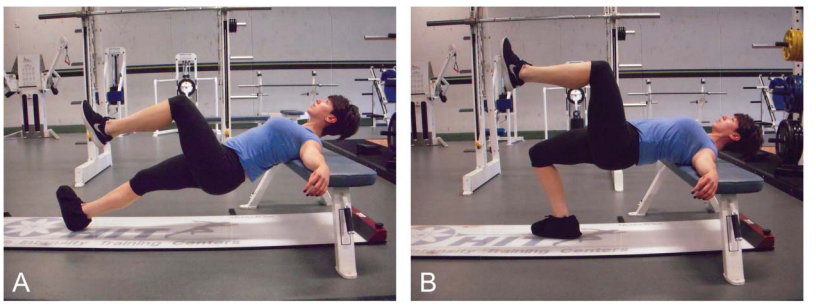

Figure 6. (A) Slide board single-leg glute bridge with hamstring curl. Straighten the right leg out across the slide board, toe pointed upward, with weight staying on the heel. Left foot elevated, flexion at the hip. (B) Slide the right heel toward the hips while simultaneously squeezing gluteals, pushing the hips upward.

suggest that the loaded leg be slightly abducted at the knee with the foot slightly externally rotated (Figure 2). Externally rotating the foot also emphasizes lateral hamstring activation over medial hamstring activation (11). Thigh abduction should occur before progressing to external rotation of the foot. Once this position has been mastered, clients and athletes should progressively abduct the entire leg and foot outward. When the client or athlete can complete the previous movements with little weight shift, additional load can be added to the exercise, using kettlebell, plate, barbell, or sandbag. For smaller weights (i.e., kettlebell and weight plate), the load should be placed directly over the hip of the working leg (Figure 3). To further add instability, larger loads, such as the barbell or sandbag, can be placed across both hips (Figure 4). Other variations of the hip thrust have been provided in this article in Figures 5 and 6, with their respective descriptions.

PRACTICAL APPLICATION

As previously mentioned, the single-leg glute bridge is an assistance exercise that aids in building strength and explosive power through the lower-body, posterior musculature. In athletic events where running is a necessity (e.g., soccer, football, and rugby), as well as vertical jumping (e.g., basketball and volleyball), the single-leg glute bridge can be an excellent accessory movement to integrate into a strength and conditioning program. For both athletes and nonathletes, the single-leg glute bridge is also a useful exercise for adjusting posture. Weak glutes are related to pronated stance and anterior hip force which may lead to anterior hip pain and instability (3,4,10). Requiring stabilization in the working hip of the single-leg glute bridge strengthens the 3 gluteal muscles which are important in posture and the phases of walking (3). Another risk associated with weak hip muscles is patellofemoral pain syndrome (PFPS) (4). A study by Şahin and colleagues examined the effects of knee-only exercises and hip-and-knee exercises on 55 female patients with PFPS. The authors determined that of the 2 groups assessed, those who performed both hip-and-knee exercises had greater improvements in pain reduction and functional gain compared with the knee-only exercise group (14). Therefore, it is suggested that strengthening the posterior and core musculature contribute greatly to improved sport performance and injury prevention. We encourage strength and conditioning practitioners to use the single-leg glute bridge and its variations highlighted in this article as an important component in a resistance training program and its role in improving overall performance.

Conflicts of Interest and Source of Funding: The authors report no conflicts of interest and no source of funding.

Kelcy Tobey *is a Graduate Student in the Human Performance Department at Lindenwood University, St. Charles, Missouri.*

Jonathan Mike *is a Visiting Professor at University of Southern Mississippi, Hattiesburg, Mississippi.*

REFERENCES

1. Beardsley C and Contreras B. The increasing role of the hip extensor musculature with heavier compound lower-body movements and more explosive sport actions. *Strength Cond J* 36: 49–55, 2014.
2. Behm DG, Leonard AM, Young WB, Bonsey WAC, and MacKinnon SN. Trunk muscle electromyographic activity with unstable and unilateral exercise. *J Strength Cond Res* 19: 193–201, 2005.
3. Blazevich AJ. Optimizing hip musculature for greater spring running speed. *Strength Cond J* 22: 22–27, 2000.
4. Bolgla LA, Malone TR, Umberger BR, and Uhl TL. Comparison of hip and knee strength and neuromuscular activity with and without patellofemoral pain syndrome. *Int J Sports Phys Ther* 6: 285–296, 2011.
5. Delp SL, Hess WE, Hungerford DS, and Jones LC. Variation of rotation moment arms with hip flexion. *J Biomec* 35: 493–501, 1999.
6. Jones MT, Ambegaonkar JP, Nindl BC, Smith JA, and Headley SA. Effects of unilateral and bilateral lower-body heavy resistance exercise on muscle activity and testosterone responses. *J Strength Cond Res* 26: 1094–1100, 2012.
7. Kibler WB, Press J, and Sciascia A. The role of core stability in athletic function. *Sports Med* 36: 189–198, 2006.
8. Lees A, Vanrenterghem J, and De Clercq D. The maximal and submaximal vertical Jump: Implications for strength and conditioning. *J Strength Cond Res* 18: 787–791, 2004.
9. Leporace G, Praxedes J, Matsavaht L, Pinto S, Chagas D, Pereira G, and Batista LA. Muscular synergism during core stability exercises. In: *International Symposium on Biomechanics in Sports: Conference Proceedings Archive*. Marquette, MI, 2010. pp. 19–23.
10. Lewis CL, Sharpen SA, and Moran DW. Anterior hip joint force increases with hip extension, decreased gluteal force, and decreased iliopsoas force. *J Biomech* 40: 3725–3731, 2007.
11. Lynn SK and Costigan PA. Changes in the medial-lateral hamstring activation ratio with foot rotation during lower limb exercise. *J Electromyogr Kinesiol* 19: 197–205, 2009.
12. McCurdy KW, Langford GA, Doscher MW, Wiley LP, and Mallard KG. The effects of short-term unilateral and bilateral lower-body resistance training on measures of strength and power. *J Strength Cond Res* 19: 9–15, 2005.
13. Oatis CA. *Kinesiology the Mechanics and Pathomechanics of Human Movement*. Philadelphia, PA: Lippincott Williams & Wilkins, 2005. p. 747.
14. Şahin M, Ayhan FF, Borman P, and Atasoy H. Effect of hip and knee exercises on pain, function and strength in patients with patellofemoral pain syndrome: A randomized controlled trial. *Turk J Med Sci* 46: 265–277, 2016.
15. Schoenfeld B. Accentuating muscular development through active insufficiency and passive tension. *Strength Cond J* 24: 20–22, 2002.
16. Teng HL and Powers CM. Hip-extensor strength, trunk posture, and use of the knee-extensor muscles during running. *J Athl Train* 51: 519–524, 2016.
17. Teng HL and Powers CM. Influence of trunk postures on lower extremity energetics during running. *Med Sci Sports Exerc* 47: 625–630, 2015.