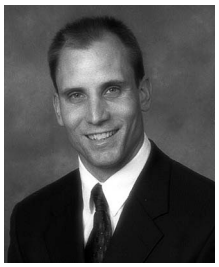

The Exercise Technique Column provides detailed explanations of proper exercise technique to optimize performance and safety.

Column Editor:
John Graham, MS, CSCS*D, FNSCA

Barbell Hip Thrust

Bret Contreras, MA,[1] John Cronin, PhD, CSCS,[1] and Brad Schoenfeld, MSc, CSCS[2]
[1]Auckland University of Technology, Auckland, New Zealand; and [2]Exercise Science Department, Lehman College, Bronx, New York

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SUMMARY

THE TECHNIQUE OF THE BARBELL HIP THRUST IS DESCRIBED AND DEMONSTRATED THROUGH THE USE OF PHOTOGRAPHS AND VIDEO IN THIS COLUMN. AN EXERCISE PRESCRIPTION IS GIVEN.

TYPE OF EXERCISE

The barbell hip thrust is a biomechanically efficient way to work the gluteal muscles. The exercise can be used to maximize gluteal muscle activation, develop end-range hip extension strength in the gluteus maximus musculature, increase horizontal force production, and increase the contribution of the gluteus maximus relative to the hamstrings during hip extension movement, which may decrease the likelihood of hamstring injuries (4).

MUSCLES USED

Primary hip extensors (gluteus maximus, hamstrings, and hamstring part of adductor magnus), secondary hip extensors (adductors and posterior fibers of gluteus medius and gluteus minimus), posterior vertebral stabilizers (erector spinae), and knee extensors (rectus femoris and vasti muscles).

This bent-leg, horizontally loaded hip extension exercise decreases hamstring contribution to hip extension through active insufficiency. Active insufficiency refers to the phenomenon where a 2-joint muscle is shortened at one joint while a muscular contraction is initiated by the other joint (11). The hamstrings (semitendinosis, semimembranosus, and long head of the biceps femoris) are a group of biarticular muscles that cross both the knee and the hip joints. Because the hamstring muscles are shortened during knee flexion (11), their force-producing capacity necessarily will be reduced during performance of the hip thrust, consequently increasing the contractile requirements of the gluteus maximus musculature.

One drawback of typical standing barbell strength exercises is the decreased tension on the hip extensors as the exercise nears lockout and the hips reach a neutral position. Because of the horizontally loaded nature of the hip thrust exercise, tension on the hip musculature is maximized at the exercise's lockout as the hips reach a neutral or a slightly hip hyperextended position. This corresponds to the zone of hip range of motion involved in ground contact during maximum speed running. Normal hip extension range of motion is around 20° past neutral (10), and moving into this range through active glute contraction may maximize gluteus maximus activation as maximal voluntary isometric contraction electromyographic activity of the gluteus maximus has been shown to increase as the hips move from flexion to extension (13). However, increased hip extension range of motion and weak glutes have been shown to increase anterior hip joint force (7,8), so proper exercise progression should be employed, and caution should be taken to ensure that the glutes are controlling the movement.

Considering that (a) vertical forces tend to plateau after approximately 70% of maximum running velocity is achieved (1), whereas horizontal forces continue to increase as velocity rises, and (b) horizontal force application is significantly correlated to increased acceleration, whereas total and vertical force production are not (9), it seems wise to incorporate strategies to work the hips from a horizontal vector if increased speed and acceleration are sought. Furthermore, because of the increased muscular tension throughout the full range of motion, the hip thrust exercise would theoretically heighten the hypertrophic stimulus for the gluteal muscles (12) and thus increase strength and power potential because of the relationship of these factors to muscle cross-sectional area (3,5,6).

EXERCISE TECHNIQUE

- Begin the exercise by sitting on the ground and straightening the legs. Line up the upper back across a secured and padded bench, step, or box. The placement of the upper back across the bench should be slightly lower than the low-bar position used in the powerlifting-style squat. Position the barbell over the lower legs (Figure 1). (Note: *Body weight resistance must be mastered before using barbell loading, and gradually progressive increments should be used to prepare the body's tissues for the new movement pattern.*)
- Lean forward and grab a hold of the barbell (Figure 2).
- Assuming large plates are used for resistance, such as 45-lb or 20-kg plates, it is usually possible to simply roll the barbell over the thighs toward the hips (Figure 3). Individuals with extremely muscular thighs may find this task challenging, in which case they will need to make modifications, such as asking a spotter to lift up on one side of the barbell to allow the exerciser to slide his or her legs underneath.
- Because the hip thrust puts considerable pressure across the lower abdominal and pubic region, it is wise to pad the barbell. Coaches have used Airex Balance Pads (Airex AG, Switzerland), dense padding, Hampton thick bar pads (Hampton Fitness, Ventura, CA), regular bar pads, towels, and homemade devices consisting of sagittally cut PVC pipe and hollowed out foam rollers. The thicker the padding, the better. The barbell is situated symmetrically and placed at the crease of the hips slightly above the pelvis. If a bar pad is used, precautions are taken to ensure that the bar will not slip through the padding by making sure that the slit in the pad is facing upward.
- Lean back and resume the proper upper back placement. Tighten everything up by scooting the feet toward the buttocks and "digging into" the bench and ground. The feet should be positioned around shoulder width apart and placed at a distance that creates a 90° angle at the knee joint with a vertical tibia relative to the ground at the top portion of the movement (Figure 4).
- From this starting position, a big breath is taken and the core is braced. The barbell is raised off the ground via a powerful contraction of the hip extensors. It is of utmost importance to ensure that the spine and pelvis stay in relatively neutral positions and the extension movement comes from the hips, not from the lumbopelvic region. A slight arch in the low back is fine, but excessive lumbar hyperextension can predispose the posterior elements of the spine to injury and increase disc deformation and spinal loading (2). Proper form involves the athlete controlling the barbell throughout the entire movement, including the concentric, isometric, and eccentric portions. The knees should track directly over the toes and not cave inward. The back hinges across the bench, and any sliding of the back up and down the bench is kept to a minimum. The exerciser should keep the feet flat and push through the entire foot. Alternatively, the exerciser may dorsiflex the ankles throughout the movement to ensure force transfer through the heels, which may slightly increase posterior

Figure 1. Start position for the hip thrust.

Figure 2. Rolling the barbell over the legs.

Figure 3. Ensuring symmetrical bar alignment and placement at the hips.

chain recruitment. For maximum safety, the head and neck should track accordingly to remain in alignment with the spine.

- The hips rise until the torso is parallel with the ground and a hip-neutral position is reached. The exerciser may choose to take the exercise a couple of inches higher into hip hyperextension via a powerful contraction of the gluteals as the hips can hyperextend around 10° with bent legs (Figure 5).
- The lockout position of the exercise is held for a 1-count. The eccentric portion is performed under control, and the barbell should lightly return to the ground. This practice may allow for better transfer to running through increased net horizontal forces (see Video, Supplemental Digital Content 1, http://links.lww.com/MAO/A83).

SET STRATEGIES

Five main strategies can be employed for the hip thrust exercise:

1. The barbell is raised concentrically for a 1-count, held isometrically up top for a 1-count, and lowered eccentrically for a 1-count, and then, the barbell rests on the ground for a 1-count before repeating. This is the standard technique.
2. The barbell is raised concentrically for a 1-count, held isometrically up top for a 3-count, lowered eccentrically for a 1-count, and then repeated just before the barbell touching the ground. This is the constant tension method and creates extreme cellular swelling and an occlusion effect, which may maximize hypertrophic signaling.
3. The barbell is raised concentrically for a 1-count, held isometrically up top for a 1-count, and lowered eccentrically for a 1-count, and then, the barbell rests on the ground for 3–5 seconds. This is known as the rest-pause method and creates an extreme high-threshold motor unit activation stimulus by allowing adequate recovery between repetitions to maximize neural drive, which may enhance neurological adaptation.
4. The exercise is first performed via the constant tension method. When it is no longer possible to perform any more repetitions, the exerciser switches to the rest-pause method to squeeze out 1–5 more repetitions. This is known as the extended set method, and because it is an advanced technique, fewer sets in this manner should be performed (1 all-out set would serve the exerciser just fine).
5. The exercise is performed via a combination of barbell, plate, and band or chain resistance. Bands can be secured to the end of the bar and fastened to heavy dumbbells residing directly underneath the bar. If chains are used, care must be taken to make sure the chains do not interfere with the ground-plate interface.

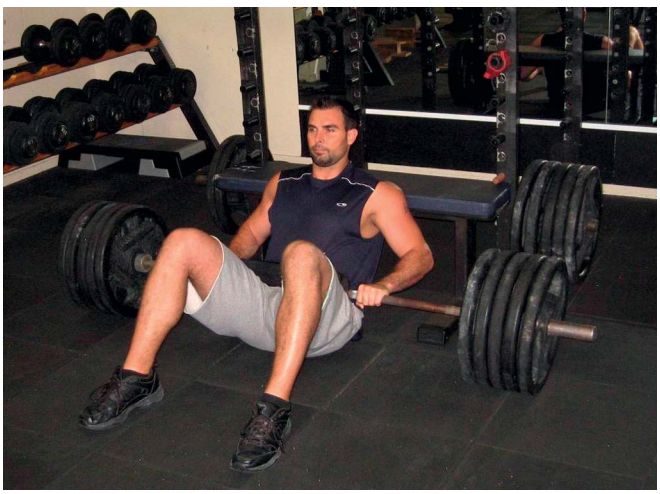

Figure 4. Bottom of hip thrust with barbell in position to be lifted.

SETS/REPETITIONS/REST

- Beginners should perform 1–3 sets with 8–12 repetitions with 60–120 seconds in between sets.
- Intermediates should perform 3–4 sets with 5–8 repetitions with 60–120 seconds in between sets.
- Advanced lifters should perform 3–5 sets with 1–5 repetitions with 120 seconds in between sets.

Figure 5. Top position for the hip thrust.

LOAD

- Beginners should demonstrate proficiency with body weight resistance before using additional loading. This means feeling gluteal activation through most of the range of motion and not the erector spinae, hamstrings, or quadriceps and keeping a stable spine while moving solely at the hips.
- Intermediates should begin working their way up to loading equal to their own body weight via gradual progressions in 20- to 25-lb increments.
- Advanced athletes have been known to work their way up to impressive loads in the hip thrust exercise. It is not uncommon for strong and powerful athletes to use 500–600 lb of resistance on this exercise after several months of progression. The gluteal muscles are extremely powerful and are capable of moving relatively large weights from this direction in this position.

Bret Contreras *is a Certified Strength and Conditioning Specialist and a PhD candidate at the AUT University in Auckland, New Zealand.*

John Cronin *is the director of Sports Performance Research Institute New Zealand and a strength & conditioning professor at the AUT University in Auckland, New Zealand.*

Brad Schoenfeld *is a lecturer at the Lehman College and is the president of the Global Fitness Services in Croton, NY.*

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