

Exercise Technique



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

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The Midthigh Pull: Proper Application and Progressions of a Weightlifting Movement Derivative

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ABSTRACT

THE CLEAN GRIP MIDTHIGH PULL AND SNATCH GRIP MIDTHIGH PULL ARE EXERCISES THAT FOCUS ON REINFORCING THE DOUBLE KNEE BEND AND TRIPLE EXTENSION INVOLVED IN WEIGHTLIFTING MOVEMENTS. AS A RESULT, THESE PULLING MOVEMENTS ARE USED WITH THE PURPOSE OF MAKING AN ATHLETE MORE EFFICIENT AT PRODUCING FORCE WITH AN OVERLOAD STIMULUS IN THE PEAK POWER POSITION. IN ADDITION, THESE EXERCISES CAN BE USED AS A TEACHING MODALITY FOR THE PROGRESSIVE DEVELOPMENT OF THE FULL CLEAN OR SNATCH.

INTRODUCTION

There is evidence to suggest that activities that involve higher rates of force production, such as the clean and snatch, are beneficial for improving an athlete's physical preparedness (1–3,9,11,12,14–17,19–21). As a result, weightlifting movements and their derivatives are popular weight-training activities that are prescribed by many sport performance practitioners. For this reason, coaches and athletes alike should understand the proper technique of these exercises so that the transfer of training effect is maximized.

TYPE OF EXERCISE

The clean grip midthigh pull (CG-MTP) and snatch grip midthigh pull (SG-MTP) variations are complex,

multi-joint exercises that mimic the second pull of their full clean and snatch counterparts. In addition, the MTP may play a role in improving an athlete's familiarity with the peak power position (8,13,19,25), which occurs after the double knee bend.

MUSCLES INVOLVED

- Isometric actions of the following muscles are created for initial stabilization of the acetabulofemoral, glenohumeral, and radiohumeral joints:
 - Erector spinae group (iliocostalis, longissimus, and spinalis), deep spinal muscles (rotators, interspinales, multifidus, and intertransversarii), rectus abdominis, transverse abdominis, external obliques, internal

Exercise Technique

obliques, quadratus lumborum, triceps brachii (long head), deltoid, subscapularis, latissimus dorsi, extensor carpi radialis, brachioradialis, trapezius, splenius capitis, splenius cervicis, infraspinatus, serratus posterior inferior, rhomboid major, rhomboid minor, and the supraspinatus.

- Ascending portion of the clean and snatch MTP variations:
 - Upper extremities—trapezius, splenius capitis, splenius cervicis, levator scapulae, rhomboid minor, rhomboid major, serratus posterior superior, posterior deltoid, teres minor, teres major, erector spinae group (iliocostalis, longissimus, and spinalis), deep spinal muscles (rotators, interspinales, multifidus, and intertransversarii), rectus abdominis, transverse abdominis, external obliques, and internal obliques.
 - Lower extremities—quadriceps group (rectus femoris, vastus lateralis, vastus medialis, and vastus intermedius), gluteus maximus, hamstrings group (biceps femoris, semimembranosus, and semitendinosus), gastrocnemius, soleus, tibialis posterior, flexor hallucis longus, flexor digitorum, peroneus longus, and the peroneus brevis.

BENEFITS OF THE EXERCISE

Sport specificity is a term commonly used to explain the degree to which a given exercise transfers to the sport setting. In other words, specificity can be referred to as the level of effectiveness an exercise has at improving an athlete's ability to execute a specific movement or task in their sport. The SAID principle (specific adaptations to imposed demands) is a term that helps explain the relationship between an athlete's training choices and their resultant gains in performance. The SAID principle suggests that the body's neuromuscular system will adapt to the demands imposed upon it (22).

The CG-MTP and SG-MTP are exercises that provide an athlete the opportunity to reinforce positions that are

essential when performing the full clean and snatch. Moreover, the CG-MTP and SG-MTP aid in the strengthening of the musculature used in the execution of the weightlifting movements from the power position. In addition, these pulling variations can serve as transitional exercises for learning the full weightlifting movements. This can be achieved by integrating previously described partial movement derivatives (4–6,10) into a progressive program. As such, these pulling movements accompany the short-to-long or partial-to-full range of motion approach to training these movements.

In the practical setting, the MTP can be defined as a concentrically dominant movement that allows the athlete to ascend with a load that is greater than they can pull from the floor. For this reason, the MTP variations can be used to enhance an athlete's rate of force development (RFD) and competitive preparedness through mechanical specificity (1–3). In addition to improving lifting performance, based on the commonalities between an athlete's position in these lifts and common sporting movements (e.g., shot put, jump shot, tennis serve, and bobsled start), these exercises may also be beneficial for developing athleticism (22).

Lastly, the MTP can serve as a potentiating modality because of the overload stimulus that is a result of lifting a load that is greater than what can be achieved through a weightlifting movement from the floor (7). As such, the MTP can be used before athletic performance in an acute manner (i.e., a maximum weightlifting attempt, sprint performance, or vertical jump). Furthermore, the MTP's limited range of motion allows for potentiation and training to occur with a lowered risk of injury as compared with the use of full weightlifting movements.

STARTING POSITION—PREPARATION

- The coach or athlete should set up technique boxes or position a power

rack such that the bar is at the athlete's height. Regardless of stature, the preferred angles of the peak power position are approximately 60–70°, 120–130°, and 140–150° at the ankles, knees, and hip, respectively (8,13,19,21).

- The athlete should address the bar on the platform with feet positioned approximately hip width apart. The bar should be situated at midthigh as well as sitting over the midfoot. The toes should be pointed outward slightly to maintain consistent foot positioning with other weightlifting derivatives (4–6,10).
- Once proper foot position has been acquired, the athlete should assume proper hand placement and grip. The appropriate hand placement for the exercise can be at clean width or snatch width, depending on the variation being performed (10). The "hook grip" (fingers over thumb) should be used for both MTP variations.
- After the acquisition of proper hand and grip placement, the athlete should partially squat under the barbell to attain the peak power position through the proper joint angles as described above.
- After the grip has been established, the athlete should position their shoulders above or slightly ahead of the barbell.
- Next, the athlete should attempt to internally rotate the shoulder (glenohumeral) joint to ensure a stable arm position for the active pulling portion of this movement. Specifically, this movement of the upper arm assists in keeping the elbow from prematurely bending during the pulling phase. Telling the athlete to "turn the elbows out" can cue this arm position.
- Once this position has been achieved, cue the athlete to "get their hips under the bar." To acquire this position, the coach should instruct the athlete to push their hips forward to make contact with the barbell 3 quarters up the length of their thigh for clean grip and at the top of the thigh for the snatch grip.



Figure 1. Front view of the starting position for the clean grip midhigh pull.

These locations on the thigh should directly correlate to the position that the athlete contacts the bar when executing a full clean or snatch (Figure 1).

- Furthermore, the athlete should be advised to "sit on their heels" in the starting position to achieve the angles that define the peak power position. This cue will also allow for greater control and improved bar speed as a result of a more forceful push through the platform.
- Before the athlete begins to pull the barbell from the static peak power position, they should have the sensation of remaining tight in the torso by inhaling deeply and bracing the muscles of the midsection, which will result in an inflated chest. Additionally, the athlete should preserve the slightly or naturally concave curvature of the thoracic spine to maintain the appropriate hip angle to maximize the force produced into the platform.
- Once the hips and heels are inline, the athlete is ready to initiate movement. Of note, this power position is optimized by a flexed knee angle ranging between 120 and 135°.

EXECUTION OF THE MTP

- Before triple extension, the bar should be at hip height, which is noted by the vertical positioning of the chest (Figure 2). Small differences in bar placement will be present for the clean and snatch grips, with the snatch grip



Figure 2. Lateral view of the starting position for the clean grip midhigh pull.

presenting the bar higher on the thigh because of the wide hand spacing. In addition, athlete anthropometric differences, including arm length, can create subtle changes in bar placement on the thigh with this lift.

- The ascending portion of this lift should be done aggressively and succinctly. The athlete should remain taut (i.e., braced trunk) through the extension of the hips, knees, and ankles.
- During the extension, the athlete should be instructed to shrug the shoulders upward and slightly behind the ears.
- The athlete should also be cued to "pop" the shrug to maximize barbell velocity (Figure 3).
- In conjunction with the shrug, the athlete should be taught to slightly flex the wrists in. This allows the barbell to stay closer to the athlete's body (Figure 4).
- Recall that the elbows should remain extended, "long and locked," and have the appearance of being slightly rotated outward during the

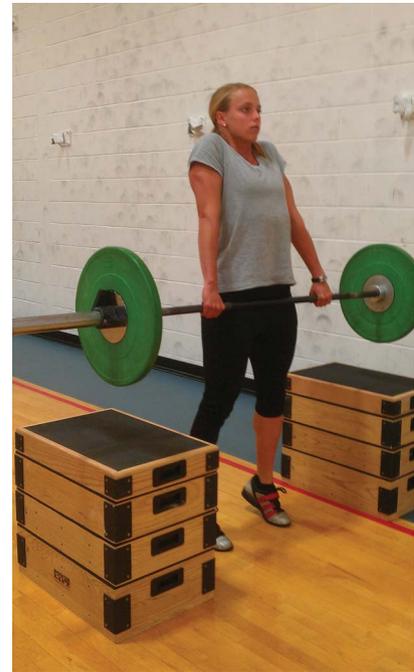


Figure 3. Lateral view of the extension phase for the clean grip midhigh pull.



Figure 4. Front view of the extension phase for the snatch grip midhigh pull.

Exercise Technique

application of force through the platform. Premature bending of the elbow (humeroulnar) joints prevents the shrug from being fully maximized. However, flexion of the elbow joints immediately after the shrug can occur as a result of barbell velocity.

- Lastly, on the descent from full extension, there should be flexion at the knee when "landing" to absorb the load while returning the weighted barbell back to the boxes or rack. The athlete should isometrically contract the posterior musculature to avoid any unnecessary anterior pelvic tilt.
- The athlete should take the time to fully reset and return to the power position before continuing the next repetition.

COMMON MISTAKES OF THE MTP

- The athlete may push the hips too far forward instead of continuing to drive vertically through the heels. This movement of the hips would cause a looping of the barbell away from the athlete's body.
- The athlete may prematurely transition their body weight to the forefoot, which will prevent the proper vertical transference of force through the heels before extending upward during the triple extension phase.
- The athlete may not finish the full triple extension of the movement through the hips, knees, and ankles.
- The athlete may initiate the shrug before full triple extension.
- The athlete may not aggressively complete the shrug at the top of the second pull.
- The athlete may "dip" by bending the knees, losing contact with the bar, before initiating triple extension.

PRACTICAL APPLICATION

The CG-MTP and SG-MTP variations are weight-training exercises that can be used in most blocks of training. The priority of the block will determine the sets and reps scheme. For instance, during a strength-endurance

block, a sport performance professional may use the MTP at a higher repetition range (3×10) coinciding with lighter to moderate loads (80–100% of power clean or snatch maximum). The prescription of this exercise during this time can improve an athlete's technique for future, heavier blocks, as well as enhance power-endurance abilities. However, the coach should consider an athlete's capabilities before prescribing this exercise during a higher volume phase as technique could falter because of fatigue.

In addition, the CG-MTP and SG-MTP variations can be used in maximal strength as well as strength-power blocks through the incorporation of reduced volumes (3×5 – 3×3) and increased loads. Specifically, Comfort et al (3) found that loads of 120–140% of an athlete's power clean maximum has demonstrated increases in force production and RFD. At this point in the training year, these weightlifting derivatives can provide the athlete an opportunity to stabilize the technique before transitioning into future blocks where complete weightlifting movements may occur. In conjunction, using the clean and SG-MTPs during a maximal strength or a strength-power block will give the athlete a chance to become more efficient at overcoming a load that is greater than what they can successfully clean or snatch.

Finally, during an explosive speed or maintenance block, the MTP can be used to enhance power output through reduced loads and intensities (3×3 , 3×2 , and 2×2). Recent research (3,18,23) has shown that loads of 40–60% of an athlete's 1 repetition maximum in the power clean elicit peak power outputs in the mid-thigh clean pull. Moreover, the load selection should be based on an athlete's technical proficiency and strength. For example, a weaker or less technically efficient athlete should focus on improving peak power through loads of 40% of power clean maximum, whereas a more established lifter may attain peak power near loads of 60% of power clean maximum.

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