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RACK IT RIGHT

Zachary Long explains how to identify and correct flexibility limitations in the front-rack position.

BY ZACHARY LONG

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Front-rack positioning can make or break the CrossFit athlete.

Poor flexibility in the front rack is one of the most frequent complaints in the gym, and without good positioning an athlete's ability to properly perform the front squat, clean, overhead press and jerk can be significantly affected.

The front-rack position is a combination of several motions: shoulder flexion and external rotation, elbow flexion and pronation, wrist extension, and thoracic-spine extension. As with any movement or positioning fault, a better understanding of the various components will allow the athlete or coach to more effectively correct underlying problems.

Points of Performance

A proper front-rack position has several key elements. First, the athlete should be able to have a full grip on the barbell, meaning each finger is securely wrapped around the entire bar. During the front squat and clean, a loose fingertip grip will sufficiently stabilize the bar in the rack position, but when the barbell must be redirected overhead during presses, jerks and thrusters, a full grip is generally needed, though some will jerk from the fingertips.

For those with insufficient mobility to fully grasp the barbell in the front rack, the first few fingers will be securely wrapped but the ring and pinky fingers will often lose their grasp.

A fingertip grip will work for cleans and squats but is not ideal for pressing.

The elbows should be high in the standing position. While there is no exact angle or landmark to measure, the general rule is for the upper arm to approach parallel to the ground, with parallel ideal, as noted in the "CrossFit Level 1 Training Guide." The hands grasp the barbell just outside the shoulders, with the spine remaining in an upright, neutral position.

(Editor's note: Different coaches will recommend different approaches. For instance, Chad Vaughn recommends setting up for the jerk with the bar on the fingertips and the elbows high, while Mike Burgener generally prefers more of the hands on the bar and lower elbows. Similarly, some athletes will drop the elbows slightly in a thruster in preparation to drive the bar overhead. Coaches and athletes should select the techniques that work best for each movement and best accommodate proportions and flexibility. Greater flexibility offers more options.)

When all these elements are present, the barbell can comfortably rest on the "rack" of the shoulders; that is, on the upper deltoids and partially on the clavicle bone but not pressing into the throat and obstructing the athlete's airway. It should be noted that the farther back the barbell is placed, the shorter the moment arm between the hips and the bar, which is why some coaches use the exaggerated cue "choke yourself with the bar."

For maximum transferability, this front-rack position with a solid grasp of the barbell and elbows raised should be maintained through any lift that utilizes the front rack. Many lifters will receive a clean with a fingertip grip and reset for the jerk, but consider the challenges of completing a squat-clean thruster with two or more fingers off the bar.

Many athletes who demonstrate a proper front-rack position while standing will drop their elbows in the bottom of the front squat or clean. If the elbows remain raised, the shoulder mobility demands on the front rack increase as the athlete descends.

In situations such as this, it becomes important to determine the source of the limitation. Often, you can tell the athlete to "keep the elbows high" or use a tactile cue at the elbows to remind the athlete of the proper position. If the resulting positions are improved, the athlete simply needs to learn the proper pattern.

When appropriate cues do not fix the front rack (or the front rack was incorrect from the start), further investigation is needed to determine the exact limitation.

Limitations throughout the entire body can alter an athlete's ability to maintain proper front-rack positioning. For example, limited ankle or hip mobility can alter the mechanics of the body enough to increase strain at joints as far up the kinetic chain as the wrist.

The remainder of this article will focus on the upper-body components of the front rack, but we suggest reading the CrossFit Journal article "Dissecting the Squat" to understand the lower-body movement and mobility demands of the squat pattern.

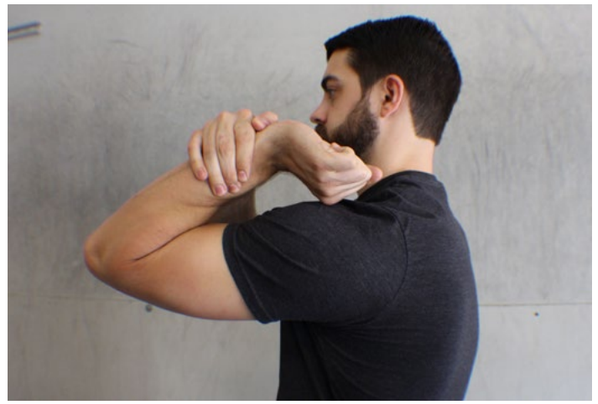
Front-Rack Breakouts

Flexibility limitations to the front rack should be analyzed independently to best isolate the physical limitation. The process should be as follows:

When breaking out mobility limitations specific to the front rack, we will start at the wrist. The athlete begins with his or her palm and fingers flat on the ground and then shifts his or her weight forward to push the forearm to vertical. If the athlete is able to obtain a vertical forearm position relative to the ground without the hand's rising, then wrist mobility can be considered normal and mobility testing down the kinetic chain should be performed. If this position cannot be reached, wrist mobility should be addressed as discussed later.

The heel of the hand should remain on the floor as the forearm reaches vertical.

Elbow flexion should be the next component tested. The athlete should begin with his or her arm held directly in front of the shoulder with the palm facing the floor. Next, the athlete should bend the elbow and attempt to touch knuckles to shoulders. For those with smaller forearm and upper-arm mass, the knuckles should reach the shoulder as shown below. In those with larger muscle mass in the upper arm, this position may not be possible due to soft-tissue approximation. In these athletes, extra external rotation of the shoulder or extension of the wrist is necessary to obtain a proper front rack.



Flexibility should be sufficient to allow the athlete to touch knuckles to shoulder.

To assess shoulder external rotation, the athlete should begin with his or her elbow positioned directly in front of the shoulder so that the upper arm is parallel to the ground and the forearm is perpendicular to the upper arm. The amount of external rotation required for a proper rack position varies among athletes, but in general all athletes should be able to move their forearms past this vertical position and into greater than 90 degrees of external rotation.

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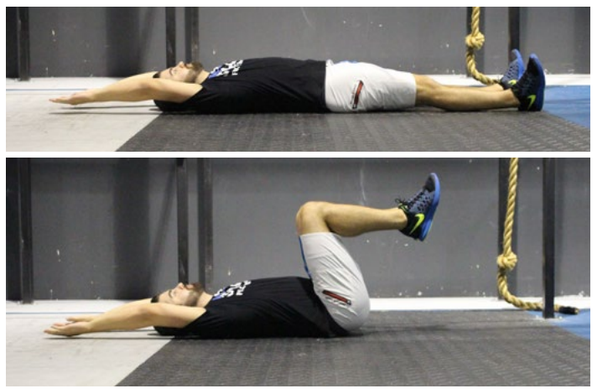
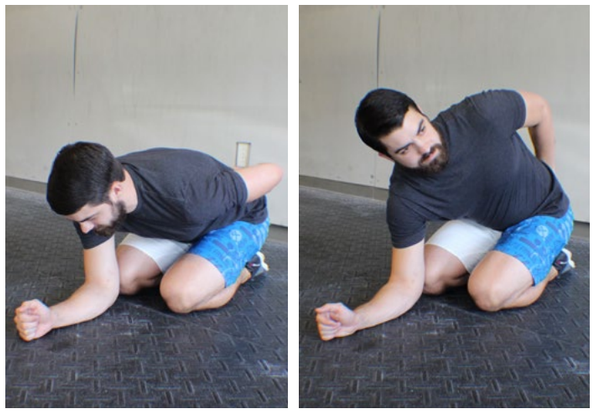
More than 90 degrees of external rotation will allow proper positioning.

The latissimus dorsi muscle, better known as the "lats," can also limit the front rack. To test the lats for tightness, the athlete lies on his or her back with legs flat on the ground. The athlete then lifts the arms as far overhead as possible without letting the back change position. The amount of shoulder flexion is noted. The test should then be repeated with the hips bent to 90 degrees. Flexing the hips stretches the lower attachment of the lats, so if mobility is decreased with the legs bent, lat tightness is to blame.



Tight lats will limit shoulder flexion when the hips are flexed to 90 degrees.

Thoracic-spine extension plays a critical but often-overlooked role in the front rack. To analyze thoracic-spine extension, test an athlete's ability to rotate the thoracic spine each way. The athlete begins on his or her forearms and knees and then lowers the buttocks to rest on the heels. The athlete should then place one hand behind the back and lift the shoulder on the same side as high as is comfortably possible without letting the buttocks rise, shifting his or her weight, or bending the spine. The athlete should be able to rotate the thoracic spine enough so that if an imaginary line were drawn through the collarbone it would make a 50-degree angle relative to the ground. This test should be repeated on both sides.



Thoracic-spine extension is lacking if athletes cannot rotate to open the chest.

Solutions: Restoring Proper Positions and Improving the Front Rack

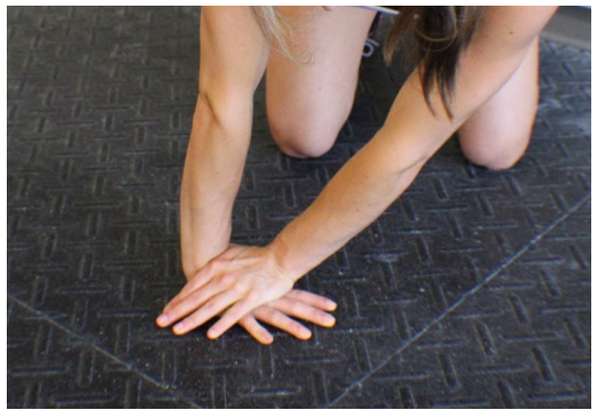
Before treating any upper-extremity limitations of the front rack, we must re-emphasize the need to ensure proper basic mobility and movement in the squat pattern. In the author's experience, lower-body mobility limitations can often manifest in upper-body problems. For example, limited ankle mobility can force the athlete to flex the spine to keep the weight over the center of the foot during a front squat. In order to keep the bar racked, the athlete may have to hold the wrist in excessive extension, and as a result pain or discomfort may present at the wrist. Never assume the site of dysfunction is the only limiter of performance.

When working to improve the front rack, a plan of attack that targets an athlete's specific limitations will produce better results than taking a generalized approach to improving positioning. This is why we advocate for such a specific series of tests to pinpoint problems before providing corrective exercises. After an athlete's problem areas are identified, perform one or two specific interventions for that problem and then perform one more-generalized front-rack mobilization to directly apply those mobility gains to the position.

To improve wrist extension, the athlete begins by applying firm pressure with the thumb of one hand onto the muscles of the palm side of the forearm while repeatedly moving the wrist into and out of wrist extension. Every few passes, the athlete will reposition his or her other hand to perform soft-tissue mobilization to the entire forearm-flexor musculature.

Working on the soft tissue of the forearm can improve wrist extension.

Following that, the athlete places his or her hand on the ground or a box and then places the opposite hand directly adjacent to the wrist joint. The top hand holds the bottom stable as the athlete rocks back and forth, mobilizing the wrist joint.

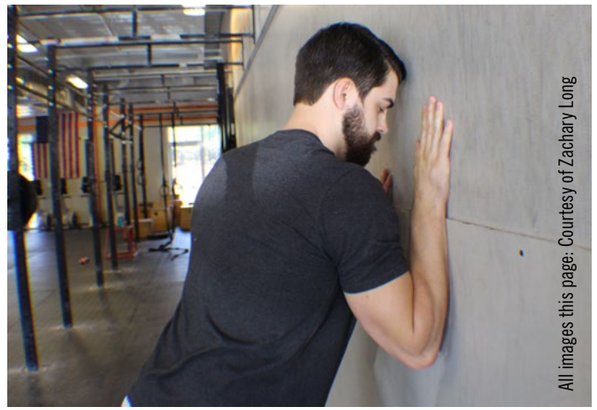


Rocking movements in this position also address wrist extension.

Elbow flexion is also treated using a combination of soft-tissue work in conjunction with joint mobilization. To improve the soft-tissue extensibility of the triceps, the athlete places the bulk of the muscle belly onto a barbell with moderate pressure. The athlete will then repeatedly bend the elbow back and forth while maintaining pressure. After a few bends, the athlete repositions the arm and continues the process at several different points throughout the triceps.

A barbell can assist with soft-tissue work on the triceps.

To focus on improving joint motion, the athlete bends his or her elbow with the palm facing away from the body. The palm and forearm are placed flat on a wall and the athlete leans into the wall, applying overpressure to push the elbow into greater angles of elbow flexion.



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Gentle pressure can be used to create greater elbow flexion.

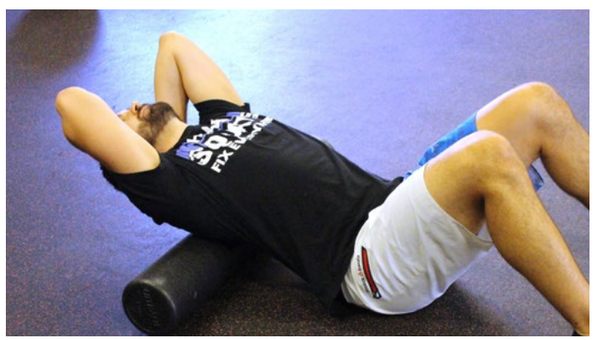
To improve shoulder-specific mobility in the rack position, have the athlete employ some self-myofascial release to the muscles around the shoulder. Focusing on the teres major, lats and subscapularis muscles will be most effective.

The lats and teres can be mobilized by having the athlete lie on his or her side with arm overhead and the foam roller positioned just lateral to the shoulder blade. The athlete can roll up and down the side while moving the arm up and down (video).

A foam roller can help address the lats, teres major and subscapularis.

The athlete can also use his or her hands to apply pressure to the subscapularis muscle, which is located on the anterior shoulder blade, by reaching it through the armpit. The arm is then lifted up and down while the pressure is maintained (video). To best stretch this area, the athlete can set a barbell at shoulder height and rest one elbow on the barbell. The opposite arm bends the treatment-side elbow maximally with the palm facing away from the body. While the arm is supported in an externally rotated position, the athlete leans his or her torso forward, stretching the lats and teres muscles (video).

For those with thoracic-spine limitations, utilizing a foam roller to mobilize the spine is one of the easiest ways to improve range of motion for the front rack. The athlete lies on the foam roller with it positioned perpendicular to the thoracic spine. The athlete then repeatedly extends the spine over the foam roller at multiple levels along the thoracic spine from the bottom of the rib cage to the neck.



The roller can be moved up and down to address different parts of the spine.

A band can be used to stretch in the front-rack position.

Following treatment of the individual's specific limitations, a front-rack-specific movement should be performed. There are many different options available to specifically mobilize the front-rack position utilizing bands, PVC pipes and barbells.

To mobilize using a barbell, position the loaded bar at shoulder height in a rack. Grip the bar at front-rack width with both hands and forearms vertical under the bar. Take one elbow and push it forward to position that arm in a proper front-rack position. Apply upward pressure to drive the barbell to its proper rack position on that side. Repeat on each side.

As with any movement dysfunction, identification and treatment of an athlete's exact limitations will provide faster and more effective fixes. The front rack is no exception. Utilize the above tests to formulate your specific action plan and break through your positioning faults. ■

About the Author: Zach Long is a doctor of physical therapy and board-certified sports specialist in Charlotte, North Carolina. He attended the University of North Carolina at Chapel Hill, where he majored in exercise and sport science, and East Carolina University, where he earned his doctorate in physical therapy. Long's research related to physical therapy and athletic rehabilitation has been presented at multiple state and national conferences. He currently runs thebarbellphysio.com.

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A loaded barbell can provide a stable object for the athlete to push on while working to achieve proper positioning.