

The Back Squat: A Functional Assessment and Training Exercise
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The back squat is considered a foundational exercise for sport performance and exercise. It engages major muscles in movement patterns necessary for ADL's, to reduce injury risk as well as physical activity. The back squat can be used as an assessment for neuromuscular control, strength, stability and mobility within the kinetic chain – exactly the arena for chiropractic doctors doing active care. Myer and his team have proposed that the unloaded back squat can also be used as a dynamic screening tool to isolate functional deficits and serve as a guide in rehabilitation and corrective exercise prescriptions.

As with any test, normative values must be defined so imbalances can be isolated and progress can be monitored. The remainder of this article will review the criteria that Meyer has standardized in performing the back squat assessment. Follow-up articles will address imbalances and corrective principles.

The unloaded Back Squat Assessment (BSA) is divided into three comprehensive domains: Upper Body, (head, neck and torso), Lower Body, (hips, knees and ankles), and Movement Mechanics, (timing, coordination and recruitment patterns). Each domain is graded for neuromuscular, strength and mobility deficits. The patient is assessed from the anterior, posterior and lateral perspectives and the test is performed for 10 repetitions. A positive finding is failure to perform the desired technique on 2 repetitions. Since the BSA is a functional assessment, it is performed when the patient is pain free. If the BSA provokes pain the test is discontinued until the underlying pain driver is addressed.

Arm and hand position:

- Pronated grip on a dowel (metal, wood, plastic approximately 36" long) slightly greater than shoulder width
- Rest the dowel across the posterior deltoids just below C7.
- Forearms parallel to the torso and wrists straight
- "Bend the Bar" – pull the bar into the trapezius and tighten the scapular retractors, depressors and latissimus (essentially creating additional core stability)
- If a dowel is not available, the patient places their hands open palmed under their ears while retracting their scapulae

Stance:

- Heels approximately shoulder-width apart and toes pointing forward.
- Maximum of 10 degree external rotation of the feet are allowed
- Heels and forefoot are kept on the ground

Note: Meyer finds this moderate stance appropriate since research documents an excessively narrow stance may increase forward knee translation and heighten anterior shear forces and a wide stance may increase patellofemoral and tibiofemoral compressive forces in the knee joint by up to 15% during descent.

Upper body:

- Head and neck in neutral alignment to slight extension, in line with the torso
- Gaze: slightly upward with a neutral head position
- Thorax: Chest up, thoracic spine slightly extended and held rigid. Scapulae are retracted and depressed with the patient's forearms parallel to the spine
- Lumbar spine and trunk: Neutral alignment throughout the entire squat movement. From the lateral view, the line of the trunk is maintained parallel to the line of the tibias.

Lower Body:

- Neutral pelvic tilt
- Hips: Square and stable
- Femurs: symmetrical movement without internal or external rotation
- Knee, Frontal Plane: track over the toes, no medial or lateral displacement
- Knee Sagittal plane: anterior translation that is parallel to the trunk

Once the BSA is performed simple corrections start immediately to help isolate imbalances in movement from strength. The descent needs to be smooth and controlled with a 2:1 ratio to the ascent, emphasizing the eccentric component of the exercise. Squat depth is determined by quality of the squat with the goal of achieving the femurs slightly past parallel to the ground, hips back, tibia parallel to the torso and feet entirely on the ground. Adequate squat depth is required to maximally engage the hamstrings and gluteal complex but cannot be sacrificed for poor execution.

Meyer advocates taking an 80% full breath before the descent. This in conjunction with the bend and bow of the dowel creates spinal stiffness to assist in grooving normal mechanics. Furthermore, he recommends holding your breath until the ascent is completed.

During the ascent phase the torso needs to remain upright, shoulders and hips need to rise at the same pace and the difference in vertical height of the shoulders and hips should remain constant. The back is to be kept rigid and tight while focusing on driving with the hips to ascend.

The back squat is the mainstay of exercise programs for wellness, fitness, performance and ADL's. Meyer's concept of using the unloaded back squat as an assessment tool can be easily incorporated in the active chiropractic treatment plan for most if not all of our patients. The next article in this series will review common deficits in the BSA and corrective interventions.

Dr. Donald DeFabio is in private practice in Berkeley Heights, NJ and acts as the team chiropractic doctor for a local university. His exercise protocols can be found on his YouTube Channel which has over 7M views and 15K subscribers. He conducts Relevant Rehab, hands-on seminars nationally to teach the keys of successful integration of active care into the everyday chiropractic office. He can be reached at DeFabioChiropractic@gmail.com or www.DeFabioDifference.com for questions, to register for his workshops, and to acquire copies of his patient handouts.

REFERENCE: