

Importance of Neck Stability in Shooting

Dr. Digpal Ranawat; Director, Abhinav Bindra Targeting Performance, and Member, ISSF Medical Committee
June, 2019

Neuromuscular coordination is imperative in a sport like shooting.

Studies have shown that exceptional muscular strength, posture control and targeted coordination between the eyes and nervous system all contribute to optimal results in shooting sport [1].

While the role of neck muscles must be emphasized, it is the neck muscles' stabilizing ability during shooting that should be considered as most important. Neck stabilizers keep the head still and enable aiming at the object with precision and accuracy.

This article aims to provide information regarding neck stability amongst shooters and suggests a few exercises to improve these muscles abilities.

Neck Mobility over Stability:

The cervical spine, as opposed to the lumbar spine, is designed to be mobile rather than stable. As a result, the need for increased stability becomes more important to shooters.

A study reports that both neck muscle weakness and lack of training negatively impact neck and head stability amongst athletes [2]. Accordingly, neck muscle workouts and stability exercises should be emphasized among sports professionals. Neck stability is even more noteworthy amongst shooting athletes.

Air Rifle shooter and 2008 Olympics Gold Medalist, Abhinav Bindra, believes strongly that maintaining a correct neck muscle tension profile and neck stability are critical to optimum performance in shooting sport.

Postural Muscles and Neck Stability:

Shooters are prone to a variety of injuries due to the prolonged postural stresses and repetitive nature of the sport. As a result, proper postural alignment is very important for shooting sport athletes.

Certain body type variations are predisposed to injury [3] as are athlete competing in specific disciplines. For example, pistol shooters are more prone to shoulder, elbow, wrist, hand and neck injuries [3]. Such injuries emphasize the need for proper posture and neck stability.

A study reports that although the relationship between balance ability/stability and reduced sports injury risk has been well established, the relationship between balance ability/stability and athletic performance is less clear [4]. Nonetheless, the study suggests that elite athlete like rifle shooters do have superior balance ability compared with their less proficient counterparts. This reinforces the importance of postural stability as well as neck and vertebral column balance to achieve sound, professional skills. Training neck stabilizers to maximize favorable sports results and performance is therefore of utmost importance.

Neck stability can be achieved with strength and endurance training together with core muscle training in a closed kinematic chain. The techniques and exercises mentioned in this article can be used by trainers and physical therapists to enhance the cervical spine's muscular strength and endurance.

Evaluation and Assessment of Neck Stability:

Postural neck muscles must be tested for strength, length and endurance.

Any sign/symptoms of neck disability or dysfunction, including pain, compromised range of motion and neural provocation must be ruled out prior to engaging in a specific training program.

Exercises and Rehabilitations:

If there is no injury or associated problems found at assessment, strengthening exercises can be implemented specific to level and needs of the trainee.

The American College of Sports Medicine suggests a wide variety of exercises ranging from isometric to isotonic with emphasis on eccentric contractions to improve neck stability [5].

1. Thera-Band Cervical Flexion Isometric

Starting position: seated comfortably on chair with back erect and unsupported

Place the band around the front of your head and hold on sides of the head with both hands. Keep the chin slightly tucked and the neck in neutral position. Keeping the neck stable, stretch the band backwards, hold for 5 seconds and return slowly. Repeat for 10 times.



Sit erect with band across the forehead

Pull back the band

2. Thera-Band Cervical Extension Isometric

Starting position: seated comfortably on chair with back erect and unsupported

Place the band around the back of your head and hold in front of the head with both hands. Keep the chin slightly tucked and the neck in neutral position. Keeping the neck stable, stretch the band forwards, hold for 5 seconds and return slowly. Repeat for 10 times.

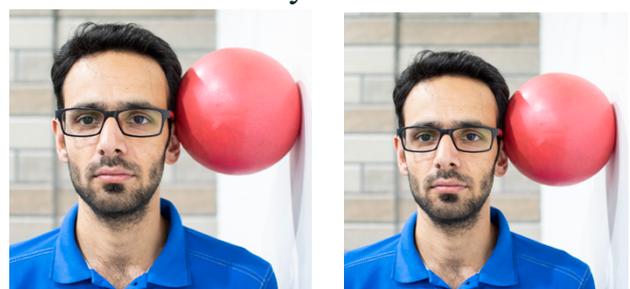


Sit erect with band around the back of the head. Pull the band forward keeping the head

3. Side flexor isometrics

Starting Position: On the side of the wall so that the wall is on your left.

- Grab a mini pilates ball and place it above your ear between the head and the wall.
- Press the head against the ball and the wall. Hold for 5 seconds and release slowly
- Repeat 10 times.
- Change the side and repeat for the other sides well.



Stand with ball against the wall

Press the head into the

Evidence based Practice to Improve Neck Stability:

There exists a relationship between motor expertise and postural ability in athletes [7]. A study suggests following an upright body type exercise program

three times a week for 12 weeks, with higher exercise intensity over time will allow athletes to improve their neck posture and stability.

To this end, some common exercises for neck stability and strength include:

1. Using the principle of SAID(Specific Adaptation to Imposed Demands), impose higher demands
2. Using the principle of specificity, strengthening and endurance training
3. Neck Isometrics for flexion and extension
4. Release of TrPs (Trigger Points)
5. Myofascial release
6. Eccentric neck and core training

A device can be used to quantify pressure under the foot using pressure sensors. This could help understand individual postural stability variations among athletes. Studies show that posture stability and weight shift in dynamic balance could affect the performance of shooting athletes ^[6].

In a close kinematic chain analysis, neck stability could be evaluated by noting minimal changes in body shift and plantar pressure distribution.

Training with the below given exercises could help shooters increase their neck muscle strength and stability

1.Chin Tuck

Starting position: The shooter should stand with the spine up against a wall and the feet out about 3 inches from the bottom of the wall.

- Keeping the spine against the wall, pull the upper back and head backward until the head touches the wall. It is important to make sure that the chin is down so that the head is pulled straight back and not looking up.
- Hold the head against the wall for 5 seconds.
- Repeat for 10 times.



2. Head clocks

Starting position: lying on the mat on your back

- Exhale and lift the chin as much as possible towards the ceiling
- Inhale and bring it back down.
- Exhale and look to the left bringing the left ear to the centre of the ball.
- Inhale and bring the head back to the centre
- Exhale and repeat the same procedure to the right side.
- Touch all the four points 10 times each



Look to the left and then the right with chin tucked in



Look up to the ceiling and then down

3. Head circles

Starting position: lying on the mat on your back

- Grab a mini pilates ball and deflate it so it's just half-way full of air
- Place it down onto the mat and lie down on your back so that the middle of your head is down onto the ball.
- Lie down relaxed with legs straight, palms facing the ceiling
- Keep your head heavy on the ball and start by making small circles with your nose, in one direction.
- Try to get as big as you possibly can with your circles
- After completing 10 circles in 1 direction, repeat the same in reverse direction.



Lie on the mat with head on the ball



Make clockwise and anti clockwise

Conclusion:

This article sought to identify and underline the importance of neck stability amongst shooting professionals. Based on its findings, it can be concluded that neck stability plays a major role in improved sports performance.

Neck stabilization exercises could and should be used on and off field of play to enhance skill and performance amongst shooting athletes not only for greater results, but because cervical dysfunctions can predispose an athlete to the risk of neck injuries.

References:

1. Dopsaj M, Prebeg G, Kos A. Maximum force of hand grip in the function of precision and accuracy of shooting from the official CZ 99 handgun from: Generic models. *Bezbednost, Beograd.* 2018;60(2):30-49.
2. Franco JL, Herzog A. A comparative assessment of neck muscle strength and vertebral stability. *Journal of Orthopaedic & Sports Physical Therapy.* 1987 Jan;8(7):351-6.
3. Arnot C. *Postural Considerations for Rifle and Pistol Shooters.* Usa shooting news, Colorado Spring. 2010.
4. Hrysmallis, C. *Sports Med* (2011) 41: 221.
<https://doi.org/10.2165/11538560-000000000-00000>
5. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, Nieman DC, Swain DP. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Medicine and science in sports and exercise.* 2011 Jul;43(7):1334-59.
6. Kim DK. The Effects of the Upright Body Type Exercise Program on Body Balance and Record of Archers. 2018;28(1):9-18.
7. Paillard T. Plasticity of the postural function to sport and/or motor experience. *Neuroscience & Biobehavioral Reviews.* 2017 Jan 1;72:129-52.