

Concussion Guard Testing Protocol

Standardised testing protocol

Warm-up: all participants will complete a standardised warm up which consists of 2 x 3 second holds using their own hands as external resistance. This will be in the forwards (A), sideways (B) and backwards (C) motions in an isometric contraction with the cervical spine in neutral. Participants are asked to gradually increase the force over the three seconds. First set to should be progressively increasing force to 60% and second set to 90% of their self-perceived maximal effort. If the participant gets neck pain in the warm-up please exclude from the data collection.



Figure 1. Warm up positions: A) Neck flexion position B) Neck side flexion position C) Neck extension position

Neck Flexor Strength Assessment: The 3D mounted dynamometer will be positioned at 140cm above the ground. Participants will adopt a half kneeling position with their right back foot on the try line. Their right leg should be within the belt and placed behind the knee, on the thigh. The belt is 90cm in length when not attached to the other end. The front left heel will be placed adjacent to the post (Figure 1A). The participant will grasp the post with both hands (Figure 1B). Participant should centre their forehead on the dynamometer. Participants are instructed to push their forehead into the dynamometer as hard as possible (Figure 1C). Participants can use their right leg to drive them forward and can use their arms to pull themselves. The neck should remain in a neutral position.

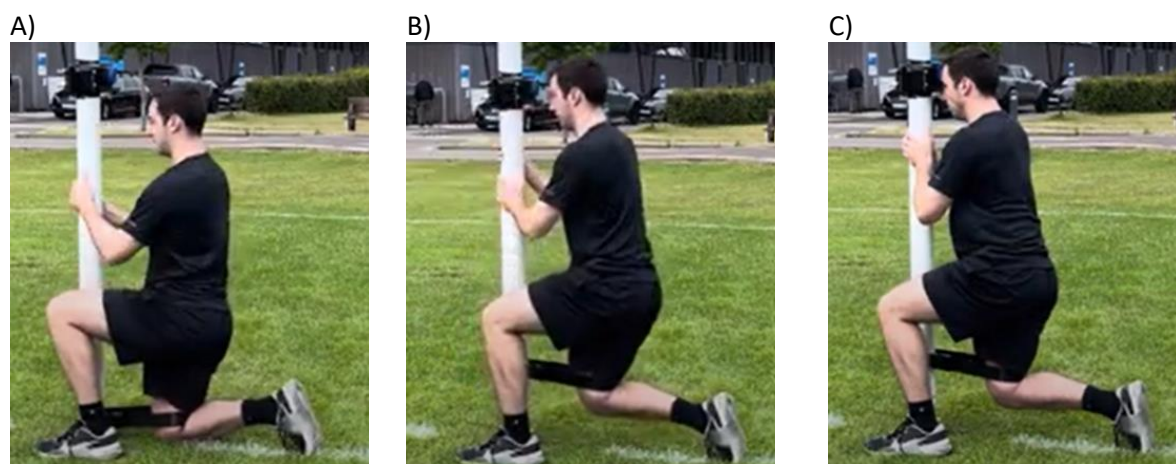


Figure 2. Neck flexor strength positions: A) Set position B) Raised position C) Data collection.

Left and Right Lateral Strength Assessment: The 3D mounted device will be placed on the rugby post at 45cm above the ground. Participants adopt a quadruped set position (Figure 2, A) position with hands just outside shoulder width. Elbows will be extended to the point where the head remains in neutral, and hips and knees set at 90 degrees. Dynamometer should be aligned above the ear. Participant feet will be placed just outside shoulder width. Both hand and foot of the measurement side will be over the try line. The opposite will be in their respective position so the technical points of the quadruped position can be adopted. Participants will raise their knees off the ground to a self-selected height (Figure 2, B). Participants will place their head on the top of the mounted dynamometer (Figure 2, C) and push as hard as they can for three seconds.

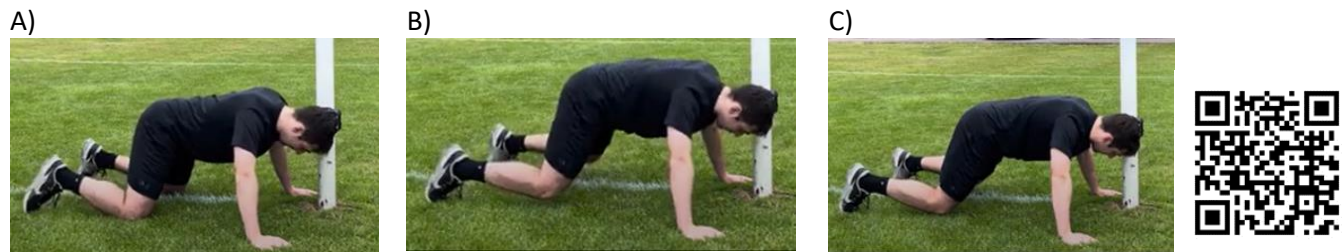


Figure 3. Left and right lateral strength positions: A) Set position B) Knee off C) Data collection.

Neck Extensor Strength Assessment: Participants will lay on their back with the 3D mounted device placed on the floor inline with the greatest prominence on the back of their head (Figure 3, A). Arms should be out to the side with hands on the floor for stability. Knees should be at 90° and feet should be just outside shoulder width. Participants are instructed to drive the back of their head into the dynamometer as hard as possible for three seconds (Figure 3, B).

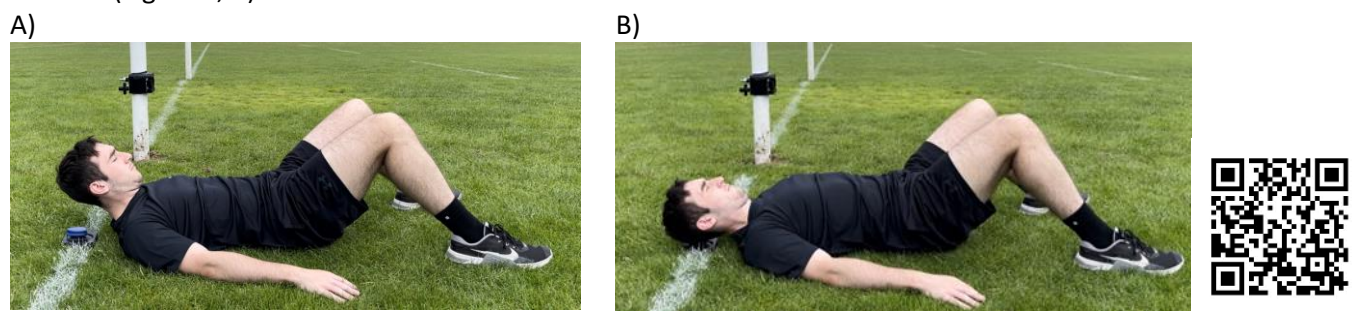


Figure 4. Neck extensor strength positions: A) Set position B) Data collection.

Data collection: Each test is repeated three times with 30secs between each repetition. Peak and average force of the three trails for each direction will be collected.

Collect participant information:

Participant no.			
DOB	Height	Weight	Currently playing (Y/N)
No. of concussions	No. years playing	Playing position	History of Neck strength training (Y/N)
Current Neck Injury/pain	Pain during the WU?		

Data collection box for Trial 1a:

	Neck flexion	Neck right lateral flexion	Neck right lateral flexion	Neck extension
T1 (Peak, Average)				
T2 (Peak, Average)				
T3 (Peak, Average)				

Data collection box for Trial 1b:

	Neck flexion	Neck right lateral flexion	Neck right lateral flexion	Neck extension
T1 (Peak, Average)				
T2 (Peak, Average)				
T3 (Peak, Average)				

Data collection box for Trial 2:

	Neck flexion	Neck right lateral flexion	Neck right lateral flexion	Neck extension
T1 (Peak, Average)				
T2 (Peak, Average)				
T3 (Peak, Average)				