This study was approved by the Institutional Review Board at Mayo Clinic. Prior to testing, procedures were explained and subjects provide written consent.

Background and Purpose: Cervical muscle strength (CMS) is advocated as a modifiable characteristic to reduce risk and severity of concussion in athletes. CMS can be measured several ways. Hand held dynamometry (HHD) is a relatively quick and easy means to capture objective strength values. Reported HHD techniques to test the CMS are varied. The purpose of this study was to investigate the reliability and magnitude of force using various HHD techniques assessing CMS. Subjects: 30 subjects between the ages of 18–30.

Methods and Materials: A single examiner using an ergoFETTM HHD performed all tests. Two separate sessions of cervical extension, flexion and side bending “make tests” were performed with the subject positioned on a table and in sitting. Testing in sitting was done both pushing into the HHD and pulling via a head harness attached to the HHD. Analyses: Intraclass correlation coefficients (ICCs) were used to examine test-retest reliability. Repeated measures analyses of variance (α = 0.05) with post hoc Bonferroni tests to examiner differences between methods.

Results: Neck strength testing via table positioning was the most reliable with ICC’s ranging from .89 to .95. For cervical extension, significantly greater force was recorded with the pull technique. For cervical flexion, force was greater with the push as compared to pull technique. For right and left side bending, force was greatest with the table technique. The minimal detectable change was the smallest with the table technique with values ranging from 3.19-4.85kg.

Conclusion: CMS testing using a HHD can be performed with excellent reliability. Testing with the subject positioned on a table is more reliable than sitting techniques. Force varies between different positions and thus consistent techniques are recommended.

Implications: This study supports the use of HHD to assess CMS. The preferred method is table positioning compared to positioning in sitting.