

An Association Between Novel Measures of Muscle Mass at the Cervical Level in Patients with Fragility Fractures of the Cervical Spine

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Introduction

Sarcopenia or decreased muscle mass has recently been acknowledged as a surrogate for patient frailty, which is a marker of physiologic reserve. The correlation between muscle mass and bone fragility of cervical spine is unknown.

Methods

In this retrospective case-control study, patients with CT-scans who underwent cervical fusion for fragility-fractures of the cervical spine composed the test cohort. Controls included healthy young (aged 21-30) patients presenting to the emergency room after minor trauma (Abbreviated injury score < 2) with CT-scans of the cervical spine without evidence of significant cervical spine injury. CT-scans were reviewed by 3 reviewers to make the following measurements: cross-sectional area of sterno-cleido-mastoid muscle (SCM), longus-coli muscles (LCM) bilaterally and vertebral body (VB) on a single axial cut at the C4 mid-pedicle level. We used LCM-VB and SCM-VB ratios as markers of frailty which were divided into quartiles. Agreement between the reviewers was assessed using two-way intra-class correlation coefficient (ICC). Two-sided t-test and multivariable logistic-regression were used to assess the association between morphometric measurements and osteoporotic fracture after adjusting for patient factors.

Learning Objectives

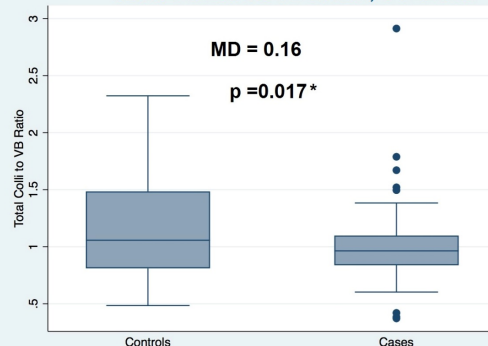
Participants should be able to:

- 1) Describe the importance of muscle mass in development of osteoporotic fractures of the cervical spine.
- 2) Identify the association between muscle mass-vertebral body volume ratios and risk of osteoporotic fractures

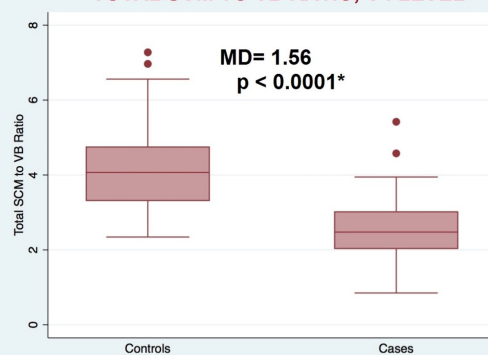
Conclusions

Our results indicate that SCM-VB ratio is a reliable measure of relative muscle mass and, similar to bone density, it is markedly

Colli Muscles Morphometrics TOTAL COLLI TO VB RATIO, C4 LEVEL



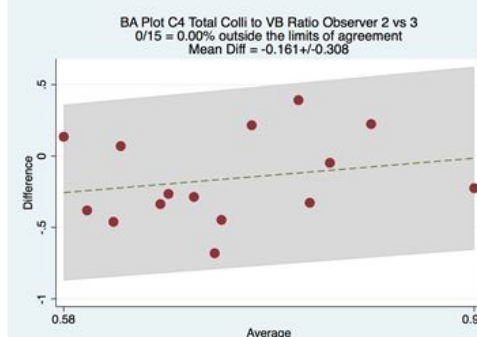
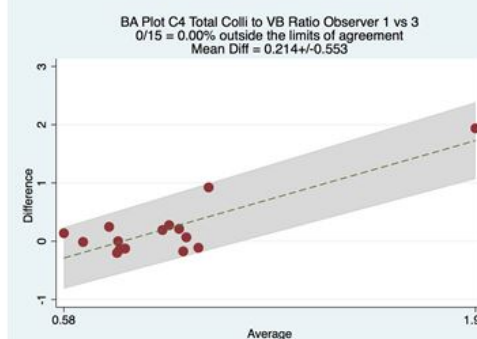
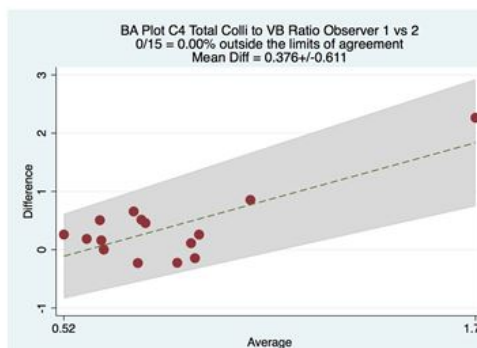
SCM Muscle Morphometrics TOTAL SCM TO VB RATIO, C4 LEVEL



Results:

Fifty-five cases and 113 controls were eligible for the study. Agreement among reviewers was found to be good for SCM-VB ratios (ICC=0.708, p<0.001) but poor for LCM-VB ratios (ICC=0.02, p=0.409). Mean SCM-VB ratio was significantly lower in cases compared to controls (2.57 ± 0.85 vs 4.14 ± 1.01 , MD=1.56, p<0.001). Mean LCM-VB ratio was found to be slightly lower for cases compared to controls (0.998 ± 0.382 vs 1.161 ± 0.464 , MD=0.16, p=0.017). On multivariable logistic-regression, patients with low SCM-VB ratio were found to be at significantly higher risk of having a fragility fracture (quartile-1: OR=121.01, 95%CI=16.68-877.74, p<0.001; quartile-2: OR=14.73, 95%CI=2.66-81.50, p=0.002).

Bland Altman Plot of Inter-reader Analysis : Colli Muscles



Bland Altman Plot for Inter-reader Analysis: SCM

