

Title: Sarcopenia and Cage Subsidence after Single Level Anterior Cervical Discectomy and Fusion

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Introduction

Sarcopenia is an age-related progressive loss of skeletal muscle mass and function and has been associated with increased complication rate, length of stay and mortality after spine surgeries. Anterior Cervical Discectomy and Fusion (ACDF) is a commonly performed procedure for cervical disc degeneration. A major potential complication of ACDF is cage subsidence, which is the loss of intervertebral height. This can potentially result in sagittal malalignment, pseudoarthrosis, and restenosis of the cervical foramina. A number of factors, including bone mineral density, cage material, and cage placement, are known to influence the risk of subsidence, but the role of sarcopenia is unknown. This study aims to investigate the relationship between sarcopenia and incidence of cage subsidence following single level ACDF surgery.

Methods

A retrospective review of patients undergoing single-level ACDF between 2017-2023 was performed. Exclusion criteria include revision surgeries, surgeries with additional procedures, or surgeries with indications involving infection, neoplasm or metabolic bone diseases. Sarcopenia was defined by evaluating fatty infiltration of the axial cuts of T2-weighted MRI images of the multifidus muscle at C5-6 using the modified Goutallier classification. Sarcopenia was graded as mild (Goutallier 0,1), moderate (Goutallier 2), or severe (Goutallier 3,4). Cage subsidence was calculated by first measuring intervertebral body height (IVH) represented as an average of anterior, middle and posterior IVH normalized to vertebral body length (VBL) **Figure 1**. The difference between IVH on postoperative day 0 and most recent follow up was then calculated and represented as a percentage height loss. Three independent reviewers performed blinded assessment of sarcopenia grading and measurement of cage subsidence, and the results were aggregated. Other variables including cage material, patient demographics and comorbidities were also collected from the electronic medical record.

Results

50 patients met inclusion criteria during the study period. The average time for follow-up was 358 days. Sarcopenia was grouped into mild (36 patients), moderate (8 patients), and severe (6 patients). Patients with mild sarcopenia noted 5.9% reduction in IVH, compared to 15% in moderate and 19.8% in severe group **Figure 2**. There was no statistically significant difference in cage subsidence between the mild and moderate sarcopenic group ($p = 0.73$), however, there was statistically significant increase in subsidence between the mild and severe group ($p = 0.004$). Regarding cage material, 42% used PEEK cages, 32% used titanium, and 26% used allograft. No difference was noted between the degree of height loss in terms of cage material (PEEK 10.7%, titanium 10.8%, allograft 7.07%; $p = 0.69$). Smokers had average 13.4% subsidence compared to nonsmokers at 8.9%, though this did not reach statistical significance ($p = 0.12$). When comparing comorbidities, there was no difference in rate of hypertension, sleep apnea, coronary artery disease or chronic kidney disease between the three sarcopenia groups.

Conclusions

Patients with severe sarcopenia demonstrated higher degree of cage subsidence following single level ACDF. No difference was noted for cage material regarding subsidence. Spine

surgeons should consider screening patients for sarcopenia preoperatively and counsel them regarding their increased risk of postoperative complications following ACDF.

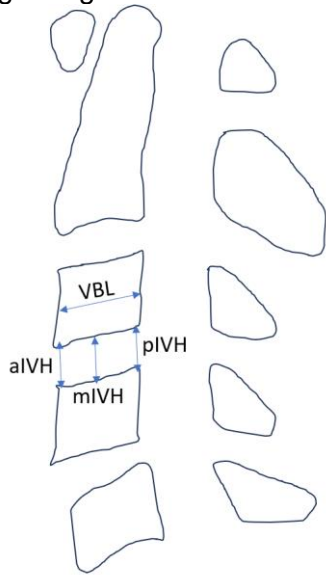


Figure 1. Measurement of intervertebral height (IVH) by averaging aIVH, mIVH, and pIVH normalized to vertebral body length (VBL).

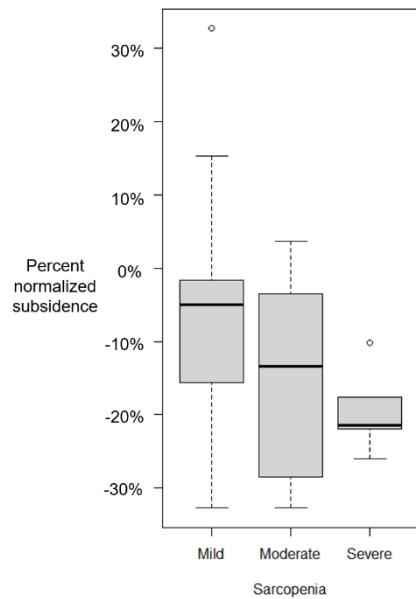


Figure 2. Percent loss of intervertebral height between patients with mild, moderate or severe sarcopenia.