The Role of Hounsfield Units In Predicting Cage Subsidence After Lateral Lumbar Interbody Fusion: A Systematic Review And Meta-Analysis

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INTRODUCTION: This systematic review and meta-analysis examined cohort studies investigating the relationship between vertebral Hounsfield unit (HU) measurements on preoperative computed tomography (CT) scans and postoperative cage subsidence (CS) in patients undergoing lateral lumbar interbody fusion (LLIF). As DEXA scans may inaccurately reflect local bone quality, vertebral HU on CT scans have emerged as a viable alternative to predict CS. This study aimed to identify a potential HU threshold predictive of CS in LLIF for future studies to explore and verify.

METHODS: Four databases were searched for studies reporting CS rates and preoperative segmental HU in patients undergoing LLIF, including oblique lateral interbody fusion, extreme lateral interbody fusion, anterior-to-psoas, and transpsoas techniques for degenerative spinal conditions. Random-effects meta-analyses were conducted. Outcomes were pooled segmental HU values and the predictive performance of different HU thresholds for CS. Intra-study risk of bias was rated using the Newcastle-Ottawa scale, and evidence certainty was assessed with the GRADE approach.

RESULTS: Five retrospective cohort studies totaling 396 patients (271 without CS, 125 with CS) were included. The pooled segmental HU was 112.1 (95%-CI: 96.3-128.0) for patients with CS and 142.6 (95%-CI: 127.5-157.6) for patients without CS. The pooled mean difference was 29.9 (95%-CI: 14.4-45.4, p<0.01, pegger=0.51). A threshold of ≤120 HU had the best predictive performance for CS.

DISCUSSION AND CONCLUSION: This study affirms that HU is a potentially useful predictive tool for CS in patients undergoing LLIF for degenerative spinal diseases. Future studies should explore the cut-off value of 120 HU to validate its predictive capability.