Introduction: Postoperative complications after anterior cervical fusions have been attributed to anterior cervical plate profiles and the necessary wide operative exposure for their insertion. Consequently, low-profile stand-alone interbody spacers with integrated screws have been developed. While they have demonstrated similar biomechanical stability to the anterior plate in single-level fusions, their role as a stand-alone device in multi-level reconstructions has not yet been established.

Methods: Thirteen human cadaveric cervical spines (C2-T1) were non-destructively tested with a custom six-degree-of-freedom spine simulator under axial rotation (AR), flexion-extension (FE) and lateral bending (LB) loading. After intact analysis, eight single-levels (C4-5 & C6-7) from four specimens were instrumented and tested with:
1) anterior cervical plate (ACP) and
2) stand-alone spacer (SAS).
Nine specimens were tested with:
1) C5-7 SAS,
2) C5-7 ACP,
3) C4-7 ACP,
4) C4-7 ACP & posterior fixation,
5) C4-7 SAS, and
6) C4-7 SAS & posterior fixation.
Testing order was randomized with each additional level instrumented. Full range of motion (ROM) data was obtained and analyzed by each loading modality utilizing mean comparisons with repeated measures analysis of variance. Paired t-tests were used for post-hoc analysis with Sidak's correction for multiple comparisons.

Results: No significant difference in ROM was noted between the ACP and SAS for single-level fixation (p > 0.05). However, only ACP significantly reduced operative level ROM compared to intact (p < 0.05). For multisegment reconstructions (two and three levels) the ACP proved superior to SAS. In all planes of bending residual ROM was significantly lower in the ACP group compared to SAS and intact (p < 0.05). In contrast, the SAS failed to provide improved segmental stability over the intact condition (p > 0.05). In spite of this, when either the three-level SAS or ACP constructs were supplemented with posterior lateral mass fixation, there was a greater than 80% reduction in ROM under all testing modalities (p < 0.05) with no significant difference between the ACP and SAS constructs (p > 0.05).

Discussion/conclusion: Stand-alone interbody spacers with integrated screws may be a reasonable option for single-level fixation. However, stand-alone interbody spacers should be used with careful consideration in the setting of multi-level cervical fusion. In the setting of supplemented posterior fixation, stand-alone interbody spacers are a sound biomechanical alternative to the anterior cervical plate.