A Biomechanical Evaluation of a Versatile and Novel Anterior Cervical Fusion Device Possessing Modular and Integrated Fixation Capabilities

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Introduction

A novel ACDF (anterior cervical discectomy and fusion) construct possessing integrated screw and modular plate fixation (MPF) capabilities has been introduced in an effort to provide intraoperative versatility when selecting a stabilization mechanism (Fig 1). Such versatility allows the surgeon to switch between zero-profile, half-plate, and full-plate fixation without needing to substitute or reposition the cage in-situ. The objective of this study was to assess segmental rigidity achieved with the novel ACDF construct in comparison to traditional ACDF and anteroposterior cervical fusion constructs.

Methods

Twelve human cervical spine specimens (C3-T1) were tested. Osseous integrity was confirmed via DEXA scans and radiographs. Specimens were then divided into three groups such that the mean bone quality across each group was consistent. The C3 and T1 vertebral bodies were potted. Each spine was first tested in an intact state. An anterior discectomy (C5/C6) was then performed, followed by sequential iterative construct instrumentation and testing (see Results for sequence). The three group protocol was executed such that each specimen received only

Results

See Table 1 and Figure 2.

Conclusions

The full-plate and half-plate constructs both appeared advantageous in comparison to the traditional ACDF construct when used as a stand-alone device, demonstrating an inherent benefit of the MPF technology. Motion reductions with zero-profile fixation were not as robust; however, it can be argued that clinically significant stability was still achieved. Lastly, supplemental fixation with LMS appeared to be a clear leveling factor across all constructs, facilitating significant motion reduction in all principle directions.

Learning Objectives

By the conclusion of this session, participants should be able to discuss/identify…

1)Benefits of in-situ fixation adjustment capabilities

2)Stabilization characteristics of a novel and versatile ACDF device

3)Patient demographics/pathologies for which the novel ACDF device could be advantageous

4)Similarities and differences between outcomes achieved with the novel ACDF device and traditional ACDF

References

alta test

Figure 1. Novel ACDF Device w/Integrated Modular Plate Fixation

Table 1. ROM Results

Construct	ROM (% Intact)		
	FE	LB	AR
Zero-Profile ACDF	68%	44%	78%
Integrated Half-Plate ACDF	22%	22%	54%
Integrated Full-Plate ACDF	20%	28%	35%
Traditional Plate ACDF	28%	39%	57%
Zero-Profile ACDF + LMS	10%	15%	29%
Integrated Half-Plate ACDF + LMS	16%	11%	19%
Integrated Full-Plate ACDF + LMS	12%	11%	16%
Traditional Plate ACDF + LMS	8%	14%	21%

Table 1. ROM (% Intact) Results

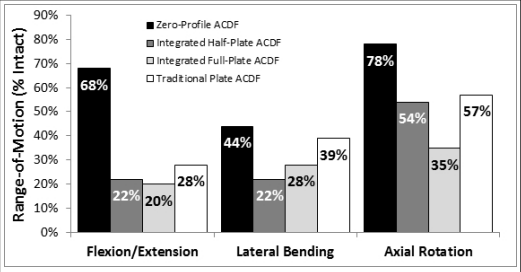

Figure 2. ROM (% Intact), Novel ACDF Iterations vs Traditional ACDF