Swallowing Function Following Anterior Cervical Discectomy and Fusion With and Without Anterior Plating: A SWAL-QOL and Radiographic Assessment

Brittany E. Haws, MD[1] ; Benjamin Khechen, BA[1]; Dil V. Patel, BS[1]; Mundeep S. Bawa BA[1] ; Harmeet S. Bawa, BA[1] ; Jordan A. Guntin BS[1]; Kaitlyn L. Cardinal, BS[1]; Andrew M. Block, BS[1]; Kern Singh, MD[1,2]

[1]Department of Orthopaedic Surgery, Rush University Medical Center

[2]Professor, Co-Director of the Minimally Invasive Spine Institute at Rush University Medical Center; Founder and President, Minimally Invasive Spine Study Group

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Disclosures

Brittany E. Haws, Benjamin Khechen, Dil V. Patel, Mundeep S. Bawa, Harmeet S. Bawa, Jordan A. Guntin, Kaitlyn L. Cardinal, Andrew M. Block– Nothing to disclose

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Introduction

- The use of anterior plating in anterior cervical discectomy and fusion (ACDF) is associated with improved postoperative outcomes compared to stand-alone cages.

- However, concerns exist regarding increased rates of postoperative dysphagia following an ACDF with use of anterior plating.

Aims and Objectives

- To quantify the effect of anterior plating on swallowing function as defined by the SWAL-QOL questionnaire following a primary, single-level ACDF.

Methodology

Study Population: Patients who underwent single-level MIS TLIF

68 primary, single-level ACDF patients

Stand-alone cage
N = 41

Cage with Anterior Plating
N = 27

Methodology

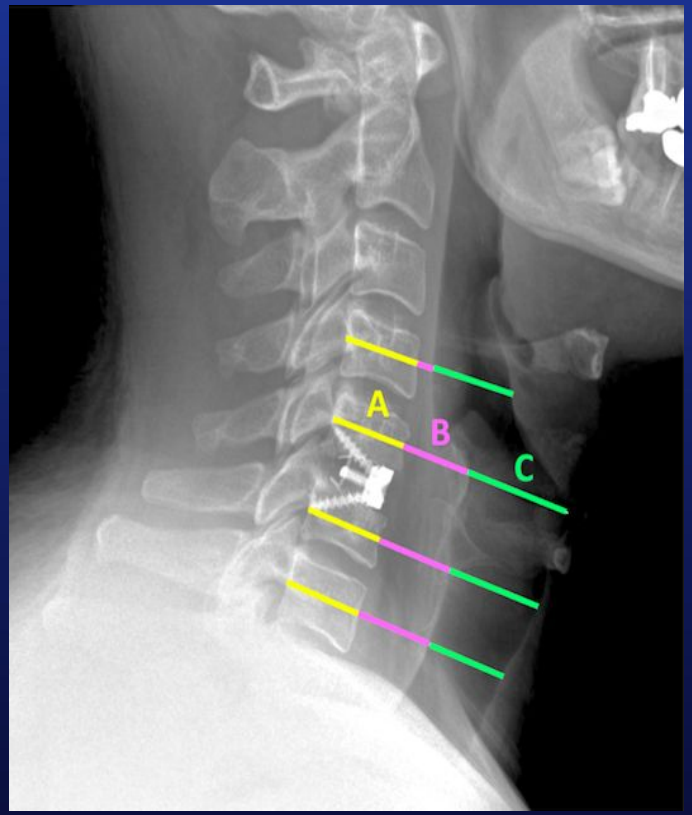
- Variables Analyzed
  - Patient demographics
  - Surgical Technique
  - Perioperative Variables
  - Complications
- Outcomes
  - Radiographic
  - SWAL-QOL
- Statistical Analyses
  - Student's t-test
  - Pearson's Chi-square analysis

Methodology

Swelling Index: B / A x 100%

Air Index: C / A x 100%

A: AP diameter of vertebral body
B: Anterior cortex of vertebral body to posterior wall of trachea
C: AP diameter of tracheal air window



Results

Table 1. Baseline characteristics

	Cage (N=41)	Plate (N=27)	†p-value
Age (Mean ± SD, years)	46.3 ± 8.1	48.7 ± 9.5	0.275
Sex (n)			0.446
Female	31.7% (13)	40.7% (11)	
Male	68.3% (28)	59.3% (16)	
Body Mass Index (n)			0.183
Non-obese (BMI < 30)	48.8% (20)	65.4% (17)	
Obese (BMI ≥ 30)	51.2% (21)	34.6% (9)	
Smoking Status (n)			0.070
Non-smoker	95.1% (39)	81.5% (22)	
Smoker	4.9% (2)	18.5% (5)	
Charlson Comorbidity Index (Mean ± SD)	0.9 ± 1.1	1.4 ± 1.2	0.103

SD = Standard deviation

†p-values calculated using Student's t-test and chi square analysis

No differences in baseline characteristics were identified between cohorts.

Results

Table 2. Perioperative Outcomes

	Cage (N=41)	Plate (N=27)	†p-value
Operative Time (Mean ± SD, min)	39.2 ± 8.9	43.6 ± 12.7	0.100
Estimated Blood Loss (Mean ± SD, mL)	27.3 ± 9.2	29.8 ± 14.2	0.386
Length of Hospital Stay (Mean ± SD, hours)	11.2 ± 9.6	9.8 ± 6.8	0.512
Day of Discharge			0.686
POD 0	80.5% (33)	85.2% (23)	
POD 1	17.1% (7)	14.8% (4)	
POD 2	2.4% (1)	0.0% (0)	
Complications			
Intraoperative	0.0% (0)	0.0% (0)	--
Inpatient	0.0% (0)	0.0% (0)	--
Postoperative	0.0% (0)	0.0% (0)	--

SD = Standard deviation; POD = Postoperative day

†p-value calculated using Student's t-test or chi square analysis

No differences in intraoperative characteristics, length of stay, and complications.

Results

Table 3. SWAL-QOL Outcomes

	Cage (N=41)	Plate (N=27)	†p-value
SWAL-QOL (Mean ± SD)			
Preoperative	93.3 ± 8.1	95.6 ± 7.5	0.245
6-week Postoperative	89.2 ± 14.1	93.5 ± 7.1	0.149
12-week Postoperative	89.5 ± 13.0	92.4 ± 10.4	0.387
Changes in SWAL-QOL (Mean ± SD)			
Preoperative	93.3 ± 8.1	95.6 ± 7.5	--
Δ 6-week Postoperative	-4.1 ± 12.4	-2.1 ± 8.0	0.457
Δ 12-week Postoperative	-3.1 ± 11.7	-3.0 ± 12.0	0.974

SD = Standard deviation

†p-value calculated using Student's t-test.

No differences in SWAL-QOL scores were observed at 6-week or 12-week postoperative.

Results

Table 4. Radiographic Outcomes

	Cage (N=41)	Plate (N=27)	†p-value
Swelling Index Average (Mean ± SD) ∫			
Preoperative	67.9 ± 18.4	75.0 ± 13.1	0.107
6-week Postoperative	**75.4 ± 16.4**	**87.6 ± 18.3**	**0.010**
12-week Postoperative	72.0 ± 15.9	80.5 ± 19.3	0.091
Swelling Index Δ (Mean ± SD)			
Δ 6-week Postoperative	7.5 ± 11.6	12.6 ± 13.5	0.124
Δ 12-week Postoperative	5.2 ± 9.3	6.0 ± 12.7	0.785
Air Index Average (Mean ± SD) ∫			
Preoperative	107.1 ± 20.6	115.5 ± 14.2	0.088
6-week Postoperative	106.6 ± 22.4	109.9 ± 18.0	0.551
12-week Postoperative	105.3 ± 22.4	108.6 ± 17.7	0.575
Air Index Δ (Mean ± SD)			
Δ 6-week Postoperative	-0.5 ± 14.8	-5.6 ± 14.1	0.189
Δ 12-week Postoperative	-1.4 ± 14.8	-7.3 ± 17.8	0.209

SD = Standard deviation
***Boldface** indicates statistical significance.
∫ Air/Swelling Index Average = Average of Tracheal Air/Pretracheal Swelling Measurement for Index, Index ± 1-level
Δ Air/Swelling Index Difference = Postoperative Air/Swelling Index Average – Preoperative Air/Swelling Index Average
†P-value calculated using Student's t-test.

The Plate cohort had a greater swelling index at 6-week follow-up
No differences in air indices at 6-week and 12-week follow-up.

Discussion

- Patients undergoing ACDF with anterior plating DO NOT experience greater postoperative swallowing dysfunction.
- Postoperative changes in radiographic swelling and air indices are similar regardless of instrumentation used.
- Anterior plating can be utilized in ACDF procedures WITHOUT concern for a higher risk of postoperative dysphagia.

Limitations

- Patients may have experienced more significant impairments earlier in their postoperative course that subsided prior to survey administration.

- SWAL-QOL survey is optimized for use in oropharyngeal oncologic and otolaryngology populations, sections of the survey regarding quality of life relating to severe swallowing dysfunction have limited utility among spine surgery populations.

Conclusions

- Patients that receive a cage with anterior plating DO NOT experience significant increases in dysphagia compared to patients that received a stand-alone cage.
- Use of anterior plating DOES NOT lead to greater radiographic swelling and air indices.
- Patients should be counselled to expect similar postoperative swallowing function following a primary, single-level ACDF regardless of instrumentation used.

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