Radiographic Assessment of Fusion Outcome Comparing PEEK Cage and FRA in Anterior Lumbar Interbody Fusion

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Learning Objectives

By the conclusion of this session, participants should be able to:

 Compare and contrast the different types of interbody spacers used in ALIF procedures.
Understand reasons for individual surgeon preference of one type of spacer over another.
Discuss fusion rate and its relevance to clinical outcome.

Introduction

Anterior lumbar interbody fusion (ALIF) is an accepted surgical intervention in the treatment of chronic back pain refractory to conservative therapy. Of the interbody spacers used in ALIF procedures, femoral ring allografts (FRAs) and polyetheretherketone (PEEK) cages are the most common. Although prior studies compared fusion outcomes of FRA versus PEEK, their small sample size and conflicting conclusions leave an important question unanswered: In ALIF surgery, does type of spacer affect fusion?

Methods

This was a retrospective radiographic study of 140 patients, operated on by 9 surgeons, who underwent ALIF with a PEEK cage or FRA between 2008-2016. Only patients with 1 year postoperative radiographic imaging were included. The fusion rate for operations using PEEK cages was compared to those using FRA. For this analysis all patients and intervertebral levels were included (N = 216: FRA = 188, PEEK = 28). To account for confounding covariates, subanalysis was also done on single level ALIFs (N = 76: FRA = 56, PEEK = 20). Propensity weighted logistic regression was used to control for both demographic factors and for the specific intervertebral level operated on.

Results

For the full analysis without demographic data, the FRA fusion rate (81%) and the PEEK fusion rate (75%) were not significantly different (p=0.61). Analysis of single level ALIFs showed FRA to be a nonsignificant independent predictor of higher fusion rate. As a result, FRA was demonstrated to be non-inferior to PEEK (odds ratio (OR) = 0.60, p = 0.52, 95% CI = 0.12-2.97).

Patient Characteristics

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Characteristic	Fusion (n=57)	Non-fusion (n=18)	p-value	
Age, Mean ± SD	53.2±16.2	54±12.6	0.846	
BMI, Mean ± SD	30.2±7.5	28.9±5.7	0.522	
Sex, n (%)			0.427	
Female	8 (44.4%)	32 (56.1%)		
Male	10 (55.6%)	25 (43.9%)		
Spacer used			0.544	
PEEK	6 (33.3%)	14 (24.6%)		
FRA	12 (66.7%)	43 (75.4%)		
Vertebral level			1.000	
L3-L4	1 (5.6%)	4 (7%)		
L4-L5	6 (33.3%)	17 (29.8%)		
L5-S1	11 (61.1%)	36 (63.2%)		
Smoking status			0.717	
Never	1 (5.6%)	6 (10.5%)		
Former	8 (44.4%)	19 (33.3%)		
Current	9 (50%)	32 (56.1%)		
Table 1. Characteristics of	of patients from single lev	el analysis in relation to their	fusion status.	

Risk Factors for Non-fusion

Risk Factor	Adjusted Odds Ratio (95% Confidence Interval)	P-value		
Age (years)	1 (0.94 - 1.07)	0.963		
Sex		0.558		
Female	1 [§]			
Male	0.67 (0.18 - 2.52)			
BMI	0.93 (0.82 - 1.06)	0.281		
Spacer used		0.478		
PEEK	1 [§]			
FRA	1.6 (0.44 - 5.87)			
Table 2. Odds ratios for non-fusion based on single level analysis (n=76). [§] Reference category				

Conclusions

Our study showed FRA to be non-inferior to PEEK when comparing the fusion rate both without demographic factors and when demographic factors were controlled for. While PEEK cages may be preferred by some surgeons as a non-biologic yet radiolucent interbody spacer, it is not likely to afford a higher fusion rate than FRA.

References

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