

Proximal Junctional Failure (PJF) Classification and Severity Scale: Development and Validation of a Standardized System

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Introduction

- Proximal junctional failure (PJF) is a potentially catastrophic complication following adult spinal deformity (ASD) surgery that requires accurate diagnosis.
- No validated classification exists for PJF.
- A PJF severity scoring scale (PJFSS) that integrated six distinct PJF characteristics was created using a modified Delphi technique.

Methods

- 15 case scenarios graded by 14 surgeons in 2 separate grading sessions (7 days between sessions).
- Classification assigned severity of 6 PJF characteristics: instrumentation problem, kyphosis/PLC integrity, level of UIV, neurological deficit, UIV/UIV+1 fracture, focal pain. (Table)
- Intra- and inter-rater reliability of the 6 PJF severity features and total PJFSS was calculated using Kappa values.
- Correlation with recommended treatment was assessed using logistic regression ($p < 0.05$).

Hypothesis

We hypothesized that the PJFSS system would be reliable and reproducible, and that PJF severity scales would correlate with recommended treatment plans.

Results

- Mean Kappa intra-rater (0.74) and inter-rater (0.71) agreement for severity scores of all six PJF characteristics was moderate to very good.
- Mean total PJFSS intra-rater (Kappa=0.47) and inter-rater (Kappa= 0.43) agreement was moderate.
- All six PJF features significantly* correlated with treatment recommendation (mean R value=0.34; $p < .01$).
- Total PJFSS score strongly* correlated with recommended treatment (mean R value=0.63; $p < 0.01$).
- PJFSS scores greater than or equal to seven uniformly resulted in recommendation for revision surgery.

Discussion / Conclusion

- The proposed PJFSS classification has good reliability and repeatability and correlates strongly with recommended treatment.
- Pain, kyphosis, neurological status, and instrumentation failure were the strongest predictors for recommendation for surgical revision.
- Further validation of the PJFSS classification using a prospective cohort is underway.

Learning Objectives

By the conclusion of this presentation, participants should:

- (1) Recognize that proximal junctional failure (PJF) is a potentially catastrophic complication following adult spinal deformity (ASD) surgery requiring accurate diagnosis,
- (2) Appreciate the application and potential benefits of the newly-proposed PJF severity scoring scale (PJFSS).

PJF Severity Scale	
Characteristic	Severity Score (points)
Neurological deficit	
None	0
Radicular pain	2
Myelopathy/Motor deficit	4
Focal pain	
None	0
VAS 4 or Less	1
VAS greater than or equal to 5	3
Instrumentation problem	
None	0
Partial fixation loss	1
Prominence	1
Complete fixation loss	2
Change in kyphosis / PLC integrity	
0-10 degrees	0
10-20 degrees	1
>20 degrees	2
PLC failure	2
UIV / UIV+1 fracture	
None	0
Compression fx	1
Burst / Chance fx	2
Translation	3
Level of UIV	
TL junction	0
Upper thoracic	1