

Radius of Curvature in Patient-Specific Short Rod Constructs Versus Standard Pre-Bent Rods

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INTRODUCTION

- Lumbar fusion effectively treats symptoms of degenerative disc disease and spinal instability in patients who have not responded to conservative treatments¹.
- Failure through adjacent segment disease and loss of lordosis is a complication in degenerative lumbar spinal fusions^{4,6-8,10-12}.
- Results of previous studies support the implication that alignment preservation, restoration and improvement should be considered when performing degenerative lumbar spinal fusions^{8,13}.

MATERIALS & METHODS

Study Design: Retrospective, single institution, cohort study.

Study Subjects: Patients who underwent posterior spinal surgeries involving 4 or less levels at University of Colorado Hospital between 9/2016 and 8/2018.

- 60 subjects were analyzed.
- Of the 60 rods analyzed, 27 had two definite curvatures and 33 had one curvature.
- For rods with two radii of curvature, the “Cranial” curve was positioned between the upper instrumented vertebra (UIV) and L4 or L5.
- The “Caudal” curve was positioned between L4 or L5 and the lower instrumented vertebra (LIV).
- The mean values of the caudal and cranial radii were compared to the 125mm standard rod using a 2-tailed paired t-test.

RESULTS

Table 1: Radius of curvature data for patient-specific rods of 60 patients

	1 ROC	2 ROC	
Number of Rods	33	27	
1 Level Fused	12	0	
2+ Levels Fused	21	27	
Portion of Rod	N/A	Cranial (UIV-L4/L5)	Caudal (L4/L5-LIV)
Avg Curvature (mm)	59	105	68
Std Dev	23.7	55.9	28.5
p-value	<0.00001*	0.1	<0.00001*

LIMITATIONS AND FUTURE DIRECTIONS

This study is limited as it is only looking at the rod curvature prior to implantation. Placement of the rod may greatly impact the amount of lordosis seen clinically. Furthermore, the use of interbody devices, the type of approach used, and the use of mono-versus polyaxial screws may have further effect on the lordosis. For example, more research could be done on polyaxial screws and how they affect the lordosis relative to radius of curvature. Further research is being collected to better understand the radiographic and clinical outcomes.

CONCLUSION AND CONFLICT OF INTEREST

PSSRs could help achieve or maintain sagittal alignment and prevent the sequela of flat back syndrome.

Conflicts of Interest: Evalina Burger, David Ou-Yang, and Christopher J. Kleck receive consulting payments from Medtronic.

Paper and References attached to the back of the poster.



Figure 1: The image shows a PSSR and a standard pre-bent rod side by side on a sterile field.



Figure 2



Figure 3

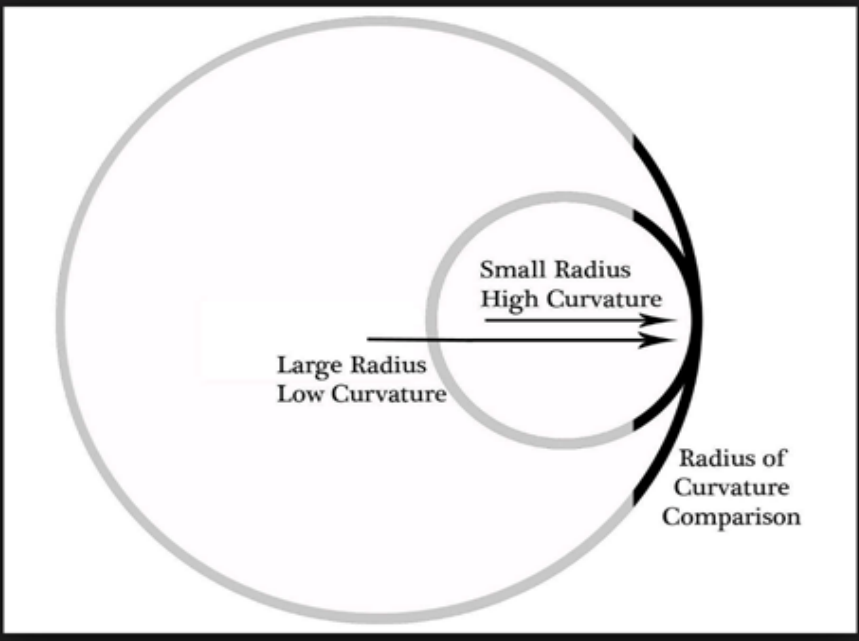


Figure 4

Figure 2: The image is an AP x-ray of the placement of PSSR shown 12 months post-operatively from a L4-LF PSF with ALIF.

Figure 3: The image is a lateral x-ray of the placement of PSSR shown 12 months post-operatively from a L4-LF PSF with ALIF.

Figure 4: The image demonstrates how a different radius changes the curvature of the circle and therefore the rod

AIM

The purpose of this study was to compare the radius of curvature of patient-specific rods, pre-bent for instrumentation based on individual spinopelvic parameters, to the standard rods currently in use (125-135mm) in a typical implant system.