

Transforaminal lumbar interbody fusion (TLIF) is performed to provide fixation and load-bearing capacity while restoring morphometric spine parameters and relieving symptoms in patients with degenerative disc disease. A supplemental interspinous process fixation plate (ISFP) as an adjunct to unilateral pedicle screw fixation (**Figure 1**) allows for a shorter operative time, reduced tissue destruction laterally, decreased risk of neural injury from screw placement, and increased bony surface area for supplemental posterolateral fusion as compared to bilateral pedicle screw placement. Biomechanical comparison of supplemental interspinous process fixation plate (ISFP) as an adjunct to unilateral pedicle screws (UPS) to bilateral pedicle screw (BPS) fixation was performed and significant increase in foraminal height has been previously reported, but the ability of this technique to achieve the same goals has not been studied clinically with standardized radiographic and clinical outcome measures.

Ninety-nine and 76 patients underwent TLIF for painful degenerative disc disease with either UPS/ISFP or BPS fixation, respectively. All consecutive patients who had no previous fusion surgeries, one- or two-level TLIF procedures (L3 – S1 levels) from May 2008 to November 2010 were included in this analysis. A direct comparison of clinical outcomes radiographic and surgical parameters was made.

The following radiographical measurements were compared: foraminal height (FH), disc height (DH), segmental alignment (SegA) - sagittal alignment of the fused segment(s); sagittal alignment (SagA) - lumbar sagittal alignment L1 to S1.

	I3/I4	I4/I5	I5/S1
UPS/ISFP ΔFH	-1.2 (-6.3 - 3.1)	-0.9 (-8.8 - 10)	0.8 (-7 - 7.1)
BPS ΔFH	-1.2 (-7.5 - 1.9)	-1.4 (-13.2 - 5.4)	0.1 (-5.4 - 13.6)
P value	P = 1.0	P = 0.5	P = 0.5
UPS/ISFP ΔDH	1.5 (-3.8 - 7.1)	1.4 (-8 - 11.1)	4.1 (0 - 14.5)
BPS ΔDH	2.4 (-3.5 - 6.5)	0.7 (-6.6 - 6.7)	1.1 (-1.9 - 5.8)
P value	P = 0.7	P = 0.3	P = 0.0001

	L3/L4 & L4/L5	L4/L5	L4/L5 & L5/S1	L5/S1
UPS/ISFP ΔSegA	-0.9 (-8.6 - 5)	0.7 (-10.4 - 11)	1.3 (-6.2 - 4.8)	0.4 (-5 - 8)
BPS ΔSegA	-1.8 (-7.9 - 2)	0.6 (-6.3 - 7.8)	0.9 (-14.2 - 11)	-2.6 (-15 - 10)
P value	P = 0.7	P = 0.9	P = 0.9	P = 0.2
UPS/ISFP ΔSagA	0.2 (-11 - 8)	0.5 (-12.5 - 18)	4.6 (-9.5 - 16)	-0.6 (-15 - 13)
BPS ΔSagA	3.5 (3 - 16.9)	2.1 (-11.2 - 23.7)	4.0 (14.7 - 20)	-0.1 (-15 - 16)
P value	P = 0.3	P = 0.5	P = 0.9	P = 0.9

Results

Foraminal height (FH) decrease was found at all levels, except at L5/S1 for both groups (**Table 1**). The increase in disc height (DH) was observed at all levels and in both groups, but there were no statistically significant differences, except at L5/S1 levels: the UPS/ISFP patient group had a significantly higher increase in DH (4.1 mm vs. 1.1 mm; $P<0.0001$). There were no statically significant changes or differences in SagA and SegA measurements between the groups (**Table 2**). Although clinical outcome scores improved significantly and satisfaction scores were quite high, there were no significant differences when clinical outcomes (VAS, SF-36, Oswestry, satisfaction) were compared between patients who underwent TLIFs using with UPS/ISFP or BPS fixation (**Table 3**). Highly significant differences were observed for all surgical parameters: 112 vs. 268 mL estimated blood loss ($p<0.0001$); 138 vs. 201 min surgery time ($p<0.0001$); 1.3 vs. 3.2 days hospitalization time ($p<0.0001$) for the UPS/ISFP and BPS patient groups, respectively.

	UPS+ISFP	BPS	P-Value
VAS/Back	2.3 (0 – 10)	2.8 (0 -8)	0.3
VAS/Leg	1.9 (0 – 10)	1.8 (0 – 9)	0.8
Oswestry (% disability)	23.4 (0 – 76)	24.8 (0 – 60)	0.8
SF-36 PCS	42.8 (20.1 – 62.4)	40.6 (23.1 – 57.3)	0.4
SF-36 MCS	48.9 (16.7 – 66)	53.2 (22.2 – 64.6)	0.1
Satisfaction	81% (16.7 – 100)	82.6% (25 – 100)	0.7

This study demonstrated that it is possible for TLIF with UPS/ISFP fixation to achieve clinical and radiological outcomes comparable to TLIF with BPS fixation. The potential benefits of performing TLIF with UPS/ISFP fixation are reduced blood loss, surgery and hospitalization times.

The participants will be able to appreciate the advantages of this less invasive approach presented.