**Table 1. Patient demographic and surgical outcomes between combined group and only PSF group**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **LLIF + PSF** | **PSF** | **p value** |
| No. of patients | 48 | 43 |  |
| Age | 69.2 ± 7.0 | 72.0 ± 4.9 | 0.076 |
| Sex (female) | 41 (85.4%) | 36 (83.7%) | 0.823 |
| BMI | 25.1 ± 2.74 | 24.9 ± 3.37 | 0.705 |
| BMD | -2.61 ± 2.74 | -2.69 ± 1.03 | 0.788 |
| Fusion level | 4.7 ± 1.3 | 4.7 ± 1.7 | 0.650 |
| LLIF level | 2.2 ± 0.7 |  |  |
| PLIF level | 0.81 ± 0.6 | 0.81 ± 0.8 | 0.672 |
| Follow-up month | 33.6 [24-55] | 37.6 [24-57] | 0.078 |
| Operation time | 438 ± 77.3 | 305 ± 75.0 | **<0.0001** |
| Estimated blood loss | 1966 ± 1251 | 2930 ± 2886 | **0.042** |
| Transfusion | 1350 ± 961 | 1752 ± 1933 | 0.213 |

LLIF = lateral lumbar interbody fusion; PSF = posterior spinal fusion; BMI = bone mass index; BMD = bone mineral density; PLIF = posterior lumbar interbody fusion

**Table 2. Clinical outcomes of ODI and VAS at pre-operative and follow-up**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **LLIF + PSF** | **PSF** | **p value** |
| **VAS (back)** |  |  |  |
| Pre-operative | 6.45 ± 2.90 | 6.98 ± 2.34 | 0.529 |
| Post-operative 3-month | 4.14 ± 2.48 | 3.97 ± 3.02 | 0.076 |
| Post-operative 2-year | 4.26 ± 2.70 | 4.15 ± 3.10 | 0.862 |
| Last follow-up | 5.30 ± 2.72 | 4.77 ± 3.01 | 0.509 |
| **VAS (leg)** |  |  |  |
| Preo-perative | 6.66 ± 2.96 | 7.55 ± 2.59 | 0.163 |
| Post-operative 3-month | 4.34 ± 3.19 | 3.29 ± 3.15 | 0.134 |
| **Changes of POD 3M** | **2.32 ± 4.07** | **4.26 ± 4.05** | **0.038** |
| Post-operative 2-year | 3.79 ± 2.91 | 3.95 ± 3.40 | 0.870 |
| Last follow-up | 4.78 ± 2.50 | 4.29 ± 3.03 | 0.529 |
| **ODI** |  |  |  |
| Pre-operative ODI | 56.5 ± 20.1 | 49.8 ± 19.1 | 0.117 |
| Post-operative 3-month | 47.1 ± 20.6 | 42.6 ± 19.0 | 0.314 |
| Post-operative 2-year | 38.4 ± 17.3 | 38.5 ± 20.8 | 0.982 |
| Last follow-up | 45.3 ± 15.4 | 39.0 ± 20.0 | 0.183 |

ODI = Oswestry disability index; VAS = visual analog scale; POD = postoperative day

**Table 3. Post-operative major complications and re-operations**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **LLIF + PSF** | **PSF** | **p value** |
| **Major complication** | 3 (6.3%) | 5 (11.6%) | 0.469 |
| Neurological  | 2 (motor weakness) | 2 (motor weakness) |  |
| Implant failure | 1 (PJF) | 1 (PJF) |  |
| Pulmonary thromboembolism | 0 | 1 |  |
| Wound infection | 0 | 1 (deep infection) |  |
| **Reoperation** | 3 (6.3%) | 1 (2.3%) | 0.619 |
| Neurological | 1 (hematoma evacuation) | 0 |  |
| Implant failure | 2 (PSF extension) | 1 (PSF extension) |  |
| Wound infection | 0 | 0 |  |

PJF = proximal junctional failure

**Table 4. Approach related complications by LLIF procedures**

|  |  |
| --- | --- |
| **LLIF related complication** | **No. patients (%)** |
| Hip flexion weakness | 4 (8.3%) |
| Anterior thigh pain | 8 (16.7%) |
| Thigh numbness | 6 (12.5%) |
| Incisional hernia | 1 (2.1%) |
| Total  | 19 (39.6%) |

**Table 5. Radiological outcomes including coronal and sagittal parameters**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **LLIF + PSF** | **PSF** | **p value** |
| **Coronal Cobb angle (°)** |  |  |  |
| Pre-operative | 19.3 ± 6.75 | 17.8 ± 7.38 | 0.137 |
| Δ Post-operative  | -13.7 ± 5.45  | -12.2 ± 6.62 | 0.078 |
| Δ Last follow-up  | -13.8 ± 5.74 | -12.3 ± 6.65 | 0.115 |
| **Coronal imbalance (mm)** |  |  |  |
| Pre-operative | 13.8 ± 11.2 | 13.5 ± 10.3 | 0.994 |
| Δ Post-operative | -0.09 ± 14.8 | -0.00 ± 13.6 | 0.977 |
| Δ Last follow-up | -2.90 ± 13.8 | 0.20 ± 15.5 | 0.324 |
| **Pelvic incidence** | 50.0 ± 10.4 | 53.2 ± 11.3 | 0.167 |
| **Sacral slope (°)** |  |  |  |
| Pre-operative | **22.8 ± 10.5** | **26.8 ± 9.37** | **0.048** |
| Δ Post-operative | 3.30 ± 8.21 | 2.61 ± 5.75 | 0.703 |
| Δ Last follow-up | **3.97 ± 7.78** | **0.79 ± 6.55** | **0.041** |
| **Pelvic tilt (°)** |  |  |  |
| Pre-operative | 26.7 ± 11.1 | 26.2 ± 9.85 | 0.811 |
| Δ Post-operative | -2.89 ± 6.80 | -2.11 ± 5.99 | 0.185 |
| Δ Last follow-up | -1.35 ± 6.98 | 0.80 ± 5.98 | 0.124 |
| **Lumbar lordosis (°)** |  |  |  |
| Pre-operative | **22.7 ± 16.4** | **29.1 ± 12.8** | **0.044** |
| Δ Post-operative | **15.3 ±11.1** | **8.87 ± 8.69** | **0.003** |
| Δ Last follow-up | **6.69±11.8** | **1.02 ± 12.4** | **0.029** |
| **Thoracic kyphosis (°)** |  |  |  |
| Pre-operative | 18.8 ± 13.4 | 22.7 ± 24.4 | 0.363 |
| Δ Post-operative | 2.77 ± 9.07 | -0.64 ± 22.0 | 0.492 |
| Δ Last follow-up | 1.72 ± 7.06 | 4.58 ± 12.9 | 0.616 |
| **Sagittal imbalance (mm)** |  |  |  |
| Pre-operative | 76.5 ± 65.9 | 52.5 ± 35.9 | 0.129 |
| Δ Post-operative | -33.7 ± 72.3 | -14.3 ± 37.4 | 0.193 |
| Δ Last follow-up | **-11.6 ± 60.7** | **15.3 ± 43.8** | **0.019** |
| **T1-pelvic angle (°)** |  |  |  |
| Pre-operative | 27.8 ± 14.4 | 25.4 ± 10.5 | 0.487 |
| Δ Post-operative | -5.26 ± 10.1 | -2.97 ± 7.93 | 0.398 |
| Δ Last follow-up | **-0.87 ± 7.76** | **1.90 ± 8.82** | **0.019** |