**SUPPLEMENTAL TABLES**

**Supplemental table 1. Univariate risk analysis of the 2-year postoperative residual low back pain (VAS score ≥4.5) among surgically treated patient with LSS.**

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | VAS ≥ 4.5 | VAS <4.5 | P value |
| **No. of patients** | 144 | 33.0% | 292 | 67.0% |  |
| **Age (*years*)** | 73.4 ± 7.7 | 70.7 ± 8.5 | 0.021\* |
| **Sex** | Female | 64 | 46.7% | 73 | 53.3% | <0.001\* |
| Male | 80 | 26.8% | 219 | 73.2% |
| **Etiology** | LSS | 130 | 32.6% | 269 | 67.4% | 0.585 |
| DS | 14 | 37.8% | 23 | 62.2% |
| **Current smoker** | No | 140 | 32.9% | 285 | 67.1% | 0.757 |
| Yes | 4 | 36.4% | 7 | 63.6% |
| **Opioid user** | No | 133 | 33.0% | 269 | 67.0% | 0.931 |
| Yes | 11 | 32.3% | 23 | 67.6% |
| **Frailty (*mFI-5*)** | Robust | 40 | 27.8% | 113 | 38.7% | <0.001\* |
| Prefrail | 66 | 45.8% | 134 | 45.9% |
| Frail | 38 | 26.4% | 45 | 15.4% |
| **Functional status****(*JOABPEQ3.1=1*)** | No | 85 | 28.9% | 209 | 71.1% | <0.001\* |
| Yes | 59 | 41.5% | 83 | 58.5% |
| **Job type** | Housewife | 38 | 33.9% | 74 | 66.1% | 0.618 |
| Office work | 59 | 34.1% | 114 | 65.9% |
| Manual labor | 14 | 28.6% | 35 | 71.4% |
| Unemployed | 40 | 39.2% | 62 | 60.8% |
| **Osteoporotic vertebral fracture** | No | 136 | 33.6% | 269 | 66.4% | 0.375 |
| Yes | 8 | 25.8% | 23 | 74.2% |
| **DISH** | No | 124 | 32.9% | 253 | 67.1% | 0.878 |
| Yes | 20 | 33.9% | 39 | 66.1% |
| **Cancer history** | No | 133 | 33.1% | 269 | 66.9% | >0.99 |
| Yes | 11 | 32.4% | 23 | 67.6% |
| **Rheumatoid arthritis** | No | 139 | 33.5% | 272 | 66.5% | 0.478 |
| Yes | 5 | 23.8% | 16 | 76.2% |
| **Cardiac disease** | No | 126 | 33.6% | 249 | 66.4% | 0.561 |
| Yes | 18 | 29.5% | 43 | 70.5% |
| **Hypertension** | No | 93 | 31.0% | 207 | 69.0% | 0.182 |
| Yes | 51 | 37.5% | 85 | 62.5% |
| **Parkinson disease** | No | 143 | 33.1% | 289 | 66.9% | >0.99 |
| Yes | 1 | 25.0% | 3 | 75.0% |
| **Cerebral palsy** | No | 140 | 32.9% | 285 | 67.1% | 0.757 |
| Yes | 4 | 36.4% | 7 | 63.6% |
| **Liver disease** | No | 141 | 32.9% | 287 | 67.1% | 0.723 |
| Yes | 3 | 37.5% | 5 | 62.5% |
| **Renal disease** | No | 138 | 33.2% | 278 | 66.8% | >0.99 |
| Yes | 6 | 30.0% | 14 | 70.0% |
| **Vascular disease** | No | 142 | 32.8% | 291 | 67.2% | 0.255 |
| Yes | 2 | 66.7% | 1 | 33.3% |
| **COPD** | No | 135 | 32.8% | 277 | 67.2% | 0.658 |
| Yes | 9 | 37.5% | 15 | 62.5% |
| **Diabetes**  | No | 117 | 32.5% | 243 | 67.5% | 0.351 |
| Yes | 27 | 35.5% | 49 | 64.5% |
| **Joint replacement** | No | 136 | 32.3% | 285 | 67.7% | 0.09 |
| Yes | 8 | 53.3% | 7 | 46.7% |
| **No. of comorbidities** | 0 | 33 | 29.5% | 79 | 70.5% | 0.51 |
| 1 | 60 | 31.7% | 129 | 68.3% |
| 2 | 38 | 36.9% | 65 | 63.1% |
| ≥ 3 | 13 | 40.6% | 19 | 59.4% |
| **Estimated bool loss (*mL*)** | 73.0 ± 33.2 | 74.5 ± 42.1 | 0.434 |
| **Time of surgery (*min.*)** | 38.4 ± 63.2 | 48.4 ± 146.4 | 0.729 |
| **Level decompressed** | 1.75 ± 0.81 | 1.74 ± 0.82 | 0.935 |
| **LBP (*VAS score*)** | 6.7 ± 2.3 | 5.0 ± 2.8 | <0.001\* |
| **Peri-op complication** | No | 135 | 33.3% | 272 | 66.7% | 0.721 |
| Yes | 9 | 30.0% | 21 | 70.0% |
| **%slip (2-year post-op ≥25%**) | No | 289 | 66.9% | 143 | 33.1% | >0.99 |
| Yes | 3 | 75.0% | 1 | 25.0% |
| **Instability (2-year post-op ≥10°)** | No | 287 | 67.1% | 141 | 32.9% | 0.723 |
| Yes | 5 | 62.5% | 3 | 37.5% |
| **Baseline HRQOL (JOABPEQ)** |
| Lumbar function | 41.9 ± 29.8 | 59.3 ± 30.2 | <0.001\* |
| Lower back pain | 32.4 ± 31.2 | 47.6 ± 36.7 | <0.001\* |
| Social life function | 34.1 ± 20.7 | 40.8 ± 21.5 | <0.001\* |
| Mental health | 39.2 ± 18.5 | 47.4 ± 18.0 | <0.001\* |
| Walking ability | 27.9 ± 28.4 | 30.9 ± 27.6 | 0.292 |
| LSS: lumbar spinal stenosis. DS: degenerative spondylolisthesis. COPD: chronic pulmonary obstructive disease. DISH: Diffuse idiopathic skeletal hyperostosis. Means and standard deviations. Numbers are given with percentages.　\*indicates statistically significant |

**Supplemental table 2. Comparisons of demographic data and HRQOLs between female and male patients.**

|  |  |  |
| --- | --- | --- |
| Variables | Mean difference | P value |
| **Age (*years*)** | 3.23 ± 1.02 [1.21, 5.25] | <0.001\* |
| **Level decompressed** | 0.00 ± 0.11 [-0.21, 0.21] | >0.99 |
| **Estimated blood loss (*mL*)** | -2.77 ± 14.39 [-31.08, 25.54] | 0.852 |
| **HRQOL (JOABPEQ)** |
| Lumbar function | -11.60 ± 3.86 [-19.21, 4.00] | <0.001\* |
| Lower back pain | -5.85 ± 4.41[-14.53, 2.83] | 0.191 |
| Social life function | -7.75 ± 2.81 [-13.28, 2.21] | 0.003\* |
| Mental health | -6.18 ± 2.33 [-10.77, 1.59] | 0.002\* |
| Walking ability | -4.66 ± 3.51 [-11.58, 2.25] | 0.192 |
| **Lower back pain (*VAS score)*** |
| Baseline | 0.87 ± 0.36 [0.16, 1.58] | 0.018\* |
| 2-year post-op  | 0.84 ± 0.35 [0.15, 1.53] | 0.019\* |
| Delta value | 0.03 ± 0.41 [-0.79, 0.84] | 0.952 |
| Delta value indicates the differences between the baseline values and postoperative corresponding values. Means and standard error. 95%CI in bracket. \* indicates statistically significant. |

**Supplemental table 3. Comparison of the lower back pain intensity in patients between baseline lower back pain VAS score ≥7.5 and <7.5.**

|  |  |  |  |
| --- | --- | --- | --- |
| Baseline LBP | VAS ≥7.5 | VAS <7.5 | P value |
| **No. of patients** | 135 | 301 |  |
| **Lower back pain (*VAS score)*** |
| Baseline  | 8.60 ± 0.77 | 4.23 ± 2.2 | <0.001\* |
| 2-year post-op  | 4.08 ± 3.18 | 2.91 ± 2.49 | <0.001\* |
| Delta value | 4.52 ± 3.17 | 1.32 ± 2.73 | <0.001\* |
| Delta value indicates the differences between the baseline values and postoperative corresponding values. Means and standard deviations. 95%CI in bracket. \* indicates statistically significant |

**Supplemental table 4. Univariate risk analysis of the baseline severe lower back pain (VAS score ≥7.5) among surgically treated patient with LSS.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables |  | VAS <7.5 | VAS≥ 7.5 | p value |
| **No. of patients** | 301 (69.0%) | 135 (31.0%) |  |
| **Age (*years*)** | 71.0 ± 8.3 | 73.1 ± 8.3 | 0.015\* |
| **Gender** | Female | 81 (59.1%) | 56 (40.6%) | 0.004\* |
| Male | 220 (73.6%) | 79 (26.4%) |
| **Etiology** | LSS | 278 (69.7%) | 121 (30.3%) | 0.221 |
| DS | 23 (62.2%) | 14 (37.8%) |
| **Job status** | Housewife | 81 (72.3%) | 31 (27.7%) | 0.421 |
| Office job | 120 (69.4%) | 53 (30.6%) |
| Labor job | 29 (59.2%) | 20 (40.8%) |
| Unemployed | 71 (69.6%) | 31 (30.4%) |
| **Current smoker** | No | 295 (69.4%) | 130 (30.6%) | 0.292 |
| Yes | 6 (54.5%) | 5 (45.5%) |
| **Opioid user** | No | 280 (69.7%) | 122 (30.3%) | 0.339 |
| Yes | 21 (61.8%) | 13 (38.2%) |
| **No. of comorbidities** | 0 | 78 (69.6%) | 34 (30.4%) | 0.387 |
| 1 | 135 (71.4%) | 54 (28.6%) |
| 2 | 70 (68.0%) | 33 (32.0%) |
| ≥ 3 | 18 (56.3%) | 14 (43.8%) |
| **Diabetes** | No | 247 (68.6%) | 113 (31.4%) | 0.785 |
| Yes | 54 (71.1%) | 22 (28.9%) |
| **COPD** | No | 282 (68.4%) | 130 (31.6%) | 0.365 |
| Yes | 19 (79.2%) | 5 (20.8%) |
| **Hypertension** | No | 210 (70.0%) | 90 (30.0%) | 0.576 |
| Yes | 91 (66.9%) | 45 (33.1%) |
| **Parkinson disease** | No | 298 (69.0%) | 134 (31.0%) | >0.999 |
| Yes | 3 (75.0%) | 1 (25.0%) |
| **Joint replacement** | No | 294 (69.8%) | 127 (30.2%) | 0.084 |
| Yes | 7 (46.7%) | 8 (53.3%) |
| **Rheumatoid arthritis** | No | 283 (68.2%) | 132 (31.8%) | 0.144 |
| Yes | 18 (85.7%) | 3 (14.3%) |
| **Cardiac disease** | No | 256 (68.3%) | 119 (31.7%) | 0.456 |
| Yes | 45 (73.8%) | 16 (26.2%) |
| **Vascular disease** | No | 300 (69.3%) | 133 (30.7%) | 0.228 |
| Yes | 1 (33.3%) | 2 (66.7%) |
| **Renal disease** | No | 290 (69.7%) | 126 (30.3%) | 0.214 |
| Yes | 11 (55.0%) | 9 (45.0%) |
| **Liver disease** | No | 295 (68.9%) | 133 (31.1%) | >0.999 |
| Yes | 6 (75.0%) | 2 (25.0%) |
| **Cancer history** | No | 280 (69.7%) | 122 (30.2%) | 0.341 |
| Yes | 21 (61.8%) | 13 (38.2%) |
| **Cerebral palsy** | No | 296 (69.6%) | 129 (30.4%) | 0.103 |
| Yes | 5 (45.5%) | 6 (54.5%) |
| **Osteoporotic vertebral** **fracture** | No | 279 (33.3%) | 126 (66.7%) | 0.809 |
| Yes | 22 (29.0) | 9 (71.0%) |
| **DISH** | No | 261 (69.2%) | 116 (30.8%) | 0.824 |
| Yes | 40 (67.8%) | 19 (32.2%) |
| **Frailty (mFI-5class)** | Robust | 116 (75.8%) | 37 (24.2%) | 0.079 |
| Prefrail | 131 (65.5%) | 69 (34.5%) |
| Frail | 54 (65.1%) | 29 (34.9%) |
| **Functional dependence****(JOABPEQ3.1=1)** | No | 216 (73.5%) | 78 (26.5%) | 0.006\* |
| Yes | 85 (59.9%) | 57 (40.1%) |
| **Baseline HRQOL (JOABPEQ)** |
| Lumbar function | 58.5 ± 29.9 | 42.3 ± 31.1 | <0.001\* |
| Lower back pain | 50.5 ± 36.4 | 23.7 ± 27.7 | <0.001\* |
| Social life function | 43.7 ± 21.5 | 27.5 ± 16.7 | <0.001\* |
| Mental health | 48.9 ± 17.5 | 35.5 ± 17.2 | <0.001\* |
| Walking ability | 34.7 ± 29.6 | 19.2 ± 19.9 | <0.001\* |
| LSS: lumbar spinal stenosis. DS: degenerative spondylolisthesis. COPD: chronic pulmonary obstructive disease. DISH: Diffuse idiopathic skeletal hyperostosis. Means and standard deviations. Numbers are given with percentages |

**Supplemental table 5. Comparisons of demographic data and HRQOLs between propensity score matched female and male patients with LSS.**

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Male | Female | p value |
| **No. of patients** | 102 | 102 |  |
| **Age (years)** | 74.1 ± 7.3 [72.6, 75.6] | 72.7 ± 6.9 [71.3, 74.1] | 0.204 |
| **Level decompressed** | 1.80 ± 0.92 [1.63, 1.97] | 1.75 ± 0.81 [1.58, 1.94] | 0.678 |
| **Etiology (LSS)** | 94 (92.2%) | 92 (90.2%) | 0.806 |
| **Joint replacement** | 3 (2.9%) | 4 (3.9%) | >0.99 |
| **Frailty (mFI-5)** |  |
| Robust | 30 (29%) | 33 (32%) | 0.782 |
| Prefrail | 52 (51%) | 47 (46%) |
| Frail | 20 (20%) | 22 (22%) |
| **HRQOLs (JOABPEQ)** |  |  |  |
| Baseline: Mental health | 41.7 ± 18.9 [37.5, 45.9] | 40.0 ± 16.0 [36.2, 43.5] | 0.520 |
| **Lower back pain (*VAS score*)** |  |
| Baseline | 6.09 ± 2.61 [5.55, 6.64] | 5.94 ± 2.50 [5.40, 6.49] | 0.691 |
| 2-year post-op  | 3.76 ± 2.78 [3.23, 4.34] | 3.97 ± 2.87 [3.36, 4.58] | 0.613 |
| Delta value | 3.12 ± 2.93 [2.43, 3.81] | 2.70 ± 2.97 [2.01, 3.38] | 0.381 |
| LSS: lumbar spinal stenosis. Delta value indicates the differences between the baseline values and postoperative corresponding values. Means and standard deviations. 95%CI in bracket. Percentage in parenthesis. |