Does the fusion status after posterior lumbar interbody fusion affect the patient-based QOL outcomes? -An evaluation using patient-based outcome measure (JOABPEQ)-

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The purpose of this study was to investigate the effect of fusion status after posterior lumbar interbody fusion (PLIF) on the patient-based QOL outcomes using Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ).
What is JOABPEQ?

- Patient-based evaluation questionnaire referred to SF-36 and RDQ
- Patients answer 25 questions
  - Five functional scores for corresponding domains are calculated according to the provided formulas
    - Low back pain
    - Lumbar function
    - Walking ability
    - Social life function
    - Mental health
- The score of each domain is 0-100; higher scores indicate a better condition

Materials and Methods

166 consecutive patients who underwent one-level PLIF (2010/11 ~ 2013/2)

Fusion status was judged by anterioposterior and dynamic lateral plain radiographs at 6 months after surgery in 94 patients (Ito’s method)


- excluding the patients
  - unable to analyze JOABPEQ
  - with rheumatoid arthritis
  - with dialysis

66 patients achieved fusion

Matching age and gender with incomplete fusion group

Fusion group (43 patients)

Incomplete fusion group (28 patients)
Materials and Methods

Outcome assessment

- JOA Score for Low Back Pain (JOA score) before and 6 months after surgery
  - Clinical severity assessed by physicians

- Recovery rate of JOA Score (Hirabayashi’s methods)
  - \[ \text{postoperative score} - \text{preoperative score} \]
  - \[ \frac{29 - \text{preoperative score}}{29 - \text{preoperative score}} \times 100 \% \]

- JOABPEQ before and 6 months after surgery
  - QOL outcomes assessed by patients

- Acquired score of JOABPEQ (all 5 domains)
  - \[ \text{postoperative score} - \text{preoperative score} \]
# Results

## Patients’ demographic and clinical data

<table>
<thead>
<tr>
<th></th>
<th>Fusion (n=43)</th>
<th>Incomplete fusion (n=28)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (year)</strong></td>
<td>69.1±8.3</td>
<td>70.9±9.8</td>
<td>0.2055*</td>
</tr>
<tr>
<td><strong>Gender (male:female)</strong></td>
<td>23:20</td>
<td>15:13</td>
<td>&gt;0.9999**</td>
</tr>
<tr>
<td><strong>Additional laminectomy (y:n)</strong></td>
<td>21:22</td>
<td>14:14</td>
<td>&gt;0.9999**</td>
</tr>
<tr>
<td><strong>Number of laminectomy level</strong></td>
<td>0.7±0.8</td>
<td>0.6±0.8</td>
<td>0.6762*</td>
</tr>
<tr>
<td><strong>Fusion level (L2/3:3/4:4/5:5/S1)</strong></td>
<td>2:7:26:8</td>
<td>2:5:12:9</td>
<td>0.4767¶</td>
</tr>
</tbody>
</table>

Data are expressed as mean ± SD
* Mann-Whitney’s U test
** Fisher’s exact probability test
¶ Chi-square test
**Results**

Pre- and post-operative JOA score and recovery rate

<table>
<thead>
<tr>
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<th>Fusion (n=43)</th>
<th>Incomplete fusion (n=28)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Preoperative JOA score</td>
<td>12.7±4.7</td>
<td>12.1±3.0</td>
<td>0.3665</td>
</tr>
<tr>
<td>Postoperative JOA score</td>
<td>26.6±2.5</td>
<td>25.8±2.5</td>
<td>0.1051</td>
</tr>
<tr>
<td>Recovery rate (%)</td>
<td>84.2±15.3</td>
<td>80.8±14.3</td>
<td>0.2006</td>
</tr>
</tbody>
</table>

Data are expressed as mean ± SD

Mann-Whitney’s U test

![Graph showing preoperative and postoperative JOA scores and recovery rates](image-url)
Results

Preoperative score and acquired score of JOABPEQ

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<th>Incomplete fusion (n=28)</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Preoperative score</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low back pain</td>
<td>37.5±35.1</td>
<td>39.3±37.0</td>
<td>0.9096</td>
</tr>
<tr>
<td>Lumbar function</td>
<td>53.9±28.2</td>
<td>53.6±30.8</td>
<td>0.9153</td>
</tr>
<tr>
<td>Walking ability</td>
<td>28.9±25.3</td>
<td>25.8±25.6</td>
<td>0.5250</td>
</tr>
<tr>
<td>Social life function</td>
<td>33.8±20.7</td>
<td>32.8±19.8</td>
<td>0.9389</td>
</tr>
<tr>
<td>Mental health</td>
<td>46.0±18.4</td>
<td>43.1±16.5</td>
<td>0.3577</td>
</tr>
<tr>
<td><strong>Acquired score</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low back pain</td>
<td>51.3±36.7</td>
<td>27.4±44.7</td>
<td>0.0489</td>
</tr>
<tr>
<td>Lumbar function</td>
<td>20.2±24.8</td>
<td>18.4±35.2</td>
<td>0.4843</td>
</tr>
<tr>
<td>Walking ability</td>
<td>44.1±33.3</td>
<td>31.5±30.2</td>
<td>0.1015</td>
</tr>
<tr>
<td>Social life function</td>
<td>35.8±24.4</td>
<td>23.0±24.1</td>
<td>0.0497</td>
</tr>
<tr>
<td>Mental health</td>
<td>17.0±21.2</td>
<td>15.6±17.0</td>
<td>0.7506</td>
</tr>
</tbody>
</table>

Data are expressed as mean ± SD
Mann-Whitney’s U test

* *p<0.05
Several authors suggested that pseudarthrosis after lumbar arthrodesis affect long-term outcome but did not affect short-term outcome. The clinical outcome was excellent to good in 86% of patients with a solid fusion after posterolateral fusion (PLF) and in 56% of patients with a pseudarthrosis in 5-14 years of follow up. (Kornblum MB, et al. Spine 2004;29:726-733)

The patients with fusion after PLF achieved better clinical results than without fusion at more than 5 years follow-up, although there was no significant difference of clinical results at 1 and 3 years follow up. (Tsutsumimoto T, et al. Eur Spine J 2008;17:1107-1112)

There was no difference of outcome obtained from Korean Oswestry Disability Index, SF-36 and VAS between fusion and pseudarthrosis one year after PLIF. (Lee JH, et al. Spine J 2011;11:647-653)

There was no statistically significant correlation between the symptoms evaluated by JOA score and fusion status after PLIF (27.6 months of mean follow-up period). (Nakashima H, et al. Eur Spine J 2011;20:1496-1502)
Discussions

In this study... (short-term outcome; 6Mo postoperatively)

**Fusion group obtained better outcomes in patients’ QOL (assessed by JOABPEQ)**

- Low back pain ↓
- Social life function ↑

Physician-based assessment could not reveal the difference of outcome by fusion status

*The achievement of fusion after PLIF is essential for not only long-term QOL outcomes but also short-term ones*
Conclusions

- Fusion group obtained better outcome than incomplete fusion group in patients’ QOL.

- Incomplete fusion after PLIF correlated with disability from low back pain and lack of social life function.

- The achievement of fusion after PLIF is essential for improvement of patients’ QOL not only long-term but also short-term.
Disclosure

No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this study.