Impact of Obesity on Cost per Quality Adjusted Life Years Gained following Anterior Cervical Discectomy and Fusion in Elective Degenerative Pathology

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Background: Obese patients are at increased risk of co-morbidities and complications after spine surgery, which might result in increased cost and lower quality of life compared to their non-obese counterparts. The aim of present study was to determine the cost-utility following anterior cervical discectomy and fusion (ACDF) in obese patients.

Methods: A total of 299 consecutive patients undergoing elective ACDF for degenerative cervical pathology over a period of four-years were included in the study. One and two-year medical resource utilization, missed work, and health state values (QALYs), calculated from the EQ-5D with US valuation using time weighted area under the curve approach) were assessed. Two-year resource use was multiplied by unit costs based on Medicare national allowable payment amounts (direct cost). Patient and caregiver workday losses were multiplied by the self-reported gross-of-tax wage rate (indirect cost). Total cost (direct + indirect) was used to compute cost per QALY gained. Patients were defined as obese for body mass index (BMI) $\geq 35$ based on the WHO definition of class-II obesity. A subgroup analysis was conducted in morbidly obese patients (BMI $\geq 40$).

Results: A significant improvement in pain (NP/AP), disability (NDI) and quality of life (EQ-5D and SF-12) was noted 2-year after surgery ($p < 0.0001$). Mean total 2-year cost was $24,524 for obese patients and $22,492 for non-obese patients ($P = 0.06$). Obese patients had lower mean cumulative 2-year gain in QALYs vs. non-obese patients (0.39 vs. 0.47 QALYs, $P = 0.19$, Figure 1). Two-year cost-utility in patients obese vs. non-obese patients was $65,805/QALY vs. $47,634/QALY$. Morbidly obese patients had significantly lower (0.15) QALYs gained and significantly higher cost $168,915/QALY gained at 2-years ($P < 0.0001$) (Table 1).
Presentation #10

**Conclusion:** ACDF provided a significant gain in health-state utility in obese patients, with a mean 2-year cost-utility of $65,805/QALY gained, which can be considered moderately cost-effective. Morbidly obese patients had lower cost-effectiveness; however, surgery does provide a significant improvement in outcomes. Obesity needs to be taken into consideration as physician and hospital reimbursements move toward a bundled model.

Table 1. QALYs gained and cost per QALY at 24months after ACDF

<table>
<thead>
<tr>
<th></th>
<th>&lt;35 (219)</th>
<th>≥35 (80)</th>
<th>P-value</th>
<th>≥40 (30)</th>
<th>P-value</th>
</tr>
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<tbody>
<tr>
<td>QALY gained 24m</td>
<td>0.47</td>
<td>0.39</td>
<td>0.19</td>
<td>0.15</td>
<td>0.036</td>
</tr>
<tr>
<td>Direct cost 24m</td>
<td>18232.94</td>
<td>20598.90</td>
<td>0.03</td>
<td>21323.96</td>
<td>0.03</td>
</tr>
<tr>
<td>Total cost 24m</td>
<td>22492.63</td>
<td>25428.18</td>
<td>0.06</td>
<td>24687.37</td>
<td>0.05</td>
</tr>
<tr>
<td>Cost utility 24 m</td>
<td>$47,634</td>
<td>$65,805</td>
<td>0.13</td>
<td>$168,915</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Figure 1. QALYs gained in obese and non-obese patients 2-years after ACDF surgery for degenerative cervical diseases