A Validation of the Oswestry Spinal Risk Index

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Background

- Oswestry Spinal Risk Index (OSRI) published in 2013 (Balain et al) aims to predict survival in patients with spinal metastases

- Cohort of 199 patients with spinal metastases

- Primary tumour pathology and general condition most important factors in predicting survival: \( \text{OSRI} = \text{PTP} + 1-\text{GC} \)

- Predicted survival important factor when planning treatment

- Less need for lengthy investigations when time is of the essence
Methods

- Salford Royal Foundation Trust neurosurgical database
- Prospectively recorded acute referrals to on call spinal surgery and neurosurgery
- Notes reviewed to identify patients undergoing surgery for spinal metastases between January 2009 & November 2011
- Primary tumours of the spine or intradural tumours excluded
Methods

- 100 patients identified
- Primary Tumour Pathology (PTP) score allocated based on system used by Tomita et al: based on speed of growth of primary tumour
- General condition score allocated with the categories used by Balain et al, based on the Karnofsky Performance Status
- Kaplan-Meier survival analysis conducted to compare survival between patients with varying OSRI scores
Methods

- Median survival times with 95% confidence intervals determined for each OSRI score

- Pairwise comparison of survival between groups assessed using Mantel-Cox log rank statistic

- Nagelkerke’s pseudo-$R^2$ statistic evaluated for a logistic regression analysis of patient survival using the OSRI score as a predictor
Results

- Mean age 60.3 years (19-88)
- Most common tumour type: breast (n=24) followed by lung (n=20)
- 74 patients died during analysis period
- Analysis undertaken July 2013
Median survival times and confidence intervals for patients with differing OSRI scores

<table>
<thead>
<tr>
<th>OSRI score</th>
<th>Median survival time (days)</th>
<th>95% CI for survival time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (n=12)</td>
<td>&gt;50% survived until end of analysis</td>
<td>&gt;50% survived until end of analysis</td>
</tr>
<tr>
<td>2/3 (n=56)</td>
<td>325</td>
<td>140-510</td>
</tr>
<tr>
<td>4/5 (n=11)</td>
<td>262</td>
<td>170-354</td>
</tr>
<tr>
<td>6 (n=11)</td>
<td>160</td>
<td>55-265</td>
</tr>
<tr>
<td>7 (n=10)</td>
<td>58</td>
<td>24-92</td>
</tr>
<tr>
<td>All (n=100)</td>
<td>253</td>
<td>165-341</td>
</tr>
</tbody>
</table>
Survival curves for patients with varying OSRI scores
Results

♦ Nagelkerke’s pseudo-$R^2$ statistic of 0.145 obtained for logistic regression analysis of patient survival (OSRI score single predictor)

♦ 0.167 when patient ages were included as a controlling variable

♦ Balain et al, proposing the OSRI found this score to have a Nagelkerke’s $R^2$ of 0.28.
Results

- The hazard ratio of 1.75 obtained for the OSRI score indicates that the hazard of death is raised by 75% for each advance in the OSRI classification.

- Using logistic regression (controlled for age model) 76% of patients were correctly classified.
Discussion

- The OSRI is a significant predictor of survival in our patient population.

- It is a useful tool when considering surgical treatment for patients with spinal metastases.

- The index has demonstrated good transferability across data sets, self-consistency and predictive capability in a validated study.

- We recommend its use.