Does bracketing reduce positive margin rates in patients undergoing partial mastectomy?

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Background

- With the advent of localization for non-palpable tumors, some have advocated bracketing with two or more devices to more accurately define the tumor extent and reduce positive margins.
- We sought to determine factors associated with the use of bracketing and its impact on margin positivity.

Methods

- Data from a randomized controlled trial of patients undergoing partial mastectomy were used to determine the effect of bracketing and the number of wires used to locate non-palpable tumors on positive margin rate after partial mastectomy.
- Margins for this analysis were assessed based on the initial partial mastectomy (inclusive of any selective margins that were taken as a result of specimen radiography or surgeon gross assessment).
- A positive margin was defined as either invasive tumor at ink or DCIS within 2 mm. Non-palpable tumors were assessed using imaging (p=0.042) and on final pathology (p=0.029)

Trial Schema

- Stage 0-3 breast cancer
- Partial mastectomy

- Selective add'l margins based on surgeon's retrospective assessment (gross/imaging)
- Intraoperative randomization

Table 1. Factors associated with bracketing

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number of wires (n; %)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median patient age; yrs</td>
<td>61 (60) 74</td>
<td>0.357</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td>0.686</td>
</tr>
<tr>
<td>White</td>
<td>147 (81.7) 22 (71.0)</td>
<td>4.800</td>
</tr>
<tr>
<td>Black</td>
<td>17 (9.4) 5 (16.1)</td>
<td>0.0</td>
</tr>
<tr>
<td>Asian</td>
<td>2 (1.2) 1 (3.3)</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>14 (7.8) 9 (2.7)</td>
<td>1.200</td>
</tr>
<tr>
<td>Hispanic Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>4 (2.8) 2 (7.4)</td>
<td>0.067</td>
</tr>
<tr>
<td>Not Hispanic</td>
<td>229 (85.6) 38 (29.8)</td>
<td>3.200</td>
</tr>
<tr>
<td>Mammographic mass</td>
<td>113 (62.8) 16 (51.6)</td>
<td>1.200</td>
</tr>
<tr>
<td>Calcifications</td>
<td>77 (42.8) 17 (54.8)</td>
<td>5.100</td>
</tr>
<tr>
<td>Presence of DCIS</td>
<td>113 (72.8) 23 (74.2)</td>
<td>4.800</td>
</tr>
<tr>
<td>Extensive Intraductal Component</td>
<td>113 (68.6)</td>
<td>0.829</td>
</tr>
<tr>
<td>Tumor Size (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ductal</td>
<td>123 (87.9)</td>
<td></td>
</tr>
<tr>
<td>Lobular</td>
<td>11 (7.9)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6 (4.3)</td>
<td></td>
</tr>
<tr>
<td>Neoadjuvant chemotherapy</td>
<td>3 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Lymphovascular invasion</td>
<td>15 (8.3)</td>
<td></td>
</tr>
<tr>
<td>Median tumor size by imaging, cm</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Median pathologic tumor size, cm</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Median excision rate (% of resected, cm)</td>
<td>60.3</td>
<td></td>
</tr>
<tr>
<td>Positive margins (%)</td>
<td>32.8</td>
<td></td>
</tr>
<tr>
<td>Median # of positive margins</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Volume of tissue resected (cm),</td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>Median total operative time (min)</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

Results

- A total of 216 patients underwent partial mastectomy with wire localization in this study.
  - 31 (14.4%) had bracketing with 2 wires, and 5 (2.3%) had bracketing with 3 wires
  - Positive margin rates were 32.8%, 45.2% and 40.0% in the 1-, 2-, and 3-wire group, respectively (p=0.047).
  - Factors associated with bracketing are shown in Table 1. Patients who underwent bracketing tended to have larger tumors on imaging (p=0.042) and on final pathology (p=0.029) – tumor size tended to be underestimated on imaging.
  - Those who were bracketed were also more likely to present with calcifications (p<0.009).
  - Bracketing with more wires resulted in a larger volume of tissue resected (p<0.001).

Conclusions

- The median number of positive margins did not vary significantly depending on the number of wires placed for bracketing (p=0.057), although there was a trend towards having more positive margins in patients who had bracketing.
  - Controlling for pathologic tumor size and presence of calcifications, bracketing did not affect the likelihood of having more than one positive margin.

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