Department of Surgery

Radioactive Counts and Sentinel Node Positivity in Breast Cancer Patients; A Single Surgeon's Longitudinal Experience

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Objective:

Pathologic nodal staging employing the technique of lymphatic mapping and sentinel lymph node (SLN) biopsy has become the standard of care for patients with invasive breast cancer.[1] Most surgeons utilize a radioactive tracer, with or without preoperative lymphoscintigraphy, alone or in conjunction with a vital blue dye to identify the pertinent nodes. The literature suggests that all nodes which have gamma counts > 10 times the background count should be considered sentinel nodes and retrieved[2], as should all clinically suspicious nodes and any with blue dye. There is literature describing the number of SLNs that should be removed to minimize the false negative rate,[3,4,5,6] but these all represent the results of multiple surgeons and do not consider the possible impact of increased experience. At our institution we utilized a single surgeon, longitudinal database to determine the degree to which the SLN counts correlate to the presence of metastasis and if we could identify an optimal number of SLNs to remove to minimize false negative rate and the number of nodes retrieved.

Methods:

- Retrospective review of a prospectively maintained database.
- Chronicles a single surgeon's breast cancer SLN biopsy experience from 1997-2011.
- The first seven years routinely using the dual tracer technique and the final seven utilizing radioisotope routinely and blue dye for inability to perform cutaneous mapping.
- 823 SLN procedures were attempted
- 152 patients (19%) met the inclusion criteria of at least one positive SLN and one negative SLN and mapping performed by radioactive counts (see Figure 1).
- Patients that had a failed mapping or had only blue dye used in their mapping were excluded.
- We then correlated the SLN radioactive counts and the pathology for each patient. The presence of metastasis in the most radioactive node(s) was then noted.
- Chi Square analysis was used to compare the rates of identification of metastasis in the most radioactive nodes.

Figure 1. Patient Inclusion Criteria
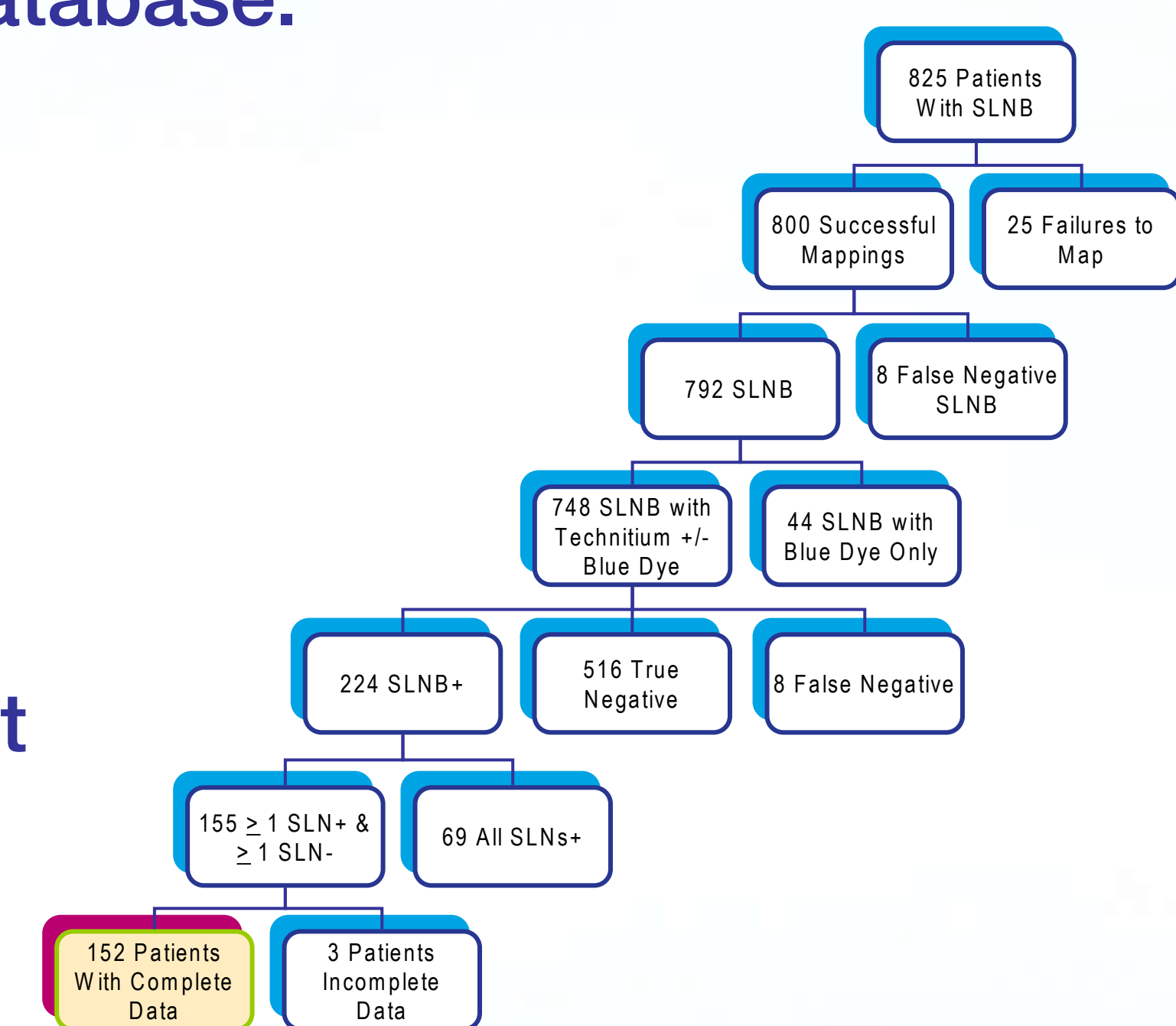
Results:

- Of the original 823 patients in which SLN biopsy was attempted, 790 procedures had successful identification of at least 1 SLN (96%).
- There were 25 procedures in which a SLN was unable to be identified (3%) and 8 false negative procedures (1%)
- The node with the highest count was positive for metastatic disease in 105 (69%).
- Removing the two nodes with the highest counts identified 140 (92%) node positive patients.

Table 1. Patient Characteristics

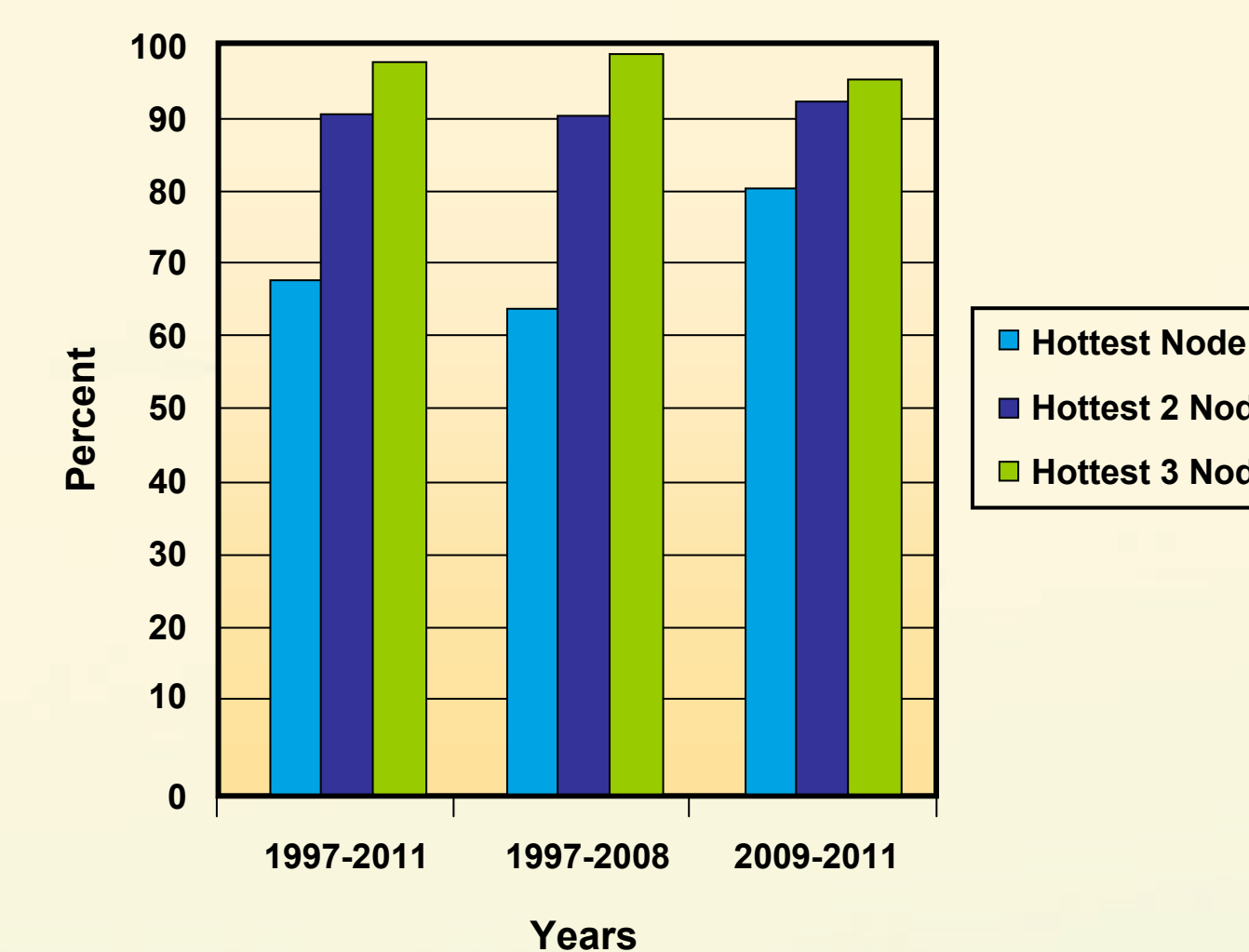|	
Age	29-87 Mean 55
Gender	Female: 150 Male: 2
Tumor Type	Invasive Ductal: 136 Invasive Lobular: 16
Tumor Size	0.3-6.5 cm Median 1.7 cm
ER Status	Positive: 126 Negative: 22 Not Reported: 4
Her 2 Status	Positive: 25 Negative: 122 Not Reported: 5
Number of Sentinel Nodes	1-6 Median: 3
Parients with Disease Past The Sentinel Nodes	29 of 116 patients (25%)

Photograph 1. Sentinel lymph node both blue and hot with lymphatic channel from 2004.

Table 2. Metastases in the hottest nodes. Over the last two years of the study the metastasis was more frequently found in the hottest node.

Time Frame	Metastases in the Most Radioactive Node	Metastases in Two Most Radioactive Nodes
1997-2008	79/120 (65%)	110/120 (91%)
2009-2011	26/32 (81%)	30/32 (93%)
Chi Square	p = 0.000104	p = Not Significant

Figure 2. Graph showing the percentages of metastases found in the hottest nodes.

- Removing the two nodes with the highest counts resulted in a false negative rate of 2.6%.
- In the final 2 years (2009-2011) of data collection, 26 of 32 of the study cohort had the metastasis identified in the node with the highest radioactive counts (81%)
- In only 2 of the 32 cases done during 2009-2011 were the metastasis not found in one of the two most radioactive nodes.
- In only 1 of the 152 cases done were the metastasis not found in one of the three most radioactive nodes.
- When comparing the rates of identifying the metastasis in the single most radioactive node between 1997-2008 and 2009-11, the difference was statistically significant (p=0.000104), but there was no difference when comparing rates for the two most radioactive nodes.

Conclusions:

We employed a prospectively collected database of 823 consecutive lymphatic mapping/sentinel node biopsies for breast cancer performed by a single surgeon, to discern whether a surgeon can limit the number of radioactive nodes he or she removes. This is increasingly important given the trend towards eliminating intraoperative nodal assessment for metastases. In that subset of our node positive patients who had at least one negative SLN, removing only the most radioactive node would have under staged almost one-third (31%) of patients while removing the two most radioactive nodes under stages only 8%. These data, from a single surgeon, are concordant with previously published findings from larger databases documenting the experiences of multiple surgeons.[4,7,8] For reasons that are unclear, there is a statistically significant improvement of sensitivity in finding metastases in the most radioactive SLN seen with increasing experience; the biologic rationale for this is unclear and the false negative rate (6%) would still prove unacceptable. For maximum accuracy, we will continue to remove all nodes with radioactive counts greater than 10% of the hottest node and we will utilize blue dye for those procedures in which radioisotope mapping fails.

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