Effectiveness and reliability of sentinel lymph node biopsy under local anesthesia for breast cancer

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Abstract

The objective of the present study was to determine the effectiveness and reliability of sentinel lymph node biopsy (SLNB) performed under local anesthesia (LA) for patients with breast cancer, by comparing the results with those obtained under general anesthesia (GA). Between January 2006 and February 2007, SLNB was performed under LA or GA in 37 and 94 patients with clinical Tis, T1, T2 or T3 N0 breast cancer, respectively. All underwent radiocolloid and blue dye injections to identify sentinel nodes. The sentinel node detection rate, the number of nodes harvested and the number of positive nodes were compared between the two groups. The sentinel node identification rates were similar for both groups. The number of sentinel and axillary nodes removed and number of positive nodes did not differ significantly between the two groups. SLNB performed under LA is an effective and reliable alternative to SLNB done under GA.

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Introduction

Sentinel lymph node biopsy (SLNB) is a valid technique for axillary staging in clinical T1-2, N0 breast cancer.1–6 An important advantage of SLNB is the decreased risk of postoperative morbidity compared with full axillary lymph node dissection (ALND). SLNB is usually performed under general anesthesia (GA) concurrently with breast surgery. SLNB under GA has several disadvantages. The need for intraoperative examination of the nodes by frozen section prolongs the duration of GA and use of the operating room.7–9 Frozen section examination is not available everywhere. There is a need to await permanent section results which may contradict those of frozen section examination, leading to further surgery.10–12 In theory, these problems can be solved by performing SLNB under LA, waiting a few days for permanent section results, and subsequently performing definitive breast and/or axillary surgery under GA based on those results.7–12

The role of SLNB performed under LA for breast cancer is being increasingly clarified.13,14 Apart from the potential advantages over SLNB performed under GA as mentioned previously, a definitive knowledge of the axillary status prior to breast surgery might help the surgeon and patient plan and prepare for the subsequent breast surgery.12,15,16 For the pathologist, there is no issue of time constraints which may lead to a misdiagnosis, as is the case for intraoperative frozen section examination.9

There is still limited information on the effectiveness and reliability of SLNB performed under LA.17 The aim of this prospective study was to answer this question, by comparing the results of SLNB performed under LA with those of SLNB performed under GA within the same time period.

Methods

Between January 2006 and February 2007, the authors performed SLNB in patients with clinical Tis (DCIS on core needle biopsy), T1–T3, N0 breast cancer, either under LA or GA depending on the judgment of each surgeon and preference of
the patient. The study was approved by Ramathibodi Hospital’s Research Ethics Committee.

The technique of SLNB under LA was as follows. SLNB was performed in the outpatient operating room. Patients arrived at the hospital 2 h before the start of the procedure. No premedication was used. Sentinel nodes were labelled and mapped using a radioactive tracer [technetium-99m tagged to sulfur colloid particles] injected 1–2 h before the biopsy procedure and 1 ml of isosulfan blue [monosodium salt of 2,5-disulphonated triphenyl methane] diluted with 1 ml of lidocaine injected 5 min before the procedure. The radioactive tracer was injected at the subareolar area in the diseased breast quadrant and the blue dye was injected into the tissue above the tumor by the intradermal technique. The breast was massaged at the area of dye injection for 5 min. The location of the sentinel nodes was marked on the skin with the help of a gamma probe [Neoprobe®, Johnson & Johnson Medical, Hamburg, Germany] and the nodes were detected intraoperatively using a combination of high radiation counts via the gamma probe and visualization of the blue dye stain, following standard guidelines. Local anesthesia was administered by subcutaneous infiltration of 0.5% lidocaine with 1:200,000 adrenaline. The biopsy incision was made with an average length of 2 cm, slightly anterior to the midaxillary line and 1 cm below the hair-bearing area of the axilla. During surgery, the use of scissors for sharp dissection was preferred over electrocautery, because the latter tended to stimulate the intercostobrachial nerve causing significant pain for the patient. Further local anesthetics was given during surgery when necessary, but the overall dose was much less than the recommended maximum dose. Hemoclips were used for ligating bleeding vessels during the operation. All patients left the hospital within 1 h of the procedure. A prescription of acetaminophen for postoperative pain was usually sufficient.

The technique of SLNB under GA was similar to that for the LA group, in particular the methods used to detect the sentinel nodes were the same, except that patients were operated on under GA in the same setting as the breast surgery and all sentinel nodes were examined intraoperatively by frozen section methods. Each surgeon who performed SLNB in the present study had done over 20 SLNBs under LA or GA prior to the period under study.

The outcomes of the present study included the detection rate of sentinel nodes — defined as the proportion of patients with detectable sentinel nodes; the number of sentinel nodes harvested; the number of sentinel nodes with metastases, and the number of lymph nodes detected in the completion ALND if metastatic disease was found in the sentinel nodes. These outcomes were based on permanent section (standard Hematoxylin & Eosin staining) results.

Continuous variables were summarized as mean (SD) or median (range) as appropriate. Categorical data were summarized as counts and percentages. Statistical comparison of outcomes between the two groups was done using independent sample t-test or Wilcoxon ranksum test for continuous variables as appropriate, and chi-square test was used for categorical variables. Statistical significance was defined as a two-sided p-value of 0.05 or less. All statistical analyses were performed with Stata version 7 (Stata Corp, College Station, TX, USA).

Results

There were 38 breast cancer patients who underwent SLNB under LA during the period under study. In the same period, 96 patients underwent SLNB under GA. Seven patients in the GA group and three patients in the LA group had excisional biopsy performed prior to the sentinel node procedure. Core needle biopsy was used to diagnose breast cancer in the majority of patients.

The triple technique of detecting sentinel nodes, consisting of static lymphoscintigraphy done at the radiology suite where the radiocolloid was administered, intraoperative use of the gamma probe and isosulfan blue injection, was done for almost all patients. Nine patients in the GA group did not receive an isosulfan blue injection. Sentinel nodes were not identifiable, whether by the radiocolloid or blue dye technique, in one patient in the LA group and in two patients in the GA group. The sentinel node identification rate was therefore 97% (37/38) in the LA group and 98% (94/96) in the GA group. Operation times for SLNB under LA were similar to those for the GA group (30—45 min). Patients without identifiable sentinel nodes were treated with ALND and excluded from subsequent analysis.

There were 131 patients in the analysis, consisting of 37 patients in the LA group and 94 in the GA group. All patients were women with a mean age of 50 years. Other patient characteristics according to sentinel biopsy group are given in Table 1. The only significant difference between the two groups was that patients undergoing SLNB under GA were more likely to receive total mastectomy alone for the treatment of the primary lesion.

Outcomes of the study are given in Table 2 for both SLNB groups. The majority of patients in both groups (approximately 70%) had negative sentinel node biopsy results. The

### Table 1

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SLNB under LA (N = 37)</th>
<th>SLNB under GA (N = 94)</th>
<th>p-Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years): mean (SD)</td>
<td>48.4 (10.1)</td>
<td>50.6 (10.7)</td>
<td>0.275</td>
</tr>
<tr>
<td>Primary tumor size (cm)</td>
<td>2 (0.1–6)</td>
<td>2.5 (0.3–7)</td>
<td>0.210</td>
</tr>
<tr>
<td>Median (range)</td>
<td>30 (81)</td>
<td>81 (86)</td>
<td>0.057</td>
</tr>
<tr>
<td>Final pathology</td>
<td>DCIS with microinvasion</td>
<td>DCIS alone</td>
<td>7 (19)</td>
</tr>
<tr>
<td>Operation for primary disease</td>
<td>Mastectomy alone</td>
<td>14 (38)</td>
<td>62 (66)</td>
</tr>
<tr>
<td>BCS</td>
<td>10 (27)</td>
<td>18 (19)</td>
<td></td>
</tr>
<tr>
<td>Mastectomy + reconstruction</td>
<td>13 (35)</td>
<td>14 (15)</td>
<td>0.008</td>
</tr>
</tbody>
</table>

SLNB: sentinel lymph node biopsy; LA: local anesthesia; GA: general anesthesia; IDC: invasive ductal carcinoma; DCIS: ductal carcinoma in situ; BCS: breast conserving surgery; *p-values according to t-test, Wilcoxon ranksum test or chi-square test as appropriate.
patients with positive lymph nodes, the number of additional axillary nodes removed and the number of additional positive axillary nodes.

None of the LA patients had to be hospitalized, and no significant technical complications occurred in either group. Many patients in the LA group did not use any pain medication after surgery.

Discussion

In the present study, SLNB under LA was no more difficult to perform than SLNB under GA. The amount of local anesthetic used was always less than the recommended safe dose, and some patients never used the prescribed pain medication after surgery. None of the LA patients had to be hospitalized as a consequence of operative complications. The reliability and effectiveness of SLNB under LA can be seen by comparing the number of lymph nodes removed in each group. The numbers were similar. A recent comparative study also found similar results.17

The finding that significantly more patients in the GA group underwent total mastectomy alone probably did not undermine the conclusion that the effectiveness of SLNB was similar for both biopsy groups. This was mainly because virtually all patients in the GA group underwent SLNB via an axillary incision in the same manner as in the LA group. Only during the wait for frozen section results would the breast procedure begin. Patients who chose to undergo total mastectomy alone usually preferred to have all operations done in one stage, thus ending up in the GA group.

Advantages of a sentinel node procedure under LA include more efficient use of the operating room and the avoidance of frozen section examination, which may not be available in all hospitals.6–9 Further, it saves the pathologist time otherwise consumed by frozen section examination. It provides a reliable histologic diagnosis of the axilla before definitive breast surgery is undertaken.10–12 For the reconstructive surgeon, a knowledge of axillary lymph node status can help in planning and choosing the appropriate autologous flaps, such as whether to use the latissimus dorsi musculocutaneous flap or not.12 The acceptability of the local procedure and positive feeling during the operation was quite high.13 And according to the study with the largest SLNB experience to date,14 this knowledge might have a positive psychological impact on the patient, for example, by providing the patient with important prognostic information prior to deciding on further treatment.

Among the disadvantages of the LA procedure, the fact that all patients must undergo two separate operations might be important. Some patients might prefer a single stage operation. It might cost more to undergo two operations. Currently, a study is underway to answer the cost-effectiveness of the two biopsy methods. Some patients might not be able to tolerate the LA procedure, although as of yet the authors have not encountered any such patient.11,13 Although a prior SLNB procedure under LA might render a subsequent axillary dissection more difficult or less effective,14 because of the tissue injury, the results of the present study seemed to show that this was not the case.

A potential use of SLNB under LA is for breast cancer patients who are candidates for neoadjuvant chemotherapy. A major question in this situation is whether SLNB is feasible and accurate following such treatment. Neoadjuvant chemotherapy has been shown to downstage axillary lymph nodes in 20–30% of patients treated with anthracycline-containing regimens20,21 and up to 40% when a taxane is added.22 Theoretically, tumor response to chemotherapy may cause tissue scarring affecting the lymphatic drainage patterns. Therefore, some authors have proposed that patients who are considered candidates for neoadjuvant chemotherapy should have an SLNB performed before, rather than after, neoadjuvant chemotherapy.23–25 In this way, information on the status of the axillary nodes can obtained without the potential confounding effects of neoadjuvant chemotherapy, and sentinel node-negative patients can be spared axillary dissection.

Conclusion

In conclusion, SLNB performed under LA is a safe, well tolerated, effective and reliable alternative to SLNB under GA in clinically node-negative breast cancer patients. It can be used in the setting where frozen section examination is not available. It may also have an important application in patients who are considered candidates for neoadjuvant chemotherapy.

References

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