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Sentinel lymph node biopsy, information gained both from testing and applying period

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Background: The number of sentinel lymph nodes (SLN) should be biopsied and the necessity of immunohistochemistry (IHC) of the SLN are still questioned.

Aim: The aim of our study was to get information from both the testing (TP) and the applying period (AP) of SLN biopsy in our unit regarding the questions raised above.

Material and Methods: 315 patients were subjected to SLN biopsy in our unit. The axillary lymphatic mapping was performed by subdermal injection of 99mTc-labelled albumin the day before surgery, combined with subareolar injection of blue dye just before the operation. During the TP 101 patients were subjected to SLN biopsy, without frozen section, and axillary lymph node dissection (ALND). During the AP the 214 patients were subjected to ALND if the SLN was found to be infiltrated on frozen section (FS). The SLNs were examined by regular histology (RH) and IHC.

Results: During the TP in 94% of patients a single only SLN was located and examined, with an average 1.02 SLN per patient (range 1−3). On the contrary during AP in 60% of patients more than one SLN were excised and biopsied with an average of 1.87 SLN per patient (range 1−7). During both periods there were 10 cases with the SLN found negative on RH and positive on IHC (3.17%). Five of them were infiltrated and 5 microinfiltrated. This node proved to be the only positive in all cases of TP. There was also a case in which RH was positive and IHC was negative (0.31%). The negative predictive value (NPV) is 96.2% and the positive predictive value is 98.2%. This discrepancy between RH and IHC was significantly less common when more than one SLN was examined (1.6% vs 3.7%, $p < 0.01$). Additionally from the TP there were 6 false negative SLN biopsies, with 1 to 5 infiltrated nodes found on ALND (5.9%). The NPV is 92.5%. Fifty five patients from both periods were found to have infiltrated the SLN (17.5%) and in 31 of them the only infiltrated node was the SLN (56%). Having this in mind, if only one SLN is biopsied instead of 2 or 3 there is a high possibility that the infiltrated one can be missed. From the 4 cases with one SN microinfiltrated who were subjected to ALND, in one case two more nodes were found infiltrated, and in this case only one SLN had been examined. From the 8 patients with only one of the two SLNs found positive, in only one case another infiltrated node was found on ALND (12.5%).

Conclusions: IHC of the SLN is necessary in order to identify microinfiltration and to reduce the false negative RH cases. If the SLN is microinfiltrated there is a possibility that other LNs can be found positive with ALND.

As more experience is gained, more than one SLNs are biopsied and this reduces the false negative FS biopsies.

The necessity of ALND when only one among the examined SLNs is infiltrated or microinfiltrated on IHC is questioned.

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Predictors of positive non-sentinel lymph nodes in breast carcinoma cases with sentinel lymph node biopsy

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Background: Lymph node metastases are the most significant traditional prognostic factor for patients with breast carcinoma. Introducing sentinel node biopsy (SNB) created a new challenge to patient management. A positive SNB is followed by axillary nodes dissection. The aim of our study is to search for factors affecting probability of finding positive non-sentinel axillary node(s) on the basis of properties of sentinel nodes metastases (sub capsular, interstitial, mixed, multifocal or diffuse metastasis; infiltration of perinodal adipose tissue) as well as on properties of primary tumor (tumor size, grade, steroid receptor status and HER2 status).

Material and Methods: All patients followed sentinel node biopsy and pathology assessment in Warsaw Cancer Center. The total of 1028 biopsies in early (tumor <3 cm, non palpable nodes) breast cancer patients were performed in years 2004–2007. The visualisation of sentinel node was performed using both technetium (Tc99) and methylen blue. This study was performed on 200 patients, who had metastasis in sentinel node. In all cases sentinel lymph nodes were cut on slices not thicker than 2 mm and paraffin blocks were made. The sentinel lymph nodes was examined by H&E. All positive H&E slides were reexamined by two pathologist and type of metastasis were determined and added to former pathologic data. Information on primary tumor and receptors status was based on original pathology reports.

Results: In our study tumor size, HER2 status, diffuse type of metastasis in non-sentinel lymph node (more than 50% of lymph node was infiltrated by carcinoma), infiltration of perinodal adipose tissue, number of positive sentinel lymph nodes (if more than one was find during biopsy) were significant predictors for positive non sentinel lymph node.

Conclusions: These results suggest that we can predict situations in which metastases to axillary lymph nodes other that sentinel nodes are more likely and those, in which subsequent axillary lymph node dissection may be avoided.

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Yield from the application of sentinel node biopsy and its impact on hospital stay

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Background: Effectiveness of the analysis of patients with breast cancer undergoing sentinel node biopsy measured in terms of the reduction on hospital stay and the use of rehabilitation service resource, and therefore its cost.

Material and Methods: A prospective study was carried out on two cohorts of patients diagnosed with breast cancer in the "12 de Octubre" hospital from April 2006 to May 2007. The first group of 62 patients underwent a sentinel node biopsy (SNB), and in the second one of 57 patients a complete axillary dissection (AD) was performed. Statistical analysis was carried out with SPSS 13.0.

Results: Axillary disease is present in 12.1% of SNB patients vs 38.6% of AD patients.

Therefore, not only 87.9% of SNB patients benefited from this treatment without the morbidity associated to the AD surgery but also 61.4% of AD patients could have avoided the damages associated to this type of surgery. 1/8 of patients of the SNB group had axillary disease vs 2/5 in AD group ($p < 0.0001$).

Average hospital stay, measured in days, in the SNB group was shorter than in the AD group (2 vs 6). Hence, if we take into account the total number of patients in each group the total hospital stay in the SNB group would 124 days (62 patients $\times$ 2 days) whereas in the AD group it would be 342 days (57 patients $\times$ 6 days).

The cost per day of a patient admitted in the hospital is 616.29 €. The hospital saved in terms of hospital stay 216 days [54 patients $\times$ (6days − 2days)] with the SNB-negative patients. In terms of their cost 133,056€ (216 days $\times$ 616.29€). In contrast, the hospital fell into additional expenses due to AD patients without axillary desease present. Their hospital stay was 140 days [35 patients $\times$ (6days − 2days)] with a cost of 86280.6€ (140 days $\times$ 616.29€).

Besides, we must not forget the additional cost derived form the use of the rehabilitation service. In the AD group all patients, no matter their nodal status, needed an average of 7 visits (2 intrahospital, 2 pre-treatment coadjuvant, 3; monthly, half-yearly and annually after the surgery).

Conclusion: The SNB is an effective and less aggressive surgery technique. It reduces substantially the hospital stay in terms of days and cost. Hence, the SNB in our hospital complies with profitability criteria.

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Endoscopic sentinel lymph node biopsy

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Background and Purpose: Since its introduction in the mid-1990s, sentinel lymph node biopsy has been rapidly and widely adopted for axillary staging of clinically node-negative breast cancer patients. However there have been some controversies in clinical application because of its various identification rates and false negative rates. The objective of this prospective study was to assess the usefulness of endoscopic sentinel lymph node biopsy.

Materials and Methods: This study was carried out in 39 breast cancer patients (bilateral breast cancer: 2 cases) who underwent endoscopic sentinel lymph node biopsy at the Department of Surgery in Soonchunhyang University from May to September of 2007. The technique involved the injection of 5 ml of 0.5% indigocarmine or Tc-99m tin colloid

into subareolar plexus. The Visiport docked with Telescope was inserted through a low transverse axillary incison (1.5 cm size) lateral to pectoralis major. During the dissection, we identified sentinel nodes by following blue stained lymphatics directly into blue lymph nodes. The identification rate and false negative rate was evaluated. We compared the value of two methods for identification of endoscopic sentinel lymph node biopsy using either only blue dye (n = 17) or combination of blue dye and radioactive tracer (n = 24).

Results: The mean number of sentinel nodes was 1.12. The identification rate and false negative rate of th sentinel node were 92.7% (38/41) and 7.7% (1/13) respectively. We compared endoscopic sentinel lymph node biopsy with using only blue dye (n = 17) vs combination of blue dye and radioactive tracer (n = 24). Sentinel lymph node identification rate were 95.8% (23/24) vs 88.2% (15/17). There was no statistical significant achived (p = 0.35).

Conclusion: The endoscopic technique of sentinel node biopsy can minimize the operative bleeding by handling the nife of Visiport pallelel to exposed vessels under endoscopic monitor analysis and keep better operative visual field and less invasiveness. Our experience of endoscopic sentinel node biopsy demonstrates a high sentinel node identification rate and low false negative rate.

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Accuracy of frozen section in sentinel lymph node biopsy for breast cancer

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Background: Sentinel lymph node biopsy (SLN) is an integral part of breast cancer surgery. Intraoperative assessment of the SLN with frozen section (FS) assists in surgical decision making for axillary clearance. We evaluate the accuracy of intraoperative FS of SLNs in breast cancer.

Methodology: All successful SLN biopsies for breast cancer from October 2005 to December 2007 were retrospectively analyzed. All patients received dual modality lymphatic mapping with radioactive and blue dye tracer. Intraoperatively, nodes were bisected for FS. For paraffin sections, nodes were serial sectioned at 200μm intervals. Immunohistochemistry was performed if H&E stains were negative.

Results: A total of 201 patients were studied. All had preoperative diagnoses of breast cancer. Median age was 50 years and mean size of the invasive tumour was 17.9 mm. Mean number of SLN harvested per patient is 2.6.

A total of 516 SLNs and 101 non-SLNs were assessed intraoperatively with FS. Of the SLNs, 65 (12.6%) were positive on paraffin, including 42 macrometastases, 19 micrometastases and 4 with isolated tumour cells. Among these, 18 (3.5%) were misdiagnoses on FS. Fourteen were false negatives, including 10 micrometastases, 2 macrometastases and 2 with isolated tumour cells. The remaining 4 were false positives. FS diagnosed 1 micrometastasis and 3 with atypical cells, but paraffin sections concluded all 4 were negative.

Among the 101 non-SLNs, only 7 (6.9%) were positive for cancer on paraffin sections. FS diagnosed all but 1, where the node contained a 0.8 mm metastasis seen only on paraffin section. There were no false positives.

FS misdiagnosis affected 16 (8.0%) patients in the cohort. Eight patients had false negatives necessitating completion axillary clearance. Only 5 underwent the second surgery, with none found to have further positive nodes. One patient with a false positive SLN on FS underwent axillary clearance; no further metastatic nodes were present. In the remaining 7 patients, the error in FS diagnosis did not alter intraoperative surgical management.

Conclusion: Intraoperative assessment of SLNs is crucial to decision making in breast cancer surgery. In our series, FS misdiagnoses occurred in 3.5% of SLNs and 8% of non-SLNs. A small fraction of patients may hence receive inappropriate treatment. Despite this, SLN biopsy remains a useful procedure that eliminates unnecessary routine axillary clearance in the majority of patients with early breast cancer.

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Research on the radiological safety of the sentinel lymph node biopsy in breast cancer

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Background: Sentinel lymph node biopsy (SLNB) in breast cancer has become a standard procedure in patients with T1/T2 tumor and clinically negative axilla. The combination of radiotracer and blue dye could improve the SLNB success rate with 1.3% and decrease the false negative rate with 2.5%. Radiotracer could also shorten the learning curve, detect SLNs outside axilla, and gamma-probe could help to localize SLN in vitro. However, this may also produce concerns of radiological safety both for patients and medical stuff. The aim of this study was to study the radiological safety issues of SLNB in breast cancer.

Materials and Methods: SLN was detected with the combination of methylene blue and 99mTc-sulfur colloid. 0.5−1.0 ml 99mTc-SC (activity, 22−44 MBq) was injected at least 3 hours before SLNB. Forty patients consistent with indications of SLNB enrolled from Oct. 2006 to Jul. 2007, with breast conserving surgery+SLNB and mastectomy+SLNB for 20 cases, respectively. The thermoluminescent dosimeters (TLD) were used to detect radiation dose received by patients and medical stuff. The TLDs were set at the sites representing breast injection site, thoracic gland, and cavitas pelvis gonad of patients, and dominant hand index finger, thoracic gland, cavitas pelvis gonad and ocular lens of medical stuff.

Results: The mean radiation dose received at the breast injection site (5.946mSv) was significantly higher than that at the thoracic gland (0.425mSv) and cavitas pelvis gonad (0.219mSv) of the patients (both p = 0.000). The mean absorbed dose of operating surgeon's index finger of dominant hand, thoracic gland, cavitas pelvis gonad, and ocular lens was 0.178mSv, 0.166mSv, 0.169mSv and 0.150mSv, respectively. That of the assistant surgeon's corresponding site was 0.186mSv, 0.155mSv, 0.147mSv, 0.145mSv, respectively. No significances of the mean radiation dose received were found among the different sites of different medical stuff (all p > 0.05), and were far lower than basic criterion of radiological health protection set by the Department of Health of P.R.China and ICRP. According to this criterion, it would be safe for surgeons to perform 1000 SLNBs annually.

Conclusions: The SLNB in breast cancer was radiological safe both for patients (even with pregnancy) and medical stuff. It would be safe for surgeons to perform 1000 SLNBs annually, and no radiological protection was needed during operation.

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Blue dye alone technique for sentinel node biopsy is safe and accurate in selected early breast cancer – a single centre experience

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Background: The aim of this study was to assess the safety and accuracy of omitting radiolabelled colloid and lymphoscintigraphy in sentinel node biopsy for selected cases of early invasive breast cancer

Materials and Methods: Study subjects consisted of patients with histologically proven invasive breast cancer with a calculated a priori risk of axillary node involvement of less than 20% based on pre operative imaging and large core needle biopsy. Following informed consent these patients underwent sentinel node biopsy with intradermal injection of patent blue dye. Histological assessment of the sentinel node was carried out using intraoperative frozen section as well as formal step sectioning and immunohistochemical staining Patients with negative sentinel nodes did not undergo further axillary dissection and were followed up and three monthly intervals for clinical local or systemic recurrences.

Results: The sentinel node was successfully identified in 94% (204/217) of consecutive patients from 2002 to 2007, of which 24.5% (50/204) were positive for sentinel node metastasis on frozen sections and immunohistochemical examination (45 and 5 patients respectively). These patients underwent axillary clearance. Of the remaining 154 patients in which further axillary clearance was omitted, 5% (8 patients) had evidence of micrometastasis or isoloated tumour cells in the sentinel nodes. Following a median follow-up of 36 months no axillary recurrences have been detected. One patient has suffered an ipsilateral breast recurrence at 30 months post surgery. The one morality was from leukemia related causes.

Conclusions: Sentinel node biopsy using with the omission of radiocolloid and lymphoscintigraphy is safe and accurate in selected early invasive breast cancer.

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Submission of blue dye sentinel node for intraoperative frozen section does not impact on operating time

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Background: A large randomised trial has confirmed that in experienced hands blue dye alone is as good as combined technique for localising sentinel node [1]. Intraoperative frozen section of blue dye sentinel nodes in our hands has been shown to be effective alternative to two stage operative procedures for the axilla with a high accuracy of pathological assessment of lymph nodes with low false positive rate [2]. Two Consultant