

Sentinel Node Technology: A Standard of Care

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Background

For most carcinomas and some sarcomas, nodal metastasis remains one of, if not the most significant prognostic indicator for disease recurrence and patient survival. In the assessment of this risk factor, the standard of care in many health care centres today includes a formal dissection of the regional lymph nodes draining a primary cancer site.

While the benefits, including retrieval of important prognostic information and possibly therapeutic disease clearance, continue to justify the risks inherent in this surgery, the potential morbidity associated with regional lymph node dissection is significant. In many instances the majority of the morbidity experienced by a patient is attributable to the dissection of the regional nodal basin rather than the primary tumour site. This is particularly true for breast cancer and melanoma surgery.

Only 30% of patients diagnosed with invasive breast cancer with lesions smaller than 5 cm will have lymph node involvement. The remaining 70%, therefore, suffer the morbidity of the standard axillary node dissection (ALND), unnecessarily. Similarly, 85% of newly diagnosed melanoma is clinically Stage I or II, of which 20% - 25% will have occult nodal disease. In addition, we have learned from lymphatic mapping studies that the

nodal drainage from truncal melanoma is often unpredictable, thereby increasing the risk of morbidity through the performance of additional and perhaps unnecessary surgery.

These observations have motivated surgeons to develop technology to better identify the patients who have the most potential benefit from undergoing formal lymph node dissections, while sparing the remainder the unnecessary inherent morbidity. This new technology, the sentinel lymph node biopsy or sentinel node biopsy (SNBx), is fast finding its way into clinical practice in the management of breast cancer, melanoma and several other malignancies.

Why Sentinel Node Biopsy?

The premise of SNBx is that the most likely node(s) to be involved in a cancer can be accurately identified and removed with a low incidence of discontinuous nodal involvement. This technology was first introduced into clinical practice by Giuliano in 1994 using blue dye, alone, to localize the sentinel node. Few others have been able to reliably identify the sentinel node using blue dye alone, which is indicative of the steep learning curve associated with this technique. The sentinel node (SN) identification rate is improved with the addition of a radioisotope, commonly technetium labeled sulfur

colloid (^{99m}Tc). First introduced by Albertini, this combination technique reliably identifies the sentinel node more than 92% of the time and, in experienced hands, is associated with false negative rates of less than 5%. Several large studies have confirmed the sensitivity and specificity of this technique in the treatment of breast cancer and melanoma.

The Technique of Lymphatic Mapping

The technique of lymphatic mapping and SNBx requires the patient, following informed consent, to present to the nuclear medicine department for an injection of ^{99m}Tc . At this time the patient is scanned to evaluate and identify the lymphatic drainage. Many patients find this component of the technique particularly unpleasant due to the discomfort associated with the injection. Usually within 24 hours of the injection the patient is taken to the operating room where second injections, using a non-vital blue dye, (e.g. 1% isosulfan blue dye, methylene blue) are given in the same site as the ^{99m}Tc . The surgeon then performs a careful dissection of the sentinel node.

Studies have indicated that the learning curve for this technique requires a surgeon to perform 20 to 30 procedures, conducting both a SNBx followed by the standard ALND at the same time, to assess

his/her own ability and success rate. Based on current literature the Canadian guideline published in the CMAJ 2001, has adopted 30 as the number of cases either performed individually or simultaneously with another surgeon(s) to perfect their technique before replacing ALND with SNBx.

Surgeon Experience is Important!

# cases	# patients	SLN ID	False negative
1-20	1817	91.7%	9.0%
>20	331	96.7%	1.9%

McMasters et al. *Annals Surg.* 2001

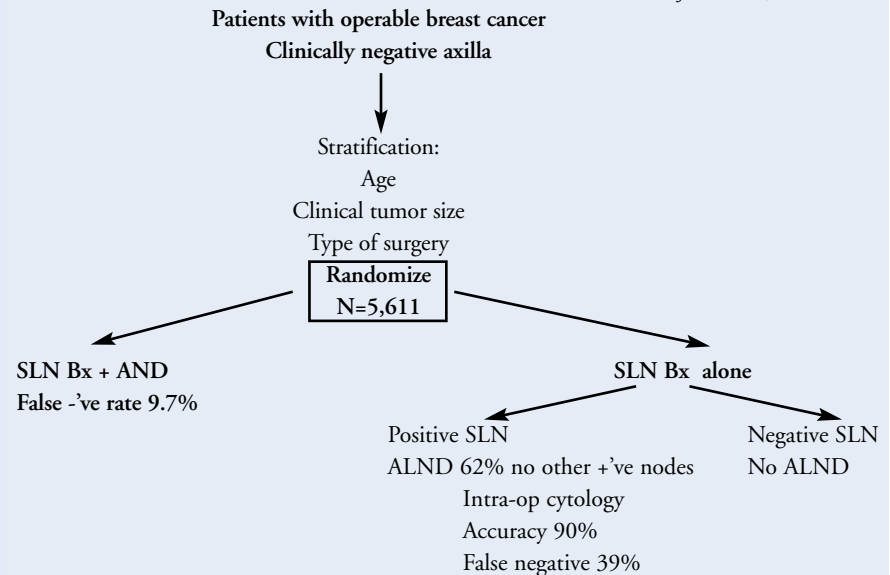
Two to three nodes, on average, are identified as SN and immediately sent for touch prep screening by the pathologist. Touch prep employs a technique where the pathologist screens the node histologically, minimizing the loss of valuable tissue that will undergo far more detailed permanent histological scrutiny.

Patients must clearly understand that, as a screening modality, touch prep has a 30%-40% false negative rate. Using this intraoperative screening method, 60%-70% of patients with positive SN's will be identified and have a 'completion' standard ALND, as recommended in positive SN cases, thereby preventing the need for second surgery.

All nodes that are removed, including touch prep positive and negative nodes, are carefully examined by the pathologist. Patients with false negative SN's are informed and return for surgery at a later date to have a standard ALND. Properly conducted by a team of skilled health professionals, the SNBx provides prognostic and therapeutic outcomes at least equal to standard nodal dissections. To date, these outcomes have been confirmed by numerous studies including early reports from the largest of these, NSABP B-32, which randomized over 5,600 patients to SNBx, alone, versus SNBx with concurrent ALND.

NSABP B-32: Preliminary Results

Julian et al, SABCS 2004



Implementation of Lymphatic Mapping in Nova Scotia

The effective implementation of the technique of lymphatic mapping and SNBx into one's practice requires the commitment of a team of health professionals, each familiar with the issues and potential pitfalls of this procedure. Radiology / Nuclear Medicine, Surgery and Pathology all function in concert to ensure that the maximum SN detection rate is achieved with minimal false negative results for each consenting patient.

At *Cancer Care Nova Scotia's* recent, "Principles and Practice of Lymphatic Mapping and Sentinel Lymph Node Dissection Course" held in Halifax in April 2005, all participating members agreed that detection rates and false negative rates must be published and available for hospital credentialing, quality assurance and patient review. Institutions that are unable to provide this information or meet the accepted standards of practice must not offer this procedure to their patient population. A database to capture this information has been created by members of the Surgical Oncology Network. It will be made available to participating institutions in fall 2005.

While the treatment of patients with melanoma and some of the more

uncommon cancers is gradually shifting to the larger regional cancer centres, breast cancer patients are and will continue to be managed in the community. Although SN technology is quickly becoming the standard of care in many centres, it is important to remember that a 'standard of care', may be region or even institution-specific. For primary care physicians in the community, striving to provide timely and effective care for their patients, the evolution of SNBx into standard cancer care practice temporarily creates new stress and logistical problems that need to be addressed.

In many centres throughout Nova Scotia and the rest of Canada the resources are not available to assemble the team of health professionals required to effectively perform SN surgery. In those centres, the standard of care appropriately continues to include standard ALND. When feasible, patients may be referred to centres offering SN technology, however, this is clearly not a reasonable option for all patients seeking care. Patients who do not have access to SNBx must be reassured that the care they receive is not sub-standard. It is imperative that they have confidence in the quality of the care they are receiving.

Patient Selection Criteria

It is important to note that SNBx has not replaced regional lymph node dissections in all cases. Careful patient selection is mandatory to minimize failure and high false negative rates. SNBx is contraindicated in patients with clinically positive lymphadenopathy or documented metastatic disease. Patients who have had radical excision of their primary cancer or those who have multiple primary cancer sites are generally not candidates for SNBx. Higher failure rates are also common in elderly and obese patients. Several other caveats are also known to influence the success of SNBx. A summary of the current indications and contraindications for SNBx is included in this section as a reference for you in counseling your patients and to assist you in directing appropriate consultations to prevent unnecessary delays in the delivery of care.

Indications:

- T1/T2 palpable or non-palpable invasive adenocarcinoma with clinically negative lymph nodes.

Contraindications: Advanced breast cancer conditions

- T4 lesions
- Locally advanced or inflammatory cancer
- Multicentric breast cancer
- Clinically positive (palpable) axillary node(s)
- Clinically positive supraclavicular lymph node(s)
- Metastatic breast cancer

Relative Contraindications: Due to the nature of the cancer or previous treatments that have rendered the breast 'disrupted' the reliability of the SNBx in such circumstances may be placed into question.

- T3 lesions
- Previous extensive surgical resections (excluding excisional biopsies)
- Previous ipsilateral lymph node surgery
- Previous breast irradiation
- Pre-operative chemotherapy
- Breast implants
- Previous reduction mammoplasty

Other contraindications:

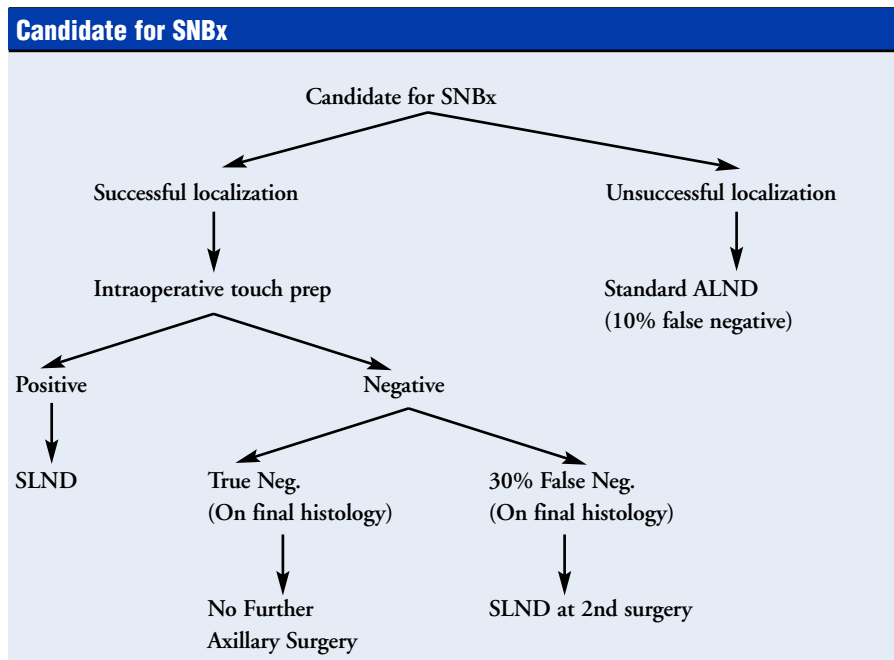
- Adverse or allergic reactions to blue dye or ^{99m}Tc sulfur colloid
- Patients unable to give informed consent

Other considerations:

- Pregnant patient
- Breast feeding

In Summary

Patients who are candidates for SNBx need to understand that if the SN is positive on intraoperative touch prep, they then need an ALND (10% false negative). If the SN is negative on intraoperative touch prep (30% false negative), but on closer examination by pathology, the SN is identified as positive, the patient must go back for ALND at another time. If the SN is negative following both intraoperative touch prep and on closer examination by pathology, then no ALND is required (1.9% false negative).



Cancer Care Nova Scotia is a program of the Department of Health. Its mandate is to evaluate, coordinate and strengthen the cancer system in Nova Scotia.

Cancer Care Nova Scotia works with and supports professionals and stakeholders in the health care system to bring about patient-centred change. Its ultimate goal is to reduce the burden of cancer on individuals, families, communities and the health care system.

In Practice is a supplement to *Cancer Care Nova Scotia's* newsletter. It is written specifically for primary care practitioners with information that we hope will make a difference in your cancer practice.

Please contact Christine Smith, Communications Coordinator, *Cancer Care Nova Scotia*, by phone at 902-473-2932 or by email at christine.smith@ccns.nshealth.ca with comments or suggestions for future topics.



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Resource for patients:

Patients who are considering Sentinel Node Dissection should read, "Questions and Answers on Breast Cancer – a guide for women and their physicians" second edition, Guideline 13. The booklet is included in the Pink Rose information kit, provided to women who are diagnosed with breast cancer. It is also available electronically on Health Canada's website at:

http://www.phac-aspc.gc.ca/ccdpc-cpcmcl/bc-cds/pdf/bc_qa_e.pdf

For more information:

Primary care physicians and surgeons who want further information regarding SNBx are invited to contact Dr. Carman Giacomantonio, Surgical Oncologist, Capital Health and Head, *Cancer Care Nova Scotia's* Surgical Oncology Network at 902-473-6177 or by email at giacomantonio@cdha.nshealth.ca

Reference:

Jacques Cantin, Hugh Scarth, Mark Levine, Maria Hugi, and The Steering Committee on Clinical Practice Guidelines for the Care and Treatment of Breast Cancer. **Clinical practice guidelines for the care and treatment of breast cancer: 13. Sentinel lymph node biopsy** CMAJ. 2001 July 24; 165(2): 166–173.