Radioguided Sentinel Lymph Node Biopsy in Early Breast Cancer: Experience at Chang Gung Memorial Hospital

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Background: Sentinel lymph node (SLN) biopsy can identify regional metastases and provides an alternative to axillary dissection that avoids arm morbidity. This investigation assessed the accuracy of SLN biopsy for predicting axillary node status.

Methods: A total of 174 clinical node-negative breast cancer patients and 165 SLN biopsies were enrolled. SLN biopsy was performed in a two-day protocol with backup axillary dissection: subdermally injected technetium-99 sulfur colloid to detect and localize SLN on day one; sentinel node harvesting under gamma-counter guidance on day two. Clinicopathological factors were statistically analyzed to assess the accuracy of the SLN biopsy.

Results: The SLN was identified in 94.3% (165 of 175) of cases. SLN biopsy had an accuracy of 98.2%, with sensitivity of 93.7%, specificity of 100%, negative predictive value of 97.5% and positive predictive value of 100%. Three SLN negative cases had non-SLN metastasis representing a false-negative rate of 6.3% (3 of 48). Tumor size was the only factor statistically correlated with the accuracy of the SLN biopsy. The diagnostic accuracy for tumors sized 2 cm or below was 100%. Hematoxylin-eosin stain followed by immunohistochemical stain increased the diagnosis of axillary metastasis from 25.5% to 29.1%.

Conclusion: SLN biopsy can accurately forecast axillary node status in early breast cancer, particularly in patients with tumor sizes of no more than 2 cm.

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Key words: sentinel lymph node, breast cancer.

Regional lymph node status is the main prognostic factor in breast cancer, providing prognostic information that can determine further adjuvant treatment and maintain control of the axilla.[1,2] Axillary lymph node dissection (ALND) has long remained a standard treatment for breast cancer owing to lack of image techniques and clinicopathological characteristics capable of accurately replacing or forecasting the axillary status. However, ALND is associated with certain morbidity following surgery, including arm pain, swelling, limited movement and lymphedema, and can even severely impact quality of life.[3] In node-negative breast cancer patients, comprising 60% of all breast cancer patients, no therapeutic benefits exist for performing ALND and thus the associated morbidity can be

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avoided.[4] Additionally, a lack of ALND leads to shorter hospital stays and reduced costs.[5]

The sentinel lymph node (SLN) is the first node that receives lymphatic flow from a primary tumor site. Following metastasis, the SLN should be the first node to be involved in metastasis. Theoretically, a tumor free SLN excludes the involvement of metastasis in other nodes. Accurate identification and SLN biopsy can reduce the number of ALNDs in SLN negative patients and avoid unnecessary ALNDs. Additionally, SLN biopsy can enable pathologists to focus on certain lymph nodes and perform detailed pathological examinations. Clinical studies have demonstrated that accurate SLN biopsy can reflect the axillary node status, particularly in clinically node-negative breast cancer patients, and indicate that SLN may eventually replace ALND.[6,7]

An accurate SLN biopsy involves preoperative localization of the SLN, operative harvesting of the SLN and SLN processing by pathologists. It is necessary to select suitable patients who will benefit from SLN biopsy and avoid ALND in the future. This work describes the preliminary results of this study and experiences at our hospital.

METHODS

Between September 2000 and December 2003, subjects with pathologically proven T1 or T2 breast cancer, confirmed by either ultrasound-guided core biopsy or excisional biopsy, and clinical node-negative breast cancer were enrolled for receiving SLN biopsy with backup ALND. All patients had non-palpable axillary nodes that were classified as clinical node-negative breast cancer. SLN biopsy was performed as part of a two-day protocol. In the afternoon of day one, filtered (through a 45 μm Millipore) technetium-99m sulfur colloid isotope was injected subdermally just above the primary breast tumor site, with a mean radioactive dose of 37 MBq (1 mCi) at a diluted volume of 1 ml. In non-palpable breast cancers, the injection sites were in the same quadrant as, and as close as possible to, the primary tumor. Moreover, in patients in whom the tumor was excised, the injections were made at four points surrounding all four sides of the scar and at 0.5 cm from it. Serial dynamic images (15 minutes per frame for two hours) were obtained using a high-resolution collimator and a static image was obtained with a 15 degree right or left anterior-oblique (RAO or LAO) view after identifying the SLNs. The first hot spots identified from the same route as the primary tumor following injection were defined as SLNs. Furthermore, different routes from the primary tumor were considered to be different SLNs. If multiple hot spots were found, dynamic images were reviewed to clarify the true SLN. The location of the SLN was then marked on the skin using waterproof permanent ink. Cases where no hot spot was detected for two hours following injection were classified as non-visualized SLN. Delayed images were obtained four hours after injection if lymphatic drainage channels were observed in the two hour image.

During the morning of day two, the patients received radical surgery, comprising either modified radical mastectomy or partial mastectomy, and the SLNs were harvested under the guidance of a hand-held gamma probe (Navigator GPS®, Norwalk, Conn, USA) followed by backup standard ALND. Extra-axillary SLNs detected via lymphoscintigraphy were also excised during surgery. The number and location of the SLNs requiring excision were determined by nuclear medicine physicians based on the lymphoscintigraphy picture. Only the first node draining from every lymphatic channel originating from the primary tumor was defined as an SLN and harvested. The same surgeon (Dr. Lo) performed all SLN biopsies.

The processing of the sentinel nodes included formalin-fixing, bisecting, paraffin-embedding and cutting into ten serial sections. Half of the ten sections were stained with hematoxylin-eosin (H & E) and half with immunohistochemical staining (IHC) for cytokeratin as indicated. The SLN was considered positive if cancer cells were identified via H&E or IHC staining.

Subjects were divided into three age groups for analysis: under 35 years, 35 to 50 years and over 50 years. Furthermore, tumors were divided into three sizes for analysis: 1 cm or less, between 1 cm to 2 cm and more than 2 cm. Seven medullary carcinomas, five invasive lobular carcinomas, five mucinous carcinomas, three apocrine carcinomas and 10 rare specific type carcinomas were classified as other tumor pathology in Table 1. The differences in SLN identification rate and diagnostic accuracy, based on various patient and tumor characteristics including age, biopsy method, tumor location, tumor size and

Table 1. Patient and Tumor Characteristics (N = 175)

Characteristics	N (%)
Age	
≦ 35 yrs	20 (11)
> 35, ≦50 yrs	93 (53)
> 50 yrs	62 (36)
Biopsy method	
Core biopsy	164 (94)
Excisional biopsy	11 (6)
Tumor location	
Medial	61 (35)
Lateral	109 (63)
Subareolar	5 (2)
Tumor size	
≦ 1 cm	43 (25)
> 1, ≦ 2 cm	75 (43)
> 2 cm	57 (33)
Tumor pathology	
Intraductal carcinoma	30 (17)
Invasive ductal carcinoma	115 (66)
Others	30 (17)

tumor pathology, were compared by the χ^2 (chi-squared) test. The identification rate was defined as successful SLN identification via lymphoscintigraphy and subsequent SLN harvesting. The statistical analyses of the SLN biopsies used the following definitions: diagnostic accuracy = (true positive + true negative)/total patients, sensitivity = (true positive)/(true positive + false negative), specificity = (true negative)/(true negative + false positive). The χ^2 test was also used to compare the above definitions. The false-negative rate was defined as the percentage of no tumors being identified in the SLN but at least one non-SLN revealing a metastasis.

RESULTS

This study included 174 breast cancer patients. Of the subjects, one patient had synchronous bilateral breast cancer, 72 patients had right side breast cancer and 101 had left side breast cancer. Moreover, ten patients were classified as having lymphoscintigraphic non-visualized SLN. A total of 165 surgical procedures, including SLN biopsy and backup ALND, were performed and the SLN identification rate by lymphoscintigraphy was 94.3% (165 of 175). Of these patients, two patients had a history of breast silicon injection and one patient had previously received breast augmentation with prosthesis. Three cases were male breast cancers. The average age of the subjects ± standard deviation was 49 ± 11 years, with a range of 26-85 years and a median of 47 years. Most of these patients had pathologically proven breast cancer by ultrasound-guided core biopsy, except for 11 cases (6%) in which the tumor was excised at another hospital. No frozen section proving breast cancer was included in this study because lymphoscintigraphy was performed in preoperatively confirmed breast cancer patients. The tumor location was classified simply as medial site, lateral site and subareola. Sixty-one tumors (35%) were located medially, 109 (63%) laterally and five cases (2%) were located in the subareolar region of the breast. Surgery included 102 (58%) procedures of modified radical mastectomy and 73 (42%) procedures of conservative breast therapy.

In most of these SLN detectable patients (154 cases, 93%) only one SLN was identified. Of these cases, two were located in level II, one was located in Rotter's node and the others were located in level 1. Eleven cases (7%) presented with two SLN, including seven cases in level I, two cases in level I and II, and two cases in bilateral axilla. No SLN was detected at the location of the internal mammary lymph node. The number of SLNs was not statistically related to age (p = 0.094), biopsy method (p = 0.663), tumor location (p = 0.304), tumor size (p = 0.937) or tumor histology (p = 0.245). The incidence of SLN identification did not differ with age (p = 0.235), biopsy method (p = 0.618), tumor location (p = 0.822), tumor size (p = 0.865) or tumor pathology (p = 0.619) (Table 2).

Forty-eight (29%) breast cancers displayed axillary lymph node metastasis and 117 (71%) breast cancers were negative for axillary metastasis. The 48 node metastasis cases included 45 cases that were SLN positive and three cases that were negative for SLN. The sensitivity with which a metastatic SLN was identified was 93.7% (45 of 48) and the specificity was 100%. The positive predictive value was 100% (45 of 45). The negative predictive value was 97.5% (117 of 120). The false-negative rate and diagnostic accuracy were 6.3% (3 of 48) and 98.2% (162 of 165), respectively (Table 4). IHC staining detected six more SLN metastasis than H & E stain-

Table 2. Incidence of Sentinel Lymph Node Identification

Characteristics	% of SLN identification	95% CI	*p* value
Age			
≦ 35 yrs	95 (19/20)	75-100	
> 35, ≦50 yrs	97 (90/93)	91-99	
> 50 yrs	90 (56/62)	80-96	0.235
Biopsy method			
Core biopsy	95 (155/164)	90-98	
Excisional biopsy	91 (10/11)	59-100	0.618
Tumor location			
Medial	93 (57/61)	84-98	
Lateral	94 (103/109)	88-98	
Subareolar	100 (5/5)	48-100	0.822
Tumor size			
≦ 1 cm	95 (41/43)	84-99	
> 1, ≦2 cm	95 (71/75)	87-99	
> 2 cm	93 (53/57)	83-98	0.865
Tumor pathology			
Intraductal carcinoma	97 (29/30)	83-100	
Invasive ductal carcinoma	93 (107/115)	87-97	
Others	97 (29/30)	83-100	0.619

Abbreviations: SLN: sentinel lymph node; CI: confidence interval.

ing (42 SLN metastasis detected by H & E stain and 48 metastasis detected by IHC) demonstrating a 3.6% increase in axillary lymph node metastasis. Of the 45 SLN positive patients, 55.6% (25 of 45) displayed only SLN metastasis. The above findings indicate that only 13.9% (23 of 165) of clinical node-negative patients require axillary lymph node dissection. Accurate removal of the SLN is sufficient for most (86.1%) clinical node-negative patients. The accuracy of SLN removal was not correlated to age ($p = 0.805$), biopsy method ($p = 0.657$), tumor location ($p = 0.399$) or tumor pathology ($p = 0.437$) but was correlated to tumor size ($p = 0.040$). All three SLN false-negative patients presented with primary tumor size exceeding 2 cm. Diagnostic accuracy of 100% was achieved for patients aged no more than 35 years, with previous excisional biopsy, medial or subareolar location, tumor size no more than 2 cm and with a pathological diagnosis of intraductal carcinoma. By definition, the specificity of SLN biopsies was 100% and the sensitivity was not correlated with all clinicopathological factors (Table 3).

Table 3. Diagnostic Accuracy of Sentinel Lymph Node Biopsy

Characteristics	Sensitivity (%)	95% CI	*p* value	Specificity (%)	95% CI	*p* value	Accuracy (%)	95% CI	*p* value
Age									
≦ 35 yrs	100 (8/8)	63-100		100 (11/11)	72-100		100 (19/19)	82-100	
> 35, ≦ 50 yrs	90 (18/20)	68-99		100 (70/70)	95-100		98 (88/90)	92-100	
> 50 yrs	94 (16/17)	71-100	0.623	100 (39/39)	91-100	-	98 (53/56)	91-100	0.805
Biopsy method									
Core biopsy	93 (40/43)	81-99		100 (112/112)	97-100		98 (152/155)	95-100	
Excisional biopsy	100 (2/2)	16-100	0.699	100 (8/8)	63-100	-	100 (10/10)	69-100	0.657
Tumor location									
Medial	100 (12/12)	74-100		100 (45/45)	92-100		100 (57/57)	94-100	
Lateral	91 (30/33)	76-98		100 (70/70)	95-100		97 (100/103)	92-99	
Subareolar	-	-	0.280	100 (5/5)	48-100	-	100 (5/5)	48-100	0.399
Tumor size									
≦ 1 cm	100(4/4)	40-100		100 (37/37)	91-100		100 (41/41)	91-100	
> 1, ≦ 2 cm	100 (24/24)	86-100		100 (47/47)	93-100		100 (71/71)	95-100	
> 2 cm	82 (14/17)	57-96	0.071	100 (36/36)	90-100	-	94 (50/53)	84-99	0.040
Tumor pathology									
Intraductal carcinoma	-	-		100 (29/29)	88-100		100 (29/29)	88-100	
Invasive ductal carcinoma	93 (37/40)	80-98		100 (67/67)	95-100		97 (104/107)	92-99	
Others	100 (5/5)	48-100	0.526	100 (24/24)	86-100	-	100 (29/29)	88-100	0.437

Abbreviations: CI: confidence interval.

Table 4. Pathologic Status of the Sentinel and Axillary Nodes Following Axillary Dissection

Sentinel nodal status	Axillary nodal status		
	Positive	Negative	Total
Positive	45	0	45
Negative	3	117	120
Total	48	117	165

DISCUSSION

The surgical treatment of breast cancer has become increasingly conservative, with breast conservation now an accepted technique for early breast cancer. More radical surgical procedures of the breast or the axillary nodes are not associated with overall improvement in survival and patients who receive radical mastectomy with level I-III axillary dissection do not achieve better outcomes than those treated with partial mastectomy and standard level I-II axillary dissection. ALND has been mainly used to predict outcomes but does not reduce rates of distant metastasis in breast cancer. After introducing the concept of the SLN, SLN biopsy was developed as an effective alternative method of assessing regional lymph node status instead of lymph node dissection in clinical node-negative cancer patients. The major advantage of SLN biopsy is the low morbidity compared with complete ALND.[8]

A successful SLN biopsy requires accurately identifying and localizing the SLN using either blue dye, the radioisotope method or both, harvesting the SLN and conducting a detailed SLN pathological examination. Only when the target SLN is detected and localized, can the SLN be easily excised and forwarded for detailed pathological examination. A non-visualized SLN will lead to a failed SLN biopsy. Owing to the importance of SLN identification, combining both of the two detection methods can increase the SLN identification rate and reduce the false-negative rate.[9,10] Previous studies have found that even when both methods are not used, using either one of these methods can also achieve an identification rate exceeding 90%.[11]

This study found that a radioguided two-day protocol is simple and can reduce the false-negative rate, particularly during the learning curve period, owing to low levels of radioactive background interference. Our experience does not include any case of a single SLN in level 1 axilla being missed during surgery. A learning curve of SLN biopsy, which describes a high false-negative rate during the first 30 SLN biopsy cases for surgeons, was not found in this study. The subdermal radiocolloid injection approach was used because of its rapid SLN detection, injection simplicity and higher success rate than the peritumoral injection method.[11-13] Dermal and subdermal injections are both feasible owing to sharing of the same embryonic origin as the underlying breast tissue. Additionally, subdermal lymphatics communicate with breast parenchyma and have richer lymphatics than parenchymal tissue.[14] The dermal, subdermal or subareolar approach can increase the SLN identification rate and reduce the false-negative rate.[6,14-17] One limitation of the subdermal approach was its low internal mammary SLN detection rate compared to the peritumoral or intratumoral approach, resulting from its deeper location, pectoralis fascia separation and origins in the retromammary lymphatics of the internal mammary lymph node.[8,12,13] Another limitation identified by this study was that no internal mammary SLN has previously been detected. However, this limitation does not necessarily influence the radioguided subdermal approach. An internal mammary SLN is not highly clinically significant in early breast cancer because SLN identification does not necessarily indicate nodal involvement. Noguchi et al. described 19 internal mammary SLN biopsies in early breast cancer and only found one case of nodal involvement.[18]

Twenty-five of 45 (55.6%) early breast cancer patients who were SLN positive had no disease in other non-sentinel nodes, which further indicates that the SLN was the first node to be involved. This finding also suggested that over 50% of all SLN positive patients do not require further ALND. Moreover, over 13.9% (23 of 165) of clinical node-negative patients require ALND. Another important issue in risk factor identification is the patients with SLN involvement without other non-SLN metastasis. Chu et al. examined tumor involved SLNs and demonstrated that 66.5% of breast cancer patients have SLN metastasis without non-SLN involvement. For small tumor size or SLN micrometastasis, the probability of non-SLN involvement is low.[19] Fournier et al. observed a 6.3% (1 of 16) rate of non-SLN metastasis in the SLN micrometastasis group compared to a 53.8% (14 of 26) rate in the SLN macrometastasis

group.[20]

This study found three false-negative SLNs, representing a false-negative rate of 6.3% (3 of 48). All of the three patients had T2 breast cancers exceeding 2 cm, which was significantly different to two smaller tumor size groups (p = 0.040). Increases in tumor size may correlate with increased SLN false-negative rates, though Bedrosian et al. found a low 3% false-negative rate for T2 breast cancer.[21] Most previous reports demonstrated that SLN excision is more accurate in smaller tumors. Mateos et al. reported that the false-negative rate was correlated with primary tumor size owing to more complex or different drainage patterns in larger tumors.[13] Noguchi et al. and Veronesi et al. also observed a 100% accuracy rate for tumors with sizes smaller than 1.6 cm and 1.5 cm, respectively.[6,10]

Various factors may be associated with SLN biopsy success rates. This study failed to find any statistical association between SLN identification and patient characteristics including age, biopsy method, tumor location, tumor size and tumor histology (Table 2). However, our investigation did find a tendency towards increased non-visualized SLNs in subjects in the older age group (Table 2). Most other reports confirmed the finding of an age effect in SLN lymphatic mapping, whether using the dye method, radioisotope method or the subdermal peritumor injection method.[7,9,10,22,23] The reasons for this age effect were unclear and are being investigated.[22] A multivariate analysis, conducted by McMasters et al., demonstrated that age was the independent factor associated with a reduced SLN identification rate.[23] Krag et al. explained that the lymph node may be replaced by fat in older patients and the capacity to retain the radioactive colloid is reduced.[7] Sandrucci et al. found that the lymphatic flow was relatively slow in aged breast parenchyma.[14] The location of the breast tumor may influence SLN identification causing inconsistent results. Some studies demonstrated that medially located breast tumors have lower SLN identification rates.[7,10,22] This phenomenon was partly explained by the relationship between a medially located tumor and the overshadowing (masking) effect of the internal mammary lymph node following radiotracer injection.[7] However, some reports, including this study, demonstrated that, regardless of whether the breast tumor is medially or laterally located, the main lymphatic drainage is to the axilla not the internal mammary nodes.[11,17] A correlation may exist between breast tumor location and the false-negative rate. Notably, Krag et al. reported that the 13 false-negative cases encountered in their study were in tumors located in the lateral half of the breast.[7] Furthermore, Hill et al. demonstrated that all of their five false-negative cases were in tumors located in the upper outer quadrant.[24] Further, McMasters et al. reported that an upper outer quadrant tumor location was the only factor associated with an increased false-negative rate.[23] All three of the false-negative cases encountered in this study were also located in the upper outer quadrant. Previous excisional biopsy may disrupt the lymphatic drainage pathway and reduce SLN identification.[7] However, some reports, including this study, did not support these findings.[7,25] Breast tissue contains rich lymphatic drainage and disruption of a small area may not disturb or reduce SLN detection.

Nine patients presented with two SLNs in the same axilla region. In seven of these nine cases, both of the SLNs were located in level I, while in the other two cases they were located in level I and II. The SLN location difference indicated that breast cancer lymphatic drainage may have diverse drainage patterns and these patterns do not consistently drain from level I to level II. Moreover, Albertini et al. studied 62 SLNs and described a direct lymphatic drainage to level II nodes without drainage to level I in 12% of cases.[26] Krag et al. reported that the SLN may be located outside the axilla in 8% of cases and outside level I in 11% of cases.[7] The lymphatic drainage patterns observed via lymphoscintigraphy may alter the concept of skip metastasis in breast cancer. The term skip metastasis should not be used without lymphatic mapping because lymphatic drainage from breast cancer is not always from axillary level I to level II. In cases where the SLN is tumor free but non-SLN display metastasis, the term false-negative should be used rather than skip metastasis. Another false-negative situation is the change of the lymphatic pathway by tumor cells. In breast cancers with multiple axillary node metastases and distal lymphatic channels that are mechanically obstructed by tumor cells, a diverse channel may direct lymphatic drainage to another node but not the tumor cells occupying the SLN and the risk of higher false-negative rates increases.[27,28] That is why SLN biopsy always has a false-negative

rate even under the guidance of lymphoscintigraphy and also why the radioactive nodes are removed.

To reduce the false-negative rate, surgeons generally remove more SLNs than the SLN number detected via lymphoscintigraphy. During surgery, surgeons harvest SLNs with different SLN definition and criteria. The definition of an SLN by Mortan et al. is easy to understand: the first lymph node that receives afferent lymphatic drainage from the primary tumor.[29] However, this concept and definition are adjusted to harvest the SLN during surgery. The radioactive mapping technique involves numerous intraoperative definitions of an SLN. Krag et al. first described the SLN biopsy in breast cancer and defined the true SLN as the node with the highest radioactive count during surgery.[30] However, others used the radioactive activity ratio, comparing the SLN and the non-SLN activity, and some harvested all radioactive nodes as SLNs.[6,31,32] Moreover, van de Ent et al. defined a node/background of 10:1 as the SLN.[31] In a multi-institutional trial conducted in Germany and reported by Kuehn et al., each radioactive lymph node was defined as a sentinel node and more than two SLNs were removed in 31.7% of cases.[32] All of the above criteria used by surgeons for harvesting the SLN may not match the original definition of an SLN, namely that the first node of the same lymphatic channel draining from the primary tumor should be classified as the SLN. Some disagreement will occur between the number of SLNs reported by nuclear medicine physicians through lymphoscintigraphy and the number of SLNs harvested by surgeons using their own definitions. Generally, only one SLN is seen by lymphoscintigraphy but surgeons remove multiple radioactive nodes based on their own definitions and multiple SLNs are harvested from the same patient. In this study, a mean of 1.1 SLN/patient was removed. The number of SLNs retrieved was the same as mentioned in the report by a nuclear medicine physician and equaled the number of SLNs marked on the skin following lymphoscintigraphy. Nieweg et al. attempted to surgically define the SLN, stating that some lymphoscintigraphy may depict more than one SLN without visible lymphatic drainage channels and such nodes should be removed.[27] This study agrees that multiple SLNs should be removed if no drainage channel is identified on the image but, generally, dynamic images help to distinguish the true SLN and only the true SLN should be removed. Though the accuracy rate increases and the false-negative rate decreases in those who have more SLNs removed, a unique and same surgical SLN definition should be followed.[32] Furthermore, minimizing the removal of true SLNs to as few as possible reduces detailed pathological examination and so reduces costs. This study demonstrated that fewer SLNs and accurate SLN retrieval do not increase the false-negative rate. Based on a previous study, the SLN false-negative rate ranged from 0% to 16.7%.[15] The false-negative rate of 6.3%, according to the surgical definition of SLN used here, in the present data was close to the optimal false-negative rate of 5% or less. Reviewing the pictures of lymphoscintigraphy before surgery, distinguishing which one is the true SLN and which ones are not true SLNs but are radioactive leakage non-SLNs, is important. Dynamic lymphoscintigraphy could help to distinguish the true SLN in cases involving multiple radioactive nodes.

In conclusion, the results demonstrated that subdermal injection lymphoscintigraphy followed by SLN harvesting guided by a hand-held gamma counter the following day can achieve a high success rate. SLN excision in clinical node-negative patients results in just 13% of patients requiring total ALND. An SLN biopsy accuracy rate of 100% was achieved for tumors no more than 2 cm in size. SLN biopsy offers an effective substitute to axillary node dissection in most clinical node-negative patients and can avoid the complications associated with dissection.

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放射線導引前哨淋巴切除術在早期乳癌的運用

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背 景： 前哨淋巴切除術可以預測早期乳癌病患局部淋巴腺轉移的情況，可以用來取代腋下淋巴腺廓清術，且可避免淋巴廓清所造成的併發症。這篇研究在探討前哨淋巴切除術的準確性。

方 法： 這篇研究收集了 174 位臨床上無腋下淋巴腺轉移的乳癌病患，共實施了 165 次的前哨淋巴切除術。手術前一天由核醫做前哨淋巴的放射線定位(lymphoscintigraphy)，手術中再使用放射線探測器 (gamma-counter) 找尋前哨淋巴並切除之，並實施腋下淋巴廓清以比對前哨淋巴的準確性。

結 果： 淋巴放射線定位可以找到 94.3% 前哨淋巴，前哨淋巴切除術的正確性爲 98.2%，靈敏度爲 93.7%，專一性爲 100%。有三位病患的前哨淋巴無癌細胞侵犯卻有其他非前哨淋巴的淋巴腺感染，因此其僞陰性爲 6.3%。前哨淋巴切除術的正確性與腫瘤的大小有統計上的意義，不大於2 公分的腫瘤其正確性達 100%。

結 論： 前哨淋巴切除術可以正確的預測早期乳癌局部淋巴的侵犯度。尤其針對不大於 2 公分的乳癌正確性更高。

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