Journal of BUON **13:** 391-393, 2008

ORIGINAL ARTICLE

Subdermal laterocranial mapping of sentinel lymph nodes in breast cancer as an alternative to the peritumoral mapping

T. Deliisky[1], A. Ilieva[1], A. Velkova[2], S. Popovska[3], T. Betova[3], G. Baichev[1], I. Daskalova[1], D. Dimitrov[1], V. Nanev[1]

[1]Clinic of Surgical Oncology, University Hospital, Pleven; [2]Department of Social and Preventive Medicine, Medical University of Pleven; [3]Department of Clinical Pathology, University Hospital, Pleven, Bulgaria

Summary

Purpose: *Peritumoral injection of blue dye is standard method of sentinel lymph nodes (SLN) biopsy in breast cancer. Applying the marker to different locations will be of great benefit in cases in which the peritumoral mapping is difficult to implement.*

The aim of this study was to demonstrate that the subdermal laterocranial (SLC) mapping with a dye has similar diagnostic reliability to the peritumoral mapping and is applicable for clinical use.

Patients and methods: *254 patients with operable breast cancer ($cT_{\leq 3cm}N0M0$) underwent SLN mapping. SLC mapping was carried out in 150 patients, and classic peritumoral mapping in 95. In the cases with SLC mapping the dye was injected subdermally in the laterocranial part of the breast, 2-3 cm mediocaudally from the macroscopic contour of the gland. In this location the dye was injected into 3 points. The rest of the procedure followed the protocol for mapping with the standard peritumoral method.*

Results: *SLC mapping was successful in 145 (97%) of the cases. In 54 (37%) patients the SLN were positive and in 91 (63%) negative. In 2 patients false-negative results were taken. Standard peritumoral mapping was successful in 94 (99%) cases. The SLN were positive in 35 (37%) patients and negative in 59 (63%). False-negative result was seen in 1 patient. Both methods of SLN mapping gave almost identical results.*

Conclusion: *The laterocranial and peritumoral method of SLN mapping are equal with regard to their diagnostic reliability. The results suggest that the laterocranial method can be used in clinical practice.*

Key words: breast cancer, diagnostic reliability, laterocranial mapping, sentinel lymph nodes mapping, success rate

Introduction

Although it is generally accepted that peritumoral mapping for SLN identification is a gold standard [1-3] and this method is established in the international and national recommendations [4-6], researchers continue to study and apply other routes for injecting different dyes [7-9]. This is because, due to technical reasons, the peritumoral method is not always feasible. For example, if a radioactive method of mapping is used in tumors near the axilla, the radioactivity of the tumor covers the radioactivity of the SLN [10]. In case of non-palpable tumors special visualization equipment (ultrasonography, CT scan) is needed for guiding the injection of the mapping substance around the tumor.

The aim of this study was to demonstrate that the SLC mapping of SLN by a dye has the same high diagnostic reliability as the classic peritumoral method, and that the described method is applicable in clinical practice.

Patients and methods

Patients

Two hundred and forty-five patients with oper-

Correspondence to: Tashko Deliiski, MD, PhD. Clinic of Surgical Oncology, University Hospital - Pleven. 8A G. Kochev Street, Pleven 5800, Bulgaria. Tel: +359 64 886 242, Fax: +359 64 801 603, E-mail: onco_surgery@abv.bg

Received 02-10-2007; Accepted 27-11-2007

able breast cancer ($cT_{\leq 3cm}N0M0$) underwent SNL mapping at the Clinic of Surgical Oncology in Pleven. Patients who met the following criteria entered the study:

a) Palpable tumor size ≤ 3 cm anywhere in the breast
b) Clinically negative axilla
c) Intraoperatively palpably negative axilla

SLC mapping was carried out in 150 patients and standard peritumoral mapping in 95.

Methods

The dye (Patent blue V or Indocyanin green) was injected subdermally in the laterocranial part of the breast, 2-3 cm mediocaudally from the macroscopic contour of the gland. In this location the dye was injected into 3 points with 2-2.5 cm distance among them (Figure 1). In each point 0.5 ml of the dye was injected. In case of patients with overweight and large breasts the injected volume of dye was increased to 0.7 ml per point. The rest of the procedure followed the protocol for mapping with the standard peritumoral method - massage, skin incision in the axilla, SLN finding and SLN immediate frozen section examination.

Results

The mapping was successful in 145 (97%) patients with the SLC method. In 54 (37%) of them the SLN were positive and in 91 (63%) negative. In 2 (4%) cases the mapping gave false-negative results of SLN.

Successful mapping by the peritumoral method was achieved in 94 (99%) patients. Positive SLN were detected in 35 (37%) patients and negative in 59 (63%). False-negative result was found in 1 (3%) case.

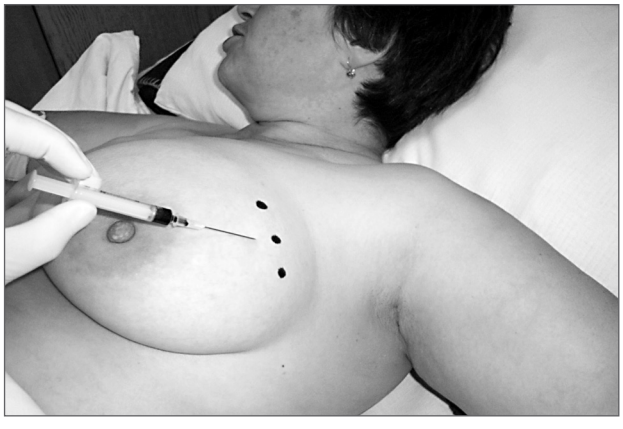

Figure 1. The 3 points of dye injections in the laterocranial subdermal method.

Diagnostic reliability with sensitivity, specificity positive and negative predictive value and accuracy of both methods are shown on Table 1.

No significant differences were found in any of the analyzed parameters between the 2 methods of mapping.

Discussion

Before adopting the laterocranial subdermal injection of dye we had long-standing experience of applying the peritumoral method [11,12]. With the passing of time we realized its inapplicability as universal method in non-palpable and laterocranially-located tumors [10,13]. The laterocranial method attracted us as an easy-to-apply and uncomplicated technique with a high diagnostic reliability. This method showed rapidly its advantages in comparison with other methods, for example:

a) Universality of application. There is almost no technical difficulty for its application in non-palpable and laterocranially or medially located tumors.
b) Easy-to-learn technique. In 3 places in the laterocranial zone of the breast a volume of 0.5 ml per place Patent blue V or Indocyanin green is injected in the subcutaneous tissue.
c) Economy. The method uses commonly 1.5-2 ml of dye per person compared to 2-5 ml in the peritumoral mapping.

This study has shown that the laterocranial mapping method displayed a high rate of success and diagnostic reliability, comparable to other methods (classic peritumoral and subareolar application) [14,15].

The opportunity to study the ways of lymph draining and metastasis is a good reason for searching for other mapping methods except the peritumoral one.

In the literature attention is paid to the subareolar method, mainly as an alternative to the peritumoral one [16-18] The theory that the lymph from the breast parenchyma passes through the subareolar lymph plexus before reaching the axilla lends support to this method [7,19]. Based on this theory some authors explain the higher effectiveness of the subareolar method compared to the peritumoral one and its advantages; still, other authors do not accept the superiority of the periareolar method [8]. Their opinions are based on the individual results and understanding that the lymphatics of the breast are quite developed and the lymph drains directly to the axilla [8].

We conclude that the SLC mapping method shows high diagnostic reliability and has clinical importance in the SLN localization, equal to the peritumoral meth-

Table 1. Comparison between laterocranial and peritumoral methods of sentinel lymph nodes mapping

Mapping method	*Success rate*		*Diagnostic reliability* *Sensitivity*		*False-negative*		*Specificity*		*Negative predictive value*		*Positive predictive value*		*Accuracy*	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Laterocranial (n=150)	145/150	97	54/56	96	2/56	4	89/89	100	89/91	98	56/56	100	143/145	99
Peritumoral (n=95)	94/95	99	35/36	97	1/36	3	58/58	100	58/59	98	36/36	100	93/94	99
p-value	0.67		0.69		0.69		–		0.70		–		0.70	

od, thus broadening the technical possibilities for SLN mapping and successful biopsy.

Acknowledgements

We are thankful to Prof. Raimund Jakesz, Department of Surgery, Division of General Surgery, University of Vienna, Austria, for giving us the methodology of laterocranial SLN mapping.

References

1. Morita ET. Lymphoscintigraphy in the detection of sentinel lymph nodes. In: Leong SPL (Ed): Atlas of selective sentinel lymphadenectomy for melanoma, breast cancer and colon cancer. Kluver Academic Publ, Boston, 2002, pp 9-39.
2. Narreddy SR, Govindarajuli S, Ibrahim N, Cawthorn SJ, Sahu AK. Blue dye-assisted for lymph node sampling: a feasible alternative in accurate axillary staging. Br J Surg 2005; 92 (Suppl): 29-32.
3. Nathanson SD, Wachna DL, Gilman D, Karvelis K, Havstad S, Ferrara J. Pathways of lymphatic drainage from the breast. Ann Surg Oncol 2001; 8: 837-843.
4. Nieweg O, Rutgers E, Jansen L et al. Is lymphatic mapping in breast cancer adequate and safe? World J Surg 2001; 25: 780-788.
5. Nieweg OE, Estourjie SH. What is a sentinel node and what is a false-negative sentinel node? Ann Surg Oncol 2004; 11 (Suppl): 169S-173S.
6. Zavango G, Rubello D, Franchini Z. Axillary sentinel lymph nodes in breast cancer: a single lymphatic pathway drains the entire mammary gland. EJSO 2005; 31: 479-484.
7. Winzer KJ. Interdisciplinary consensus for sentinel node biopsy in breast cancer. Chirurg 2004; 75: 298-299 (in German).
8. Villa G, Gopponi M, Buffoni F et al. Localization of the sentinel lymph node in breast cancer by combined lymphoscintigraphy blue dye and intraoperative gamma probe. Tumori 2000; 86: 297-299.
9. Tanis PJ, Nieweq OE, Valdes Olmos RA, Rutgers EJ, Kroon BB. History of sentinel node and validation of the technique. Breast Cancer Res 2001; 3: 109-112.
10. Tafra L, Lannin DR, Swanson MS et al. Multicenter trial of sentinel node biopsy for breast cancer using both technetium sulfur colloid and isosulfan blue dye. Ann Surg 2001; 233: 51-59.
11. Schwartz GF. Clinical practice guidelines for the use of axillary sentinel lymph node biopsy in carcinoma of the breast: current update. Breast J 2004; 10: 85-88.
12. Salmon R, Marcolet A, Viera M. Sentinel node biopsy or limited oriented axillary dissection (LOAD) in early breast cancer. EJSO 2005; 31: 949-953.
13. Rody A, Solbach C, Kaufmann M. Sentinel lymph node in breast cancer. Chirurg 2004; 75: 767-773 (in German).
14. Ranger GS, Mokbel K. The evolving role of sentinel lymph node biopsy for breast cancer. EJSO 2003; 29: 423-425.
15. Noguchi M. Current controversies concerning sentinel lymph node biopsy for breast cancer. Breast Cancer Res Treat 2004; 84: 261-271.
16. Morton DL. Sentinel node mapping and an international sentinel node society: current issues and future directions. Ann Surg Oncol 2004; 11 (Suppl 3): 137S-143S.
17. Mignotte H, Treileux I, Faure C, Nessah K, Bremond A. Axillary lymph-node dissection for positive sentinel nodes in breast cancer patients. EJSO 2002; 28: 623-626.
18. Herfarth Ch, Bastert G. Breast cancer as an example for revolution in oncology. Chirurg 2004; 75: 1129-1134 (in German).
19. Tanis PJ, Valdes Olmos RA, Muller SH, Nieweg OE. Reproducibility of lymphoscintigraphy for lymphatic mapping in patients with breast cancer. Radiology 2003; 228: 546-551.