

Inappropriate Intra-cervical Injection of Radiotracer for Sentinel Lymph Node Mapping in a Uterine Cervix Cancer Patient: Importance of Lymphoscintigraphy and Blue Dye Injection

Sima Kadkhodayan¹, Elham Hosseini Farahabadi¹, Zohreh Yousefi¹, Malihe Hasanzadeh¹, Ramin Sadeghi^{2*}

¹ Women's Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

² Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

ARTICLE INFO

Article type:
Case report

Article history:
Received: 7 Mar 2014
Revised: 2 Apr 2014
Accepted: 15 May 2014

Keywords:
^{99m}Tc-Phytate
Cervical cancer
Lymphoscintigraphy
Methylene blue
Sentinel node

ABSTRACT

Herein, we report a case of sentinel lymph node mapping in a uterine cervix cancer patient, referring to the nuclear medicine department of our institute. Lymphoscintigraphy images showed inappropriate intra-cervical injection of radiotracer. Blue dye technique was applied for sentinel lymph node mapping, using intra-cervical injection of methylene blue. Two blue/cold sentinel lymph nodes, with no pathological involvement, were intra-operatively identified, and the patient was spared pelvic lymph node dissection. The present case underscores the importance of lymphoscintigraphy imaging in sentinel lymph node mapping and demonstrates the added value of blue dye injection in selected patients. It is suggested that pre-operative lymphoscintigraphy imaging be considered as an integral part of sentinel lymph node mapping in surgical oncology. Detailed results of lymphoscintigraphy images should be provided for surgeons prior to surgery, and in case the sentinel lymph nodes are not visualized, use of blue dye for sentinel node mapping should be encouraged.

► Please cite this paper as:

Kadkhodayan S, Hosseini Farahabadi E, Yousefi Z, Hasanzadeh M, Sadeghi R. Inappropriate Intra-cervical Injection of Radiotracer for Sentinel Lymph Node Mapping in a Uterine Cervix Cancer Patient: Importance of Lymphoscintigraphy and Blue Dye Injection. *Asia Oceania J Nucl Med Biol.* 2014; 2(2):135-137.

Introduction

Sentinel node mapping, as a useful method for regional lymph node staging, minimizes the morbidity associated with lymph node dissection in patients with solid tumors.

The concept of sentinel node mapping relies on an orderly and predictable pattern of lymphatic flow from tumors. Sentinel nodes are the first lymph nodes in the lymphatic drainage system of tumors, and can be considered as surrogates for regional lymph nodes, regarding the pathological involvement (1, 2).

Two conventional methods for sentinel lymph node mapping are injection of radiotracer and blue dye. A combination of radiotracer and

blue dye injection for lymphatic mapping is found to increase the detection rate and decrease the false-negative rate of sentinel node biopsy (3). However, several authors have proposed a more restricted use of blue dye injection due to potential life-threatening complications, associated with this method (4-6).

Case report

A 56-year-old female patient with a histologically proven squamous cell carcinoma (2 cm in diameter) of uterine cervix was scheduled for sentinel node mapping in the

* *Corresponding author:* Ramin Sadeghi, Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: +985118012202; Fax: +985118933186; Email: sadeghir@mums.ac.ir; raminsadeghi1355@yahoo.com

© 2014 *mums.ac.ir* All rights reserved.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

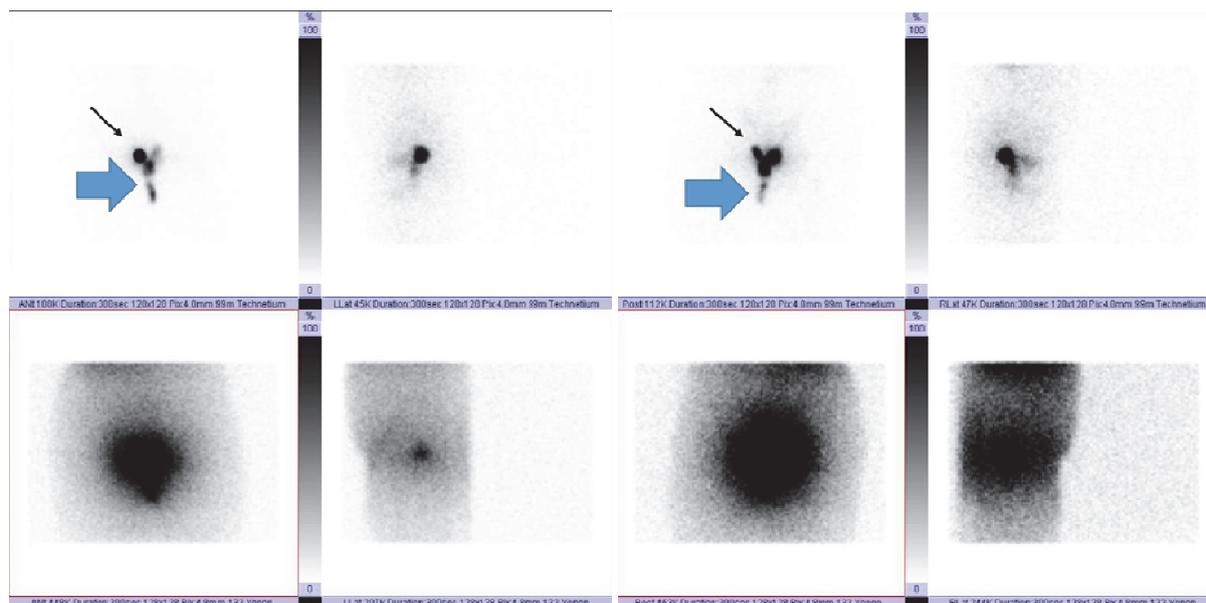


Figure 1. Early lymphoscintigraphy images of the patient. The original images are shown in the upper row and the scattergrams of the patient's hue in the lower row. Note minimal activity in the cervix (black arrows) and extension of radiotracer in the vagina (blue large arrows). No sentinel node could be visualized in the pelvis

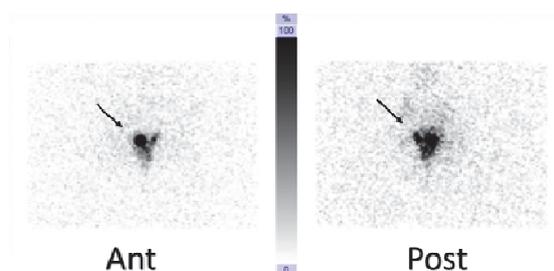


Figure 2. Delayed anterior/posterior lymphoscintigraphy images of the patient. No sentinel node is visible. Arrows are the injection sites in the cervix

nuclear medicine department of our institute. The patient was planned to undergo total hysterectomy and bilateral salpingo-oophorectomy.

Eighteen hours before the surgery, the patient received two intra-cervical injections of ^{99m}Tc - Phytate at 3 and 9 o'clock positions (1 mCi /0.1 cc for each injection). Lymphoscintigraphy images with anterior-posterior and lateral views were obtained 30 min after the injection, using a dual-head variable-angle gamma camera (ECAM, Siemens), as previously specified (7). The gamma camera was equipped with low-energy high-resolution collimator and images were taken by ^{99m}Tc photopeak and scatter photopeaks (for imaging the hue of the patient) (1 image /5 min).

Lymphoscintigraphy images showed improper injection of radiotracer in the cervix, as most of the radioactivity was visible in the vagina (Figure 1); also, no sentinel nodes were seen on the lymphoscintigraphy images.

The patient refused to undergo any further radiotracer injection. Pre-operative lymphoscintigraphy images also showed the same findings without any visible sentinel lymph nodes (Figure 2). The patient received two intra-cervical injections of methylene blue (0.5 cc/injection), and lymphatic mapping was performed using a gamma probe (EUROPROBE, France) and blue dye technique.

Two blue sentinel nodes were identified intra-operatively in the right and left obturator regions. However, no hot sentinel nodes were detected by the gamma probe. Frozen section examination of the sentinel nodes was negative for pathological involvement, and no pelvic lymph node dissection was performed.

Discussion

The importance of blue dye technique in sentinel node mapping has been demonstrated by many researchers (5, 8). The rationale behind blue dye technique is to decrease false-negative rate of sentinel node mapping and increase the intra-operative detection of sentinel nodes.

However, addition of blue dye is associated with some risks including life-threatening anaphylactic reactions (6, 9, 10). Therefore, some authors have proposed a more restricted use of blue dye in sentinel node mapping (11). In an important study, Derossis et al. reported that the marginal benefit of blue dye injection in breast cancer patients decreases as the experience of surgeons increases (12). Another

study by Sadeghi et al. reported similar findings, and showed the marginal benefits of blue dye technique in case of sentinel node visualization on lymphoscintigraphy images (4).

The present case shows the importance of lymphoscintigraphy imaging as an integral part of sentinel node mapping. Lymphoscintigraphy images indicated the inappropriate injection of radiotracer (in our case, failure to inject the air bubble behind the radiotracer in syringes), and the surgeon was informed about the results before the surgery. Blue dye technique was successful for lymphatic mapping and the patient was spared pelvic lymph node dissection.

Therefore, non-visualization of sentinel nodes on lymphoscintigraphy images should be reported to surgical oncologists, and use of blue dye technique should be promoted in similar clinical situations.

References

1. Tarjan M. Sentinel lymph node biopsy in Hungary. Results with a revolutionary new method in surgical oncology. *Magy Onkol.* 2002;46 (4):315-21.
2. Ellis LM. A perspective on sentinel lymph node biopsy in colorectal cancer: the race between surgical technology and molecular oncology. *Ann Surg Oncol.* 2000;7 (7):475-6.
3. Snoj M, Golouh R, Movrin-Stanovnik T, Vidergar-Kralj B. Added value of blue dye in sentinel node biopsy for breast cancer. *J Exp Clin Cancer Res.* 2003;22 (4):551-5.
4. Sadeghi R, Alesheikh G, Zakavi SR, Fattahi A, Abdollahi A, Assadi M, et al. Added value of blue dye injection in sentinel node biopsy of breast cancer patients: Do all patients need blue dye?. *Int J Surg.* 2014;12 (4):325-8.
5. Ramin S, Azar FP, Malihe H. Methylene blue as the safest blue dye for sentinel node mapping: emphasis on anaphylaxis reaction. *Acta Oncol.* 2011;50 (5):729-31.
6. Jangjoo A, Forghani MN, Mehrabibahar M, Sadeghi R. Anaphylaxis reaction of a breast cancer patient to methylene blue during breast surgery with sentinel node mapping. *Acta Oncol.* 2010;49 (6):877-8.
7. Momenzhad M, Zakavi SR, Dabbagh Kakhki VR, Jangjoo A, Ghavamnasiri MR, Sadeghi R. Scatterogram: a method for outlining the body during lymphoscintigraphy without using external flood source. *Radiol Oncol.* 2011;45 (3): 184-8.
8. Kang T, Yi M, Hunt KK, Mittendorf EA, Babiera GV, Kuerer H, et al. Does blue dye contribute to success of sentinel node mapping for breast cancer?. *Ann Surg Oncol.* 2010;17:280-5.
9. Dang Y, Engel J. Patent blue dye and an atypical anaphylactic reaction after sentinel lymph node biopsy in early breast cancer. *Breast J.* 2012;18 (1): 91-2.
10. Noirot A, Vigneau A, Salengro A, Bonnet F. Allergic reaction to patent blue dye for sentinel lymph node detection during uterus oncological surgery. *Ann Fr Anesth Reanim.* 2005;24 (5): 541-2.
11. Jangjoo A, Shabani G, Zakavi R, Kakhki VRD, Sadeghi R. Disappearance of a sentinel node on the delayed lymphoscintigraphy imaging of a breast cancer patient: Importance of blue dye injection. *Nowotwory.* 2011;61 (1):30-1.
12. Derossis AM, Fey J, Yeung H, Yeh SD, Heerdt AS, Petrek J, et al. A trend analysis of the relative value of blue dye and isotope localization in 2,000 consecutive cases of sentinel node biopsy for breast cancer. *J Am Coll Surg.* 2001;193 (5): 473-8.