Original Article

The value of lateral lymphoscintigraphy images of the pelvis for gynecological cancers: Are they necessary?

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ABSTRACT

Introduction: In the current study we evaluated the incremental value of lateral pelvic lymphoscintigraphy imaging of endometrial or cervical cancer patients who underwent sentinel node mapping.

Methods: Operable endometrial and cervical cancer patients without clinical or paraclinical evidence of lymph node involvement were included in the study. The day before surgery the patients were sent to the nuclear medicine department for injection of the radiotracer. All patients received two intra-cervical injection of 1 mCi/0.2 cc radiotracer in the 6 and 12 hour locations. 18-24 hours after the radiotracer, lymphoscintigraphy imaging in anterior/posterior and lateral views was done. After induction of anesthesia, 2 mL Methylene blue in two aliquots was injected intra-cervically in the same location as the radiotracers. During operation, any hot and/or blue node was harvested as sentinel nodes.

Results: Overall 40 patients were included in the study (30 endometrial and 10 cervical cancers). Sentinel node visualization was achieved in 30 patients. These sentinel nodes were all visualized on the ANT/POST views. Only in 7 patients sentinel nodes could be visualized on the lateral views. Intra-operative sentinel node detection rate was 38 out of 40 (95%). Radiotracer detection rate was 37/40 (92.5%) and blue dye detection rate was 17/40 (42.5%).

Conclusion: Anterior/Posterior pelvic lymphoscintigraphy imaging is sufficient for imaging in cervical and endometrial cancer patients undergoing sentinel node mapping. Lateral views can be omitted due to limited valued of these projections.

Key words: Sentinel node; Lymphoscintigraphy; Lateral view; Radiotracer; Blue dye

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INTRODUCTION

Gynecological cancers are among the most common female malignancies which can be diagnosed and treated very effectively [1]. Cervical and endometrial cancers are the two most common gynecological malignancies which could be treated surgically [2, 3].

Lymph node involvement is one of the most important prognostic factors in cervical and endometrial cancers and routine pelvic and para-aortic lymphadenectomy is considered as the standard of care according to FIGO [2, 4]. However, routine lymphadenectomy can cause significant complications to many node negative patients [5].

Sentinel node biopsy is an alternative method for lymph node staging of solid cancers which can decrease the morbidity of lymph node dissection considerably [6, 7]. In this approach the first node draining the tumors (which is called sentinel node) is found using two methods: blue dye and/or radiotracers [8]. Using radiotracers has the advantage of giving the treating team the opportunity of imaging (lymphoscintigraphy) before surgery which can help in surgery planning considerably [9]. However, pre-operative imaging can interfere with operation room scheduling especially in busy departments.

In the current study we evaluated the incremental value of lateral pelvic lymphoscintigraphy imaging of endometrial or cervical cancer patients who underwent sentinel node mapping in our department.

METHODS

Operable endometrial and cervical cancer patients (Stage I and IIA of cervical and Stage I to III of endometrial cancer) without clinical or paraclinical (ultrasonography and Pelvic CT scan) evidence of lymph node involvement were included in the study.

The day before surgery the patients were sent to the nuclear medicine department for injection of the radiotracer. All patients received two intra-cervical injection of 1 mCi/0.2 cc radiotracer (Tc-99m-Antimony sulfide colloid or Tc-99m-Phytate) in the 6 and 12 hour locations.

18-24 hours after the radiotracer, lymphoscintigraphy imaging in anterior/posterior and lateral views was done using a dual-head variable angle (E.CAM Siemens) or single head gamma camera (GE SOPHA) equipped with low energy high resolution collimator (128×128 matrix , 10 minutes/view). Body outlining was performed as described by Momennezhad et al using scattered photons of the primary injection site [10].

Lymphoscintigraphy images were evaluated by two nuclear medicine specialists and number and location of sentinel nodes were recorded on each set of images.

After completion of the imaging, the patients were sent back to the gynecologic surgery department. After induction of anesthesia, 2 mL Methylene blue in two aliquots was injected intra-cervically in the same location as the radiotracers.

During operation, any hot (more than 2 times in vivo activity of the background) or blue node was harvested as sentinel nodes.

RESULTS

Overall 40 patients were included in the study (30 endometrial and 10 cervical cancers). Table 1 shows the characteristics of the patients as well as the results of lymphoscintigraphy images. Figure 1 shows the lymphoscintigraphy imaging of a patient with endometrial cancer.

Table 1: Characteristics of the patients.

Total number of patients	40
Age	56±12 years
BMI	22±5
Malignancy types	
Endometrial cancer	30
Cervical cancer	10
Sentinel node visualization	30
Ant/Post images	30
Lateral images	7
Bilateral sentinel nodes visualization	17
Sentinel node detection intra-operatively	38
Hot	37
Blue	17
Blue/Hot	16
Median number of harvested sentinel nodes	2
Bilateral sentinel node harvested during surgery	30

At first we used Tc-99m-antimony sulfide colloid for sentinel node mapping. However after several defective labeling with this tracer [11], we changed the tracer to Tc-99m-Phytate [12]. Thirty patients were injected with Tc-99m-Antimony sulfide colloid and the remainder ten with Tc-99m Phytate.

Sentinel node visualization was achieved in 30 patients (bilateral in 17; Figure 2). These sentinel nodes were all visualized on the ANT/POST views. Only in 7 patients sentinel nodes could be visualized on the lateral views (Figure 1).

In the remainder of the patients, no sentinel node could be visualized on the delayed images (Figure 3).

Intra-operative sentinel node detection rate was 38 out of 40 (95%).

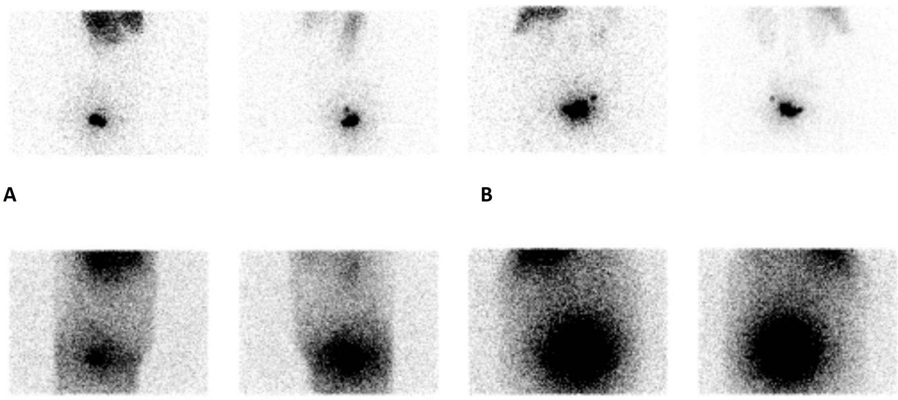

Fig 1. Lateral (A) and Anterior/Posterior (B) lymphoscintigraphy images of an endometrial cancer patient. The bottom row images are scatterograms using scattered photons of the primary injection site. Note visualization of pelvic sentinel nodes on the left side.

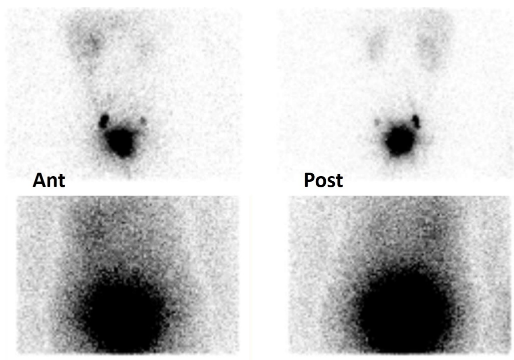

Fig 2. Anterior/Posterior lymphoscintigraphy images of an endometrial cancer patient. The bottom row images are scatterograms using scattered photons of the primary injection site. Note visualization of pelvic sentinel nodes on both sides.

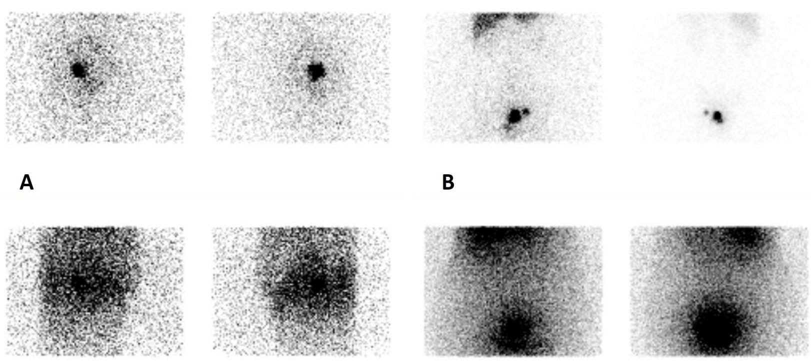

Fig 3. Lateral (A) and Anterior/Posterior (B) lymphoscintigraphy images of a cervical cancer patient. The bottom row images are scatterograms using scattered photons of the primary injection site. Note visualization of pelvic sentinel nodes on the left side. The lateral images does not show any sentinel node.

The patients with sentinel node detection failure were 45 and 55 year old cervical cancer patients and both have pelvic lymph node involvement. Bilateral sentinel nodes were found in 30 patients. Radiotracer detection rate was 37/40 (92.5%) and blue dye detection rate was 17/40 (42.5%).

DISCUSSION

Since its introduction, sentinel node concept has changed the surgical oncology field considerably [8]. This approach can decrease the morbidity of regional lymph node dissection by sparing patients with negative sentinel nodes from an usual extensive procedure. In gynecological cancers, sentinel node mapping is gaining acceptance as can decrease the complications as well as duration of surgery [13].

The sentinel node mapping is usually performed by two methods alone or in combination: Blue dye and radiotracer methods. Many groups prefer, radiotracer method due to high prevalence of allergic reactions to blue dyes [14] as well as the opportunity of pre-operative lymphatic mapping using lymphoscintigraphy imaging.

Pre-operative lymphoscintigraphy can help the surgeons to better plan the surgery, and usual locations of sentinel nodes can also be identified beforehand [15]. Outlining the body using flood source [16] or other available methods [10] can also help the surgeons considerably. However, sending patients to nuclear medicine department for imaging which can be quite time consuming may interfere with operating room scheduling and some groups do not recommend pre-operative imaging on this account and advocate intra-operative radiotracer injection [17]. Since the introduction of sentinel node procedure in our department in 2004 we have changed the lymphoscintigraphy parameters in order to decrease the time patients spend in our department [18]. We started to perform sentinel node mapping for gynecological cancers since 2010 [19]. Operating room scheduling for endometrial or cervical cancers is much harder than breast cancer patients due to longer duration of surgery in the gynecological cancers and difficulty in arrangement with pathologists to perform intra-operative sentinel node evaluation.

Intra-operative sentinel node detection rate was high in our cohort of patients (95%) which is compatible with other tumors [20]. Radiotracer detection rate was considerably higher than blue dye detection rate (92.5% vs. 42.5%) which is also compatible to the other studies [21]. Our results also are in concordance with the other studies in gynecological cancers. For example, Barlin et al in a large group of endometrial cancer patients (498 patients) reported 95% detection rate [22] and Yamashita et al reported >90% detection rate in early stage cervical cancer patients [23]. However, studies used blue dye only method had lower detection rate compared to those with radiotracer technique. Chereau et al reported 69% sentinel node detection rate in a cohort of 66 cervical cancer patients [4] and Vidal et al reported 62.1% sentinel node detection rate in endometrial cancer patients [24].

The current study showed that lateral pelvic lymphoscintigraphy imaging had very low yield since only in 7 patients sentinel nodes were detectable on these images. This is due to superimposition of the injection site on the sentinel nodes on the lateral views. Actually the lateral images didn't provided additional information to help the surgeons intra-operatively. These results showed that acquiring lateral lymphoscintigraphy imaging cannot add to the diagnostic value of ANT/POST pelvic images and only increases the time of imaging. This extra time (which is even longer by single head gamma cameras) can interfere with operation room schedule and our recommendation is to omit lateral pelvic lymphoscintigraphy imaging for sentinel node mapping of gynecological cancers. It is worth mentioning that in addition to planar imaging, SPECT or SPECT/CT can be very useful in pre-operative imaging of sentinel node mapping of gynecological cancers. Diaz-Feijoo et al reported better sentinel lymph node detection by SPECT/CT imaging which allowed easier intra-operative detection with gamma probe [15]. In the most recent reports, Kraft et al and behocine et al also reported considerable added value of SPECT/CT over planar imaging in gynecological cancers [25, 26]. SPECT/CT gamma cameras are getting installed more and more in our country and in the future this outstanding imaging technique would play an important role in sentinel node mapping in different departments.

CONCLUSION

Anterior/Posterior pelvic lymphoscintigraphy imaging is sufficient for imaging in uterine cervical and endometrial cancer patients undergoing sentinel node mapping. Lateral views can be omitted due to limited valued of these projections.

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