

Sentinel Lymph Node Biopsy in Melanoma Patients: An Experience with Tc-99m Antimony Sulfide Colloid

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ABSTRACT

Introduction: Sentinel lymph node biopsy is the standard procedure for lymph node staging in intermediate thickness melanoma. In Iran, this procedure has not been addressed sufficiently. In this study, we report our experience in this area.

Methods: Ten consecutive patients with intermediate thickness melanoma were included in our study. 1.5 mCi of Tc-99m antimony sulfide colloid in two divided doses was injected around the tumor. All patients underwent surgery 2-4 hours after injection of the tracer. Patent blue V dye was also used for 8 patients. Using a hand-held gamma probe, the sentinel nodes were harvested and sent to the pathologist for frozen section and H&E review. For patients with positive sentinel nodes, lymph node dissection was performed.

Results: At least one sentinel node could be harvested in all patients. The mean number of sentinel nodes was 1.66. Detection rate with radiotracer and blue dye was 100% and 75% respectively. 30% of the patients had positive sentinel nodes. One patient in the pediatric age range and one head and neck melanoma were included in our study with successful sentinel node mapping.

Conclusion: Sentinel lymph node biopsy using Tc-99m antimony sulfide colloid is a reliable and safe method in melanoma patients which can help in treatment planning and patient's ultimate prognosis.

Keywords: Melanoma, Sentinel node, Tc-99m antimony sulfide colloid

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INTRODUCTION

Melanoma is a fatal skin cancer with increasing in recent years all around the world (1, 2). Although this malignancy is not very frequent in Iran (4.5% of all skin cancers in a study by Amouzgar et al, almost half of the reported frequency in other countries (1), its aggressive nature and recent advances in treatment of this tumor warrants more attention. One of the growing issues in oncology and tumor surgery is the concept of sentinel lymph node biopsy, which is almost the standard procedure for lymph node staging of breast cancer (3) and melanoma (4, 5). The invasive procedure of lymph node dissection would not be necessary in case of negative sentinel lymph node (6, 7). In Iran the sentinel lymph node biopsy procedure for breast cancer is growing rapidly (8), however to the extent of our knowledge there is only one report in the literature on sentinel lymph node biopsy in melanoma in Iran (9). In this above-mentioned study Omranipour R. reported the experience of sentinel lymph node biopsy in melanoma using blue dye injection in Tehran University of Medical Sciences with excellent results. However not all studies had such good results with blue dye only technique and using radiotracers and gamma probe during surgery seems rational (10, 11). Actually many centers in Iran are equipped with gamma probes and have active nuclear medicine departments capable of applying the procedure in an incremental pace.

In this study, we presented our experience in sentinel lymph node biopsy of melanoma using Tc-99m antimony sulfide colloid. This radiotracer is easily available in Iran (12).

METHODS

From March of 2005 to June of 2009, ten consecutive patients with intermediate thickness melanoma were included in our study. 1.5 mCi of Tc-99m antimony sulfide

colloid in two divided dose (0.2 cc volume each) was injected peritumorally with insulin syringes. Five minute post-injection imaging was performed with a Siemens dual head variable angle gamma camera (E.CAM) in anterior and posterior views using low energy high resolution collimator and photopeak centered on the Tc-99m energy with 20% window. For the lesions in the extremities, whole body sweep mode with the scan speed of 10cm/min was used from the injection site to the torso (Figure 1). For the lesions in the head and neck anterior and posterior spot views (5 min/view) were obtained.



Figure 1. Lymphoscintigraphy of a patient with lower extremity melanoma. Note the lymphatic vessels which connect the injected site to the lymph nodes in the inguinal area.

After completion of imaging, the patients were sent to the operating room. All patients underwent surgery 2-4 hours after injection of the tracer. Immediately after anesthesia induction, 2 mL of patent blue V dye was injected in two divided dose peritumorally. Using a hand-held gamma probe (RMD navigator GPS system) all nodes with ex vivo count rate 10% or higher of the hottest sentinel node or any blue node were harvested. The harvested nodes were sent to the pathologist for frozen section and H&E staining review and for patients with positive sentinel nodes, lymph node dissection was performed.

RESULTS

Table 1 showed the results of the study and the demographic data of the patients. At least one hot node was detected on the lymphoscintigraphy images. Totally 25 hot nodes were harvested during surgery. Fourteen nodes were blue during surgery. No sentinel node was harvested only with blue dye. In three patients sentinel nodes were positive by frozen section. In patient 3, 2 out of four, in patient 5, 2 out of two

and in patient 7, 1 out of 3 sentinel nodes were positive in frozen section. In patient 7 the sentinel node was the only involved node after lymph node dissection.

DISCUSSION

It is reported that almost 85% of cutaneous melanomas are in stage I or II at presentation. Many of these patients can have clinically undetectable regional lymph node metastases (about 20%), with significant effect on prognosis and treatment planning (13-15).

Although, three large controlled trials are underway for evaluation of sentinel lymph node biopsy concept in melanoma (Multicenter Selective Lymphadenectomy Trial (MSLT), SunBelt Melanoma Trial (SBMT), and Florida Melanoma Trial (FMT)), the interim report of MSLT-1 shed light on this issue (5, 15-17). The strongest prognostic factor in cutaneous melanoma is sentinel lymph node involvement, even better than tumor thickness (15, 17). This is the first rational behind sentinel lymph node biopsy of melanoma.

Table 1. The results of the study as well as demographic data of the patients.

N	Sex	Age	Tumor thickness (mm)	Localization	Number of hot sentinel nodes	Number of blue sentinel nodes	Histology of the sentinel node
1	F	45	1.59	Right heel	3	2	Negative
2	F	55	2.13	Right elbow	2	2	Negative
3	F	43	3.67	Left heel	4	2	Positive
4	M	45	1.67	Right face	1	N/A	Negative
5	M	57	4.05	Left palm	2	2	Positive
6	M	67	2.56	Right instep	3	3	Negative
7	F	60	2.76	Left calf	3	0	Positive
8	M	49	2.14	Right elbow	3	0	Negative
9	M	68	1.78	Right heel	1	N/A	Negative
10	F	13	1.00	left calf	3	3	Negative

Although the controversy remains in the survival benefit of lymph node dissection in melanoma patients with positive sentinel lymph node (15, 17), it is usually accepted that for these patients, lymph node dissection should be performed and this can probably increase the survival. This is the second rationale behind sentinel lymph node biopsy of melanoma. It is worth mentioning that, the regional lymph node recurrence would significantly be decreased by using sentinel lymph node biopsy in melanoma (15, 18). We didn't follow the patients for a sufficient period to assess this possibility.

Not all melanoma patients are eligible for sentinel lymph node biopsy. The main recommendation is in patients with American Joint Committee on Cancer (AJCC) clinical stage II (1–4mm thick) and those with AJCC clinical stage I with poor prognostic features (regression, ulceration, high mitotic rate or Clark level IV/V invasion (recommendation A). It is also recommended for patients with melanoma thickness more than 4 mm (recommendation B) (19, 20). Except for patient number 5 all our patients were in the second group. For patients with tumor thickness less than 1 mm, sentinel lymph node biopsy may not be indicated (19) since the rate of lymph node involvement is very low.

Detection rate in our study was 100% with radiotracer and 75% for blue dye. This shows that using blue dye alone would not be sufficient for sentinel node mapping. The other studies have also the same favorable results with radiotracers (2, 21). We used Tc-99m antimony sulfide colloid for sentinel lymph node mapping. This tracer has favorable properties for sentinel node mapping such as small particle size and rapid lymphatic movement as well as visualization of lymph vessels. This radiotracer is no longer available in Europe; however it is still in use in Australia as well as our country (13). The other radiotracers can also be used with good results such as Tc-99m sulfur colloid, etc (10, 13).

The mean number of sentinel lymph nodes in our study was 1.66. Multiple sentinel nodes are the rule in extremity and head and neck melanomas. All the hot nodes should be harvested during surgery in order to avoid missing any sentinel node (22). It is reported that low dose of the tracer can result in less active nodes and it is prudent to use at least 1 mCi for this purpose (2).

In patients 3, 6 and 8 more sentinel nodes were harvested during surgery compared to the visible nodes on lymphoscintigraphy images which is in agreement of other studies (23). This can be the result of tracer movement to the second echelon lymph nodes as the time passes. Currently there is no way to identify the second tier nodes and there is much concern regarding this issue in the literature. In a recent study, Chakera et al reported significantly more sentinel nodes by two-day protocol compared to the 1-day protocol (24). This remains an important issue to be studied in the future.

Although we didn't have any sentinel node in unusual lymph node basins, the frequency of this pattern is reported to be as high as 9% and pre-operative lymphoscintigraphy is strongly recommended in melanoma patients for detecting these cases (2).

In patient 1, we found an interval sentinel node in the popliteal fossa. This node was removed and was not involved. This phenomenon can happen in 3-5% of patients. Although these nodes are reported to be false sentinel nodes, their removal is recommended (2, 25).

Patient 10 in our study was in pediatric range of age. This is a rare tumor in children, however the concept of sentinel node can be successfully applied in these patients too (26-28).

Finally patient 5 had head and neck melanoma. Sentinel node biopsy can also been performed safely in this group of patients, however the radiotracer should be injected in the superior border of the tumor and the injection site is better to be removed

first during surgery in order to help avoiding interference of the radioactivity from the injection site (15, 29).

CONCLUSION

In conclusion sentinel lymph node biopsy using Tc-99m antimony sulfide colloid is a reliable and safe method in melanoma patients which can help in prognosis determination and treatment planning.

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