

full validation of these results by time-proven protocols are advantageous.

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Lymphatic Drainage to Triangular Intermuscular Space Lymph Nodes in Melanoma on the Back

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Methods: Lymphoscintigraphy with ^{99m}Tc-antimony sulphide colloid was performed on patients with cutaneous melanoma of the back to define draining node fields and sentinel nodes before surgery. **Results:** One patient was found to have drainage from the back to sentinel lymph nodes in the triangular intermuscular spaces bilaterally, above and lateral to the scapula. Subsequently, drainage to this node field has been found in 26% of 42 consecutive patients who have had lymphoscintigraphy performed for melanoma on the back. **Conclusion:** When performing lymphoscintigraphy to locate draining node fields and sentinel nodes in patients with melanoma on the back, it is important to look for drainage to the triangular intermuscular space node field by obtaining posterior and lateral scans. Any sentinel lymph nodes found in this field should be marked prior to surgery in the same way as nodes in other node fields are delineated so that they may be removed at surgery.

Key Words: melanoma; lymphoscintigraphy; sentinel lymph nodes; triangular intermuscular space

J Nucl Med 1996; 37:964-966

At the Sydney Melanoma Unit, lymphoscintigraphy has become an integral part of the presurgical diagnostic evaluation of patients with intermediate thickness cutaneous melanoma. Lymphoscintigraphy is used in conjunction with the blue dye method at surgery to allow accurate excision biopsy of the sentinel nodes in each draining node field. If the technique is to be successfully applied, all sentinel nodes must be identified. This article describes lymphatic drainage from the skin of the back to a new node field, the triangular intermuscular space. We also examine the incidence of drainage to this node field in a

sequential group of patients with primary lesions on the back and describe the changes in the lymphoscintigraphy imaging technique required to ensure that all sentinel nodes in this node field are identified.

METHODS

Patients

The patients described were referred for lymphoscintigraphy by the Sydney Melanoma Unit for lymphatic mapping and specifically to have the sentinel lymph nodes marked in each draining node field prior to surgery. Included in this report is the initial case showing drainage to the triangular intermuscular space and the following sequential 41 patients with back lesions, resulting in a total of 42 patients studied.

Lymphoscintigraphy

Lymphoscintigraphy was performed after excision biopsy of the primary lesion in most patients, although some patients still had the primary lesion in situ. The delay between excision biopsy and lymphoscintigraphy was usually 1-3 wk. Histologic diagnosis of malignant melanoma was present in each patient prior to lymphoscintigraphy. Surgery with wide local excision of the excision biopsy site and also in most patients sentinel node biopsy was performed the day after lymphoscintigraphy in almost all patients.

Technetium-99m-antimony tri-sulphide colloid was injected intradermally at multiple points immediately adjacent to the primary lesion or the excision biopsy site. This meant that the injections were given within 1-2 mm of the excision biopsy site or the primary lesion. Scanning was performed as previously described (1). Four to six small-volume (0.05 to 0.1 ml) injections were generally required, with each containing 5-7 MBq of tracer. Scanning began immediately and the major draining lymph channels were marked on the skin at this time, thus enabling an discontinuity dissection, including the lymph channels, to be per-

Received Jul. 7, 1995; revision accepted Jul. 20, 1995.

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formed if necessary. This was done using a point source of radioactivity to trace the path of the major channels over the skin. We then used Castellani's paint on a cotton bud or an indelible pen to mark on the skin the path of the channel or channels. The positions of any interval nodes were also marked. The patient returned 2.5 hr later for delayed imaging. Scans of all potential draining node groups were obtained at this time. If the lesion was on the trunk, this routinely included the axillary and inguinal node groups, and, if high on the trunk, the supraclavicular and posterior triangle nodes were also checked. After the discovery of drainage to the TIS described in this case below, posterior and lateral views of the upper back were also routinely performed in patients with back lesions to ensure that drainage to the TIS was detected when present. These extra views were performed in all of the patients described in this study. Once the draining node fields were identified, the position of the sentinel node or nodes in each group was marked.

RESULTS

Case Report

A 39-yr-old man with a primary melanoma on the lower back just to the right of midline was referred for lymphoscintigraphy after initial excision biopsy. The purpose of the investigation was to define the draining lymph node fields and to locate the sentinel lymph nodes (1). The melanoma was 1.8 mm thick, Clark level IV. The study showed drainage to interval nodes just lateral to the scapula on each side, an interval node in the right mid-axillary line inferior to the axilla and eventual drainage to the axilla bilaterally (Fig. 1). At surgery the next day following the intradermal injection of blue dye, blue stained lymph nodes were found on each side in the triangular intermuscular space near the scapula immediately beneath the skin marks made at lymphoscintigraphy. These nodes were excised, as was a right axillary sentinel node, after which a wide local excision of the primary lesion site was performed. Histological examination showed metastatic melanoma in the left triangular intermuscular space sentinel node but no malignancy was detected in any of the other nodes. Three weeks later, radical left axillary dissection was performed. No metastatic melanoma was found in any of the 24 nodes removed at this time.

Subsequent Patients with Back Melanomas

Subsequent to the first identification of drainage to this node field, we have performed lymphoscintigraphy on 41 patients with melanoma on the back and have found drainage to this node field in 10 patients. Therefore, 11 of 42 patients (26%) had drainage to the triangular intermuscular space (Fig. 2). In patients with melanoma on the back above Sappy's line at the level of the umbilicus, the incidence of drainage to the triangular space nodes is 10 in 33 (30%).

Surgical Findings

In 9 of these 11 patients, the TIS sentinel node was sought at surgery using the blue dye method. In each patient, the TIS sentinel node was located immediately deep to the skin mark made at the time of lymphoscintigraphy. These nodes were examined histologically and were negative for melanoma metastases, except for the patient described in the case report. In 2 of the 11 patients, no attempt was made to locate the TIS sentinel node at surgery.

DISCUSSION

In February 1992, we began to use lymphoscintigraphy in patients with melanoma to define draining node fields as well as locate the sentinel lymph nodes (1,2). With this in mind, it became important to identify all lymph nodes receiving direct

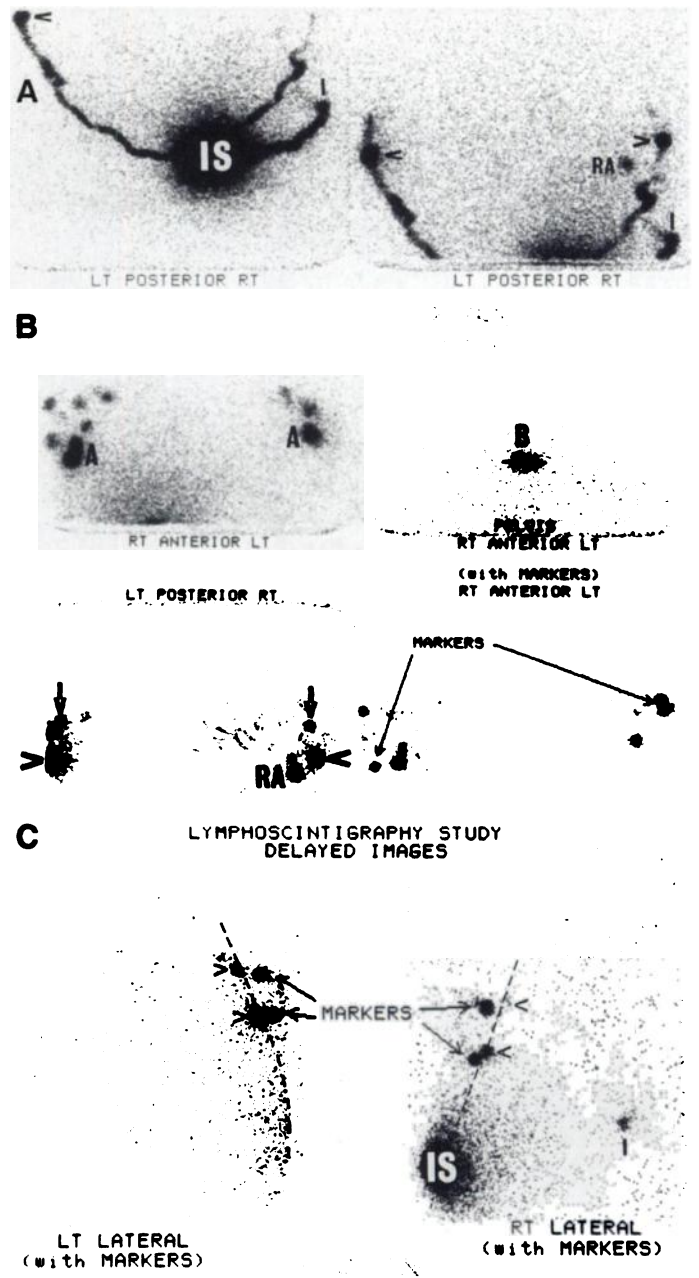


FIGURE 1. (A) Early dynamic study recorded in the posterior view depicts major channels passing from the injection site (IS) towards the scapula bilaterally where each met a single sentinel node in the triangular space (horizontal arrowheads). A separate dominant channel was seen passing to the right to an interval node (I) which was present in the mid-axillary line inferior to the axilla. The channel then passed on to the right axillary (RA) region. (B) Delayed scans in the posterior view shows tracer in the sentinel nodes in the triangular space bilaterally (horizontal arrowheads) and some tracer also passing superiorly into other nonsentinel nodes in the triangular space (vertical arrow). Tracer is also seen in the axillary lymph nodes bilaterally (A) in the anterior view of the chest. Anterior view of the pelvis shows normal bladder activity (B), but there was no drainage to groin nodes. Anterior view of the axillary regions (bottom right) with surface markers on the skin (markers) measures the depth of the sentinel nodes in the axilla. (C) Right and left lateral delayed scans show the posterior location of the nodes in the triangular space (horizontal arrowheads). Dotted line is approximate position of the skin of the back. The patient's back is towards the center of the figure for both laterals. The injection site (IS) is seen in the right lateral view as is the interval node in the right mid-axillary line inferiorly (I). The markers shown in the figure (markers) are on the skin and allow measurement of the depth of the nodes in the triangular space.

drainage from the tumor site, and thus we were careful to image all the channels in the early part of the study and record the

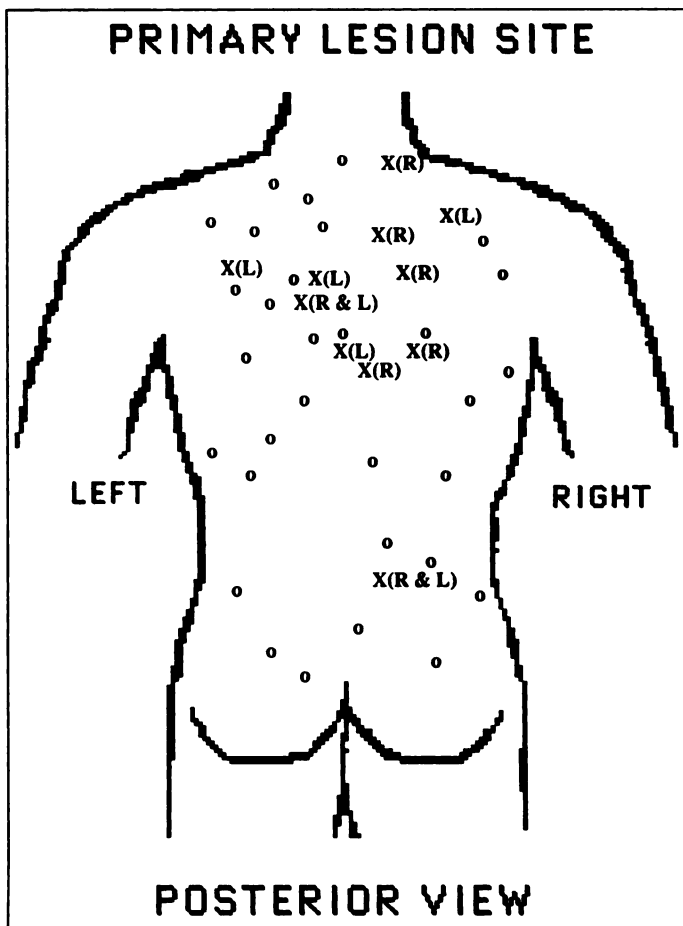


FIGURE 2. Location of primary lesion in the last 42 patients with melanoma on the back. The "o" marks lesions not showing drainage to the triangular space node field. Lesions marked with an "x" did have drainage to the triangular space node field and (R) or (L) designates the side receiving the drainage.

location of all interval nodes and lymph nodes receiving such direct drainage.

Recently while performing lymphoscintigraphy in a patient with melanoma on the back, we noticed drainage to an "interval" node just lateral to the scapula and we began to look for this node in all patients with melanomas on the back. To maximize detection of these nodes, careful examination of the early images for drainage to this area and posterior scans of the upper back on delayed imaging were performed. Delayed lateral scans to define the posterior location of the activity were also used. Surgical exploration of these areas show that these nodes lie in the triangular intermuscular space just lateral to the scapula. This space is a long-recognized anatomical entity formed by the teres major inferiorly, the infraspinatus, teres minor and subscapularis superiorly and the long head of the triceps laterally (Fig. 3). The circumflex scapular vessels pass through this space. It would be more correct to refer to nodes in this space as sentinel nodes in the triangular intermuscular space lymph node field rather than interval nodes, although it is

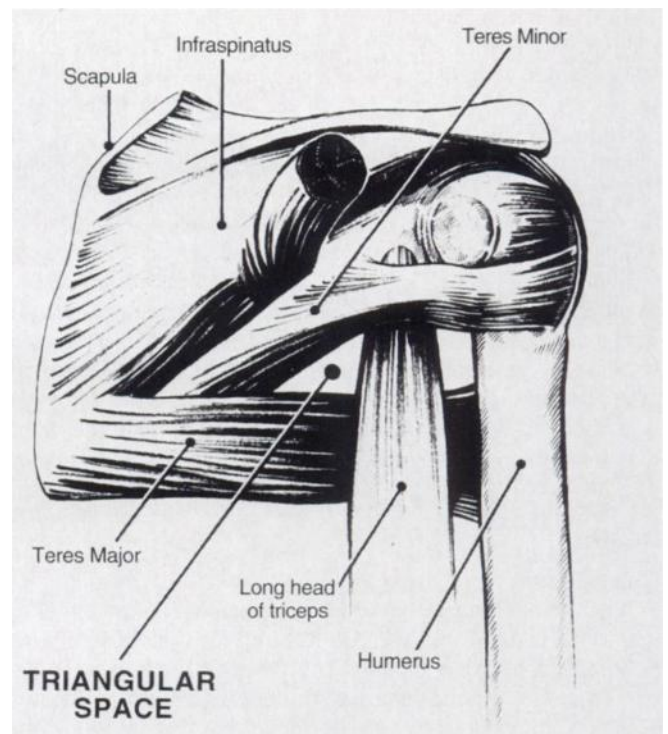


FIGURE 3. Right triangular intermuscular space viewed from the posterior aspect is clearly seen in this illustration defined by the teres major, long head of the triceps and the teres minor muscles. The infraspinatus and subscapularis muscles are also close to its superior boundary.

clear that lymphatic channels which pass onwards from them travel to the axillary lymph node field following the course of the circumflex scapular and then the subscapular vessels.

CONCLUSION

When performing lymphoscintigraphy to locate sentinel nodes in patients with melanoma on the back, it is important to be aware of the presence of this lymph node field and to modify the lymphoscintigraphy imaging protocol so that drainage to this node field will be detected when it is present. Such drainage will occur in approximately 25% of patients with lesions on the back. In our patient, the node in the triangular intermuscular space on the left was the only node containing metastatic melanoma. This would have remained undetected if its presence had not been identified by lymphoscintigraphy, even if a full radical axillary lymph node dissection had been performed.

ACKNOWLEDGMENT

Supported in part by a grant from the Melanoma Foundation of the University of Sydney, Sydney, Australia.

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