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## *Situs Inversus* & Sentinel Lymph Node Biopsy (SLNB): Revisiting the Importance of SPECT/CT for SLNB in Cutaneous Melanoma During COVID-19

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Dear Sir,

The Coronavirus (COVID-19) pandemic has had a devastating global effect on healthcare systems worldwide. Amidst COVID-19 taking the spotlight with subsequent diversion of resources, melanoma remains an increasing interdisciplinary public health challenge. In the management of cutaneous melanoma, Morton et al., established Sentinel Lymph Node (SLN) biopsy (SLNB) as a technique for highly accurate sampling and staging of lymphatic fields draining a primary tumor site [1]. Information yielded from this procedure is indispensable for patient management decisions, and often provides a gateway for adjuvant therapy eligibility. Current guidelines recommend SLNB for melanomas of clinical stage T1b-T4b without clinically evident locoregional or distant metastasis [2].

The introduction of Single-Photon Emission Tomography/Computed Tomography (SPECT/CT) in protocols for the identification of SLN in patients with melanoma has been advocated due to the relatively recent scientific evidence showing additional value over planar imaging [3,4].

Running a SLNB service requires multidisciplinary coordination between nuclear medicine, the operating team and histopathology department [5]. As all units do not inherently utilize SPECT/CT, we present a case report of a patient undergoing SLNB with *situs inversus*, re-emphasizing the importance and practicalities of this imaging modality in the context of SLNB for cutaneous melanoma.

A 29-year-old female had an initial excision biopsy of a pigmented lesion from her back. This was reported as an invasive superficial spreading malignant melanoma with a Breslow Thickness of 1.4 mm with 1 mitosis. The patient was offered a wider local excision and SLNB, which she agreed to proceed with. Pre-operatively the patient was deemed fit for surgery with no abnormalities in routine laboratory analysis. On the day of surgery, the patient underwent a nuclear medicine SPECT/CT scan where she was noted to have two sentinel lymph nodes in the right axilla and one sentinel lymph node in left axilla. Incidentally *situs inversus totalis* was also noted including a right-sided aortic arch, dextrocardia, left-sided liver and right-sided spleen (Figure 1). Preoperatively, particular attention was given to location of the Cardiac Apex Beat (CAB) and intravenous line placement. Intra-operatively there remained an awareness that following intubation, the left lung would be predominantly ventilated compared to the right. Notably, Electrocardiogram (ECG) lead placement was also reversed due to the patient's dextrocardia. Postoperative vital signs were stable and the patient was subsequently reviewed in clinic with no evidence of residual malignancy or metastatic disease. *Situs inversus* is an autosomal recessive disorder that was first described by Matthew Baillie with an incidence reported between one in 5000-20000 births [6]. In this condition the major visceral organs are reversed or mirrored from their normal positions [6]. This often has multiple peri-operative implications including reversal of ECG placement for appropriate analysis as well as user awareness of paddle placement for external defibrillation due to dextrocardia [7,8]. During SLNB, methylene blue dye is often injected in the primary tumour to assist with SLN identification. Surgical pause and notifying the anaesthetist is common practice as potential anaphylaxis to the dye is well documented. In this circumstance, it is prudent to know that for *situs inversus* patients, central venous access and pulmonary artery catheter placement in the left internal jugular vein provides the most direct access to the morphologic right atrium [9]. Awareness of this anatomical variation also avoids potential damage to the brachiocephalic vein, thoracic duct and right mammary vein [10].

During COVID-19, efficiency in theatre is at an all time low. This has become more pronounced

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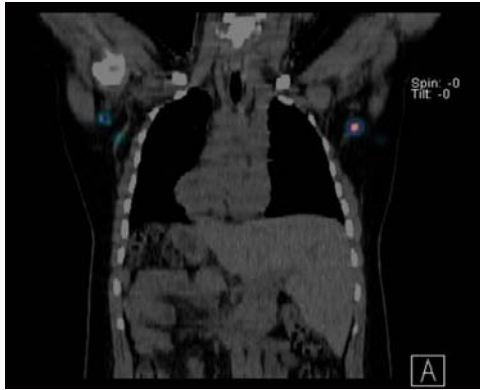
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**Figure 1:** Nuclear medicine scan sentinel lymph node imaging demonstrating two sentinel lymph nodes in the right axilla and one sentinel lymph node in left axilla. *Situs inversus totalis* noted including right-sided aortic arch, dextrocardia, left-sided liver and right-sided spleen.

largely due to scarcity of both resources and manpower coupled with additional time lost whilst donning PPE. Therefore in this climate, utilisation of SPECT/CT has been extremely beneficial as it assists in determining the exact anatomic location of the SLNB [3] thereby decreasing operative time. It is the combination of both dynamic and static planar images that improves node localisation and allows for implementation of smaller incisions thus reducing scar related morbidity.

In a study that looked at the added value of SPECT-CT in SLNB for management of melanoma, investigators found that in approximately 30% of cases, information obtained from SPECT-CT caused surgeons to adjust previously planned surgical approaches [11]. This was further supported by a large prospective multicentre trial, which demonstrated that SPECT/CT had modified the surgical approach in 37% of the patient population with melanoma [12]. Benke et al., also demonstrated that in patients with trunk melanoma, SPECT/CT located significantly more SLNs than planar lymphoscintigraphy. Furthermore, the average number of lymph nodes detected in a patient-based analysis was significantly higher when SPECT/CT was performed [13].

This detailed imaging modality allows for recognition of mediastinal nodes as well as other concurrent tumours. In a 2012 study, investigators determined more radioactive nodes, and more positive nodes were identified per patient if SPECT-CT was used vs if SPECT-CT was not used [14]. In complex anatomical regions or cases of ubiquitous multiple LN basins such as the trunk, SPECT/CT also acts as complementary multimodal technique in the identification of an SLN located in the proximity of the primary tumor [15].

SPECT/CT is currently not used in all units providing a SLNB service. From our experience, we advocate routine SPECT/CT for SLNB in cutaneous melanoma. Our case reiterates the relevance and aptness of this imaging technique not only to improve surgical efficiency and oncological outcomes but also to identify aberrant anatomy that can have pre-found peri-operative implications if not identified.

**Keywords:** Sentinel lymph node biopsy; Nuclear medicine; SPECT/CT; *Situs inversus*; Anaesthesia; Melanoma

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