



Review

Complications of sentinel lymph node biopsy for melanoma – A systematic review of the literature

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Abstract

Purpose: The complications reported after sentinel lymph node biopsy (SLNB) for melanoma is highly variable in the worldwide literature; the overall complication rate varies between 1.8% and 29.9%. With heterogeneous reporting of morbidity data, no ‘average’ complication rates of this procedure have been reported. This systematic review aims to determine the complications rates associated with SLNB.

Methods: A systematic review of English-language literature from 2000 to 2015, which reported morbidity information about SLNB for melanoma, was performed. The methodological quality of the included studies was performed using the methodological index for non-randomised studies (MINORS) instrument and Detsky score. Pooled proportions of specific post-operative complications were constructed using a random effects statistical model, and subgroups including lymph node basin and continent of origin of the study were compared.

Results: After application of inclusion and exclusion criteria, 21 articles progressed to the final analysis. 9047 patients were included. The overall complication rate was 11.3% (95% CI: 8.1–15.0). The incidence of infection was 2.9% (95% CI 1.5–4.6); seroma 5.1% (95% CI: 2.5–8.6); haematoma 0.5% (95% CI: 0.3–0.9) lymphoedema 1.3% (95% CI: 0.5–2.6) and nerve injury 0.3% (95% CI: 0.1–0.6). There was no statistically significant difference in morbidity between the sites of SLNB or between continents.

Discussion: This study provides information about the incidence of complications after SLNB. It can be used to counsel patients about the procedure and it sets a benchmark against which surgeons can audit their practice.

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Keywords: Complications; Sentinel; Lymph node; Biopsy; Melanoma; Infection; Seroma; Haematoma; Lymphoedema

Introduction

The incidence of melanoma across the developed world is increasing; in England, the incidence has almost doubled from 6000 cases in 2000 to 11,000 cases in 2011.¹ The 5-year disease specific survival rate for localised melanoma is 80%² and for patients with regional (stage III) and distant (stage IV) disease it is 39% and 33% respectively.³ Sentinel lymph node biopsy (SLNB) is a minimally invasive

technique that identifies patients who have occult lymph node micrometastasis.⁴ Research shows that regional lymph node status is the most powerful predictor of survival,⁵ and since 2009 the American Joint Committee on Cancer (AJCC) classification for melanoma has incorporated it into the staging system.³ Since SLNB with dynamic lymph node mapping was introduced in 1992, it is considered the gold standard of staging for melanoma.^{6,7}

The practice of SLNB has high sensitivity and specificity for diagnosing subclinical regional lymph node involvement and the sentinel lymph node can be identified in 95% of patients. The British Association of Dermatologists recommends that SLNB be carried out in patients with a melanoma of ≥ 1 mm thickness,⁴ of whom 20% will have

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lymph node micrometastasis.⁶ However, it is worth noting, that studies have shown 5% of patients with melanoma of thicknesses 0.5 mm or less will also have micrometastasis.⁴

With SLNB being a well-established investigation, there is huge variation in the reporting of early post-operative morbidity. The overall complication rates range from 1.8%⁸ to 29.9%,⁹ with infection rates ranging from 0.3%¹⁰ to 19.0%.¹¹ Many of the studies presenting morbidity data are small in scale and are retrospective in design, with paucity of high quality evidence available. Although considered a relatively safe procedure with little reported morbidity by a number of studies,^{8,10,12–15} there is no overall ‘average’ complication rates with which we can use to counsel patients prior to the procedure. The aim of this study is to pool the outcomes from international literature, such that the worldwide incidence of specific complications for SLNB can be reported.

Materials and methods

Data sources

A systematic literature review of publications in English of the following electronic databases was conducted: Cochrane Database of Systematic Reviews, MEDLINE and EMBASE. The following keywords were used: (complications) AND (sentinel) AND (lymph node) AND (biopsy) AND (melanoma). The publication date range for studies was from 01/01/2000 to 31/12/2015.

Study selection

Two researchers independently conducted the literature search. Study eligibility was defined using the population, intervention, comparator, outcome, and study design approach (PICOS),¹⁶ which is summarised with the inclusion and exclusion criteria in Table 1. Articles were included if a subgroup of patients fulfilling the inclusion criteria could be extracted from the reported cohort (e.g. complications of SLNB extracted from a mixed cohort of SLNB and wide excision). If SLNB data was not extractable, or incomplete from a mixed cohort, it was excluded. In the initial literature search, abstracts were excluded if they failed to mention morbidity; we included abstracts that contained numbers or percentage of reported complications, or abstracts that alluded to the reporting of morbidity data. In order to minimise inclusion of studies at high risk of selection bias, papers were excluded if the study arms contained fewer than 100 patients.

According to the criteria of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA),¹⁶ our study selection was performed through three levels of screening. Initially, title screening included studies with the following word combinations: 1) SLNB and melanoma; 2) sentinel lymph node, melanoma, and morbidity or complications; 3) sentinel lymphadenectomy and melanoma. Studies were excluded if these phrases were omitted, or if the study title stated the number of participants were fewer than 100. In the second level of screening, abstracts were

Table 1

Inclusion and exclusion criteria applied to the screened articles and data selected for extraction.

	Inclusion criteria	Exclusion criteria	Data extracted
Population	Patients undergoing SLNB for melanoma. Patients with any type of primary melanoma. Any anatomical site or lymph node basin. Human patients of all ages and both sexes.	Patients undergoing SLNB for other malignancies. Non-melanoma skin cancer or extra-cutaneous malignancy. Non-human or experimental studies.	Patients (n). Site of primary melanoma and/or lymph node basin. Males (n); females (n); age at operation.
Intervention	SLNB for melanoma. Randomized and non-randomized studies; Non-comparative studies; Case series. English language literature.	Complications reported together with wide excision or complete lymphadenectomy. Single case reports; Review articles. Primary language other than English.	Surgical technique; SLNB extraction rate; Number of lymph node basins. Year of publication; continent of origin of population; type of study; years of study.
Comparator	Study cohort of >100 patients in SLNB arm.	Study cohort of <100 patients in SLNB arm.	Comparison group.
Outcome	All reported complications.	No complication numbers or percentages reported. Morbidity data presented in conjunction with another procedure.	Overall complications (n); Specific complications (infection, haematoma, etc.).
Study design	Any clinical study design (randomised, or non-randomised; comparative or non-comparative).	Non-clinical study; meta-analyses.	Study design; method of randomisation; year of study; length of follow up.

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