



ASO Author Reflections: Non-radioactive Sentinel Node Localization with Superparamagnetic Iron Oxide in Clinically Node-Negative Breast Cancer Patients: A Possibility for Improvement of the Care Pathway

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PAST

Sentinel node biopsy (SNB) was first established in the therapy of early-stage melanoma,¹ then subsequently adopted for other oncologic entities. Currently, it is a pivotal part of the staging and therapy for breast cancer patients. In this context, various agents for sentinel lymph node localization have proven suitable for reaching high detection rates and low false-negative rates.² Radioactive localization using technetium⁹⁹ (Tc⁹⁹) in combination with blue dye or as a single tracer has long been considered the “gold standard.” However due to the short half-life of technetium, injections need to be scheduled close to surgery. Radiation protection measures, and in Germany additional lymphoscintigraphy, are mandatory and extend the preparation time. A more flexible schedule and thus an increase in patient comfort might be achieved by using superparamagnetic iron oxide (SPIO). Proven equivalent to Tc⁹⁹ for primary SNB by multiple meta-analyses,^{2, 3} SPIO can be administered up to 7 days before surgery.

PRESENT

This study enrolled 59 patients at Charité–Universitätsmedizin Berlin to investigate the impact of SPIO use for SNB on the care process, reimbursement, surgical time, and patient comfort compared with ⁹⁹Tc.⁴ The preoperative preparation time was significantly shorter for the SPIO group (SPIO, 5.4 ± 1.3 min vs TC⁹⁹, 82 ± 20 min; $p < 0.0001$), even with omission of the time spent for lymphoscintigraphy (TC⁹⁹, 54.4 ± 13.6 min; $p < 0.0001$). Also, the duration of the sentinel lymph node extraction was slightly shorter (SPIO, 5 min [range, 3–15 min] vs TC⁹⁹, 10 min [range, 7–15 min]; $p = 0.151$). With SPIO, the duration of the whole SNB procedure also was shorter (SPIO, 9 min [range, 4–15 min] vs TC⁹⁹, 10 min [range, 7–15 min]; $p = 0.412$) despite the fact that the iron-based system was a new method at our institution. Concerning pain assessment and reimbursement, the study could not detect any significant differences between the two groups. The study was limited by its small sample size, non-randomized group allocation, and variation in surgical procedures (mastectomy and breast-conserving surgery). In hindsight, detailed patient-reported experience measurements would have been favorable for examination of patient comfort.

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FUTURE

The aforementioned findings show that SPIO-based sentinel-node localization facilitates a shortened preoperative preparation time and has no negative impact on reimbursement in the German health care setting. Due to a multitude of reasons such as lack of health care

professionals, decreased financial resources, and development of even more complex therapy regimens, specialized oncologic care probably will be provided in fewer but larger centers, thus increasing travel time for patients and making scheduling of procedures even more critical. Flexible and less time-consuming alternatives to radioactive sentinel node-marking, such as the SPIO-guided approach, are necessary, especially in rural areas, where nuclear medicine facilities usually are scarce. Further studies should investigate the safety of SPIO for SNB after neoadjuvant chemotherapy (NACT). Currently, dual tracing with TC⁹⁹ and blue dye is recommended in this context. In addition, the SPIO application method and dose for patients in need of postoperative magnetic resonance imaging (MRI) still need to be examined.⁵

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