ORIGINAL ARTICLE

NON-VISUALIZED SENTINEL NODE IN RADIOLCOLLOID IMAGING IN BREAST CANCER PATIENTS SCHEDULED FOR PER-OPERATIVE AXILLARY NODAL BIOPSY; A CLINICAL AUDIT AT TERTIARY CARE FACILITY

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ABSTRACT

Non-visualization of sentinel node (nv-SN) in breast cancer patients with clinically negative axilla (using radiolabeled colloid and or blue dye) is associated with less favorable survival than visualized nodes (v-SN). The reasons for nv-SN could be improper mapping technique or patient plus disease related factors like obesity, large tumor or extensive nodal disease. Regular clinical audit of facilities performing SN mapping is important to mitigate the avoidable technical factor of non-visualization of sentinel node.

Key Words: Breast Cancer, sentinel node, non-visualized, audit

Introduction

In breast cancer status of the axillary lymph nodes is one of the most important prognostic factors and axillary lymph node dissection (ALND) is the most accurate method for assessing nodal metastasis. Importantly when the axilla is clinically negative by palpation and ultrasound examination, the pathologic node positive rate after ALND decreases to approximately 18%.[1] However, an ALND can cause significant morbidity, such as pain, lymphedema in ipsilateral arm, dysesthesia and impaired mobility.[2] After introduction of sentinel node biopsy (SNB) about two decades ago (using radiolabeled colloid and/or blue dye), it has essentially replaced ALND in patients with clinically negative axilla (cN0). According to recommended guidelines, identification rate (visualization of sentinel node on mapping) should be 90% and a false negative rate (FNR; harvested node negative on SNB but positive on ALND) <5%.[3] However, non-visualization of sentinel node on mapping using radiolabeled colloid and/or dye is not uncommon and varies from 2.5%[4] to 28%.[5] Section of Nuclear Medicine, Dept of Radiology, Aga Khan University Hospital, Karachi (AKUH) has been performing sentinel node mapping using Tc-99m labelled colloid imaging since 2002 for early breast cancer patients. In this clinical audit we estimated the incidence of non-visualized sentinelnode(nv-SN) in cN0 patients on radionuclide mapping and did a root cause analysis (RCA) to find cause of failure.

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Material and Methods

We used 55 MBq of Tc-99mn colloid to be injected subcutaneously at 12, 3, 6 and 9 O clock position. 10 minute and 1-hour images are acquired in anterior and oblique position under dual head digital gamma camera and visualized nodes are marked over skin with a marker. In patients with non-visualized nodes (nv-SN), delayed imaging up to 3 or 18 hour post-injection, depending upon the scheduled time of surgery, is done. In our section, two nuclear technologists are involved in preparing the radiopharmaceutical while 02 female technologists perform injection and mapping of visible node(s) under gamma camera. Consecutive breast cancer patients (cN0) who had SN imaging at Nuclear Medicine section of Radiology department of AKUH-K from 1 January 2022 till 30 May 2023 were retrospectively retrieved. Patient s demographic like age, tumor laterality (right or left), dose of Tc-99m radiocolloid, number of sentinel node(s) visualization, time of visualization and delayed images timing in case of non-visualization were fed into excel sheet. Identification rate and failure rate were calculated and compared against published benchmark.[3] Average difference and standard deviation was calculated for each parameter(s). t-test was applied for calculation of significant difference in identification and failure groups. Statistically significance difference in year of experience of technologists involved in dose preparation of Tc-99m radiocolloid, peri-areolar subcutaneous injection technique and SN mapping procedures were estimated and plotted in bar graphs. Root-cause analysis (RCA) was done for identification failure group and reasons were plotted in bar graph.

Results and Dicussion

During audit period a total of 242 patients were retrieved and all were women with cN0. In 230 patients, one or mor sentinel nodes were visualized with an identification rate of 95% (vSN). In 12 patients, no sentinel node was visualized with a failure rate of 05% (nv-SN). Our rate of non-visualization is compatible with published guidelines.[3] But our failure rate is higher than reported in AMROS trial (3%) and other published study (2.5%).[1] However, our result is better than other reported studies.[2]

Comparing age, laterality of primary tumor, average dose of radiocolloid, no significant difference was found between v-SN and nv-SN groups. However, significant difference was found for time for non-visualization of SN (60 min Vs 120 min).

Both technologists involved in preparation of radiocolloid have 8 years of experience (p = 1.000; (Fig.1). Similarly, the experience of female technologists involved in injection and mapping was non-significant (>10 years; p = 1.000; Fig.2 and 3).

After RCA, no action was required as no deviation from compliance was observed.

We inferred that nv-SN in this clinical audit is due to patients associated factors than technique of SN mapping at our section. We must consider established

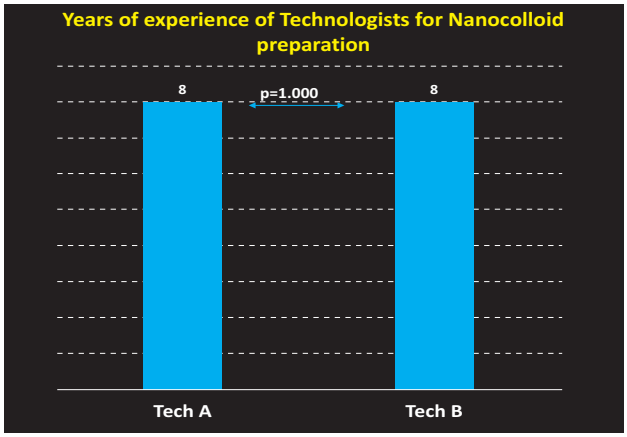

Figure1: Number of years of experience of Nuclear medicine technologists involved in preparation of radiocolloid dose.

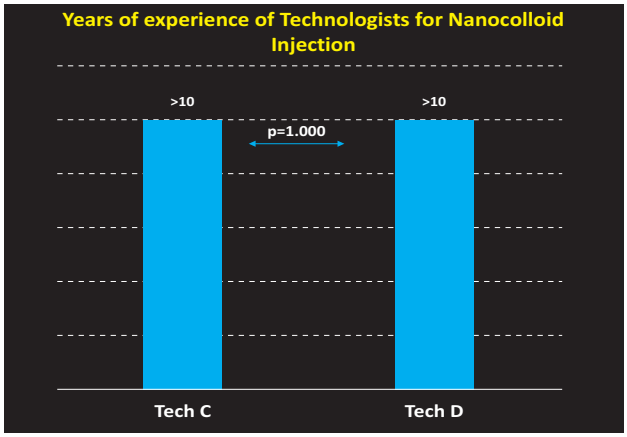

Figure1: Number of years of experience of Nuclear medicine technologists involved in perareolar injection technique of Nanocolloid.

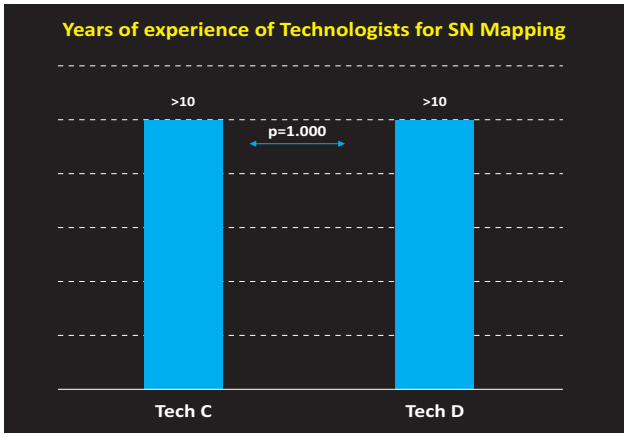

Figure1: Number of years of experience of Nuclear medicine technologists involved in sentinel node mapping technique.

Variable N=242	SN Visualized (n=230)	No SN visualized (Identification Failure) (n=12)	t-test	p-value
Age (years) Mean ± SD	63 ± 12	62 ± 13	-0.280	0.7795
Site of SN mapping Left: Right	121 : 109 53% : 47%	07 : 05 58% : 42%	0.114	0.7356
Dose of Tc-99m Nanocolloid (MBq) Mean ± SD	50 ± 09	50 ± 10	0.000	1.000
Number of SN visualization Mean ± SD	02 ± 01	00	-	-
Time of SN visualization (Minutes) Median and range	60 (60-80)	120 (60-1140)	7.416	<0.0001*

Table1: Demographics of study population (n=242) and comparison of visualization and non-visualization cases of sentinel node mapping from Jan 2022 till May 2023.

N = 242	% Compliance	Benchmark
% Identification Rate (230)	95%	95%
% Failure Rate (12)	05%	05%[ii]

Table 2: % compliance of identification rate against departmental benchmark as per international standards.

factors associated with nv-SN are old age, obesity, large primary tumorand presence of high number of metastatic axillary nodes resulting in blockade of native lymphatic pathways with creating of alternative routes.[4]

Conclusion

nv-SN in breast cancer patients is associated with less favorable survival than v-SN. The reasons for nv-SN could be improper mapping technique or patient plus disease related factors. Regular clinical audit of facilities performing SN mapping is important to mitigate the avoidable technical factor of non-visualization of sentinel node.

Conflict of Interest: No financial or institutional conflict of interest.

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