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Original Article

Could radiotherapy play a major role in misidentification of sentinel lymph node in breast cancer recurrence?

Germana Lissidini [a], Giuseppe Trifirò [c], Paolo Veronesi [a,b], Chiara Grana [d], Stefano Zurrida [b], Viviana Galimberti [a], Giovanni Corso [a], Cecilia Vellani [c], Giovanni B. Ivaldi [e,*]

[a] Division of Breast Cancer Surgery, European Institute of Oncology, I.R.C.C.S., Milan; [b] University of Milan; [c] Unit of Nuclear Medicine, ICS Maugeri, I.R.C.C.S., Pavia; [d] Division of Nuclear Medicine, European Institute of Oncology, I.R.C.C.S., Milan; and [e] Unit of Radiation Oncology, ICS Maugeri, I.R.C.C.S., Pavia, Italy

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ABSTRACT

Misidentification of sentinel lymph node via lymphoscintigraphy for breast cancer is an infrequent event. We analysed 35.022 consecutive procedures from a single institution and tried to find a correlation between failures of sentinel node identification and previous oncologic treatments received by the patients.

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Lymphoscintigraphy [1] and radioguided SN identification [2] associated with biopsy of the sentinel lymph-node (SN) is a well-consolidated method for breast cancer (BC) treatment. Theoretically, it is considered technically feasible and likely effective even in special situation such as pregnancy [3], previous breast surgery [4], previous SN biopsy and/or mastectomy [5], and neo-adjuvant treatments [6].

Materials and methods

At the European Institute of Oncology (IEO) we prospectively collected clinical and biological data of 35.022 consecutively patients treated for primary or recurrent BC between 1996 and 2016.

A subdermal (or peritumoural) injection of the radiotracer, ^{99m}Tc-labelled human albumin colloid particles, was performed 2–20 h before surgery in correspondence of the skin projection of the tumour. Planar scintigraphic images of involved breast and axillary regions were acquired 15–30 min post-injection (p.i.) by a gamma camera. Static left/right 40° anterior-oblique (LAO/RAO) and anterior views were performed. Patients performed a light massage on the injection site to favour the lymphatic drainage. In most cases, the images of the identified sentinel node showed a single area or, less frequently, two or multiple hot spots, corresponding to the SNs. The skin projection of these hot spots was marked with a proper pen. During surgery the SN was identified by the surgeon using a gamma ray detection probe, removed and sent to the pathologist.

Results

The SN was identified in 98.4% of the 35.022 procedures. In 577 (1.6%) patients SN was not identified. Multiple possible risk factor of lymphoscintigraphic failure has been found for 462 (80%) cases of "unidentified SN": (a) clinical massive axillary lymph nodes involvement (b) previous breast and/or axillary surgery, (c) previous breast radio- and/or chemotherapy. Most causes were concomitants, 280/462 (61%), while a single factor was associated with lymphoscintigraphy failure in 39% of cases (182/462).

Notably radiotherapy was part of the previous treatment in 205 (44.4%) of the 462 patients with unidentified SN with an attributable risk factor in their clinical history.

Conversely, 115 cases (19.9%) remained without any possible correlation with previous conditions (see Table 1).

Discussion

It is know that previous treatments could alter lymphatic drainage causing a false negative result in the SN detection during lymphoscintigraphy. Historically numerous previous conditions has been considered to affect the outcome or actual contraindications

* Corresponding author.
E-mail address: giovannibattista.ivaldi@icsmaugeri.it (G.B. Ivaldi).

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Table 1
Factors possibly associated with misidentification of SN; Total procedures: 35,022.

Number	%	Factors
205	44.4	RT
111	24	M only
35	7.6	CHT only
36	7.8	S only
75	16.2	Combined M + CHT + S
462	**100**	All Factors
115		No Identifiable Cause
577		Total Misidentified SN

RT: Radiotherapy; M: Massive axillary lymph nodes involvement (>4); CHT: Chemotherapy; S: Surgery.

to lymphoscintigraphy: age, body weight, clinical involvement of the axilla, tumour location or tumour size exceeding 3 cm, neoadjuvant chemotherapy, a previous breast biopsy, previous axillary surgery, and multicentric tumours [4,7,8]. Nevertheless, more recent data have proven that many situations are not a absolute obstacle to the correct identification of the SN [9,10,11]. We already suggested that previous breast surgery, in our hands, do not significantly affect the rate of SN node identification [4,5]. Conversely, in this cohort, previous radiotherapy, was the most frequent single factor (44.3%) correlated to "unidentified SN", between patients with a attributable risk factor in their clinical history. It is known that radiation therapy decreases the number of dermal lymphatic vessels with a severe long-term lymphatic dysfunction [12]. This effect could explain our results probably because of the impossibility of the radiotracer to reach the nodes via reduced or damaged dermal lymphatics by radiation. We conclude that even if failure for SN identification is an infrequent event, concomitant factors seem to compete, with radiotherapy possibly playing an important role when it has been part of the previous treatments.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflicts of interest.

Ethical approval

This article does not contain any studies with human participants or animals performed by the author.

Informed consent

Not necessary for this paper.

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