

Occult Breast Lesion Localization and Concomitant Sentinel Lymph Node Biopsy in Early Breast Cancer (SNOLL)

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Rezumat

Localizarea leziunilor mamare infraclinice și biopsia concomitentă a ganglionului santinelă în cancerul glandei mamare (SNOLL)

Introducere: Leziunile mamare infraclinice descoperite imagistic ridică probleme privind atitudinea diagnostică și terapeutică adecvată. Aceste leziuni pot reprezenta un cancer mamar puțin avansat și cu cât depistarea bolii se face într-un stadiu mai puțin avansat cu atât tratamentul este mai eficient, mai puțin mutilant. Scopul acestui studiu prospectiv a constat în evaluarea tehnicii de localizare preoperatorie a neoplasmului mamar infraclinic folosind injectarea sub control imagistic a unui traser radioactiv și biopsia concomitentă de ganglion santinelă, tehnică ce poartă denumirea de SNOLL (Sentinel lymph Node biopsy and Occult Lesion Localization).

Material și metodă: Am identificat imagistic un număr de 107 de pacienți cu leziuni mamare infraclinice cu caractere de malignitate la care am injectat peritumoral, preoperator, sub control imagistic, nanoalbumină marcată radioactiv cu Technetiu 99. Excizia chirurgicală, atât a tumorii primare cât și identificarea și biopsia ganglionului santinelă, au fost ghidate intraoperator de sonda gamma.

Rezultate: Intraoperator au fost identificate și biopsiate toate leziunile mamare infraclinice, 98 de tumori fiind confirmate

malign prin examen histopatologic intraoperator. 7 leziuni au avut un rezultat microscopic intraoperator neconcludent iar 2 leziuni au fost microscopic benigne. Din cele 7 leziuni incerte intraoperator 6 s-au dovedit a fi maligne la examenul la parafină, iar 1 leziune a fost benignă. Piese de rezecție au avut margini negative cu excepția unui singur caz. Greutatea pieselor operatorii a fost în medie de 40 grame. Ganglionul santinelă a fost identificat la 95 dintre cele 98 de pacienți cu rezultat malign intraoperator al tumorii, iar în 14 de cazuri a fost necesară limfadenectomia axilară completă.

Concluzii: Localizarea preoperatorie orientează actul chirurgical, asigură că leziunea evidențiată imagistic va fi extirpată și evită rezecții mamare largi, inutile. Folosirea traserului a facilitat localizarea și excizia leziunii mamare iar în cazurile în care aceasta a fost malignă, a permis identificarea și biopsia ganglionului santinelă. Astfel, s-a realizat în același timp operator intervenția curativă necesară în funcție de rezultatul histopatologic intraoperator al tumorii primare și al ganglionului santinelă.

Cuvinte cheie: cancer mamar, tumori mamare nepalpabile, ganglion santinelă, SNOLL

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Abstract

Aims: Mammographic screening and the increasing resolution output of mammography have raised the identification number of small-size mammary lesions without clinical expression. The aim of this study was to evaluate in a prospective study the localization technique and concomitant sentinel lymph node biopsy for breast cancer (SNOLL - Sentinel lymph Node biopsy and Occult Lesion Localization).

Methods: We identified by means of imaging techniques a number of 107 patients with clinically occult suspicious breast tumors. All patients preoperatively underwent a protocol in which the injection of ^{99m}Tc -nanocolloid under imaging procedures was performed. Surgical excision was performed, guided by the hand held gammaprobe. The sentinel lymph node was identified as an axillary hot spot on the probe.

Results: All primary lesions were identified and were clear of invasive margins needing excision. 98 tumors proved to be malignant on frozen sections. 7 lesions could not be clearly examined through frozen section and 2 proved to be benign. 6 out of 7 suspicious lesions confirmed to be malignant on paraffin embedded sections. Sentinel lymph node was identified in a number of 95 out of 98 patients. In 14 cases complete axillary lymphadenectomy was performed. The average specimen weight was 40grams.

Conclusions: Using this technique, we removed the lesions identified prior to surgery in all cases, achieving a complete pathologic diagnostic, the necessary surgical treatment and also prognostic data by axillary lymph node assessment.

Key words: ROLL, breast cancer, non palpable breast lesions, sentinel lymph node

Introduction

Breast cancer is one of the most frequent forms of malignant tumors in women, with a rising incidence. At present, 30-50% out of the total of newly detected breast tumors, in countries undergoing national breast cancer screening programmes, is represented by tumors in the infraclinal (occult) stage (1). In Romania, however, over 60% of breast cancers are detected in advanced stages of the disease (2).

The most important prognostic factor in breast cancer is the stage in which the disease is diagnosed, the evolution of a patient diagnosed in less advanced, infraclinal, stages of the disease being more favorable.

Progresses made in the domain of breast imaging (increasing mammography resolution, more and more performant ultrasound devices, MRIs) have allowed the more and more frequent highlighting of a series of non-palpable tumors, without clinical expression.

Small-sized breast lesions, detected by means of various imaging techniques, but lacking clinical expression, set forth a specific series of diagnostic and therapeutical problems. The mammographic, ultrasound and MRI semiology of occult breast lesions is difficult, the characterization through imaging techniques of any suspectable millimeter-sized malignant lesion being the decisive aspect of the therapeutic decision that is to be made afterwards. Suspectable lesions have excisional biopsy indication. Without precisely localizing these small-sized lesions before the operation, the surgeon is faced with the situation of having to operate on "an image".

Developing the sentinel node technique, meaning that of performing a biopsy of the first lymph node collecting lymphatic fluid from the primary tumor, an idea described for the first time by Ramon Cabanas related to penile cancer in 1977 (3) and subsequently promoted by Jim Morton in 1992 (4) in relation to malignant skin melanoma, allowed the selection of patients in less advanced stages, which benefit from the therapeutic role of axillary lymphadenectomy only when there is node invasion.

The combination of two techniques, of preoperative localization of occult breast lesions and, simultaneously, identifying and performing a biopsy of the sentinel node in breast cancer, using a radioactive tracer, lead to the development of a method that solves the main problems related to small-sized breast lesions, considered suspicious due to imaging: describing the precise localization which enables the surgical excision of a series of lesions which could have been omitted otherwise, due to their small dimensions, correctly formulating an oncologic diagnosis and avoiding large, useless, resections of breast tissue and performing selective lymphadenectomy according to the histopathologic state of the sentinel node. This method is called SNOLL. (5)

We have been using preoperative localization of occult breast lesions since 1997. If at first we used hook wire localization, since 2006 we have slowly replaced the old localization technique with SNOLL.

We underwent this prospective study at the "Prof. Dr. Al. Trestioreanu" Institute of Oncology in Bucharest, including patients with less advanced, occult, breast malignant tumors, detected through imaging. The preoperative localization technique has been used for these patients, injecting a radioactive tracer under imaging guidance, simultaneously performing a biopsy of the sentinel node and selective lymphadenectomy according to the state of the sentinel node.

Method

As a result of routine imaging exams (breast ultrasound, mammographies) we have discovered 107 patients presenting tumors with characteristic suspectable of malignancy. Patients with uncertain imaging lesions underwent additional preoperative breast MRIs. The criteria for admission to the study were represented by: the presence of non-palpable breast tumors, suspectable through imaging techniques, without clinical or paraclinical signs of node invasion or distant metastases. In terms of the TNM staging, only patients with T1N0M0 lesions were included in the study.

Informed consent was obtained in each case. All 107 patients followed the preoperative localization of non-palpable lesions protocol, using the injection of a radioactive tracer technique.

The day before the surgical intervention, approximately 16-24 hours before the surgery, nanoalbumin radioactively marked with Technetium 99 ($\text{Tc}99$) was injected in the areas surrounding the tumor, under ultrasound or mammographic guidance. The $\text{Tc}99$ isotope is the most frequently used in nuclear medicine, ever since the 1960s, at the initiative of

Powell Richards. (6) The qualities which recommend it for such a procedure are a 6 hour half-life, translated in a lesser risk of contamination and a rapid elimination, as well as the energy released in sufficient amount to ensure a correct marking, therefore a precise detection.

The vector to which the tracer was attached was a human colloid albumin, smaller than 80 nanometers in diameter. This ensured the quartering of the tracer at injection level, as well as a lymphatic dissemination at sentinel node level, where it remains detectable for a predictable period of 16-36 hours. The dose used was of 0.5-1.5 miliCuries, in a volume of 0.5 colloid suspension.

Ultrasound localization of occult breast lesions was performed with a 10 MHz linar probe, through a bimanual technique, ensuring real time guidance of the tracer injection. (Fig. 1)

A precise non-palpable breast lesion localization technique is that of mammographic localization. This can be performed using stereotaxy or a perforated platen. Once having established the position of the lesion, the tracer is injected in the proximity of the tumor. (Fig. 2)

After the injection, each patient was submitted to a lymphatic "mapping" procedure. Lymphoscintigraphy offers a perspective image of the lymphatic drainage basin, indicates the position of the sentinel node and specifies the number of sentinel nodes. Preoperative lymphoscintigraphy was performed 3-4 hours after the injection, by means of a Picker gammacamera (USA), dinamic images of the sentinel node ("hot spot") being obtained.

Lymphoscintigraphic detection of the sentinel node took place after an average 30 minutes from the administration of

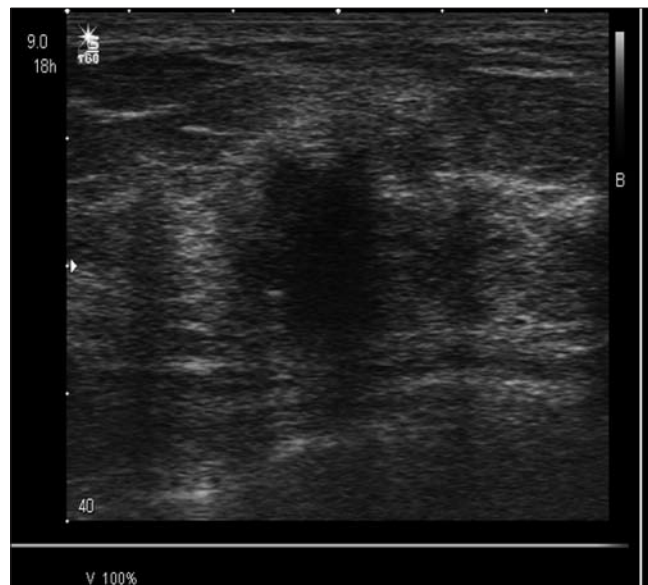


Figure 1. Preoperative ultrasound localization of breast tumor

the radioactive tracer. After the lymphoscintigraphy the sentinel node was marked graphically on the overlying axillary skin layer. The orientation of the surgical act per say is done with a gamma probe connected to a portable radiation detector provided with optic and acoustic signaling. The detector used for these interventions was Neoprobe2000 (Neoprobe Corporation, Dublin, Ohio, USA), compatible with the following isotopes: Tc-99m, Co-57, I-125, In-111, I-131, F-18. All the surgical specimens for which the injection was performed under mammographic guidance were sent to the

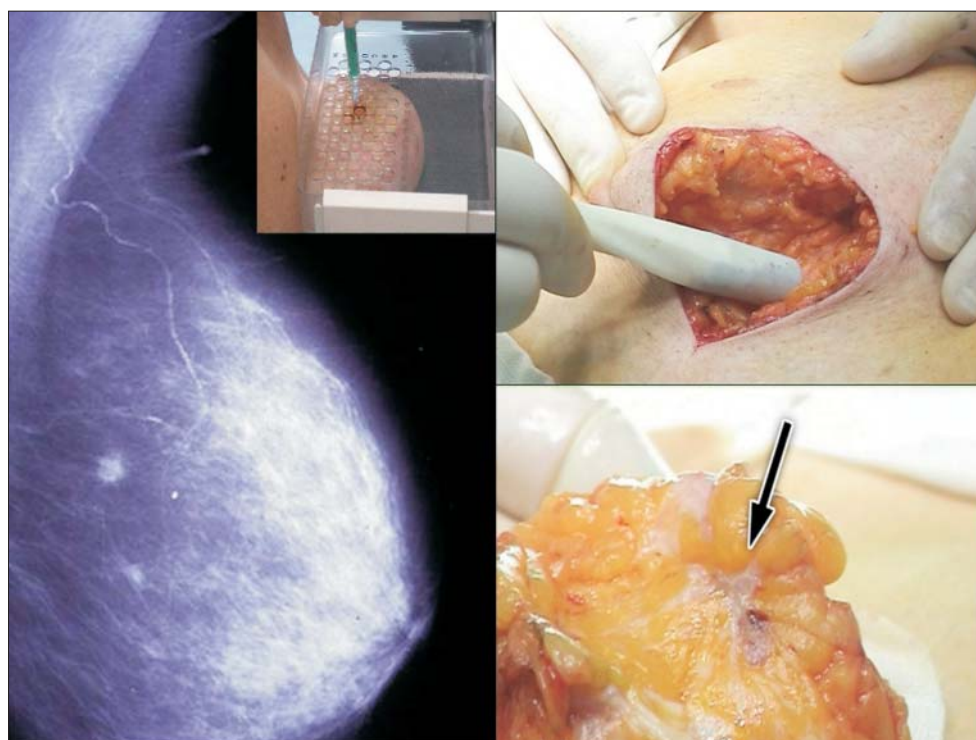


Figure 2. Mammography-guided injection of the tracer

radiology department, where an X-ray of the resection specimen was done, in order to confirm the excision of the lesion.

The breast incision is usually made in the area next to the maximum level of isotopic activity, corresponding to the point of injection, overlying the tumor. The surgeon thus takes benefit not only of a rapid and easy detection of the primary lesions, but is also aided in controlling the wound post-resection for remaining radioactivity, an aspect which both helps him orient and be assured of the fact that the resection was complete.

After the excision of the primary tumor and obtaining the confirmation of malignancy by means of an intraoperative histopathologic exam, one proceeds to identifying and performing a biopsy of the sentinel node. This stage involves enlarging the current incision towards the superior-external quadrant or performing a new incision through the axillary skin layer, in the point where the gamma probe detects a maximum level signal, precisely indicating the localization of the sentinel node. After the appropriate dissection and identification of the node, one proceeds to an excisional biopsy of the sentinel lymph node, leading to two intraoperative frozen sections for each node. As a routine, sentinel nodes are embedded and afterwards examined in paraffin and immunohistochemically. A complete evaluation of the axillary status is thus obtained.

If the sentinel node presented tumor invasion, lymphadenectomy was performed. Also, if other enlarged lymph nodes were detected during the intervention, an excision biopsy was performed on these as well.

Results

A number of 107 patients presented occult lesions susceptible of malignancy according to imaging techniques, each of these lesions presenting a BIRADS score highly suggestive for neoplasm, 4c and 5 respectively (7), detected during routine ultrasound or mammography. After excision biopsy and obtaining an intraoperative microscopic result, the malignant nature of the tumor was confirmed in 98 patients. In 7 patients the result of the intraoperative microscopic exam showed only a suspicion of malignancy, out of which 6 proved to be malignant after the paraffin microscopic exam, and one benign. 2 occult breast tumors proved to be benign after the intraoperative microscopic exam, and subsequent paraffin exam. The 6 patients who were confirmed with malignant lesions postoperatively by means of a paraffin histopathologic microscopic exam benefited in a different surgical stage of the identification and biopsy of the axillary sentinel node.

Among the 98 patients confirmed intraoperatively to present malignant lesions, the age average was of 52 years, the youngest of the patients being 27 years old, while the oldest 76. In the case of 36 patients the lesion was discovered during an ultrasound exam, while in the other 62 cases it was detected with the aid of a mammography. In 31 patients we requested an additional preoperative breast MRI exam, due to morphological characteristics of the lesions identified through

prior imaging techniques and to other breast modifications difficult to characterize. A total of 98 occult lesions was identified, with diameters ranging between 3 and 27 mm, the average diameter being of 9 mm. The lesion morphology included tumor lesions per say, as well as areas of myxocalcification or architectural distortions of suspectable imaging nature. Thus, in 11 patients the lesions presented themselves as suspectable foci of myxocalcification, with a diameter between 6 and 27 mm. In 11 patients the lesions took the form of architectural distortions, ranging from 8 to 15 mm diameters. The remaining 76 patients presented tumors with a diameter between 3 and 13 mm.

The injections with the radioactive tracer were performed under ultrasound guidance in 71 of the patients and under mammography guidance with a perforated platen in 27 patients. 11 patients needed an association between the ultrasound localization and the mammographic one in order to correctly inject the tracer in the area surrounding the tumor, usually in cases where the lesions presented myxocalcifications.

Results after the analysis of the primary lesion

All tumors were identified through incisions placed and centered according to the preoperative graphic skin mark corresponding to the hotspot area. In terms of pTNM staging (8), the lesion stage at the time of diagnosis was 0 and I respectively, with existing tumors in pTis-T1c N0 M0 stage. In the majority of cases of malignant lesions identified intraoperatively the intraoperative histopathologic diagnosis was that of invasive ductal carcinoma (54 out of the total of 98 lesions). (Table 1) The histopathologic exam indicated a G3 degree of differentiation in 15 of the cases.

The resection pieces bore an average weight of 40 grams (with limits between 21 and 68 grams). Intraoperatively, circumferential samples (superior, inferior, lateral, medial and profound) were taken, only one sample presenting neoplastic invasion in the histopathologic paraffin exam, and leading to an additional subsequent intervention. By identifying and performing a biopsy of all the lesions preoperatively, the sensibility of the method was of 100% (107/107).

Results related to the sentinel node

The total number of sentinel nodes identified in the patients with malignant tumors was 119, with an average of 1.2 sentinel nodes per patient. In all cases the lymphoscintigraphy indicated an ipsilateral localization, with the sentinel node at axillary level. None of the cases presented with contralateral sentinel nodes or with uncertain internal breast localization.

There were 3 cases recorded where the radioactive tracer did not migrate from the injection point towards the axillary sentinel node. In these cases axillary lymphadenectomy was performed. Out of the 95 cases where a sentinel node was identified, biopsy was performed in 40 of these through separate axillary incisions, while in the remaining ones the

Table 1. Primary lesion confirmed intraoperatively as being malignant through histopathologic exam (98 patients)

Characteristics of the lesion	TNM staging	Topography	Detection (BIRADS 4c-5)	Histopathological diagnosis	Degree of differentiation
Diameter=3-27 mm	Tis=23 T1a=23 T1b=36 T1c=16	Right breast= 58 Left breast = 40 to level	Ultrasound 36* Mammographic 62* Additional breast MRI 31*	DCIS DCIS+microinvasion IDC	7 26 54
Morphologically: Tumors	76	quadrants: SEQ = 56 IEQ = 10		ILC	6
Myxocalcifications	11			DCIS + LCIS	2
Architectural distorsions	11	N0=98* M0=98*		LCIS	3
Unilateral	98	SIQ = 3			
Bilateral	0	IIQ = 3 CQ = 26			
Unicentric	98				
Multicentric	0				
Lesion total	98				

*out of a total of 98 female patients with malignant lesions

Caption: SEQ - superior external quadrant; IEQ - inferior external quadrant; SIQ - superior internal quadrant; IIQ - inferior internal quadrant; CQ - central quadrant; DCIS - in situ ductal carcinoma; IDC - invasive ductal carcinoma; LCIS - lobular in situ carcinoma; ILC - invasive lobular carcinoma

lesions for the primary lesion proving to be sufficient, or needing just an enlargement towards the axilla. After the incisions, the point of maximum radioactive level signal ("hotspot") is identified by means of a gamma probe, and an excision biopsy is performed. The intraoperative histopathologic result indicated the invasion of the sentinel node in 6 of the cases. In 89 cases the result was negative. (Table 2) In this study, the sensibility of the method for identifying and performing an excision biopsy of the sentinel node was of 96.93% (95/98).

In all cases, when other enlarged axillary nodes were detected intraoperative, an excision biopsy was performed, even if they did not determine any signal on the intraoperative gamma probe, thus leading to a number of 22 inferior axillary dissection.

Complete axillary dissection was performed in 14 cases, in 6 of these having detected an invasion of the sentinel node, a lack of migration of the tracer towards a sentinel node in other 3 cases, and due to intraoperatively detected axillary poliadenopathies in the remaining 5 (Table 3).

Out of the 6 cases in which the sentinel node was invaded, there were 2 patients which presented only one affected node, 3 patients with invasion in 2 nodes and only one patient with carcinoma invasion in 3 nodes. In these cases, the histopathologic analysis of the all the lymph nodes after lymphadenectomy showed the fact that in 2 out of the 6

cases there was an invasion in nodes other than the sentinel ones as well.

Results related to the surgical intervention

SNOLL offers the advantage of a correct evaluation of the stage of the disease, and thus of adopting the appropriate therapeutic surgical pathway. Thusly, out of the 98 patients, a selection of the cases where unnecessary resection of lymph node tissue could be avoided was made. In most cases, the elected treatment was that of conservatory treatment of the primary lesion (Table 3). In all cases a paraffin histopathologic and immunohistochemical exam were performed in order to establish the course of the subsequent oncological treatment.

In 77 cases we practiced conservatory breast treatment, while in 21 cases we performed modified radical mastectomy in terms of the histopathologic type, of the central localization of the breast tumor or of the patient's desire for a radical approach in case of a malignant histopathologic result.

No immediate postoperative complications were recorded. There were 22 cases of mild postoperative axillary pain, which yielded to regular antialgic medication. 7 axillary seromas were recorded, which were resolved in the first 15 days after the operation through repeated evacuation punctures.

Table 2. Identification of the sentinel node

Sentinel node	n
Patient total	98
Patients in which it was identified	95
Patients with positive result	6 (6.3%)
Patients with negative result	89 (93.7%)
Total sentinel nodes identified	119
Out of which... were invaded	11 (9.24%)

Table 3. Surgical intervention

Intervention Type	n
Breast conserving surgery	77
Modified radical mastectomy type Madden	21
Axillary surgery	
Excision biopsy of the sentinel node	62
Inferior axillary dissection	22
Complete axillary dissection	14
Total	98



Figure 3 Identification and biopsy of the sentinel node within the same surgical step

Discussions

Detecting breast cancer in early stages represent the first step to limiting the impact that this disease has over the female population. Throughout recent years, the number of patient which presented themselves at the “Prof. Dr. Al. Trestioreanu” Institute of Oncology for whom a diagnosis of breast cancer was obtained in early stages has increased, but their percentage out of the total of breast cancers detected is lower than similar statistics coming from other institutes specialized in this domain throughout the world (9), in countries where national screening programmes exist. While in countries such as Italy and the USA the percentage of breast cancers detected in the non-palpable stage ranges between 30 and 50%, (10) in Romania, over half of the malignant breast tumors are discovered in stages III or IV. (11) However, compared to previous years, an increase was observed in the number of cases of non-palpable breast lesions with suspectable imaging characteristics, later proving to be inchoactive breast cancers which were detected by means of mammography, breast ultrasound or breast MRI. This was due to a better informed population and to campaigns designed to increase awareness with regards to the importance of early diagnosis of this disease.

In the case of occult breast lesions with suspectable imaging characteristics, we consider that the optimum therapeutic attitude is that of surgical excision. A complete resection of the lesion ensures a correct histopathologic diagnosis. Without a preoperative localization of these tumors, however, the surgeon’s task can prove to be very complicated, having to operate on an image, and performing the surgery virtually blind-sided. The localization of non-palpable, “occult” lesions from a clinical perspective, offers therefore the possibility of a guided surgical act which ensures the correct excision of the lesion and the avoidance of any unnecessary breast resections as well. There are authors which support the utility of following these lesions, as they rarely develop into clinical lesions. (12)

The localization of non-palpable lesions can be done

with the aid of breast ultrasound and/or conventional or digital mammography. A surgical act can be guided through various methods, the insertion of a metallic hook wire at the level of the lesion (hook wire localization – HWL) (13) or the injection of a radioactive tracer in the proximity of the lesion being the most frequently performed techniques at present. (14) In medical literature, the efficiency of both methods has been proven (15). Compared to similar studies, we did not record any “wash-out” phenomena when localizing the primary lesions, the tracer emitting a signal for a sufficient amount of time as to allow the intraoperative detection of the lesion, but there have been 3 cases in which the “wash-out” phenomenon appeared, in localizing the sentinel node (16).

SNOLL represents a procedure which not only ensures a precise localization of occult lesions, but allows the evaluation of the tumor extension to axillary level as well, which is in fact the great advantage that this procedure offers, compared to classic techniques such as hook wire localization (17).

The advantages that SNOLL presents compared to HWL are also related to the simple nature of the procedure, and the ease with which the nuclear medicine doctor, the surgeon and the pathologist can apply the protocol, the reduced degree of discomfort that the procedure involves (18) and, last but not least, the good cosmetic result and fast healing. (19) Other advantages that the radioactive tracer techniques offers are the predictable migration time, a high degree of retention in the sentinel node and a low rate of passage to other ganglia.

The radiation exposure is minimum, and the degree of reproduction of the technique is a high one. Although during the injection and localization procedures radioactive substances are used, there is no risk of contamination of the patient or of the medical staff. For the patient the dose of radioactive tracer used in SNOLL is 20 times lower than the dose administered in the case of a bone scintigraphy, and the area where the radiation is emitted in the case of this isotope is only 0.5 meters (20). Several studies have calculated the maximum exposure time allowed for a team of doctors, so that up until reaching a critical threshold the surgeon and

radiologist can be exposed to the usual dose of radioactive substance necessary for SNOLL approximately 42 times a week, and in the case of the pathologist, up to 75 hours a week of exposure to radioactive injected slices of tumors or ganglia. (21,22) The radioactive isotope used, Technetium 99, is the most frequently used isotope in nuclear medicine, its efficiency having been proven in multiple studies. (23,24)

The resection of the primary tumor in SNOLL involves the excision of a small quantity of free breast tissue, thanks to the precise localization.

The modern surgical attitude in the treatment of early stage breast cancer is a conservatory one, both in terms of the breast and of the regional lymph nodes. (25) The conservatory treatment bears the same results as a mastectomy in terms of prognosis and long-term survival rate. (26) We must mention a higher local relapse rate attributed to conservatory treatment in comparison to mastectomy. (27) The precise preoperative localization of non-palpable breast lesions using a radioactive tracer allows a complete excision of the primary lesion and a correct assesment of the axillary status, and represents thus an option comparable to mastectomy in oncological terms, and a superior one from an aesthetic result point of view. The high percentage of correct localization of primary lesions and of cases where complete lymphadenectomy could be avoided, which implicitly meant a decrease of post-operative morbidity, (28) justifies the continuation of applying the SNOLL protocol in patients with occult breast lesions.

For some patients however, the aesthetic result is less important, a radical approach being accepted and even preferred, as a safer measure, as a sacrifice needed to be made in order to be healed, this aspect also explaining the large number of mastectomies performed in this lot, an aspect observed in other studies as well. (29,30)

The identification and excision biopsy of the lesion ensures a diagnosis, and, at the same time, in cases without axillary invasion represents the treatment itself, as it eliminated the need for any other additional surgical act. In medical literature several techniques of tracer injection are mentioned. (31) A higher rate of sentinel node identification can be obtained by injecting the radioactive tracer at intradermal level, compared to the injection in the tissue surrounding the tumor, but there is the risk that a prospective sentinel node situated at internal breast level will not be identified, it being a known fact that the lymph circulating at toracic dermal level is drained only by axillary nodes. (32)

The histopathologic exam of the lesions can, in some cases, be inconclusive, due to the small size of the resection pieces. A histopathologic intraoperative analysis can be performed both through the method of frozen sections as of that of imprint cytology cytology. (33) The advantage in the first case is related to the high degree of specificity, the ease of examination and the fact that it allows immunohistochemical examination, but it also presents disadvantages pertaining to cost, time or false negative results in some cases. Imprint cytology also offers the advantage of a rapid examination, as well as of excellent cytological details, and also allows immunohistochemical examination. Its disadvantages are related to false negative

results, the examination of a relatively small quantity of cells and to the fact that it requires the involvement of an experienced cytologist. SNOLL requires a learning curve on behalf of the multidiscipline team, this stage being mandatory for implementing the technique.

Conclusions

SNOLL is an efficient technique in the surgery of occult malignant breast lesions, which offers the possibility of precise localization of the lesions with the help of a radioactive tracer, which allows a limitation of the volume of breast resection, a good aesthetic result and a simpler postoperative evolution.

At the same time, the technique offers the advantage of selecting cases of breast cancer in which axillary lymphadenectomy is truly necessary after performing a biopsy of the sentinel node, thus obtaining an improvement in the patient's quality of life.

In our study, the sensibility of the method for tumor localization (100%) and of identification of the sentinel node (96.93%) was very good, similar to results obtained by other international studies.

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