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Research Article

Sentinel Lymph Node Technique: Experience of the Gyneco-Obstetrics II Department at the Hassan II University Hospital in Fez

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Abstract

Introduction: Breast cancer screening has led to the increasingly frequent discovery of smaller sized cancers. These tumors have a low lymph node metastatic potential, hence the introduction of the sentinel lymph node (SLN) technique to determine axillary lymph node involvement. The sentinel lymph node is the first lymph node affected by metastatic cells from a primary tumor. Its excision, a less morbid technique, makes it possible to reliably establish the lymph node status of breast cancer. Thus, it selects patients who, having occult lymph node metastases with regard to the clinico-radiological evaluation, could benefit from adjuvant regional or systemic treatment. The first techniques to remove this lymph node were based on standard anatomical models and never replaced classic lymphadenectomies. The development of more functional pre- and intraoperative lymphatic mapping techniques in the 1990s then made it possible to validate the concept of sentinel lymph node as an alternative to lymph node dissection. This article describes the experience of the obstetrics and gynecology department 2 with the sentinel lymph node and the results are compared to those found in the literature.

Objectives: Report the results of the SLN technique in breast cancer at the GOII department within the HASSAN II University Hospital of FES.

Materials and Methods: This is a retrospective study between January 2022 and February 2024 during which 35 patients with breast cancer were included. All these women had a SLN search using a combined method.

Results: The detection rate was 97.6% (n = 33). An extemporaneous examination was carried out in all patients. The average number of lymph nodes collected was three (ranging from one to five). The sensitivity of the extemporaneous examination was 95.7%. No false positives were found on extemporaneous examination. The SLN was invaded in 04 patients (9.5%) completed by an axillary dissection.

Conclusion: The SLN technique is a reliable and feasible technique. However, it requires training from the surgeon, the pathologist and the nuclear doctor. It helps reduce the morbidity of breast cancer treatment by avoiding "unnecessary" lymph node dissections in patients without lymph node involvement. The increase in the number of smaller sized cancers discovered during screening makes it possible to increase the number of patients who can benefit from this technique.

Keywords: *Sentinel Lymph Node Technique; Breast Cancer*

Introduction

Breast cancer is the most common cancer among women worldwide, both before and after menopause. It is a public health problem with an increasing incidence from year to year, despite the evolution of multidisciplinary care. According to the cancer registry of the greater Casablanca region, statistics for a period from 2008 to 2012 showed an incidence of breast cancer of 47 per 100,000 women. Since the time of radical mastectomy recommended by Halsted at the end of the 20th century which consisted of a total mastectomy associated with an axillary dissection with excision of the pectoral muscle, axillary dissection was the standard necessary to define the lymph node status of patients with breast cancer. The latter has an important prognostic value, but its morbidity is significant and can have unpleasant consequences. It can lead to decreased sensitivity, as well as arm pain on the operated side. It can also be the cause of lymphedema or a functional deficit of the ipsilateral shoulder. The advent of systematic breast cancer screening has therefore made it possible to diagnose tumors at an early stage with a reduced risk of lymph node involvement. This made possible a de-escalation of breast surgery with the development of conservative oncoplastic surgery and the sentinel lymph node (SLN) technique. This surgical technique of "selective lymphadenectomy" (SL) consists of sampling the first lymph node relay(s), thus avoiding sampling all of the lymph nodes. This sample makes it possible to carry out a precise lymph node status, to determine the prognosis of the disease and above all to reduce the morbidity of axillary surgery in comparison to axillary dissection which constituted the reference technique until the beginning of the 2000s. The protagonists leading to the success of this technique are the surgeon, the pathologist and the nuclear doctor who are required to undergo continuing training.

Objective of the Study

The objectives of our work, from a retrospective series of 35 cases, between January 2023 and March 2024 at the Obstetrics and Gynecology II department of the Hassan II University Hospital of FES were: To evaluate the feasibility of the ganglion technique sentinel; To determine its impact on the therapeutic decision; To evaluate the benefit of SLN compared to conventional axillary dissection.

Material and Method

The aim of our study is to evaluate the technique and results of SLN research procedures in breast cancer surgery on a series of 35 cases collected at the obstetrics and gynecology department II at the Hassan II University Hospital in Fez. This is a single-center retrospective study, in the GO2 department between January 1, 2023 and March 2024 in patients who had breast surgery, whether conservative or not, with performance of the sentinel lymph node technique. Patients with: Non-T4 tumors (T1, T2, T3) were included in our study; Absence of palpable axillary lymphadenopathy cN0; Absence of suspicious lymphadenopathy on axillary ultrasound; Uni- or multifocal tumors. Patients presenting: Tumors with skin or pectoral muscle involvement (T4) were excluded from our study; Inflammatory breast cancers. Palpable or suspicious axillary lymphadenopathy on ultrasound; History of axillary surgery. The two detection methods used in our series are the patent blue colorimetric method and the isotopic method. All 35 patients included in the study benefited from detection of the sentinel node by the colorimetric method using methylene blue which consists of the injection of 2 ml of methylene blue is done peri-areolar intraoperatively, 10 minutes before the incision. We identify the blue lymphatic channels to reach the SLN (lymph node colored in blue). All patient benefited from the isotopic method as well.

Results

According to the location of the tumors

The right breast was affected in 12 patients or 34.28% and the left breast in 23 patients or 65.71% (Table 1).

Sein	Right	34.28%
	Left	65.71%
Quadrant	SEQ	62.85%
	IEQ	17.13%
	IIQ	8.57%
	SIQ	5.71%
	JSQ	5.71%
	JIQ	2.85%
Retro areola		5.71%

Table 1: *Location of tumors in our study.*

According to tumor size: The tumors had a mean clinical size of 2.57 cm. The tumor size varied between 1 and 5 cm for the 35 patients and were therefore classified T1 or T2 and 07 patients had a tumor larger than 5 cm, i.e. T3.

After a careful clinical examination, all patients underwent mammograms supplemented by breast and axillary ultrasounds.

BIRADS scores were 4 or 5 with scores 5 predominating (Figure 1).

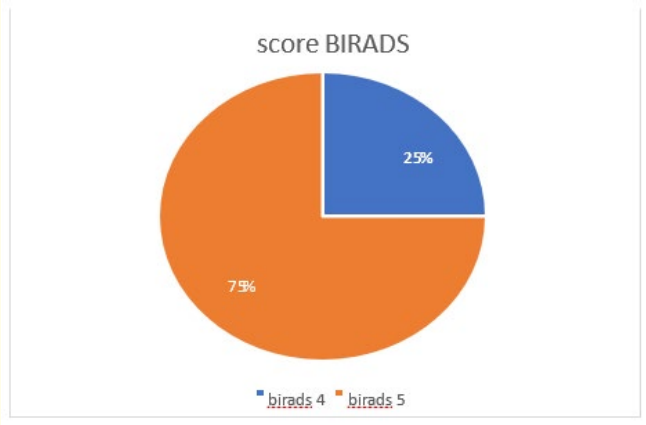

Figure 1: *Distribution according to the BIRADS score.*

Micro calcifications were observed in 74.28% of cases on mammography of the affected breast.

The predominant histological type was NOS-type infiltrating breast carcinoma in 76.74% of cases. There were 05 cases of intraductal carcinoma, two cases of infiltrating lobular carcinoma (Figure 2).

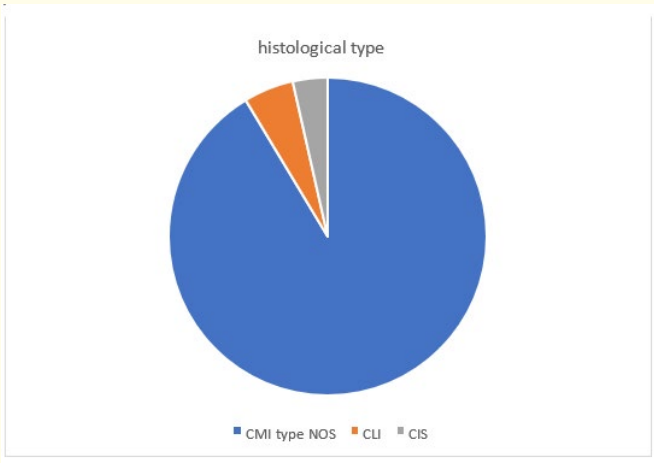

Figure 2: *Distribution according to histological type.*

Hormone receptors were positive in 86.05% and negative in 13.95% of cases and HER2 positive in 4.65% of cases (Figure 3).

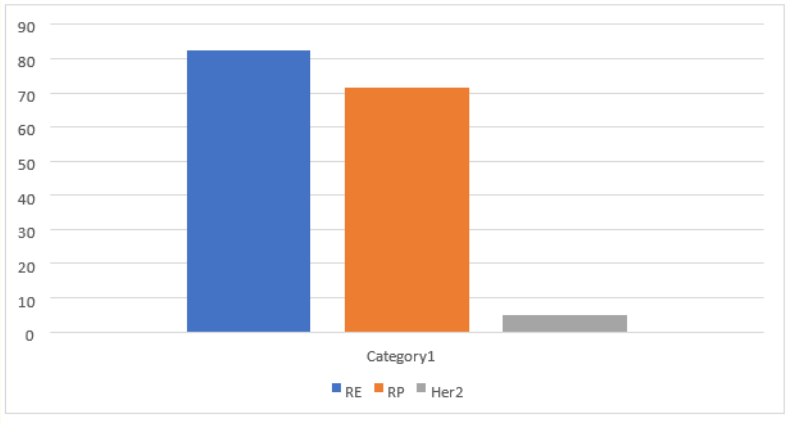

Figure 3

The total number of sentinel lymph nodes taken in our study was 126, an average of 3 nodes per patient (range: 1 and 5). The average size of the SLN was 3.04 cm (range: 0.3 and 5 cm). The SLN was negative in 31. cases and positive in 04 cases, i.e. respectively 88.37% and 11.63% as indicated in the table 2 below.

Axillary dissection was carried out for 3 additional patients after the detection of tumor cells during the extemporaneous examination. The remaining 32 patients did not have an axillary dissection.

Results of SNL	Number	Percentage
SNL-	31	88.37%
SLN+	4	11.62%
SNLmi	0	0%
1SLN+	01	2.32%
2SLN+	03	9.30%
3SLN+	0	0%
Total	35	100%

Table 2: *Illustrating the results of SLN.*

The treatment of patients after the SLN and axillary dissection technique was essentially based on conservative or radical surgical treatment associated with adjuvant chemotherapy, radiotherapy or hormonal therapy.

Discussion

The sentinel lymph node technique is a feasible and reliable technique, but requires training on the part of the various specialists: surgeon, pathologist and nuclear physician. Its collection using a minimally invasive technique and its targeted histological analysis have opened the way to minimally invasive axillary stratification surgery while reducing the morbidity linked to axillary dissection for well-selected patients. Ideally and according to an initial postulate established by the first teams, the identification rate must be greater than 90% and the false negative rate less than 5% for optimal patient care [1].

A positive lymphoscintigraphy with positive transcutaneous identification using the isotope probe combined with a colorimetric technique should provide a detection rate close to 100%. On the other hand, a negative lymphoscintigraphy strongly exposes the risk of failure of the procedure even when trying the blue detection technique alone.

The identification rate in our study was 100%. This value is comparable to the results of the Lyon study carried out by Bodin, which found an identification rate of 100% using the combined method on a series of 243 cases [2]. Furthermore, other studies find high rates, such as the study conducted by Hoen N., *et al*. in 2016 on a series of 293 patients with an identification rate of 98.6% [3]. Several data affect this SLN identification rate, in particular: The experience of the surgeon and his surgical ability; The detection method used; The BMI of the patients and their age; The location of the tumor; The conditions of the anatomopathological examination.

The detection rate of SLN depends on the experience of the surgeon. Indeed, a "learning" during which the biopsy of the SLN is done, is systematically followed by an axillary dissection. Team work between the surgeon, the pathologist and the nuclear physician is also necessary in order to increase the detection rate and reduce the false negative rate.

Each surgeon can evaluate their results after completing a learning phase regarding the detection and false negative rate, and check whether they are within the recommended standards before performing the SLN biopsy routinely. The learning phase is improved by using a combined method (colorimetric + isotopic) with the assistance of a surgeon who has validated his learning "curve". According to Tafra, the identification rate increases and the false negative rate decreases respectively after thirty interventions are carried out. As for Mariani., *et al*. carrying out 40 to 60 procedures using the isotopic method is essential to complete the learning phase [4].

The ability of the surgeon and the frequency of his performance of the SLN technique therefore plays a significant role in increasing the identification rate, and in the absence of consensus, it is therefore recommended to perform 50 procedures with systematic axillary

dissection to validate the technique (false negative rate < 5%, detection rate > 90%) [5]. To justify the interest of this surgical activity, Cox., *et al*. reported a detection rate of 86% during the learning period for surgeons who performed less than three SLN per month compared to 97% for those who operated more than six. per month [6]. The use of a combined method plays a fundamental role in improving the identification rate; the results of single or multicenter studies almost constantly find higher identification rates compared to colorimetric or isolated isotopic methods. The isotopic method offers the advantage of detecting all marked lymph nodes, even those not visible, while the colorimetric technique offers ease of dissection and identification, particularly when the SLN and the primary tumor are quite close, however experienced teams can be satisfied with carrying out the method with a single plotter. Obesity and age of patients are known risk factors for breast cancer, but they also hamper the detection of SLN given the laborious dissection in an axillary cavity rich in adipose tissue and the increased incidence of failure of the mapping in the elderly.

A study showed that obese patients were faced with a high risk of edema of the upper limbs after axillary dissection, therefore strongly indicating the SLN technique. However, it is reported that an obese individual (BMI > 30) has less SLN, which is probably due to the fact that adipose tissue envelops the SLN, thus reducing lymphatic drainage [7]. Cox., *et al*. also show that a BMI greater than 29.5 is responsible for an increased risk of defective SLN detection. In terms of age, it is reported that the detection rate in patients aged 50 and over is relatively low.

In breast cancer patients at older ages, the lymphatic tissue degenerates and therefore the lymph nodes function less effectively to engulf pathogens [8]. As for the studies carried out on the impact of anatomopathological techniques on the detection of SLN, they lead to two observations: The increase in the number of sections (up to 60 sections at intervals of 50 to 200 µm) and levels (starting through the hilum) allows the diagnosis of a greater number of metastases.

IHC further increases the chance of positivity of the lymph nodes collected by detecting micrometastases and isolated tumor cells. According to the characteristics of breast lymphatic drainage, if a tumor is located in the SEQ of the breast near the armpit where there are many draining lymphatic vessels, the detection rate of SLN may be affected because lumpectomy may damage the circulating lymph. If a tumor is located in the inner quadrant, there is a high risk of metastases and therefore a higher detection rate [9]. This does not agree with the results obtained in our study where the localization and detection of SLN were maximum for tumors located at the level of the SEQ (62.85%).

The injection site of the detection products does not seem to play a role in modifying the detection rate. According to a multicenter study by Mc Masters, the identification rate is equivalent for peri-tumoral and intradermal injections [10].

In our study, the identification rate which is 100% is significantly higher than the 90% recommended in the literature data. The FN rate corresponds to the number of patients having a SLN devoid of metastases while the rest of the axillary dissection is the site of one or more metastases. It is essential to have the lowest possible false negative rate to validate the sentinel lymph node technique. This rate should ideally be less than 5% and in practice approaches 10%. The false negative rate in our study was 0%. Several factors can modify the false negative rate and therefore contribute to improving the validity of the SLN technique. Among these factors, we cite: The age of the patients; The number of SLN collected; The use of combined methods; Clip placement at the level of metastatic SLN; The experience of the surgeon and the multifocal location of the tumor. The use of a combined technique reduces the false negative rate, as does the sampling of a large number of SLN [11]. The placement of a clip in the metastatic sentinel lymph node is also an interesting element which reduces the false negative rate. In the review of the cohort of the 1071 ACOSOGZ study, 33% of patients had a lymph node clip placed before chemoneoadjuvant and 55.8% of patients had the clip at surgery. In the group with clip, the false negative rate dropped to 7.4% compared to 13.6% without clip [12]. Finger exploration of the axillary cavity and finally sampling of the SLN should be systematically carried out, allowing in some cases to identify and sample any axillary lymphadenopathy that is increased in size and/or indurated and does not

allow the lymphophilic product to penetrate. These nodes that are neither blue nor "hot" could perhaps further reduce this false negative rate. A selection of patients who will benefit from this technique is also essential: single lesion less than 20 mm without palpable axillary lymphadenopathy. Axillary dissection, which is the reference standard, also has a false negative rate of between 1.5 and 3% [13]. Age in our study is not a factor contributing to SLN invasion. In fact, the average age in the SLN+ population is 50 - 18 years, and remains lower than the average age in SLN- patients which is 53 - 87 years. In our study, the histological size in SLN+ and SLN- patients was practically the same. We found an average tumor size of 2.75 cm in the SLN+ group and a size of 2.76 cm in the SLN- group. All 04 SLN+ patients had tumors whose size was between 20 mm and 50 mm. In our study, hormone receptors were present in 100% in SLN+ patients and in 87.5% in SLN- patients. In the group where HR and SLN were positive, estrogen and progesterone receptors were almost always present unlike HER2 which was negative in 100% of cases. Menopausal status does not seem to be a predictive factor for SLN invasion in our study, however several studies have classified age and menopause as factors favoring SLN invasion. Complications of axillary surgery, whether traumatic like l axillary dissection or less invasive like the SLN technique, can occur in the short, medium or long term.

Long-term morbidity remains the most debilitating and constitutes a serious problem that can be seen in patients with breast cancer who have undergone axillary lymph node dissection. The after-effects of axillary dissection can manifest as lymphedema constituting the most common complication (50%), axillary, breast or chest pain, hypoesthesia, numbness and tingling of the breast, armpit and arm, or functional impotence of the shoulder or arm. Although axillary dissection provided good local tumor control and guaranteed optimal lymph node stratification of the disease, sentinel lymph node biopsy emerged as an effective alternative to axillary dissection providing equally reliable results for lymph node stratification, but leading to a reduction in long-term complications. Since SLN biopsy requires less traumatic axillary surgery compared to axillary dissection, it has been postulated that it would result in reduced shoulder or arm morbidity. The incidence is 5% in the SLN group compared to 13% in the control group. The study of quality of life also showed a favorable difference in favor of the SLN group in the eighteen months following the intervention ($p > 0.001$). A certain number of clinical studies have already evaluated the results after short, medium and long-term follow-up in groups of patients who have benefited from axillary dissection and others from the SLN technique. Associated radiotherapy to the armpit increased the risk of lymphedema by 2.4 times (13.9%) in patients who received axillary dissection. This risk did not seem to increase in patients who benefited from the SLN technique in the event of associated radiotherapy [14].

Conclusion

Sentinel lymph node biopsy has revolutionized the management of breast cancer. It has become the axillary stratification procedure of choice for many surgeons and has enabled the precise demonstration of axillary lymph nodes in women with early-stage breast cancer while reducing the morbidity often seen in breast cancer. after-effects of axillary dissection. The technical details of the procedure have been defined and it appears that the isotope technique alone or combined with a dye (methylene blue or indocyanine green) can be used to effectively identify SLN. Various injection techniques have been used successfully, and many factors previously thought to influence the accuracy of the procedure turned out to be of limited importance. The main challenge of this technique is to have a low false negative rate making it possible to judge the reliability of the results obtained. This can only take place after the selection of patients, compliance with the indications for the technique and the completion of a learning curve by all teams wishing to adopt sentinel axillary dissection. The sentinel procedure remains a notable advance for all women with early-stage breast cancer. It improves their quality of life compared to axillary dissection. However, collaboration between the different stakeholders in a multidisciplinary manner with a view to perfecting it must take place constantly.

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