



Intraoperative Ultrasound for Nonpalpable Breast Lesions – Experience and Operative Time

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Abstract

Introduction: The essential tools doctors need to diagnose breast cancer tumors at the early stages and with no clinical presentation are screening mammography and ultrasonography. Nonpalpable breast lesions are a current problem nowadays and there are various types of navigation techniques that are utilized in order to achieve cancer cell-free resection margins in the first place. Intraoperative ultrasound has been proven to be a safe and effective way to excise this type of breast tumors.

Aim: To study the correlation between the experience we obtained while using intraoperative ultrasound for excision of nonpalpable breast lesions, and the duration of surgery.

Materials and methods: Twenty-five women with nonpalpable breast lesions underwent breast-conserving surgery using ultrasound navigation. Nominal and ordinal data were presented using numbers and percentages. Spearman's rank-order correlation was used to assess the effect of experience gained on the duration of surgery.

Results: The tumor distribution was 72% malignant tumors and 28% benign. A 100% identification rate in the effective surgical excisions was reported. In the process of gaining experience using the method, the duration of surgery shortened by 30%. No tumor cells on ink were found in all specimens and there was no need for secondary surgeries.

Conclusions: Our results demonstrate a relatively short learning curve, and we believe that breast surgeons should be helped and encouraged to gather adequate expertise to ensure patient safety and gain confidence.

Keywords

breast, breast cancer, lesions nonpalpable, surgery, ultrasound

INTRODUCTION

The key to Identify breast cancer at an earlier stage is the introduction of a screening program in each country worldwide. It guarantees a bigger chance of survival and better quality of life. It is reported that nonpalpable breast cancers are detected using screening mammography as masses, microcalcifications, or architectural distortions.^[1]

The benefits of the implementation of patient centered approach and shared decision making are proved by the literature and we think are crucial in those type of women.^[2,3]

Nowadays there are various methods that surgeons all over the world utilize in order to identify and successfully excise those type of lesions. One of the methods that have been used is the intraoperative ultrasound navigation. It has been proven, that this specific procedure results in a reduced number of positive resection margins and benefit in saving more healthy breast tissue.^[4]

AIM

To study the correlation between the experience we obtained while using intraoperative ultrasound for excision of nonpalpable breast lesions, and the duration of surgery.

MATERIALS AND METHODS

From March 2020 to September 2021 a total number of 25 women were diagnosed with nonpalpable breast lesions and underwent breast conserving surgery, using ultrasound navigation in the department of "Surgery" in Kaspela University hospital – Plovdiv and the department of "Surgical oncology" in the Complex oncological center - Plovdiv. The surgical time was determined between the first incision and the formation of the last knot on the skin wound and divided into destructive period and construction period.

Intraoperative margin examination was done in all patients using frozen section analysis. Statistical analysis was done using numbers and percentages(%) to present nominal and ordinal data. Spearman's rank-order correlation was used to study the influence of the experience gained on the duration of surgery.

Exclusion criteria were: patients with multifocal or multicentric lesions, patients who had previous breast cancer surgery and those preoperative diagnosed with ductal in situ carcinoma.

RESULTS

A total number of 25 women were included in the present study. The patient's age was between 40-82 years old with a median of 62 years. The BMI of the selected group was between 17,60-35,90 kg/m² with an average value of 24,92 kg/m². The majority of the patients (84%) had BMI in the

normal references - between 18.50 and 24.90kg/m². Twelve percent of the patients had BMI values above the normal range > 25kg/m² and there was one case of subnormal value BMI-17.60 kg/m². In 64% of the women, the tumor was localized in the left breast and in 36% in the right one. The upper outer quadrant was most affected(44%) as a localization.

The mean duration of surgery was 16 min. In order to study the impact of the accumulated experience in conducting operations, the time was coded in the following categories: 1 - between March and December 2020; 2 - between January and May 2021; 3 - between June and September 2021. Spearman's rank-order correlation was used to study the influence of the gained experience on the duration of surgery.

The body mass index (BMI) was also included in the analyzes, which was introduced as a continuous measure (not as categories) to check its effect on the duration of the the operation, the destructive and the constructive period.

The results showed no association between BMI, duration of surgery, resection time and suturing time (p> 0.05 in all analyzes performed).

The time period of the operation showed a significant influence on the duration of the surgeries. It was an important factor with two statistically significant correlation coefficients. First, the time period of the operation showed a relatively high negative association with the duration of surgery (rs = -0.525, p = 0.007). This result signifies that with the increase of the surgeon's experience in performing ultrasound guided excision surgeries, there is a decrease in the time required to perform this type of procedure. The same tendency was found for the resection time, with a

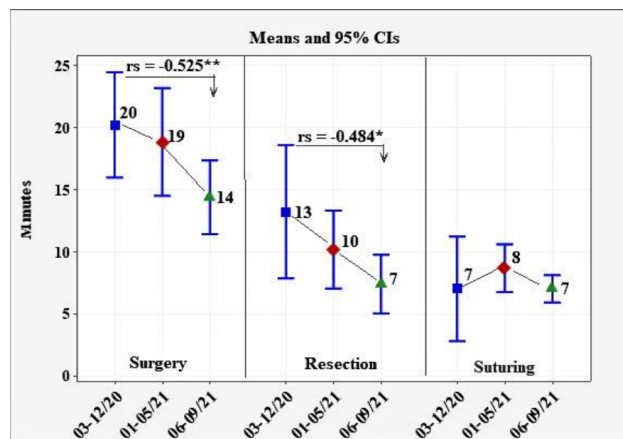


Figure 1. Significant negative association between surgical time, duration of the whole procedure, and only the destructive period. * statistical significance at p<0.05; ** statistical significance at p<0.01.

correlation coefficient showing a moderate negative association (p = 0.014).

Fig. 1 illustrates a significant relationship between the time of the operation, as an indicator of the surgeon's practical experience, and the time required to perform the

surgery. The figure illustrates the reduction of the average duration of surgery from 20 minutes (March-December 2020) to 19 minutes (January-May, 2020) to 14 minutes (June-September, 2021). The resection time is also from 13 minutes (March-December 2020) to 10 minutes (January-May, 2020) to 7 minutes (June-September, 2021). The suturing time is shortened between 7 and 8 minutes. This indicates again that the gained experience in performing breast conserving surgery while using intraoperative navigation is associated with a reduction in the time required for resection. Only the suturing time (7-8 minutes) did not show a connection with the surgeon's practice in performing this type of operation ($rs = -0.001$, $p = 0.994$).

In all patients, 100% negative margins were achieved and no re-excision and second surgeries were needed.

Pathological examination showed that 72% (18) of tumors were malignant and 28% (7) of them benign. The larger part of the patients - 12 (67%) were in T1c stage and 5 (28%) were in T1b. We report one patient (5%) who had a pathological complete response after neoadjuvant chemotherapy and a 0.5cm therapeutically associated fibrosis was found.

DISCUSSION

Nowadays breast conserving surgery and adjuvant radiotherapy is the method of treatment for early-stage breast cancer.^[5,6] The most important goal of this type of surgery is to obtain clear resection margins and the last are defined as "no tumor on ink" based on the last guidelines.^[7,8] A compromise with the latter is a major predictor for local recurrence.^[7,9]

In order to present our experience in time, we compared identification rate, effectiveness, re-excision rate, surgical duration in the time period and the impact of patient's BMI.

Since in all 25 patients the nonpalpable breast lesion was identified by ultrasound examination with similar dimensions and was effectively excised with clear resection margins, we found a positive impact of the experience gained in the time period we analyzed.

In the beginning, the average total surgical duration was 20 minutes and in the last period, the time was shortened by 30% (6 minutes). The duration of the destructive period began with 13 minutes and ended with 46% less (6 minutes) in the last time interval presented.

The fact that ≈85% of the patients were categorized with normal BMI values is a possible explanation for the lack of association with the duration of the surgical process.

CONCLUSIONS

Intraoperative ultrasound has been proven to be an important tool navigating surgical excision of nonpalpable breast lesions. Our results demonstrate a relatively short learning curve, possibly because our study has been focused on sur-

geons, who were already experienced in the ultrasound examination of the breast.

Based on the outcomes of all currently available studies worldwide on the positive impact of ultrasound-guided surgery, we advocate the help and support of breast surgeons to obtain sufficient experience in order to ensure patient safety and obtain expertise.

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Интраоперационное ультразвуковое исследование непальпируемых образований молочной железы – опыт и время операции

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Резюме

Введение: Основными инструментами, необходимыми врачам для диагностики опухолей молочной железы на ранних стадиях и при отсутствии клинических проявлений, являются скрининговая маммография и ультразвуковое исследование. Непальпируемые поражения молочной железы являются актуальной проблемой в настоящее время, и существуют различные типы навигационных методов, которые используются, прежде всего, для достижения краёв резекции без раковых клеток. Было доказано, что интраоперационное ультразвуковое исследование является безопасным и эффективным способом иссечения этого типа опухолей молочной железы.

Цель: Изучить корреляцию между опытом, полученным нами при использовании интраоперационного ультразвука для иссечения непальпируемых образований молочной железы, и продолжительностью операции.

Материалы и методы: Двадцати пяти женщинам с непальпируемыми образованиями молочной железы была проведена органосохраняющая операция с использованием ультразвуковой навигации. Номинальные и порядковые данные были представлены с использованием чисел и процентов. Ранговая корреляция Спирмена использовалась для оценки влияния полученного опыта на продолжительность операции.

Результаты: Распределение опухоли составило 72% злокачественных опухолей и 28% доброкачественных опухолей. Сообщалось о 100% уровне идентификации при эффективном хирургическом иссечении. В процессе приобретения опыта использования метода продолжительность операции сократилась на 30%. Опухолевые клетки на чернилах не были обнаружены во всех образцах, и не было необходимости во вторичных операциях.

Заключение: Наши результаты демонстрируют относительно короткую кривую обучения, и мы считаем, что необходимо помогать и поддерживать хирургов молочной железы с целью приобретения достаточного опыта, обеспечения безопасности пациентов и обретения уверенности.

Ключевые слова

молочная железа, рак молочной железы, непальпируемый, хирургия, УЗИ
