

## Analysis of sparing surgical procedures use in breast cancer patients at the Oncology Centre in Bydgoszcz in 2002–2017

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**Introduction.** Diagnosis of breast cancer at its early stage influences significantly long-term treatment outcomes in patients. As result, more often application of breast-conserving surgical procedures becomes possible. This paper presents our centre's up-to-date experiences in this field.

**Materials and methods.** 12,337 patients diagnosed with primary malignant neoplasm of the breast surgically treated at the Oncology Centre in Bydgoszcz between 2002 and 2017. Analysis of applied breast-conserving procedures in the analysed group.

**Results.** Observation of consecutive years indicates over double increase in the number of patients (498 in 2002, 1136 in 2017). Breast-conservative treatment (BCT) was recorded in 10.6% of patients (2002) and 65.1% in 2017. Treatment sparing lymph nodes of the axillary fossa concerned 2.2–79.0% in the analyzed period.

**Conclusions.** In the analyzed time period, we recorded a significant increase in the number of surgical BCT procedures applied. It was possible due to regular introduction of changes regarding diagnostic and therapeutic algorithms to our everyday clinical practice in patients suffering from malignant breast neoplasms.

NOWOTWORY J Oncol 2018; 68, 1: 3–7

**Key words:** breast cancer, conserving treatment, sentinel lymph node biopsy

### Introduction

A cancer diagnosis at an early stage of the disease can influence significantly a long-term treatment outcome in patients. Additionally, particularly in breast cancer patients, early discovery of lesions allows for more frequent use of sparing surgical procedures [1, 2]. Depending on the cancer stage initially found, they can involve local radical resection of the mass with radiotherapy supplementing the surgery (BCT). This may also refer to structures of the regional lymphatic system — by using the sentinel lymph node biopsy (SLNB).

The surgical procedures listed above belong to treatment methods commonly used in patients [1, 2]. Their effectiveness and safety of use were proven by many years of monitoring in groups of patients enrolled into source studies [3, 4]. They are also confirmed by results of successive randomised clinical studies [5–7].

The most important objective of sparing treatment used in breast cancer patients is the maximum effectiveness of the cancer therapy. However, attempting to limit adverse effects of cancer treatment is also of great importance. For BCT, the priority in that respect is that patients avoid undesirable changes related to a loss of a breast [1–6]. However, a possibility of performing SLNB allows for avoiding complications characteristic for axillary lymphadenectomy (or significant reduction in their intensity). The most important clinical problems include lymphatic swelling of the upper limb on the treated side, sensory disturbances, disrupted motor function in relevant muscles (as a consequence of the peripheral nervous system damage) and post-surgery deformation of integuments [7, 8].

Apart from the current treatment standard for breast cancer patients, the extent to which BCT and SLNB pro-

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cedures are used in individual oncology centres may also depend, though to a much lesser extent, on local equipment and technical resources. A type and level of medical personnel education, as well as their individual preferences, also appear to be of importance [9–11].

This study aims at discussing application of sparing surgical procedures in patients with breast cancer, hospitalised at our centre. The reasons for the changes in the method of qualification of patients for both types of surgical procedures were determined. Furthermore, clinical consequences of modifications introduced in this area were also evaluated, visible at individual intervals of the analysed period.

### Material and methods

A group of 12,337 patients (12,278 women, 59 men) diagnosed with primary breast cancer, hospitalised at the Breast Cancer and Reconstructive Surgery Clinical Unit and at the Surgical Oncology Clinical Unit, Oncology Centre in Bydgoszcz, in 2002–2017. All patients underwent surgical treatment, in most cases of radical nature.

The study was conducted in the form of a retrospective analysis, in which clinical data from patients digital medical records were used.

For purposes of statistical comparisons, a group of patients was distinguished in the analysed clinical material, in whom sparing surgical procedures were used. The group of patients who underwent BCT included cases, in which initially planned breast-conservative treatment was not changed. Therefore, patients who eventually required

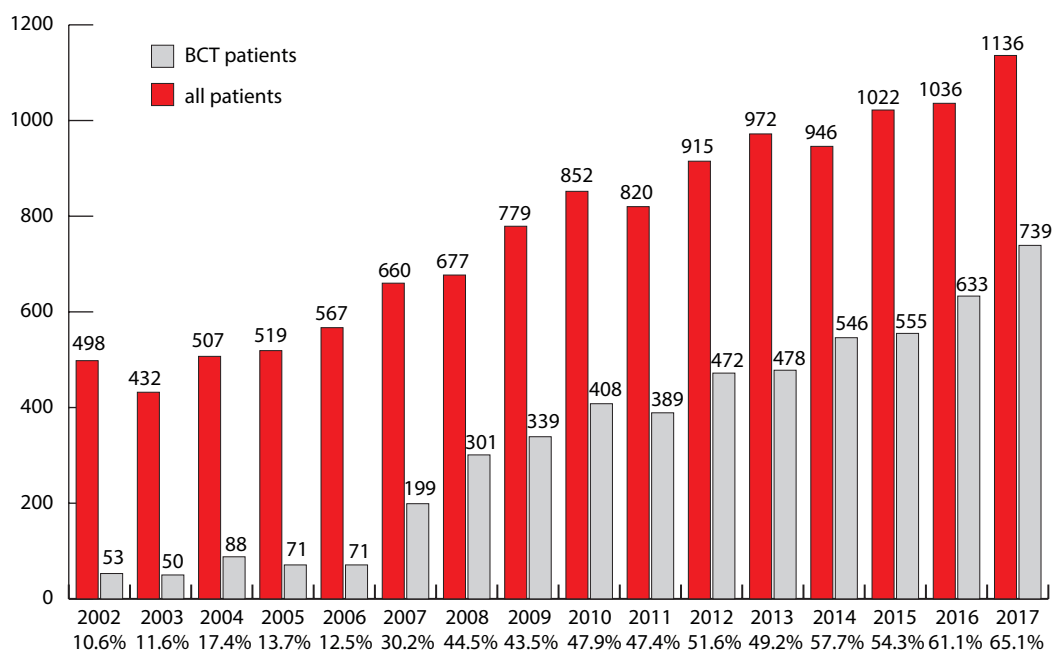
mastectomy resulting from the need for more radical treatment following initially performed BCT, were not included in this group.

The group of patients undergoing the treatment sparing axillary lymph nodes included patients qualified for the SLNB procedure. It did not include cases of cancers not requiring verification of the axillary lymphatic system (patients diagnosed with cancer of mesenchymal origin and some patients with ductal carcinoma in situ — DCIS) or treated in non-radical way (patients undergoing salvage mastectomy). Apart from determining the number of subjects in the group, a percentage of metastatic lesions found in resected lymph nodes was also analysed. The size and type of metastases were classified according to the classification established by the American Joint Committee on Cancer (AJCC) [12].

Due to significant modifications of treatment recommendations for patients with metastases in sentinel nodes, observed during the study, this clinical problem was not analysed separately.

During the patient qualification for specific surgical procedures, commonly available recommendations on surgical treatment of breast cancer published by national and international scientific associations were used [3, 4, 13–18].

In order to determine the reasons for the changes in the method of qualification of patients to particular types of surgical procedures, we estimated the extent of use of neoadjuvant systemic treatment/induction therapy and pre-operative diagnosis based on screening tests in investigated patients.



**Figure 1.** Use of breast-conservative treatment (BCT) in the analysed group of patients (2002–2017)

## Results

In the successive years of follow-up, it was found that the number of patients requiring surgical treatment due to breast cancer more than doubled. The number of patients hospitalised for this reason was 498 in 2002, 852 in 2010 and 1136 in 2017 (with the overall increase in the number of cases throughout the analysed period by 128%). The complete data for the analysed period has been provided in Figure 1.

The differences were much larger for the frequency of use of sparing surgical procedures in the analysed group. For BCT, this procedure was performed in every tenth patient (10.6%) undergoing surgery in 2002. In 2017, this surgical procedure was performed in 65.1% of breast cancer patients (Fig. 1). In total, BCT was performed in 5391 patients, and the average use of this procedure reached 43.7% for the whole analysed period.

The surgical treatment sparing the axillary lymphatic system started being used at our centre slightly later than BCT (since 2004). 5446 patients in total were qualified for the sentinel lymph node biopsy. In the first year, it was conducted in 11 patients (representing 2.2% of all patients treated surgically), while in the last year of the observation, 79.0% (897/1136) of patients were qualified for SLNB — Figure 2.

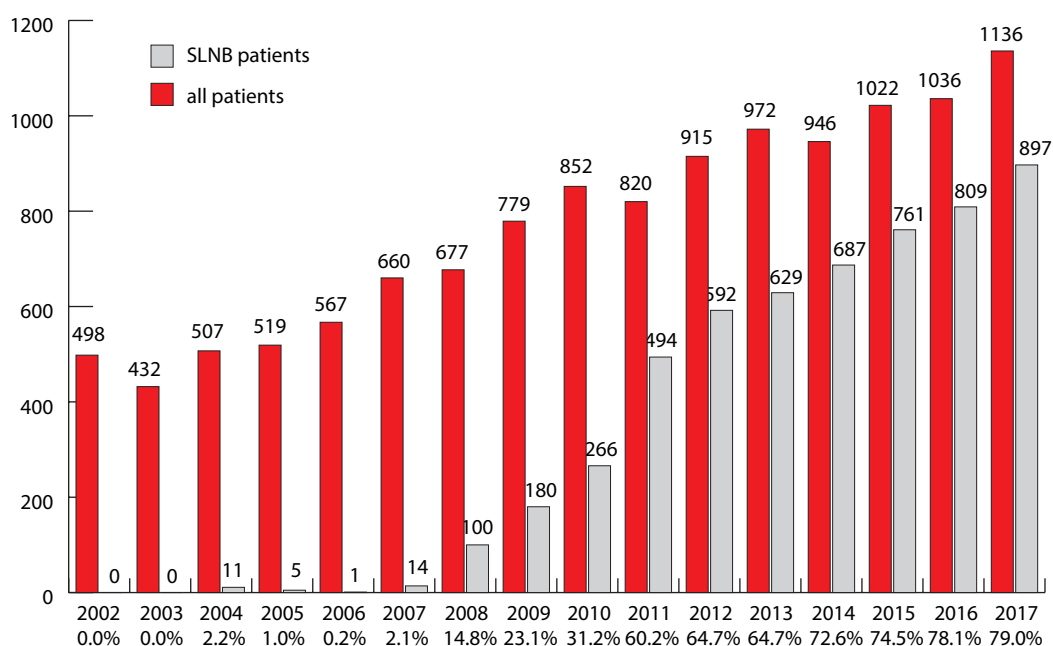
In 1282 (23.5%) patients undergoing SLNB, presence of metastases was found in resected lymph nodes. They were not observed during the first three years of this procedure's use (2004–2006). This resulted from the fact that the lymph node sparing procedure was used in patients with ductal carcinoma in situ requiring simple amputation. In successive years of analysis, the percentage of patients with axillary

metastases qualified for SLNB ranged from 18.3–25.5%, reaching the highest value in 2011 (Table I).

Within analyzed time frames significant differences in the extent of neoadjuvant systemic treatment (and induction therapy) use in patients were observed. In year of 2002, 7.6% patients who underwent surgical procedure, 2006 — 13.2% and 2011 — 9.8%, however in 2017 — 19.9% were qualified for such treatment.

**Table I.** Patients qualified for sentinel lymph node biopsy

Period	Patients qualified for SLNB (n = 5446)	Patients with axillary metastases (n = 1282)	Percentage of axillary metastases (%)
2004	11	0	0.0%
2005	5	0	0.0%
2006	1	0	0.0%
2007	14	3	21.4%
2008	100	20	20.0%
2009	180	33	18.3%
2010	266	64	24.1%
2011	494	126	25.5%
2012	592	137	23.1%
2013	629	152	24.2%
2014	687	159	23.1%
2015	761	163	21.4%
2016	809	199	24.6%
2017	897	226	25.2%
Total	5446	1282	23.5%



**Figure 2.** Patients qualified for the axillary conserving treatment (SLNB) — 2002–2017

The existence of similar discrepancies was noted in the percentage of patients, whose diagnosis of breast cancer subjected them to screening mammography. In 2006 this situation occurred in 16.2% of operated patients, in 2011 — 39.5% and in 2017 — 30.7%.

## Discussion

In the conducted analysis, observations performed at our centre and concerning the use of BCT and SLNB procedures were presented. As the analysis covered a long period of several years and a very large number of patients, a complete and extensive analysis of this important issue was possible. In the available Polish reports, analyses at the similar scale are not frequently attempted [19–22].

As the presented data imply, significant changes occurred in frequency of use of both types of sparing procedures. Currently, both BCT and SLNB are most commonly used surgical procedures, out of surgical treatment options available to patients.

One of the key reasons for an increase in a rate of the breast-conservative treatments was a fact that a number of relative contraindications to BCT were no longer taken into account. In some cases, these limitations were of clearly historical importance (for example, a patient with a history of breast cancer involving the other breast or of other primary cancer, primary cancer of comedo type).

The most important reason for an increase in BCT use were clinical outcomes achieved with the implemented screening population programme aiming at early breast cancer diagnosis using screening mammography. This relationship is confirmed by results of many studies, including those conducted at our centre [23–25]. Apart from the main objective for performing screening tests — a reduced risk of breast cancer mortality (even by 30–32%), frequently a new case can be diagnosed in a period preceding development of the first clinical symptoms [25, 26]. This facilitates more frequent use of breast-conservative treatment.

An important factor supporting the increase in the number of patients undergoing BCT was also the increasing percentage of patients with resected breast masses qualified for neoadjuvant therapy. In some patients this helped to avoid amputation. In accordance with the current standard for breast cancer treatment, a possibility to apply the breast-conservative treatment for multiple lesions was also of importance [16, 17, 27].

Even greater changes were noted for a percentage of patients qualified at our centre for the treatment sparing axillary lymph nodes. As it was noted before, it raised from the level of 2.2% to 79.0% in the analysed period. The SLNB procedure was initially used to supplement the simple amputation performed for extensive lesions of DCIS nature. A gradual extension of indications for the sentinel node resection (also as a part of the so-called learning curve) led to the

widespread use of SLNB in patients with invasive forms of breast cancer. A prerequisite for this procedure was a lack of suspicious axillary lymph nodes (in clinical evaluation and diagnostic imaging scans) in patients. However, when anomalies were found in physical examination (in the form of enlarged lymph nodes), concurring with lesions shown in ultrasound scans, the patients underwent effective axillary lymphadenectomy.

Achieving the current percentage of patients qualified for the SLNB was possible thanks to taking into account the current recommendations for this procedure, presented by the National Consultant for surgical oncology. In accordance with these recommendations, “finding (by palpation or in imaging scans) single, clinically suspicious lymph nodes does not authorise use of axillary lymphadenectomy, but it necessitates their verification (fine-needle aspiration)” [18]. Thus a decision not to perform treatment sparing axillary lymph nodes is justified when metastases are found in them before the surgery. In other cases, SLNB procedure is required, and currently nearly 80% of breast cancer patients are qualified for this procedure at our centre.

Besides the evaluation of a frequency of the SLNB procedure in the analysed period, it was also necessary to present direct clinical consequences of the implemented changes. To this end, it was necessary to decide whether the increasing number of patients qualified for SLNB results in a comparable increase in a number of breast cancer metastases to lymph nodes. The greatest raise in the percentage of metastases found in the sentinel node accompanied the extension of indications for SLNB to metastatic lesions exceeding 3 cm (masses at the clinical stage cT2 > 3 cm and cT3) and to patients with multiple lesions (2011–2012). This is consistent with results of other studies, in which it was confirmed that in breast cancer patients the size of the primary mass is one of the most important factors increasing a risk for metastases found in the lymphatic system [7, 9, 14]. Another modification of rules for qualifying patients for the sentinel node resection (according to the National Consultant recommendations [18]) did not lead to further increase in the overall number of metastases to lymph nodes.

Regardless of the gradual extension of recommendations for the SLNB procedure, other causes were decisive for additional use of treatment sparing the axillary lymphatic system, too. Its use was also possible in strictly defined groups of patients with metastatic lesions in the sentinel node. According to international experts' recommendations, in specific clinical situations, a withdrawal from the auxiliary axillary lymphadenectomy is currently the standard procedure [16]. This is confirmed by our earlier studies, in which complete safety of implementation of the above changes was demonstrated [28–30]. However, a comprehensive discussion of them exceeds the framework of this study.

## Conclusions

With a systematic implementation of changes in diagnostic and therapeutic procedures in breast cancer patients in daily clinical practice, it was possible to increase significantly the rate of use of sparing surgical procedures. The expected result of that situation is a reduction in frequency and intensity of adverse effects of cancer treatment. However, a complete evaluation of this issue requires more extensive analyses.

As it was demonstrated additionally, only detailed knowledge of currently applicable diagnostic and treatment rules concerning breast cancer patients enables selection of the optimal cancer treatment. This also applies to the use of surgical procedures.

**Conflict of interest:** none declared

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Received: 11 Apr 2018

Accepted: 28 May 2018

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