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Review Article

MASTECTOMY VS LUMPECTOMY RECURRENCE AND SURVIVAL RATES, A SYSTEMATIC REVIEW

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Abstract:

Background: Respect to patient preference, a lumpectomy is one of the operations that has been practised up to this point. In terms of mortality survival rate, it has both benefits and drawbacks. However, some breast cancer patients may experience a tumour recurrence following a lumpectomy, whether or not radiation was used to treat it.

Objectives: This study aims to assess and current evidences regarding overall survival (OS) and oncological outcomes of breast conservative treatment (lumpectomy) versus mastectomy.

Methods: For article selection, the PubMed database Information Services were used. All relevant articles relevant with our topic and other articles were used in our review. Other articles that were not related to this field were excluded. The data was extracted in a specific format that was reviewed by the group members.

Conclusion: Half included studies reported equivalent results for both BCT and mastectomy. Yet, 6 studies against 3 were supporting BCT over mastectomy respectively in respect to patient diagnostic status and associated adjuvant treatment. However, BCT is the standard surgical technique for primary breast cancer and meets the preferences of the majority of breast cancer patients in terms of oncological safety and aesthetic outcome.

Keywords: breast cancer, lumpectomy, breast conservative treatment, mastectomy, overall survival, recurrence

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INTRODUCTION:

More than one in ten new cancer diagnoses in women each year are for breast cancer, which is the most prevalent cancer among women. In the entire world, it is the second most prevalent reason for a woman's death from cancer [1]. Due to altered risk factor profiles, improved cancer registration, and cancer detection during the past three decades, its incidence and death rates have grown [2].

Patients who have been diagnosed with breast cancer are given personally tailored therapy options after their diagnosis. The patient's age, general health, preferred method of medical care, as well as the kind, size, stage, and grade of the breast cancer, all influence the course of treatment. The location of the tumour and the volume of the tissue removed from the breast will also affect the surgical possibilities [3, 4].

Most occurrences of early-stage breast cancer are treated by surgery [5]. Breast-conserving surgery (BCS) and mastectomy are the two main surgical techniques that allow the removal of breast malignant tissues. BCS, also known as partial or segmental mastectomy, lumpectomy, wide local excision, or quadrantectomy, allows for the simultaneous removal of malignant tissue and preservation of healthy breast tissue. Oncoplasty techniques are frequently used in conjunction with BCS. A mastectomy, which involves completely removing both breasts, is frequently followed by quick breast reconstruction. Both axillary lymph node dissection and sentinel lymph node biopsy (SLNB) are used to remove the afflicted lymph nodes (ALND). Despite the fact that BCS appears to be much more advantageous for patients, those who have undergone this procedure frequently display a propensity for a subsequent requirement for a total mastectomy [6].

The prevalence of mastectomy as the primary operation has decreased as a result of recent modifications in breast cancer treatment tactics. The indications for breast-conserving treatment (BCT) have, however, been broadened more recently.

Additionally, administering chemotherapy prior to surgery to patients with operable tumours enables BCT to be performed on a larger patient population [7, 8].

Study Rationale:

Respect to patient preference, a lumpectomy is one of the operations that has been practised up to this point. In terms of mortality survival rate, it has both benefits and drawbacks. However, some breast cancer patients may experience a tumour recurrence following a lumpectomy, whether or not radiation was used to treat it.

Study Objective:

This study aims to assess and current evidences regarding overall survival (OS) and oncological outcomes of breast conservative treatment (lumpectomy) versus mastectomy.

METHODOLOGY:**Study design**

A qualitative systematic review will be conducted.

Study duration

This review will be conducted during 1 July to 30 October, 2022.

Search strategy

An electronic systematic search will be carried out on PubMed using the following terms in different combinations: breast cancer, mastectomy, lumpectomy, breast conservative treatment, radiotherapy, chemotherapy. along with other key words. We will include randomized controlled trials, cohort studies, and retrospective analysis in making up of this study.

Selection criteria:

Inclusion criteria: All relevant studies with similar objectives as our study. Time and language restrictions will be made to 10 years and English language due to lack of translation sources.

Exclusion criteria: All studies irrelevant to our topic and papers published 10 years ago or more.

Data extraction

The authors will extract qualitative data, and then the author's names, year, study type, methodology, and the result will be reported.

Data management

No software will be utilized to analyze the data. The data will be extracted based on specific form on Microsoft Excel Worksheet. These data will be reviewed by the group members to determine the initial findings, and the modalities of performing the surgical procedure. Double revision of each member's outcomes was applied to ensure the validity and minimize the mistakes.

RESULTS:

Figure 1 shows the selection and identification of studies. The search of the mentioned databases

returned a total of 314 studies that were included for title screening. 211 of them were included for abstract screening, which lead to the exclusion of 132 articles. The remaining 79 publications full-texts were reviewed. The full-text revision led to the exclusion of 62 studies due to difference in study objectives, and 17 were enrolled for final data extraction (**Table 1**).

Half studies indicated that breast conservative surgery is equivalent with mastectomy in terms of overall survival and oncological outcomes in suitable patients [9- 11, 13, 18, 19, 24- 26]. BCT was reported to be a better choice by 6 studies in terms of locoregional recurrence-free, disease-free, and overall survival rates in pT1-2N1 TNBC [12] as well as T1-2N0M0 TNBC patients [17] regardless of age or hormone receptor status [16, 21] especially when followed by radiotherapy [17, 20, 23]. On the other hand, mastectomy and reconstruction were reported to have better oncological outcomes [14] and overall patients' satisfaction [15] and 2.5-fold lower risk of LR [22].

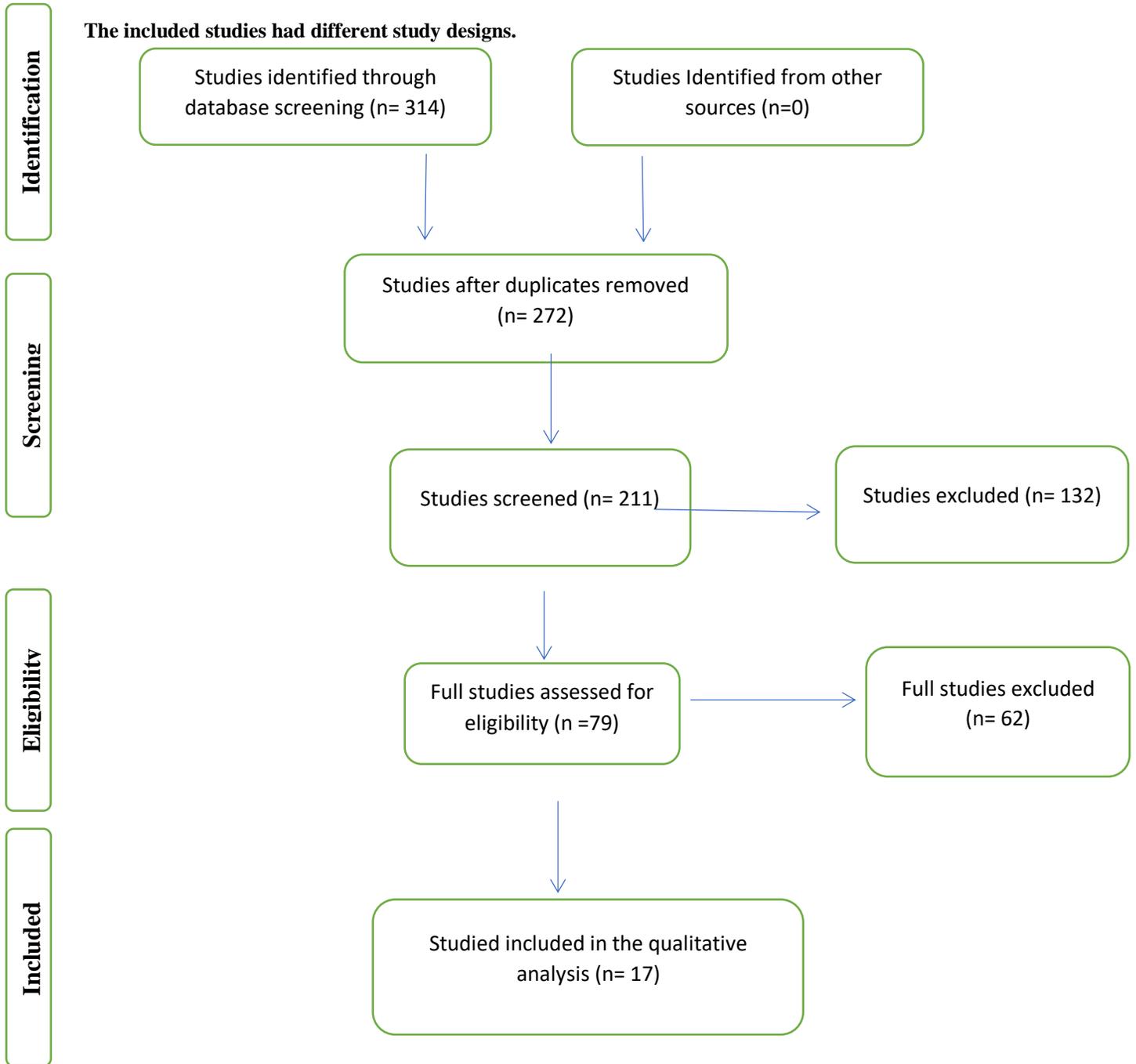


Table 1: Summary of study characteristics

Author, Year	Study Objective	Methodology	Study Outcome
Landercasper, Jeffrey et al. (2019) [9]	To ascertain whether the OS of matched breast cancer patients who underwent lumpectomy versus mastectomy differed.	a retrospective analysis of patients with breast cancer in stages I–III. OS by surgical type was examined using Propensity score matching (PSM), Kaplan-Meier, and multivariate Cox proportional hazards models.	Overall survival after mastectomy was comparable to that after lumpectomy
Abel, Mary Kathryn et al. (2021) [10]	examine the effects of BCT versus mastectomy on locoregional recurrence or recurrence-free survival (RFS) in patients with ILC less than 4 cm in size.	searched a prospectively maintained database to find individuals with ILC measuring less than 4 cm, and then used a multivariate model to compare the recurrence free survival (RFS) of those treated with BCT against mastectomy.	As long as negative margins are established, BCT offers tumour control that is comparable to that of mastectomy.
Hannoun-Levi, Jean-Michel et al. (2021) [11]	to compare oncologic results following mastectomy versus conservative treatment in order to address the dearth of evidence on second breast event management.	Patients who were diagnosed with a second breast event had their oncologic outcomes examined utilising a propensity score-matched cohort analysis research. In the population receiving conservative treatment, complications and the 5-year incidence of mastectomy were examined.	Conservative treatment does not appear to be related with any changes in terms of oncologic outcome when compared to mastectomy.
Kim, Kyubo et al. (2018) [12]	to evaluate the therapeutic effects of mastectomy with breast conserving surgery (BCS) combined with radiation (RT) for patients with pT1-2N1 triple-negative breast cancer (TNBC).	A pooled study was carried out among 320 individuals with pT1-2N1 TNBC using two multicenter retrospective studies on breast cancer. All of the 212 patients who underwent BCS received whole breast radiation with or without regional nodal radiation, whereas none of the 108 patients who underwent mastectomy did. Adjuvant chemotherapy based on taxanes was given to all patients. In the BCS+RT group, the median follow-up time was 65 months, while it was 74 months in the mastectomy group.	Breast conservation therapy outperformed mastectomy in terms of locoregional recurrence-free, disease-free, and overall survival rates in pT1-2N1 TNBC.
Mazor, Anna M et al. (2019) [13]	to assess patterns and outcomes of BCT for T3 tumors.	examined noninflammatory breast tumours larger than 5 cm that received BCT or mastectomy (Mtx) with nodal assessment. Patients who had chest wall or skin involvement were not included.	It is confirmed that tumour size should not be a strict BCT exclusion that the OS for patients with T3 breast cancers is comparable regardless of whether they underwent mastectomy or BCT.

Dolen, Utku et al. (2020) [14]	investigated the effect of a tumor's relative volume versus the total breast on outcomes in patients following BCT versus mastectomy and reconstruction	a prospective cohort analysis of patients undergoing BCT or mastectomy and reconstruction for ductal carcinoma in situ (DCIS) or invasive breast cancer Analysis of tumour and breast volumes from three-dimensional magnetic resonance imaging reconstructions was performed as a condition for inclusion in order to compute the TBR.	In contrast to BCT, mastectomy and reconstruction were used to treat a wide range of TBRs. TBR's value as a guide for deciding between BCT and mastectomy with reconstruction is limited by the relative impact of oncologic and surgical risk reduction, symmetry, and number of treatments.
Admoun, Claudia, and Harvey Mayrovitz. (2021) [15]	to gather comparative data to assist breast cancer patients who are debating whether to have a mastectomy or a lumpectomy.	A 19-question survey given online to several breast cancer support groups was used to collect feedback from previous breast cancer survivors. It focused on concerns related to deciding between the two surgical methods, such as post-surgical complications, breast reconstruction, chronic discomfort, cosmetics, and satisfaction with surgery choice.	The overall satisfaction was similar between BCT and mastectomy. When compared to lumpectomy, mastectomy is related with reduced chronic pain frequency and a lower incidence of post-surgical side effects. Lumpectomy was also related with a higher likelihood of chronic discomfort when compared to mastectomy.
Hwang, E Shelley et al. (2013) [16]	to see if RCT objectives were obtained in the general population and if survival changed by surgery type when stratified by age and hormone receptor (HR) status	gathered information on all women diagnosed with stage I or II breast cancer in the state of California, treated with either BCT or mastectomy, and followed for vital status	BCT was associated with better disease-specific survival in patients with early-stage breast cancer. These findings bolster the case for BCT as a viable alternative to mastectomy for early-stage illness, regardless of age or hormone receptor status.
Saifi, Omran et al. (2022) [17]	compare the overall survival (OS) and breast cancer-specific survival (BCSS) results of breast conservative therapy (BCT) and mastectomy (TNBC)	The database Surveillance, Epidemiology, and End Results (SEER) was utilised to investigate the role of RT in early stage TNBC. OS and BCSS were the primary endpoints.	In T1-2N0M0 TNBC patients, lumpectomy followed by RT is associated with a better OS and BCSS than mastectomy.

Yoshida, A et al. (2016) [18]	To look into the prognostic impact of IBTR surgery (mastectomy versus repeat lumpectomy).	A total of 271 individuals with histologically proven IBTR and no distant metastases underwent definitive IBTR surgery. The effect of IBTR surgery on distant disease-free survival (DDFS) and overall survival (OS) was assessed using multivariable proportional hazards regression and propensity score matching.	There was no change in DDFS or OS between repeat lumpectomy and mastectomy following IBTR.
Ye, Jason C et al. (2015) [19]	inspect the difference between outcomes in young women with BC managed by with BCT versus mastectomy.	The Surveillance, Epidemiology, and End Results database was searched for women over the age of 40 who had stage I-II invasive breast cancer treated surgically. Kaplan-Meier survival analysis and the log-rank test comparing treatment groups were used to assess breast cancer specific survival (BCSS) and overall survival (OS).	Although young age would be a poor prognosis for BC, there is little indication that mastectomy is superior than BCT in these patients.
Corradini, Stefanie et al. (2019) [20]	to evaluate the oncological outcomes of mastectomy vs breast-conserving treatment in patients treated in a modern clinical context outside of randomised trials.	7565 women were diagnosed with early invasive BC (pT1/2pN0/1) (median follow-up: 95.2 months). To eliminate selection bias and confounding, a subgroup analysis of a matched 1:1 case-control cohort of 1802 patients was done (median follow-up 109.4 months).	Patients who received BCS followed by radiotherapy had a better outcome than those who received radical mastectomy alone. The cautious strategy dramatically improved local control, distant control, and overall survival.
Ratosa, Ivica et al. (2021) [21]	to evaluate survival outcomes following breast-conserving therapy (BCT) to mastectomy alone in patients with stage I-IIA breast cancer, whose tumours are frequently amenable to both locoregional therapies.	The study included 1360 patients who received either BCT (n = 1021, 75.1%) or mastectomy alone (n = 339, 24.9%).	BCT was demonstrated to have better disease-specific results than mastectomy alone, highlighting the importance of adjuvant treatments, such as postoperative radiation therapy, in patients with early-stage breast cancer at diagnosis.
Nguyen, Dang Van et al. (2021) [22]	The researchers evaluated the cumulative incidence of local recurrence in young patients with breast cancer who received BCT vs mastectomy alone.	311 of the 428 women treated for early-stage breast cancer underwent BCT, while 117 underwent mastectomy alone. Adjuvant systemic therapies were given to 409 individuals (95.6%). We evaluated the cumulative incidence of LR and survival rates in two groups.	The BCT group had an about 2.5-fold higher risk of LR than the mastectomy alone group. Despite extensive salvage therapy, patients with isolated LR following BCT had a poor prognosis.
de Boniface, Jana et al. (2021) [23]	To see if the claimed survival benefit of breast conserving is eliminated after	A cohort study was conducted utilising prospectively obtained national data. Breast-conserving surgery with radiotherapy (BCS+RT), mastectomy without radiotherapy	conserving surgery with radiotherapy generated better survival than mastectomy irrespective of RT. Whether

	controlling for two important variables, comorbidity and socioeconomic level.	(Mx-RT), and mastectomy with radiotherapy (Mx+RT) were the three groups compared in this locoregional treatment study. Overall survival (OS) and breast cancer-specific survival were the primary outcomes and measures (BCSS)	both procedures are viable, mastectomy should not be equated with breast conservation.
Onitilo, Adedayo A et al. (2015) [24]	to assess surgical outcomes following BCS or mastectomy, regardless of subsequent radiation, chemotherapy, or endocrine therapy.	a breast cancer retrospective cohort study Data on patient and tumour characteristics, as well as therapy specifics, were recorded electronically.	The survival benefit of BCS plus radiation over mastectomy may be due to the addition of adjuvant radiation therapy rather than the surgery itself.
Wang, Lize et al. (2015) [25]	A matched cohort research was conducted to assess two kinds of therapy for primary breast cancer, breast-conserving therapy (BCT) and modified radical mastectomy (MRM).	A total of 1,746 individuals with primary breast cancer who received BCT or MRM were studied retrospectively. The patients were matched in terms of age at diagnosis, metastasis to axillary lymph nodes, hormone receptor status, neoadjuvant chemotherapy treatment, and maximal tumour diameter. The match ratio was 1:1, with 873 patients in each arm.	In suitable patients, BCT is as successful as modified radical mastectomy in terms of local tumour control, DFS, and DDFS, and may result in a better outcome.
Wan, Qiting et al. (2021) [26]	To evaluate survival rates following BCT versus mastectomy in BRCA1/2 variant carriers and noncarriers in a large group of unselected individuals with breast cancer.	A large sequential series of 8396 unselected patients with primary breast cancer had BCT, mastectomy plus radiation, or mastectomy alone. The primary objectives were breast cancer-specific survival (BCSS) and overall survival (OS); supplementary outcomes comprised recurrence-free survival, distant recurrence-free survival, and ipsilateral breast tumour recurrence.	BCT have survival rates at least comparable to those treated with mastectomy with radiotherapy or mastectomy alone.

DISCUSSION:

Both mastectomy and breast-conserving therapy (BCT) are recognized local treatments for breast cancer. BCT is safe and has survival outcomes comparable to mastectomy in stage I and stage II breast cancer, according to numerous randomized clinical trials with follow-up of up to 20 years [26]. With the goal of achieving long-term local disease management and minimal local morbidity, BCT comprises of breast-conserving surgery (lumpectomy, partial mastectomy) and whole-breast radiation; in other words, the cosmetic outcome is favourable and the side effects of treatment are minimal [27].

More than 25 years ago, Veronesi et al. [28, 29] and Fisher et al. [30, 31] were published. Because BCT can retain a similar level of oncological safety compared to mastectomy, it has been established as the standard treatment for the majority of patients with early breast cancer based on the findings of their study. Prior to this realisation, the choice to have a mastectomy was made based on two misconceptions: first, that radical

surgery of the breast lowers LRR rates compared to BCT; and second, that it lowers the uncertainty of yearly follow-up mammograms and potential recall for additional diagnostic and therapeutic procedures.

The overall outcomes of BCT and mastectomy were comparable, according to a meta-analysis of the 10-year survival data from 7 randomized studies [32]. In the residual breast tissue, it became clear that BCT carried some risk of recurrence, although there were no appreciable differences in OS at 10 years [33], and a follow-up of 20 years [34, 35] confirmed these findings. All subsequent investigations demonstrated that early breast cancer patients who underwent BCT and postoperative radiation to the ipsilateral breast had higher LRR but comparable long-term survival when compared to those who underwent radical mastectomy.

Although some previous studies indicated locoregional recurrence (LRR) rates following BCT that were higher than those seen after mastectomy

(10–22%), most recent research report substantially lower LRR rates. The adoption of microscopic confirmation of negative resection margins and the widespread use of systemic therapy are responsible for the decline in LRR [27].

A higher LRR risk is linked to a higher chance of distant disease and, ultimately, a higher risk of breast cancer-related death. This estimate may vary significantly depending on the patient's age at diagnosis, the degree of axillary lymph node involvement, the histology of the cancer, and, consequently, the timing and intensity of systemic therapy. In order to reduce the detrimental impact on OS caused by local recurrence, it is currently generally agreed that LRR rates for early breast cancer should not exceed 1% per year or 10% at ten years [36].

The LRR rates were 20% after BCT and 12% after mastectomy, respectively, according to the original European Organisation for Research and Treatment of Cancer (EORTC) 10801 data after a 10-year follow-up (but there was no discernible difference in long-term OS) [37]. Without focusing on LRR because the number of events was minimal in the follow-up since the previous analysis, an even longer follow-up of these patients after more than 20 years revealed the comparability in OS [38].

The 10-year local recurrence rates (LRR) were 5.2% and 8.7%, respectively, in a study of patients with node-negative and node-positive breast cancer receiving systemic therapy following BCT in five National Surgical Adjuvant Breast and Bowel Project (NSABP) protocols. These rates are equivalent to observed 10-year rates of 8% or less for isolated local recurrence following mastectomy [39].

To treat localized micro metastatic disease and stop distant recurrence, patients also get adjuvant systemic medicines. Chemotherapy, biologic therapy, and endocrine therapy are examples of the types of adjuvant therapy that can be used depending on the patient's risk of recurrence. There is currently no place for routine cross-sectional imaging after adjuvant systemic therapy when there are no symptoms. New methods for early tumour identification are good, but they must first show that they are clinically useful in prospective trials [27].

A clear communication approach on the concepts of shared decision-making with relation to the surgical alternatives is required when advising patients who have early-stage breast cancer. It should be stressed that the surgical component of breast cancer treatment

is just one part of the overall treatment chain; the other components, including (neo)adjuvant systemic therapy and radiotherapy, may be necessary regardless of the advised surgical method [40].

Prophylactic mastectomy rates have increased over the past ten years, but there is insufficient evidence that they improve oncologic survival, particularly for patients who are not in a genetically confirmed high-risk situation. This increase is primarily due to the patient's increased awareness of breast cancer in general [41]. In the future, attention should be placed on the patient's unique risk perception and effective communication techniques in typical patient-doctor encounters to fulfil the patient's expectations of being an equal, knowledgeable conversation participant.

CONCLUSION:

Half included studies reported equivalent results for both BCT and mastectomy. Yet, 6 studies against 3 were supporting BCT over mastectomy respectively in respect to patient diagnostic status and associated adjuvant treatment. However, BCT is the standard surgical technique for primary breast cancer and meets the preferences of the majority of breast cancer patients in terms of oncological safety and aesthetic outcome. In terms of overall long-term survival, BCT is equally safe as mastectomy when there are no special contraindications to a breast-conserving treatment.

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