E-ISSN: 2833-3772 | Volume 2, Issue 6 | September-December 2023

The Scientific Journal of Medical Scholar

Publisher: Real-Publishers Limited (Realpub LLC)

30 N Gould St Ste R, Sheridan, WY 82801, USA

Co-Publisher: SSESD, Egypt

Website: https://realpublishers.us/index.php/sjms/index

The Scientific Journal of Medical Scholar

Available online at Journal Website
https://realpublishers.us/index.php/sjms/index
Subject (Surgery)

Original Article

Evaluation of Conservative Breast Surgery After Neoadjuvant Chemotherapy in Early Breast Cancer

Ahmed Abdelshafy Ibrahim Mohammad [1]* | **Sameh Gabr Attia** [2] | **Mohammad Omar Mahmoud** [2]

[1] Department of General Surgery, Ministry of Health, Egypt.

[2] Department of General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

Article information

Submitted: December 1st, 2023

Accepted: December 21st, 2023

DOI: 10.55675/sjms.v2i6.71

Citation: Mohammad AAI, Attia SG, Mahmoud MO. Evaluation of Conservative Breast Surgery After Neoadjuvant Chemotherapy in Early Breast Cancer. SJMS 2023; 2 (6): 114-120. DOI: 10.55675/sjms.v2i6.71

ABSTRACT

Background: The breast cancer is a frequent type of cancers. It is associated with high mortality related to cancer in women. The treatment options transferred from radical surgery to less invasive operations. This was attributed to surgical advance and available neoadjuvant chemotherapy.

Objective: This work aimed to evaluate the conservative breast surgery feasibility and outcome for early breast cancer received neoadjuvant chemotherapy (NACT) for downstaging.

Patients and Methods: Thirty women (30) with early breast cancer were included between November 2022 and May 2023. All women were assessed in systematic manner by history, clinical, laboratory and radiological investigations before chemotherapy, before and after surgery. A true cut biopsy was drawn to estimate the histopathological nature. All surgeries were performed one and half months after the last session of NACT. A regular postoperative follow up was carried out up to six months. Any complications were recorded. Effect of NACT on the tumor grading was the primary outcome, while cosmetic results and patient satisfaction were the secondary outcomes.

Results: Complications were in the form of wound infection, seroma and hematoma in 6.7%, 13.3% and 3.3% respectively. These were mild and treated conservatively. The excellent cosmetic result was achieved for 80.0% and excellent patient satisfaction was recorded for 60.0%. The effect of chemotherapy showed significant improvement of clinical and pathological post chemotherapy tumor size values when compared to clinical tumor size values before chemotherapy, the T1 grade (≤2cm) increased from 50% to 66.7%, while the T2 grade (> 2cm <5 cm) decreased from 50% to33.3%.

Conclusions: NACT was associated with excellent response regarding tumor size reduction, negativity of lymph nodes as well as pathological response of early breast cancer, before breast conservation surgery (BCS). The BCS after NACT could be considered as a safe option with acceptable aesthetic outcome.

Keywords: Conservative breast surgery; Neoadjuvant Chemotherapy; Early breast cancer; Aesthetic outcome.

* Corresponding author
Email: ahmedabdelshafy359@gmail.com

INTRODUCTION

Breast cancer is a frequent condition in females worldwide. It is associated with high-cancer related mortality in women in their thirties to sixties. It is responsible for about 33.0% of all women cancers and 20.0% of cancer-related mortality [(1)]. In Egyptian women, it is responsible for 37.7% of all cancers and responsible for 29.1% of cancer related fatalities in 2008 [(2)]. Surgical treatment of breast cancer is a crucial part of the treatment plan of breast cancers. With advancement of surgical methods, the minimal interventions were introduced with satisfactory outcome and cosmetic results [(3)].

Neoadjuvant chemotherapy (NACT) plays a pivotal and remarkable role in the management of breast cancer (BC) [(4)]. It was introduced to change inoperable tumor to operable. It had a cytoreductive and curative potential. It could reduce the extension of primary neoplasms and down-stage cases of axillary lymph node involvement, with permission of breast conserving surgery (BCS) [(5,6)].

BCS with postsurgical radiation therapy (RT) represented the gold standard of locoregional therapy for breast cancer in the vast majority of women with early-stages of breast cancer. It provides results of survival close to radical mastectomy, moreover the BCS improves the aesthetic results and patients' quality of life [(7)].

The use of NACT in early breast cancer is not well-addressed. Thus, the current work was designed to evaluate the feasibility and overall outcome of breast conserving surgery preceded by NACT. We suggested that, the NACT will be associated with down-grading of the tumor and permits free-margin with preservation of breast tissue and subsequently associated with aesthetic outcome.

PATIENTS AND METHODS

The current work was designed as a prospective study that carried out between November 2022 to May 2023. Thirty women (30) with early breast cancer were included. They were eligible to NACT followed by breast conservation surgery. They were selected from Al-Azhar University Hospitals (Al-Hussein and Bab-Elshaaria).

Inclusion criteria: Woman was included if she had complete resolution of skin edema, had a remaining tumor size < 5 cm, with no signs of multicentric malignancy, had no prior radiation therapy for the chest and breast wall, had normal functions of the heart, liver and kidney (on laboratory chemical basis), with no involvement of lymph nodes or widespread micro-calcification and finally attained intraoperative negative margins.

Exclusion criteria: women were excluded if they had multicentric involvement, wide microcalcification of mammogram, had inflammatory cancer, prior radiotherapy, scleroderma, pregnancy, central lesions and huge tumor with ill-defined margins. In addition, patient refusal was an exclusion criterion.

Before surgery, all women participated in the study were evaluated with a detailed history, exhaustive clinical examination, imaging evaluation (mammography and adjuvant ultrasound to estimate the tumor size, CT of the chest, abdomen and pelvis to exclude metastasis, as well as a complete bone scanning for the same purpose). Finally, a true cut biopsy was drawn to estimate the histopathological nature of the tumor.

All were submitted to BCS including an intraoperative frozen section. All surgeries were performed one and half months after the last session of NACT. The NACT was tailored according to the diagnosis (type) of the tumors.

After surgery, each woman had been exposed to early follow-up weekly for the first postoperative month. This early follow-up aimed to confirm the operative incision, the local cleanliness, existence of any complications (e.g., hematoma, dehiscence, seroma or sepsis). After that, the follow up was performed after 3 and 6 months (late follow up). It was performed by mammography and adjuvant ultrasound to assess any local recurrence.

After surgery, all women received RT to reduce the risk of local recurrence. Each patient received 180-200 cGy daily (conventional whole breast radiation). RT was performed according to the Radiation Therapy Oncology Group contouring consensus definitions [(8)].

The primary outcome was the effect of chemotherapy on tumor grading and the secondary outcomes include cosmetic results and patient satisfaction.

The cosmetic outcome was assessed one month after surgery using the 4-point scoring system described by **Winchester and Cox** [(9)]. It is a 4-point Likert scale to rate the appearance of the breast: 1(The excellent score reflected the breast appearance nearly identical to the contralateral breast), 2 (good), 3 (fair) and 4 (poor indicates major functional and aesthetic sequelae in the treated breast) [(10)]. This assessment was completed by the junior researcher. The patient satisfaction was subjectively assessed by the patient her-self and graded as excellent, good, fair and poor. All collected data were document and coded for the purpose of anonymization and prepared for statistical data analysis.

Data analysis: The collected data were fed to a personal computer excel sheet (Microsoft Inc., USA). Then, transferred to the statistical package for social science (SPSS) version 22, produced by the IBM Inc. (Armonk, USA). Categorical variables were presented by the relative frequency and percentages. On the other side, continuous numerical variables were presented by the arithmetic mean and standard deviation (SD), when normally distributed. Otherwise, the median and interquartile range were used for representation of this data. The Kolmogorov-Smirnov test was used to check the normal data distribution. P value < 0.05 was considered significant to interpret data.

RESULTS

Patient and tumor characteristics of included 30 females is presented in table (1). The majority of females were in the age group < 45 years of age (60.0%) and the mean age was 45.4 years. Diabetes mellitus was the commonest associated comorbid chronic diseases (23.3%), while 53.3% had no comorbid condition. In addition, positive family history was reported for 23.3%, oral contraception was practiced by 60.0% and nulliparity was reported among 60.0%.

The affected side was right in 60.0% of women, and upper outer quadrant (UOQ) was the commonest site (50.0%). The ductal carcinoma (DC) was the commonest pathological type (83.3%). Furthermore, the most common nuclear grade was grade II (80.0%) and the luminal B was the commonest hormonal receptor affected (40.0%). No positive safety margin was recorded for any patient and the partial response (PR) tumor feature was the commonest (66.7%) (Table 1).

Regarding overall outcome, the operative time ranged between 90 and 130 minutes with incision length ranged between 7 to 11 cm. The mean distance to the nearest surgical margin was 2.21 cm (range 1-2.5cm). The complications were in the form of wound infection, seroma and hematoma in 6.7%, 13.3% and 3.3% respectively. These were mild and treated conservatively. The excellent cosmetic result was achieved in 80.0% and excellent patient satisfaction was recorded for 60.0% (Table 2).

The effect of chemotherapy showed significant improvement of clinical and pathological post chemotherapy tumor size values when compared to clinical tumor size values before chemotherapy, the T1 grade(≤2cm) increased from 50% to 66.7%, while the T2 grade (> 2 cm-5 cm<) decreased from 50% to 33.3% (Table 3).

Table (1): Patient and tumor characteristics

		Statistics (n=30)
Age (years)	Mean±SD	45.4 ±6.81
	Min. – Max.	35- 60
Age group	Lower than 45 years	18 (60.0%)
	45-50 years	6 (20.0%)
	More than 50 years	6 (20.0%)
Associated comorbid medical condition (n,%)	None	16 (53.3%)
	Diabetes mellitus	7 (23.3%)
	Hypertension	4 (13.3%)
	Ischemic heart disease	3 (10.0%)
Positive family history of BC (n,%)		7 (23.3%)
Oral contraceptive pills (n,%)		18 (60.0%)
Nulliparity (n,%)		18 (60.0%)
Affected side (n,%)	Right	18 (60.0%)
	Left	12 (40.0%)
Tumor site (Affect quadrant)	Upper outer quadrant (U O Q)	15 (50.0%)
	Lower outer quadrant (L O Q)	5 (16.7%)
	Upper inner quadrant (U I Q)	6 (20.0%)
	Lower inner quadrant (L I Q)	4 (13.3%)
Pathological type (n, %)	ductal carcinoma (D C)	25 (83.3%)
	lobular carcinoma (L C)	2 (6.7%)
	Mixed ductal and lobular	3 (10.0%)
Nuclear grading (n, %)	I	3 (10.0%)
	II	24 (80.0%)
	III	3 (10.0%)
Hormonal receptor	Luminal A (ER + PR + HER-)	5 (16.7%)
	Luminal B (ER + PR + HER+)	12 (40.0%)
	Triple negative (ER - PR – HER-)	11 (36.7%)
	HER2 positive (ER - PR - HER+)	2 (6.7%)
Positive safety margin (n, %)		0 (0.0%)
Response of chemotherapy	Partial response (PR)	20 (66.7%)
	Complete response (CR)	7 (23.3%)
	Stationary disease (SD)	3 (10.0%)

Table (2): Outcome among study populations.

		Min. – Max.	Mean ± SD.
Operative time (min)		90 – 130	105 ± 14.14
Incision length (cm)		7 – 11	8.71 ± 1.01
Distance to the nearest surgical margin(cm)		1– 2.5	2.21 ± 0.27
Complications (n,%)	Post-surgical wound Infection	2 (6.7%)	
	Seroma	4 (13.3%)	
	Hematoma	1 (3.3%)	
Cosmetic results (n,%)	Fair	2 (6.7%)	
	Good	4 (13.3%)	
	Excellent	24 (80.0%)	
Patient satisfaction (n,%)	Poor	2 (6.7%)	
	Fair	3 (10.0%)	
	Good	7 (23.3%)	
	Excellent	18 (60.0%)	

Table (3): Effect of chemotherapy on clinical tumor grading in relation to pathological tumor size after chemotherapy.

Chemotherapy-pathological tumor size values	Clinical Pre -chemo tumor size (n =30)		Clinical Post-chemo tumor size (n =30)		Pathological Post- chemo Tumor size (n=30)		p
	No.	%	No.	%	No.	%	
≤ 2cm	15(T1)	50	20(T1)	66.7	22	73.3	<0.001*
> 2cm – 5 cm<	15(T2)	50	10(T2)	33.3	8	26.7	
Difference between groups	p_1<0.001*,p_2<0.001*,p_3<.0001						
Min. – Max.	1– 5		1 – 3		1 – 2.5		<0.001*
Mean ± SD.	3.29 ± 1.55		2.31 ± 0.60		1.49± 0.52		
Median	3.40		2.10		1.80		
Difference between groups	p_1<0.001*,p_2<0.001*,p_3=0.992						

p_1: p value for comparing between clinical pre-chemo and clinical post-chemo tumor size values.

p_2: p value for comparing between clinical pre-chemo and pathological post- chemo tumor size values.

p_3: p value for comparing between clinical post-chemo and pathological post-chemo tumor size values.

*: Statistically significant at P ≤ 0.05

DISCUSSION

The current work aimed to evaluate the feasibility surgical, and aesthetic results of BCS in women with early breast cancer who have been down-graded by neoadjuvant chemotherapy. Thirty females (30) who had early breast cancer and submitted to neo-adjuvant chemotherapy followed by breast conserving surgery were involved in the study. The response to NACT showed partial response in 66.7%, complete response in 23.3% of cases, and stationary disease in 10% of cases, which is close to **Salem *et al.*** [11] who reported complete response for 9%, partial response in 79%, 10% have a stationary disease, and 2% have a progressive disease. However, **Canavese *et al.*** [12] reported a partial response for 48.4%, complete response in 26.6% and stationary disease for 23.4%, and 1.6% had progressive disease.

NACT was initially announced to convert the inoperable breast cancer into operable disease. However, when its benefit in breast cancer (both node positive and then node-negative) was demonstrated, its use was expanded to include patients with early (operable) breast cancer [13].

NACT benefits are well recognized, and include the capability to downstage the extent of breast cancer with subsequent increase of the rate of conservative surgery and avoid complete dissections of the axilla [14, 15].

In a study from the Netherlands on 1124 patients showed that the addition of NACT in the form of trastuzumab resulted in higher achievement of pathological complete response in 65% while those who do not receive NACT, the rate was 41% [16]. Another Indian study showed a complete response of 55.6% [17], while a study from South

Korea showed a complete response rate of 65.0% [18] after the use of NACT. On the other side, **Ishii *et al.*** [19] conducted an exploratory analysis of some studies and concluded that, NACT may be of no further benefit in small primary or node-negative breast cancer.

These heterogenous results are explained by the different histological definitions used to categorize the tumor response, inclusion of different subtypes of the cancer and different regimens of NACT.

The mean age of studied women is 45.4 years old, which is close to that reported by **Debled *et al.*** [20] who studied 152 females and found that the mean age was 49 years old. In addition, **Cho *et al.*** [21] reported mean age of 46.6% for 431 females. T1 lesions were reported for 50% of females and the other 50% were of T2, which is close to **Brooks *et al.*** [22] which reported 41% of T1 and 59% of T2. However, **Simons *et al.*** [23] reported 14.9% of T1, 68.8% of T2. These differences could be attributed to different inclusion criteria and different sample size.

In the current work and before NACT, the mean tumor size was 3.29 cm that was reduced to 2.31 cm after NACT. These results are close to **Cho *et al.*** [21] who reported mean tumor size of 3.12 cm before and 1.9 cm after NACT.

The current investigation found that 60% of patients exhibited N0, 20% exhibited N1mi, and 20% had N1. That close to the results of **El-sayed *et al.*** [24] study that stated that 55% of patients had N0, 25% of them had N1mi, 20% of them had N1. However, **Mazor *et al.*** [25] reported 45% had N0 and 49% of patients had N1, which is different than the current work, and could explained by different inclusion and exclusion criteria affecting the pathological type of the tumor.

In the current work, 10% had breast cancer stage IA, 20% exhibited breast cancer stage IB, and 70% exhibited breast cancer stage IIA. This is close to **Curigliano *et al***. [26] found that 13% of women had stage IA and 67% had stage IIA.

We detected DC in 83.3%, LC in 6.7%, and mixed ductal and lobular carcinoma in 10%, which is close to the results of **Raj-kumar *et al.*** [27] who discovered DC in 86.3 % of participants and LC in 13.7%. In addition, **Rahman *et al***. [28] discovered DC in 80.45%, LC in 13.64% and 5.91% had a mixed invasive pattern.

In the current work 10% had well differentiated tumors (G1), 80% had moderate differentiation tumors (G2) and 10% had poor differentiated tumors (G3). That close to the results of **Steenbruggen *et al.*** [29] which found 78% of patients had moderate differentiated tumors(G2),22% of patients had poor differentiated tumors(G3). However, **Barranger *et al.*** [30] reported a rate of 3.5 %, 41.7 % and 54.8% of G1, G2 and G3 respectively. These differences share in the explanation of heterogenous results of the overall outcome.

We used intraoperative frozen section to assess the margins permits the surgeons to resect suspected or positive margins, resulting in free margins in all 30 women and a low incidence of local repetition and re-excision. This matched with the findings of **Costa *et al.*** [31] study, but not matched with **Mittra *et al.*** [32] study which found Positive margins in 2.4% of women with BCS. These differences might be explained by the inclusion of a larger number of participants (726 participants) than the current one (30 participants).

This study found that 16.7% had a luminal group A (ER/PR-positive) and 6.7% had Her2+. These results are close to the results of **Simons *et al.*** [23] who discovered the luminal group A in 14.7% and 6.8% have been Her2+. However, the results contradict that of **El-Sayed *et al***. [24] who discovered that 21% had Her2+.

Seroma was reported for 13.3%. This seroma was diagnosed on clinical basis and confirmed by ultrasound. In addition, 6.7% of had a wound infection. These results are close to the results **Mazor *et al.*** [25] who reported seroma in 11% and wound infections in 4%. In addition, **Decker *et al.*** [33] reported 10% and 6.0% for seroma and wound infection, respectively. Obesity, older age, and diabetes mellitus have all been recognized as risk factors for post-BCS problems. The presurgical antibiotic coverage had been shown to reduce the infection rates.

In this research, all patients received postsurgical radiation to reduce the local recurrence risk. No local recurrence was detected after 1 month and up to 6 months after BCS. **Levy *et al.*** [34] noted local recurrence in 9% of patients on the 5-years follow up period. The long-term follow up for 5 years and the large number of cases explains the higher recurrence rate in their study than the current one with short term follow up.

The aesthetic results revealed excellent, good and fair outcome in 80%, 13.3% and 6.7% respectively. **Tewari *et al.*** [35] discovered good to excellent cosmetic outcome in 73% and a fair outcome in 27% of patients.

When the patients in the follow-up instances had been asked to score their level of satisfaction, 60%, 23.3%, 10.0% and 6.7% reported excellent, good, fair and poor satisfaction respectively, which are close to the results of **Banks *et al.*** [36] who found 56% with excellent, 21% with good, 14% with fair and poor score was rated in 9% of cases. However, **Swisher *et al.*** [37] reported excellent satisfaction in 43% of the studied patients.

These variations may be explained by the extent of breast asymmetry that can occur after BCS and were highly dependent on the extent to which postoperative outcomes matched patient expectations.

In conclusion: NACT was associated with excellent response regarding tumor size reduction, negativity of lymph nodes as well as pathological response of early breast cancer, before breast conservation surgery. The BCS after NACT could be considered as a safe option with acceptable aesthetic outcome. However, the small number

of patients representing one limiting step of the current work, which prevents the globalization of results. In addition, the absence of control group for comparison is another limiting step of the current work. Thus, future case-control studies are recommended.

Financial and non-financial disclosure: none

REFERENCES

1. Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer statistics, 2022. CA Cancer J Clin. 2022 Jan;72(1):7-33. doi: 10.3322/caac.21708.
2. Zeeneldin AA, Ramadan M, Gaber AA, Taha FM. Clinico-pathological features of breast carcinoma in elderly Egyptian patients: a comparison with the non-elderly using population-based data. J Egypt Natl Canc Inst. 2013; 25(1):5-11. doi: 10.1016/j.jnci. 2012.10.003.
3. Xing L, He Q, Wang YY, Li HY, Ren GS. Advances in the surgical treatment of breast cancer. Chin Clin Oncol. 2016;5(3):34. doi: 10.21037/cco.2016. 05.08.
4. Spring LM, Bar Y, Isakoff SJ. The Evolving Role of Neoadjuvant Therapy for Operable Breast Cancer. J Natl Compr Canc Netw. 2022;20(6):723-734. doi: 10.6004/jnccn.2022.7016.
5. Rastogi P, Anderson SJ, Bear HD, Geyer CE, Kahlenberg MS, Robidoux A, et al. Preoperative chemotherapy: updates of National Surgical Adjuvant Breast and Bowel Project Protocols B-18 and B-27. J Clin Oncol. 2008 Feb 10;26(5):778-85. doi: 10.1200/JCO.2007.15.0235.
6. Zavagno G, De Salvo GL, Scalco G, Bozza F, Barutta L, Del Bianco P, et al.; GIVOM Trialists. A Randomized clinical trial on sentinel lymph node biopsy versus axillary lymph node dissection in breast cancer: results of the Sentinella/GIVOM trial. Ann Surg. 2008 Feb; 247 (2): 207 - 13. doi: 10.1097/SLA.0b013e31812e6a73.
7. Saunders CM. Breast surgery: a narrative review. Med J Aust. 2022 Sep 5;217(5):262-267. doi: 10.5694/ mja2.51678.
8. Rosenkranz KM, Ballman K, McCall L, Kubicky C, Cuttino L, Le-Petross H, et al. The Feasibility of Breast-Conserving Surgery for Multiple Ipsilateral Breast Cancer: An Initial Report from ACOSOG Z11102 (Alliance) Trial. Ann Surg Oncol. 2018; 25 (10):2858-2866. doi: 10.1245/s10434-018-6583-6.
9. Winchester DP, Cox JD. Standards for diagnosis and management of invasive breast carcinoma. American College of Radiology. American College of Surgeons. College of American Pathologists. Society of Surgical Oncology. CA Cancer J Clin. 1998 Mar-Apr;48(2):83-107. doi: 10.3322/canjclin.48.2.83.
10. White JR, Winter K, Cecchini RS. Cosmetic outcome from post-lumpectomy whole breast irradiation (WBI) versus partial breast irradiation (PBI) on the NRG Oncology/NSABP B-39/RTOG 0413 phase III clinical trial. Oral Scientific Session 2019:105(1): S3–4. DOI: 10.1016/j.ijrobp.2019.06.384
11. Salem MAE, Hamza HA, Abd El-Aziz NM. Neoadjuvant Chemotherapy and Surgical Options for Locally-advanced Breast Cancer: A Single Institution Experience. Middle East Journal of Cancer. 2017; 8(3): 127-34
12. Canavese G, Dozin B, Vecchio C, Tomei D, Villa G, Carli F, et al. Accuracy of sentinel lymph node biopsy after neo-adjuvant chemotherapy in patients with locally advanced breast cancer and clinically positive axillary nodes. Eur J Surg Oncol. 2011 Aug; 37 (8): 688-94. doi: 10.1016/j.ejso.2011.05.012.
13. Harbeck N, Gnant M. Breast cancer. Lancet. 2017; 389 (10074): 1134-1150. doi: 10.1016/S0140-6736(16) 31891-8.
14. Zardavis D., Piccart M. Neoadjuvant therapy for breast cancer. Annu. Rev. Med. 2015; 66:31–48. doi: 10.1146/annurev-med-051413-024741.
15. Boughey JC, Ballman KV, Le-Petross HT, McCall LM, Mittendorf E, Ahrendt GM, et al. Identification and resection of clipped node decreases the false-negative rate of sentinel lymph node surgery in patients presenting with node-positive breast cancer (T0–T4, N1–N2) who receive neoadjuvant chemotherapy: Results from ACOSOG Z1071 (Alliance) Ann. Surg. 2016; 263: 802 – 807. doi: 10.1097/SLA.0000000000001375
16. van der Voort A, Liefaard MC, van Ramshorst MS, van Werkhoven E, Sanders J, et al. Efficacy of neoadjuvant treatment with or without pertuzumab in patients with stage II and III HER2-positive breast cancer: a nationwide cohort analysis of pathologic response and 5-year survival. Breast. 2022; 65:110-115. doi: 10.1016/j.breast.2022.07.005.
17. Arora S, Gogia DA, Deo S, Sharma D, Mathur SR. Neoadjuvant pertuzumab plus trastuzumab in combination with anthracycline- free chemotherapy regimen in patients with HER2 positive breast cancer-Real-world data from a single center in India. Cancer Treat Res Commun. 2021; 29:100483. doi: 10.1016/j.ctarc.2021.100483.
18. Kim JY, Nam SJ, Lee JE, Yu J, Chae BJ, Lee SK, et al. Real-World Evidence of Neoadjuvant Docetaxel/ Carboplatin/Trastuzumab/Pertuzumab (TCHP) in Patients with HER2-Positive Early or Locally Advanced Breast Cancer: A Single-Institutional Clinical Experience. Cancer Res Treat. 2022 Oct;54(4):1091-1098. doi: 10.4143/crt.2021.901.
19. Ishii K, Morii N, Yamashiro H. Pertuzumab in the treatment of HER2-positive breast cancer: an evidence-based review of its safety, efficacy, and place in therapy. Core Evid. 2019 Oct 31; 14:51-70. doi: 10.2147/CE.S217848.
20. Debled M, MacGrogan G, Breton-Callu C, Ferron S, Hurtevent G, Fournier M, et al. Surgery following neoadjuvant chemotherapy for HER2-positive

locally advanced breast cancer. Time to reconsider the standard attitude. Eur J Cancer. 2015 Apr;51(6):697-704. doi: 10.1016/j.ejca.2015.01.063.

21. Cho JH, Park JM, Park HS, Park S, Kim SI, Park BW. Oncologic safety of breast-conserving surgery compared to mastectomy in patients receiving neoadjuvant chemotherapy for locally advanced breast cancer. J Surg Oncol. 2013 Dec;108(8):531-6. doi: 10.1002/jso.23439.

22. Brooks JM, Chrischilles EA, Scott SD, Chen-Hardee SS. Was breast conserving surgery underutilized for early-stage breast cancer? Instrumental variables evidence for stage II patients from Iowa. Health Serv Res. 2003 Dec; 38(6 Pt 1):1385-402. doi: 10.1111/j.1475-6773.2003.00184.x.

23. Simons JM, Jacobs JG, Roijers JP, Beek MA, Boonman-de Winter LJM, et al. Disease-free and overall survival after neoadjuvant chemotherapy in breast cancer: breast-conserving surgery compared to mastectomy in a large single-centre cohort study. Breast Cancer Res Treat. 2021 Jan;185(2):441-451. doi: 10.1007/s10549-020-05966-y.

24. El-Sayed MI, Maximous DW, Zakhary MM, Mikhail NN. Biological markers and response to neoadjuvant taxane-based chemotherapy in patients with locally advanced breast cancer. ISRN Oncol. 2012; 2012:245891. doi: 10.5402/2012/245891.

25. Mazor AM, Mateo AM, Demora L, Sigurdson ER, Handorf E, Daly JM, et al. Breast conservation versus mastectomy in patients with T3 breast cancers (> 5 cm): an analysis of 37,268 patients from the National Cancer Database. Breast Cancer Res Treat. 2019 Jan;173(2):301-311. doi: 10.1007/s10549-018-5007-4.

26. Curigliano G, Burstein HJ, P Winer E, Gnant M, Dubsky P, Loibl S, et al; Panel Members of the St. Gallen International Expert Consensus on the Primary Therapy of Early Breast Cancer 2017. De-escalating and escalating treatments for early-stage breast cancer: the St. Gallen International Expert Consensus Conference on the Primary Therapy of Early Breast Cancer 2017. Ann Oncol. 2019 Jul 1;30(7):1181. doi: 10.1093/annonc/mdy537.

27. Raj-Kumar PK, Liu J, Hooke JA, Kovatich AJ, Kvecher L, Shriver CD, Hu H. PCA-PAM50 improves consistency between breast cancer intrinsic and clinical subtyping reclassifying a subset of luminal A tumors as luminal B. Sci Rep. 2019 May 28;9(1):7956. doi: 10.1038/s41598-019-44339-4.

28. Rahman MS, Akhter PS, Hasanuzzaman M. Outcome of neoadjuvant chemotherapy in locally advanced breast cancer: A tertiary care center experience. Bangladesh Medical Journal. 2016; 45(3): 141-146.

29-Steenbruggen TG, van Ramshorst MS, Kok M, Linn SC, Smorenburg CH, Sonke GS**.** Neoadjuvant therapy for breast cancer: established concepts and emerging strategies. Drugs. 2017; 77(12): 1313-1336.

30. Barranger E, Antomarchi J, Chamorey E, Cavrot C, Flipo B, Follana P, et al. Effect of Neoadjuvant Chemotherapy on the Surgical Treatment of Patients with Locally Advanced Breast Cancer Requiring Initial Mastectomy. Clin Breast Cancer. 2015 Oct; 15(5): e231-5. doi: 10.1016/j.clbc.2015.03.001.

31. Costa SD, Loibl S, Kaufmann M, Zahm DM, Hilfrich J, Huober J, et al. Neoadjuvant chemotherapy shows similar response in patients with inflammatory or locally advanced breast cancer when compared with operable breast cancer: a secondary analysis of the GeparTrio trial data. J Clin Oncol. 2010 Jan 1;28(1):83-91. doi: 10.1200/JCO.2009.23.5101.

32. Mittra I, Badwe RA, Dinshaw K, Sarin R, Chinoy RC, Thakur M, et al. Conservative surgery in breast cancer. Indian J Surg. 2003; 65: 325-35

33. Decker MR, Greenblatt DY, Havlena J, Wilke LG, Greenberg CC, Neuman HB. Impact of neoadjuvant chemotherapy on wound complications after breast surgery. Surgery. 2012 Sep;152(3):382-8. doi: 10.1016/j.surg.2012.05.001.

34. Levy A, Borget I, Bahri M, Arnedos M, Rivin E, Vielh P, et al. Loco-regional control after neo-adjuvant chemotherapy and conservative treatment for locally advanced breast cancer patients. Breast J. 2014 Jul-Aug; 20(4):381-7. doi: 10.1111/tbj.12277.

35. Tewari M, Krishnamurthy A, Shukla HS. Breast conservation in locally advanced breast cancer in developing countries: wise or waste. Surg Oncol. 2009;18(1):3-13. doi: 10.1016/j.suronc.2008.07.004.

36. Banks A, Coronado G, Zimmerman R, Iyengar G, Holmes DR. Breast conserving surgery with targeted intraoperative radiotherapy for the management of ductal carcinoma in situ. J Surg Oncol. 2019 Mar; 119(4):409-420. doi: 10.1002/jso.25347.

37. Swisher SK, Vila J, Tucker SL, Bedrosian I, Shaitelman SF, Litton JK, et al. Locoregional Control According to Breast Cancer Subtype and Response to Neoadjuvant Chemotherapy in Breast Cancer Patients Undergoing Breast-conserving Therapy. Ann Surg Oncol. 2016 Mar;23(3):749-56. doi: 10.1245/s10434-015-4921-5.

The Scientific Journal of Medical Scholar

SJMS | E-ISSN: 2833-3772 | Volume 2, Issue 6 | September-December 2023

Publisher: Real-Publishers Limited (Realpub LLC)

30 N Gould St Ste R, Sheridan, WY 82801, USA

Co-Publisher: SSESD, Egypt

Website: https://realpublishers.us/index.php/sjms/index