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Research Article

ROLE OF MAMMOGRAPHY IN RESPONSE ASSESSMENT FOLLOWING NEO-ADJUVANT CHEMOTHERAPY IN LOCALLY ADVANCED BREAST CARCINOMA: EXPERIENCE FROM A TERTIARY CARE CENTER

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ABSTRACT

Objectives: Neo-adjuvant chemotherapy (NACT) has an important role in the treatment of locally advanced breast carcinoma (LABC). In this study, we analyzed the efficacy of mammography in response assessment of NACT in patients with LABC and its correlation with histopathological reports.

Methods: Eighty patients with LABC underwent clinical examination and mammography at first. Then, after receiving three cycles of NACT, mammography and clinical examination were done again to evaluate the response to NACT. Patients with at least a partial response underwent radical surgery. Then, we correlate the findings of histopathological reports with that of post-NACT mammography findings.

Results: After three cycles of NACT, mammography detected complete response (CR) in 20% (n=28) patients and partial response (PR) in 70% (n=48) patients. Clinical examination overestimated the CR to be 45% and underestimated PR to be 50%. Histopathological examination (HPE) showed complete pathological response in 25 specimens and in rest 51 cases HPE revealed residual tumor. Mammography overestimated the pathological complete response by 4% (three patients).

Conclusion: It can be said that mammography can be used as an effective imaging tool for response assessment after NACT, especially in resource-limited setups.

Keywords: Locally advanced breast cancer, Mammography, Neo-adjuvant chemotherapy, Response assessment.

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INTRODUCTION

Breast cancer is a type of malignant epithelial tumor with obvious local invasion capability and distant metastasis tendency. Because of breast cancer stem cells' multi-lineage potential and the variance of individual microenvironments, the morphology of breast cancer is diversified, and some histological types have distinctive clinical features and prognostic significance. As of the end of 2020, there were 7.8 million women alive who were diagnosed with breast cancer in the past 5 years, making it the world's most prevalent cancer [1]. By 2040, the breast cancer burden will increase to more than 3 million new cases per year (an increase of 40%) and more than 1 million deaths per year (an increase of 50%). It is reported that it takes about 2–3 years from the beginning and when the lump of 1 cm can be felt by physical examination. Reports show that increased survival and decreased cancer-related mortality are possible in women with smaller primary cancers at the time of their diagnosis, hence the importance of early detection.

At present, imaging is an important tool in the early diagnosis and response assessment of breast cancer patients [2]. Mammography has a role in response assessment after neo-adjuvant chemotherapy (NACT) for breast cancer patients [3].

In this study, we have tried to investigate the role of mammography in response assessment after NACT in locally advanced breast cancer cases.

METHODS

It was a prospective study done at our institute among patients with locally advanced breast carcinoma (LABC) who received NACT. The study was conducted between June 2023 and December 2023. The study was started after getting ethical clearance from the Institutional Ethics Committee.

Inclusion criteria

The following criteria were included in the study:

1. LABC (Stage IIIA-IIIC)
2. Age 18–70 years
3. ECOG score up to 2.

Exclusion criteria

The following criteria were excluded from the study:

1. Carcinoma involving bilateral breast
2. Metastatic breast carcinoma
3. Presence of any other malignancy
4. Medically unfit for chemotherapy
5. Previous history of treatment with chemotherapy/radiotherapy.

Study technique

We enrolled 80 patients of LABC using the above-mentioned inclusion and exclusion criteria. All the patients underwent clinical examination and mammography before NACT.

Then, patients were given three cycles of NACT with 5-FU, doxorubicin, and cyclophosphamide regimen. Following three cycles of chemotherapy, clinical examination and mammography were done again for response assessment according to RECIST 1.1 criteria.

Patients who had at least partial response underwent radical surgery. After that, residual tumor detected (if any) in histopathological examination (HPE) was correlated with that of response assessment by mammography.

Mammographic assessment

Bilateral mammograms were obtained during baseline staging and were repeated after 3rd cycle of chemotherapy for the affected breast.

Pre- and post-treatment mammograms were assessed by a confluent radiologist.

The following criteria were assessed:

a. Mass: Size measured on mammogram using a scale in three perpendicular directions (two maximum dimensions considered). The shape and margins of the lesion and its density compared with the adjacent breast parenchyma
b. Microcalcification: Distribution and extent
c. Associated features: Architectural distortion, skin thickening, nipple retraction, additional masses, and associated lymphadenopathy.

Response assessment by mammography

a. Complete response: Complete resolution of mass at mammography with residual abnormality
b. Partial mammographic response: Suggested by the following features
   I. Mass resolved in mammography but micro calcification present
   II. Variable decrease in size and density of mass
   III. Decrease in size of a mass with no change in density
   IV. Size unchanged but density decreased
c. Stable disease: Findings unchanged from previous mammographic examinations
d. Progressive disease: Enlargement of mass or increase in the extent of abnormality.

Statistical analysis

All the data were analyzed by SPSS software (version 20) using appropriate statistical tests. Data for categorical variables were expressed as percentages and counts and from numerical variables were summarized as standard deviation and mean.

RESULTS

Most of the patients (45%) belonged to the age group of 41–50 years and 52.5% had TNM stage IIIB disease. More than half (55%) of the patients had a tumor size of around 5–6 cm (Table 1).

Evaluation of chemotherapy response

Clinical response

The overall response rate of the primary tumor to the NACT was 95% (complete response 45% and partial response 50%). Two patients (2.5%) had progressive disease and 2 (2.5%) had stable disease. These four patients were excluded from the study.

Mammographic response

Twenty-eight patients (20%) had a complete response and 48 patients (70%) had a partial response as per mammography results. Three patients (7.5%) had progressive disease as per mammographic evaluation (Table 2).

Histopathological evaluation

Seventy-six patients underwent surgery after NACT. The final histopathology report showed pathological complete response in 25 patients (32.8%) in comparison to 28 patients shown by mammography. In 67.1% (n=51) cases, HPE revealed the presence of residual disease (Table 3).

Table 1: General clinical characteristics of patients

Parameter	Number (%)
Age group (in years)	
20–30	08 (10)
31–40	20 (25)
41–50	36 (45)
51–60	16 (20)
Total	80 (100)
Size of tumor (in cm)	
5–6	44 (55)
6–7	12 (15)
7–8	09 (10)
8–9	15 (20)
Total	80 (100)
Lymph node status	
Node negative	34 (42.5)
Node positive	46 (57.5)
Total	80 (100)
Clinical staging	
IIIA	36 (47.5)
IIIB	44 (52.5)
Total	80 (100)

Table 2: Response assessment by clinical examination and mammography

Response	Modality of assessment	
	Mammography	Clinical examination
Complete response	28 (20)	36 (45)
Partial response	48 (70)	40 (50)
No response or stable	01 (2.5)	02 (2.5)
Progressive	03 (7.5)	02 (2.5)
Total	80 (100)	80 (100)

Table 3: Response assessment by histopathology and mammography

Response	Modality of assessment	
	Mammography	Histopathological examination
Complete response	28 (36.8)	25 (32.8)
Partial response	48 (63.1)	51 (67.1)
Total	76 (100)	76 (100)

DISCUSSION

Patients with big operable and locally advanced breast cancer are increasingly receiving NACT in an effort to shrink the primary tumor and remove micrometastasis to enhance the prognosis.

Seventy-six of our patients (95%) showed some degree of tumor reduction. Thirty-six patients (45%) had complete clinical response, whereas 40 patients showed partial response (50%). Only two patients had progression of disease on clinical examination. These response rates are similar to those reported in the literature using different regimens. Singletary *et al*. observed 16% complete clinical response and 84% partial clinical response after three cycles of vincristine, doxorubicin, cyclophosphamide, and prednisone. Of these, 23% became candidates for breast-conserving surgery [4]. Scholl *et al*. in their study were able to attain objective rates of 65% with four cycles of cyclophosphamide, Adriamycin, and 5-Fluro uracil regimen as neoadjuvant therapy [5].

Clinical response rates are thought to be significant since they may influence patient survival and aid in the selection of additional surgical procedures. Nevertheless, it is shown that the clinical evaluation overestimates the response to treatment.

Clinical response rates are believed to be important because this may correlate with patient survival and also help in deciding further surgical treatment. However, it is found that response to chemotherapy is overestimated with clinical examination [6,7]. As many as one-third of patients thought to be in complete remission on clinical assessment may have residual disease on pathological examination [8]. On the other hand persistence of residual abnormalities on clinical examination or mammography does not always mean the persistence of pathological disease. Our study also showed a similar trend of results where clinical examination overestimated the complete response of the disease. In 82% of instances, Segel *et al*. reported an excellent or moderate mammographic response [9]. A complete response rate of 8% with clinical examination, 0% with mammography, and 14% with pathologic examination was reported by Cocconi *et al*. [7].

However, this study has certain limitations also. The sample size was relatively small. We did not take the inter-observer variation into account for mammographic examination.

CONCLUSION

It can be said that mammography is a compatible radiological tool for response assessment after NACT in locally advanced breast cancer. In resource-limited centers with huge patient loads, it can be used for its easy availability, cost-effectiveness, and simple procedure.

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AUTHOR'S CONTRIBUTION

Dr. Bidyut Biswas and Dr. Asif Ali MD: Designed, conducted the research, and finalized the manuscript. Dr. Shatanik Mondal: Did the statistical analysis, data interpretation, and editing of the manuscript. Dr. Linkon Biswas: Did a literature review, reviewing, and final editing of the manuscript.

CONFLICTS OF INTEREST

None.

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REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2020;68:394-424.
2. Lee SC, Jain PA, Jethwa SC, Tripathy D, Yamashita MW. Radiologist's role in breast cancer staging: Providing key information for clinicians. Radiographics. 2014;34(2):330-42. doi: 10.1148/rg.342135071, PMid: 24617682
3. Li H, Zhang S, Wang Q, Zhu R. Clinical value of mammography in diagnosis and identification of breast mass. Pak J Med Sci. 2016;32(4):1020-5. doi: 10.12669/pjms.324.9384, PMid: 27648060
4. Singletary SE, McNeese MD, Hortobagyi GN. Feasibility of breast-conservation surgery after induction chemotherapy for locally advanced breast carcinoma. Cancer. 1992;69(11):2849-52. doi: 10.1002/1097-0142(19920601)69:11<2849:aid-cncr2820691134>3.0.co;2-p, PMid: 1571916
5. Scholl SM, Piegra JY, Asselain B, Beuzeboc P, Dorval T, Garcia-Giralt E, *et al*. Breast tumour response to primary chemotherapy predicts local and distant control as well as survival. Eur J Cancer. 1995;31A(12):1969-75.
6. Smith IE, Jones AL, O'Brien ME, McKinna JA, Sacks N, Baum M. Primary medical (neoadjuvant) chemotherapy for operable breast cancer. Eur J Cancer. 1993;29:592-5.
7. Cocconi G, Dib Blassio B, Alberti G, Bisagni G, Botti E, Peracchia G. Problems in evaluating response of primary breast cancer to systemic therapy. Breast Cancer Res Treat. 1984;4(4):309-13. doi: 10.1007/BF01806044, PMid: 6549147
8. Vinnicombe SJ, MacVicar AD, Guy RL, Sloane JP, Powles TJ, Knee G, *et al*. Primary breast cancer: Mammographic changes after neoadjuvant chemotherapy, with pathologic correlation. Radiology. 1996;198(2):333-40. doi: 10.1148/radiology.198.2.8596827, PMid: 8596827
9. Segel MC, Paulus DD, Hortobagyi GN. Advanced primary breast cancer; assessment at mammography of response to induction chemotherapy. Radiology. 1988;169(1):49-54. doi: 10.1148/radiology.169.1.3420282, PMid: 3420282