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Correlation of Hormone Receptor Status with Prognostic Markers and Relapse Patterns in Breast Carcinoma

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Abstract: ***Background and objective: This retrospective study examines the correlation of hormone receptor status with prognostic factors such as age, menopausal status, tumour size, grade, histological type, lymph vascular invasion, and nodal metastasis in patients with biopsy proven breast cancer. The study involved 90 patients aged >18 years diagnosed with BIRADS 4. The results showed that hormone receptor expression is inversely correlated with tumour size and HER2neu over expression is associated with oestrogen and progesterone receptor positivity. Methods: 90 patients aged >18 years having Radiologically diagnosed with BIRADS 4 were planned for trucut biopsy in minor procedure room along which other than tissue diagnosis hormonal assessment was also sent immunohistochemistry. According to study selection criteria, patient information sheet, blood tests, imaging studies, postop recurrence was taken into account for study x. Results: The expression of hormone receptors is inversely correlated with tumour size, with smaller tumours expressing higher levels of receptor positivity. The statistical significance of this inverse association Lower HER-2/neu over expression was associated with oestrogen and progesterone receptor positive. Conclusion: The study concludes that hormone receptor status in breast carcinoma is inversely correlated with tumour size and HER2neu over expression. More postmenopausal women with tumours larger than 2 cm, Histological grade I, and nodal negative patients have oestrogen and progesterone receptor positive tumours. Oncoprotein over expression is frequent in patients with nodal positive tumours, grade III tumours, and tumours larger than 2 cm.***

Keywords: Estrogen receptor, Progesterone receptor, HER 2/neu oncoprotein, Grading, Lymph node, Age

1. Introduction

Breast cancer is the leading cause of death among women worldwide. It causes 20% of women's cancer-related deaths and 33% of all female cancers. 9, 00, 000 new cases are diagnosed each year, and 3, 76, 000 people worldwide die due to it.

In Rajasthan, breast cancer represents 26.8% of all female cancers. A few decades ago, 30% to 35% of women were under the age of 50 whereas 65% to 70% of women over the age of 50 were more likely to develop breast cancer. However, the situation has changed at the moment with a 49% increase in incidence among those under 50. The breast cancer situation in India likewise demonstrates a major tendency of rising incidence at far younger ages than in the past.

The development of ER-positive breast cancer is effectively predicted and prognosticated by estrogen exposure. The hormone estrogen is a steroid. It activates the nuclear hormone receptor known as the estrogen receptor, which has a proliferative effect on the normal human mammary epithelium. Up to 70% of breast cancers have an overexpression of ER positive. Estrogen receptor is still a very effective target for treating breast cancer today. The prognosis of ER/PR-positive cancers is better than that of ER/PR-negative tumors. Since hormone therapy has fewer side effects and avoids recurrence in roughly 25% of patients, hormone receptor testing is standard.

The immunohistochemical approach is used to determine the status of the ER, PR, and HER/Neu receptors. In cancers that are ER/PR positive, the response to hormone therapy suggests a favorable prognosis. The management of breast cancer depends significantly on the association between the presence of the ER, PR, and HER 2/neu receptors, as well as the tumor grade, lymph node status, and age.

2. Methodology

From July 2018 to June 2020, It is conducted to female patients presented with abreast lump in the female OPD, The department of General surgery, Geetanjali medical college & Hospital, Udaipur

Female patients with palpable lump are admitted and are subjected to detailed history regarding age, parity, family history, socio economic status, menstrual history, lactational history and any previous biopsy reports if any.

Newly diagnosed patients and with unilateral breast malignancies, with no history of neoadjuvant chemotherapy are included in this study. Patients with bilateral breast malignancies and has a history of neoadjuvant chemotherapy are excluded from this study.

Based on the clinical examination, patients are subjected to mammogram, fine needle aspiration cytology (FNAC). If FNAC is proven to be in conclusive, trucut biopsy was done. Based on the results of triple assessment if proven to be malignant, staging work-up done with X-Ray chest, Ultrasonogram of abdomen and pelvis and Bones can

(locally advanced breast carcinoma).

Based on the above findings patients are categorized as
1) Early Breast carcinoma (T1, T2, N1, N0).
2) Locally Advanced Breast Carcinoma (TxN2, T3Nx, T4Nx)

In Early breast cancer patient is subjected to MRM. The specimenis sent for histopathological study and hormone receptor study. Based on the histopathological report and hormone receptor status, patient is followed up with adjuvant chemotherapy and radiotherapy.

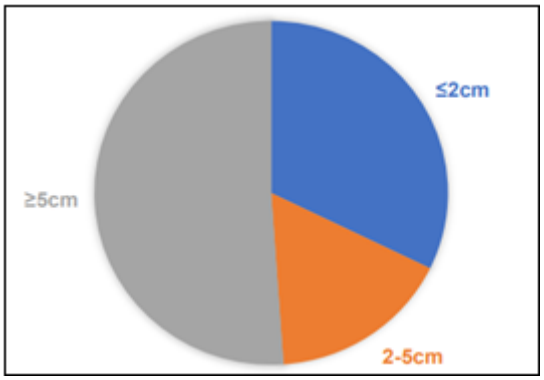
In Locally advanced breast carcinoma patient is subjected to trucut biopsy and the specimen is sent for histopathological study and hormonereceptorstatus.

Based on the report patient is started on neoadjuvant chemotherapy followed by MRM. Postoperatively patient is started with chemotherapy/radiotherapy.

Immunohistochemical analysis of hormone receptors are done informal in fixed paraffin wax embedded tissue sections using the supersensitive Polymer HRP system which is based on non-biotin polymeric technology. It makes use of Super enhancer and poly HRP reagent. Then the retrieved antigen binds to primary antibody and then a secondary antibody conjugated with horse radish peroxidase polymer and DAB substrate is added for its detection. Then the score is calculated after required color developed which can be read under alight microscope. Than statistical data was collected and correlation between Age, menopausal status, size of tumor, grade, histological type, lymph vascular invasion and nodal metastasis, hormone receptor status and recurrence pattern in carcinoma breast was studied

3. Results

The expression of hormone receptors is inversely correlated with tumour size, with smaller tumours expressing higher levels of receptor positivity. The statistical significance of this inverse association Lower HER-2/neu overexpression was associated with oestrogen and progesterone receptor positive.



Graph 1: Tumor Size

Table 1: Tumor Size

Size of tumour	Number	Total %
<2 cm	29	32.22 %
2-5 cm	15	16.67%
>5 cm	46	51.11 %
Total	90	100%

Correlation of Hormone receptor status with age group

Age Group	Number	ER+	PR+	HER2/ NEU+	TNBC (ER/PR/HER2-)
31-40	12	0	4	4	0
41-50	27	8	7	12	3
51-60	22	7	9	7	0
61-70	23	7	8	11	0
Above-70	6	0	0	3	0
Total	90	22	28	37	3

Incidence in age group

Age Group	Number	Percentage (%)
31-40	12	13.33%
41-50	27	30%
51-60	22	24.44%
61-70	23	25.56%
Above-70	6	6.67%
Total	90	100%

Correlation with menopausal status

	ER+VE	PR+VE	HER2/NEU+VE	TNBC (ER/PR/HER2-)
Pre-Menopausal	6 (26.08%)	11 (37.94%)	9 (23.69%)	1 (33.33%)
Post Menopausal	16 (69.56%)	17 (58.62%)	28 (73.68%)	2 (66.66%)
Total	22	28	37	3

Distribution with age / hormone receptor / recurrence and aggregate correlation

Age Group	Number	ER+	PR+	HER2/NEU+	TNBC (ER/PR/HER2-)	Recurrence
31-40	12	0	4	4	0	0
41-50	27	8	7	12	3	4
51-60	22	7	9	7	0	1
61-70	23	7	8	11	0	0
Above-70	6	0	0	3	0	0
Total	90	22	28	37	3	5

4. Discussion

In the Indian context, 33% of female breast cancer is prevalent while it accounts 20%of cancer deaths. A few decades ago, 30% to 35% of women were under the age of 50 whereas 65% to 70% of women over the age of 50 were more likely to develop breast cancer. However, the situation has changed as of late, with 30% of cases now occurring in

people between the ages of 41 and 50. The breast cancer situation in India likewise demonstrates a major tendency of rising incidence at far younger ages than in the past.

In line with the earlier studies, the current study also showed that the condition is most prevalent in those between the ages of 41 and 50.

Hormone Receptor Status and HER-2/NEU in Breast Carcinomas

Cancers that express the estrogen and progesterone receptors have a much longer disease-free lifespan than cancers that do not. Rosen et al. attempted to connect the status of the estrogen and progesterone receptors with different histological kinds of breast cancer in 1975. In his investigation, HER-2/neu expression was positive in 15-20% of the breast cancer specimens, whereas estrogen and progesterone receptors were present in 70-80% of the tumors. In the current study, ER+ and PR+ were 57.47% while HER-2/neu expression was seen in 42.52%.

In 1993, Wilbur D. et al. used immunohistochemistry on paraffin wax-embedded blocks to evaluate the status of hormone receptors in 30 patients. He noted that 73% (22/30) of the patients had estrogen receptor positive, 63% (19/30) had progesterone receptor positivity, and 37% (11/30) had HER-2/neu overexpression.

In a population-based study conducted in 2003, Lici et al. reported on the incidence of invasive carcinoma by hormone receptor status from the years 1992 to 1998. He discovered that there has been an increase in prevalence in the United States over time, with hormone receptor positive rising from 75.4% to 77.5%. While in the current study, invasive carcinoma was noted in 95.56% of cases where receptor positivity was 57.47%

In comparison to women in the west, far fewer investigations have been done on the status of the hormone receptors in Asian women. Desai et al. reported the presence of estrogen and progesterone receptors in breast cancer in India in the year 2000. With the aid of the immunohistochemistry approach, the investigation was completed. He examined 798 tumors in total, of which 32.6% had estrogen receptors and 46.1% had progesterone receptors. He noted that individuals with breast cancer in India had a significant rate of hormone receptor non-reactivity. Receptor non-reactivity in the current was 57.78%. Our study also showed same outcome.

Col. V. Dutta and colleagues conducted a study in 2008 at the Armed Forces Medical College in Pune. He examined the overexpression of HER-2/neu and the hormone receptors in breast cancer. 75 tumors were examined, and out of those, 33% (25/75) of the cases showed positive estrogen receptors, 67% (50/75) of the cases showed negative progesterone receptors, or both. In 58% (43/75) of the patients, there was an overexpression of HER-2/neu. Overexpression of HER-2/neu receptor in this study was 42.52%.

This study found that as compared to western communities, the proportion of receptor negativity in this tumor group is higher.

Tanuja Sheet and colleagues conducted a study on the expression of hormone receptors during the course of the previous eight years, from 1999 to 2006, at an Indian cancer referral center in 2009. 11, 780 patients in all were examined throughout this time. The proportion of hormone receptors that were expressed positively ranged from 52% to 57%.

According to a 2007 study by Vikash Kumar et al., HER-2/neu overexpression affects 46.3% of breast cancer patients in India, compared to 25-30% of patients in the West. In the current study, 57.47% of cases had positive estrogen and progesterone receptors, while 54.44% had negative receptors for both.

In 42% of patients, HER-2/neu overexpression was present. As a result, this study can be compared to others carried out in Asian cultures. Because theoretically this might be accounted for by variances in the method of evaluation and between-laboratory discrepancies, there appears to be very little variation in receptor expression.

A study by H. J. Huang et al. involved 1362 women who had primary breast tumors. He discovered a negative correlation between the expression of oncoproteins and hormone receptors. This can be explained by the fact that the two paths for tumor growth are interconnected.

The results of this investigation demonstrated an antagonistic correlation between the expression of these hormone receptors and oncoproteins. It can therefore be compared to the studies stated above. In a study of 591 tumors conducted in 2006, Francis G. et al. found that more than 20% of HER-2/neu positive tumors stained moderately or strongly for estrogen receptors.

Bhargava R et al. investigated 205 cases in 2009 and found that 4% (8/205) of the cases were positive for the expression of the HER-2/neu hybrid oncoprotein and that 15% (32/205) of the cases were triple negative. The current study also revealed an inverse association between hormone receptor and oncoprotein expression, which is consistent with the findings stated above

A Study of 1000 cases by A. gogia, V. raina, S. V. S deo et al conducted in 2014 TNBC is significantly associated with younger age and high-grade tumors and constitutes 21.9% of all breast cancers, where in our study (90 cases) it constitutes only 3 % of breast cancer cases which could be due to small sample size.

5. Conclusion

The study concludes that hormone receptor status in breast carcinoma is inversely correlated with tumour size and HER2neu overexpression. More postmenopausal women with tumours larger than 2 cm, Histological grade I, and nodal negative patients have oestrogen and progesterone receptor positive tumours. Oncoprotein overexpression is

frequent in patients with nodal positive tumours, grade III tumours, and tumours larger than 2 cm.

References

[1] Dowsett M, Hanna W M, Kockx M et al. Standarisation of HER-2/neu testing: Result of an international proficiency-testing study. Mod. Pathol2007: 20: 584-591.
[2] Gown A M: Current issues in Oestrogen receptor and HER-2/neu testing by immunohistochemical method in breast cancer. Mod. Pathol2008; 21: S8-S15.
[3] Schwartz's Principle of Surgery; FCharlesBrunicardi8thed.2005. McGraw-Hill Companies. Inc. The Breast. P453-500.
[4] Park'sTextbookofPreventiveandSocialMedicine19the d, 2007. P378-380.
[5] Bancroft JD, Marilyn Gamble (Ed) Theory and practice of histological techniques. ChurchillLivingstone2002. P
[6] Sondik. E. J. Breast cancer trends, Incidence, Mortality and Survival. Cancer: 1994; 74; 995-999.
[7] WHO (1999) Health Situation in South East Asia Region during1994-1997.
[8] Government of India Ministry and Social Welfare, NewDelhi. 2001-2002.
[9] Moore DH, Breast carcinoma Etiological Factors, Adv. CancerRes; 1983: 40; 189-253.
[10] Pathak DR et al. Breast carcinoma Etiological Factors, Reproductive and Hormonal Factors. Cancer 2000; 88: 1230-1238.
[11] Priti Lal MD, Lee K. Tan MD, et al. Correlation of HER-2/neustatus with Oestrogen, Progestrone receptor and histological features in 3, 655 Invasive breast carcinoma. AmJClin. Pathol2005.
[12] Susanc. Lester, The Breast. Robbins and Cotran Pathological basis of Disease, 7th Ed (2004)P.1120-1153.
[13] Mwillams Audeg, The new era of cancer risk assessment in Surgical Oncology P.261-265.
[14] Gavin Harris, Sarah E Pinder, et al Invasive carcinoma special types. In Foundation in diagnostic pathology (2006). P.201-220.
[15] Paul Peter Rosenin Rosen's Breast Pathology 3rd Ed (2009).
[16] Lippincott Williams & Wilkins. P.352-519.
[17] Rosai Ackerman's Surgical Pathology. Juan Rosai, 9th edition, 2005; Elsevier. Breast P.1763-1876.
[18] WHO Classification of tumours. Pathology and Genetics of Breast and Female genital organs. Lyon: IARC press 2003; 13-59.
[19] Rosen PP, Menendez Botet CJ, et al Pathological review of Breast lesions analyzed for Oestrogen receptor protein. Cancer Res1975; 35; 3187-3194.
[20] Fisher ER, Andersons, Dean, et al. Solving the dilemma of IHC and other methods. Cancer: 103: 164-173.
[21] Foote FW Jr, Stewart FW et al. A Histological Classification of Carcinoma of Breast. Surger1946; 19: 74-79.