The relationship between histologic grades of invasive carcinoma of breast ducts and mast cell infiltration

Ashraf Fakhrjou, Mohammad Naghavi-Behzad¹, Yahid Montazeri², Farid Karkon-Shayan³, Leila Norouzi-Panahi⁴, Reza Piri⁵

Abstract

Introduction: Breast carcinoma is the most prevalent tumors among women. Transformation of inflated cells in immune response leads to increase in inflammatory cells such as macrophages, mast cells (MC) and fibroblasts. The aim of this study was to determine the relationship between grades of invasive carcinoma of the breast ducts and MC infiltration around tumoral cells. Methods: During the present study, 75 female patients suffering from invasive ductal carcinoma who underwent surgery or diagnostic biopsy during 2010 and 2013 in Educational-Medical centers of Tabriz University of Medical Sciences, were included in the study. Based on Bloom-Richardson grading system, 25 cases were selected from each grade. To better observe of MCs, samples were stained by Toluidine blue and MCs were counted in 10 × 40 fields. Results: The mean age was 47.56 ± 10.84 years and the number of MCs was between 6 and 96 and their overall average was 43.01. Average count of MCs in grade 1, 2 and 3 were 15.92 ± 10.07, 45.32 ± 10.47, and 67.8 ± 20.70, respectively. There was a significant relationship between the number of MCs and increase in disease grade (P < 0.001). With increasing grade of malignancy, the number of MCs had grown. No significant relationship was observed between age and grade of disease or age and number of MC. Conclusion: According to obtained results, number of MC around tumoral cells increased significantly with an increase in the grade of disease. In order to treat in the first stages of the disease, recognizing primary changes in the stroma of cells could be helpful. Key words: Breast cancer, histopathological grade, invasive ductal carcinoma, mast cell

Introduction

Breast carcinoma is the most prevalent tumor among women and constitutes one-third of women’s cancers and is the second reason of mortality after lung cancer. Of all histological types of breast carcinomas, invasive ductal carcinoma (IDC), is the most prevalent type with the frequency of about 83%. Due to increase in early mammmography prevalence rate, early diagnosis and proper treatment mortality and morbidity has been decreased. [1] One of the important prognostic factors is a grade of disease. Tumoral cells cause the emergence of antigens which are identified by immune system, so immune response causes an increase in inflammatory cells such as mast cells (MC), macrophages and fibroblasts around tumoral cells. [2,3] Increasing evidences indicate that a unique immune cell, the MC, accumulates in the stroma surrounding certain tumors, especially mammmary and pancreatic adenocarcinoma as well as melanoma. [4]

Different studies have been conducted about the relation between MC activity and angiogenesis and other inflammatory cells. Some of breast carcinoma tumoral cells have hormonal receptors, it was shown that increased number of MC was around the cells with receptor which has been announced as activity against tumoral cells. [5,6] According to the analysis of clinical data it has been concluded that specific types of tumor infiltrating leukocytes have a significant impact on the clinical course of malignant diseases. [7,8]

The aim of this study was to investigate relationship between histologic grades of invasive carcinoma of breast ducts and MC infiltration to see if it is possible to present counting MCs in breast tumor in different grades of disease, as an independent prognostic factor.

Methods

During a present Descriptive-Analytic study in which 75 female patients suffering from IDC were enrolled in the study. Twenty-five patients from each histological grade were selected, and the relation between the number of MCs and histopathological grade of cancer was investigated.

Acknowledgements

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References

Table 1: Bloom-Richardson grading system

<table>
<thead>
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<th>Tubular differentiation</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
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<tbody>
<tr>
<td></td>
<td>75%≤</td>
<td>10-75%</td>
<td>10%≥</td>
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<td>Cell size and shape</td>
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<tr>
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<tr>
<td>Score 2</td>
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<tr>
<td>Score 3</td>
<td>Large and different</td>
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Number of mitosis

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</tr>
<tr>
<td>Grade 2</td>
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</tr>
<tr>
<td>Grade 3</td>
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Table 2: Average count of MCs in IDC samples

<table>
<thead>
<tr>
<th>Item</th>
<th>Number</th>
<th>Mean±SD</th>
<th>Minimum-maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of MC in all grades</td>
<td>43.01±25.65</td>
<td>6-96</td>
<td></td>
</tr>
<tr>
<td>Average number of MC in grade I</td>
<td>15.92±10.07</td>
<td>6-46</td>
<td></td>
</tr>
<tr>
<td>Average number of MC in grade II</td>
<td>45.32±10.74</td>
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<tr>
<td>Average number of MC in grade III</td>
<td>67.80±20.70</td>
<td>10-96</td>
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MC=Mast cell, SD=Standard deviation, IDC=Invasive ductal carcinoma

Discussion

In the present study according to findings, MCs count reflect a grade of IDC ($P < 0.001$). In Iran, prevalence of IDC, tubular carcinoma, and lobular carcinoma are 78%, 4.8% and 3.3% respectively. In accordance with statistics of other countries, IDC is the most prevalent one. Of all patients with breast carcinoma in Iran, Age group containing patients 40–50 years old has the most frequency in comparison to other age groups,[11] this is just similar to the most affected age group in present study.

Investigating the number of MCs in various tumors, and potential checking of increased factors in cells’ stroma has been conducted. All results show an increase in the number of MCs but relationship between the number of MCs, the prognosis of disease and metastasis in these studies is different.[12,13] In a study where relationship between the number of MC and prognosis of breast IDC has been studied, it was concluded that stromal MC infiltration in invasive breast carcinoma is an independent good prognostic marker and demonstrates the outstanding role of local inflammatory reactions in breast cancer progression.[14]

In the current study, the relationship of the number of MC and grades of disease was investigated. According to this study, like conducted studies, number of MC around tumoral cells increased significantly with an increase in the grade of disease. In a study about the significance of MCs in basal cell carcinoma and its subtypes by comparing their numbers in the peritumoral stroma to those in uninvolved adjacent normal skin. It was concluded that no significant relationship was found between MC number and the degree of peritumoral inflammation, patient age, or gender.[15] Also in the current study, relation of age and number of MC was not statistically significant.

In the present study, among patients with grade III IDC age varied from 27 to 73 years old, Therefore possibility of high-grade disease also exists in low ages. Identifying effective factors in tumor development and other effective factors in disease procedure could be helpful in therapy and finding a basic strategy. The practice should be based on diagnosing the first intra-cellular changes and during the disease and after therapeutic acts such as chemotherapy.

According to MC’s possible role in tumor generation, wide studies are needed to discover available mechanism. According to diagnostic importance and usage of various techniques, available knowledge to the accurate evaluation of disease is increasing.

In conclusion, most of the studies have reported increased number of MC around tumoral cells as disease grade increases. However it has not been used as an independent factor to diagnose and therapeutic acts yet, but by inspiration of increase in factors affected by MC around tumor with its possible origin, it has been the basis for other studies to help pre and post-surgical treatment. Considering easy staining, MC could be stated as a prognostic factor. It is possible to use anti-MC and MC abductor materials in the treatment of disease to reduce number of tumoral cells and to reduce angiogenesis. To determine the relationship with other factors effective in diagnosis and prognosis of disease, studies with a wide spectrum of patients are suggested.

Because of the limited time period among cross-sectional studies, confounding factors, lack of data such as early symptoms of disease, time interval between emergence of symptoms and diagnosis of disease, which had not been mentioned in patients’ documents, a prospective and comparative study is suggested. Further studies are required to determine the relationship between MC and other prognostic factors and factors effective on the number of MC.

Acknowledgment

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References

7. Gutkin DW. Tumor infiltration by immune cells: Pathologic evaluation and a clinical significance. In: The Tumor Immunoenvironment. New York:
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