

Study of Mast Cell Distribution and its Role in Breast Carcinoma

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ABSTRACT

Aims: This study is an attempt to find the Mast cell distribution in Tumors of Breast and thereby substantiating its role in Biology and Natural History of Breast Tumors ,principally Breast Cancer.

Study Design: Cross Sectional Histopathological study

Place of Study: Department of Pathology Faculty of Medicine Northern Border University Arar, K.S.A

Materials & Methods: Sample study includes 40 diagnosed cases of Breast Carcinoma. Histopathology slides were collected and subjected to Toluidine Blue Stain for demonstration and distribution of Mast cells, there by comparing the findings with other studies

Results: Invasive ductal carcinoma, Lobular Carcinoma [2-4/hpf] and [1-2/hpf] within tumor area Invasive Ductal Carcinoma, Lobular Carcinoma [1-2/hpf] and [2-4/hpf] within Stroma

Conclusion: The distribution of Mast cells in breast carcinoma in present study is comparable to other studies

Keywords: Mast cell, Breast Carcinoma, Prognosis, Study, Distribution

INTRODUCTION

Mast cells are part of local innate immune system which can enhance regulate and inhibit residual immune function in Breast. Mast cells secrete a gamut of biologically active substances which can sustain Breast tumors by modification of its microenvironment¹.The significance of Mast cell products have been proved in various studies².Recent literature also established the relation of Mast cells with the growth course of Breast Tumors, especially with regards to initiation and progression of disease³.Research has shown the correlation between Mast cell density and therapeutic response ,especially with Mast cell inhibitors⁴. Studies performed to correlate Mast cell density with Tumor grade has shown the relation between them⁵. In addition evidence is presented by studies about the link between Mast cells proportion and Hormone receptor status in Breast Cancer⁶.Latest literature points to the significance of Distribution of Mast cells in Breast cancer especially with regards to prognosis⁷.Studies has proved the good prognostic value of Mast cells in Stroma in Patients with Invasive Breast Carcinoma⁸.Whereas Presence of Mast cells among the Tumor cells is a bad prognostic indicator⁹.The connection between Mast cell density in Microscopic types of Breast Carcinoma and associated Clinical Aggressiveness has been proved by the fact that there is proportionally more Mast cells in some type relative to other type¹⁰.

MATERIALS AND METHODS

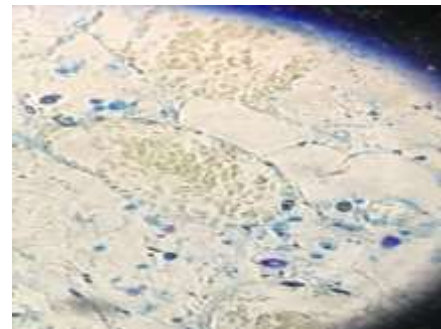
40 histopathology slides from diagnosed cases of breast carcinoma were chosen for study which includes 25 cases of invasive ductal carcinoma and 15 cases of lobular carcinoma .These slides were subjected to Toluidine blue staining for Demonstration of Mast cells while ,benign tumors and inflammatory lesions of breast were excluded from study.The distribution of Mast cells were observed under Microscope and categorized as those within tumor cells and those in stroma and then findings were compared with other studies.

RESULTS

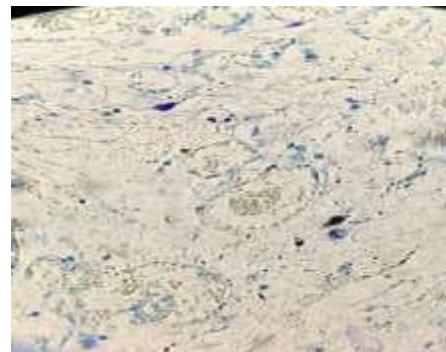
The distribution of Mast Cells in Breast Carcinoma in present study is 2-4/HPF , 1-2/HPF within Tumor and 1-2/HPF ,2-4/HPF in stroma in Invasive ductal Carcinoma and Lobular Carcinoma as indicated in Table 1 and photomicrographs[1-4]

Table 1.

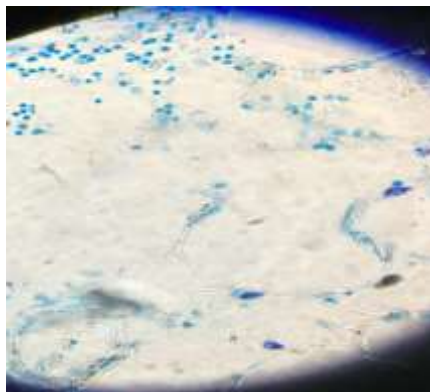
Type of Tumor	Mast Cell Distribution/HPF	
	tumor within	stroma
Invasive ductal carcinoma	2-4	1-2
Lobular carcinoma	1-2	2-4



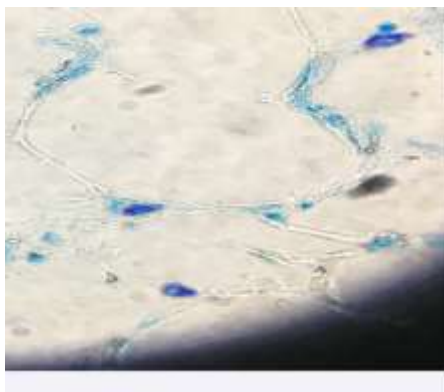
Photomicrograph no.1



Photomicrograph no.2



Photomicrograph no.3



Photomicrograph no.4

DISCUSSION

The origin of Mast cells traces back to Bone Marrow, where it arises from Haemopoietic Parent stem cell through multipotent mast cell precursor that transforms into committed mast cell precursor, which leaves Bone marrow and travels to Peripheral tissues to finish its final development¹¹. The Final Development in peripheral tissues takes place due to stimulatory effect of various biological substances [Stem cell factor, IL-3] secreted by local tissue environment¹². Mature Mast cells have been classified based upon their Enzyme content. Those which contain Tryptase are labelled as MCT, whereas those which contain, carboxypeptidase A, tryptase, chymase and cathepsin G are labelled as MCTC. These sub types also differ in their distribution and possibly functional role. MCT is localized in mucosa of small bowel and bronchial tissue, while MCTC is present in normal skin, small bowel mucosa¹³. The structure of Mast cells under Light Microscopy is described as irregularly Oval Mononuclear cell with central nucleus obscured by granular dense cytoplasm¹⁴. Mast cells can be activated upon exposure to different stimuli and upon which it provides protective response against viruses, Gut helminths and bacteria¹⁵, in addition to its role in allergy¹⁶. The most important mechanism of activation of Mast cells is the IgE mediated, which binds to its receptor (FcεRI), leading to release of various biologically active products by degranulation of Mast cells, such as Histamine, Leukotrienes, cytokines and chemokines, responsible for vasodilation, angiogenesis, leukocyte recruitment and activation, along with

mitogenesis¹⁷. With regards to role of Mast cells in Breast carcinoma, several theories have been put forward, which point to distribution of Mast cells in Breast tissue, whether mast cells are localized in stroma or within tumor cells. Evidence for stromal location of mast cells and their role in breast cancer suggests that stromal mast cells aid in Angiogenesis by release of tryptase from mast cells which functions as agonist of proangiogenic factor proteinase-activated receptor-2 (PAR-2) in vascular endothelial cells stimulating their proliferation and also release of various other angiogenic factors such as cytokines and metalloproteinases from ECM. Large follow up studies substantiated the evidence of stromal mast cells with good prognosis¹⁸. Studies have found that Intratumoral Mast cells in Breast is associated with poor prognosis due to the fact that there is increased microvessel density and angiogenesis induced by mast cell released tryptase¹⁹. The mechanisms of Protumoral effects of Mast cells, include Histamine mediated growth and proliferation of tumor cells through their action on H2 receptors, and Tryptase mediated stromal invasion and possible metastases²⁰. Whereas mechanism of Antitumoral effects of Mast cells is due to release of reactive peroxides, IL-4, TNF by Mast cells which leads to Apoptosis of tumor cells²¹. The findings in the present study were comparable to other studies with regards to Stromal Mast cells²². Pertaining to Intratumoral distribution of mast cells, the findings are similar to other studies²².

CONCLUSION

Mast cells are the master cells capable of gaining entry into Breast tissue as part of immune mechanism against cancer, at the same time the function of Mast cell can vary from Antitumoral and also Protumoral. The distribution of Mast cells in Breast Carcinoma has a bearing on prognosis. The identification and distribution of Mast cells in tissue biopsies of Breast carcinoma can provide valuable information that aids in overall understanding of their role in Breast Carcinoma.

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