



Original Article

Mast Cell profile in Skin lesions

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ABSTRACT

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The present study included a total of 52 cases, of which squamous cell carcinoma 10 cases, basal cell carcinoma 10 cases, malignant melanoma 10 cases, seborrheic keratoses 6 cases, keratoacanthoma 6 cases and chronic nonspecific dermatitis with epidermal hyperplasia 10 cases. Significant increase of mast cells was observed in all the lesions when compared to normal control. The mast cell count was significantly increased basal cell carcinoma and malignant melanoma when compared with squamous cell carcinoma.

Key words: Skin neoplasm, pseudo-epitheliomatous, mast cell.

1. INTRODUCTION

Mast cells are bone marrow derived specialized secretory cells distributed in connective tissues throughout the body, particularly in association with blood vessels and nerves. Increased proportions of mast cells are present in the skin, respiratory tract, uterus and urinary bladder.

Mast cells occur in normal dermis in small numbers as oval to spindle shaped cells with centrally located granules in the cytoplasm that do not stain with H&E stain. They are identifiable when stained with Toluidine blue, Cresyl violet, Azure A and Methylene blue due to the presence of metachromatic granules in their cytoplasm.

Mast cells play a vital role in various inflammatory and immunologic reactions often joining the humoral and cell mediated phases of process. Degranulation of mast cells occur within minutes of exposure to stimuli and usually entire granules are extruded and release their preformed and stored mediators like Histamine, Heparin, Serine Protease and certain cytokines, which may contribute to allergic inflammation and chronic inflammation.

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Biologic functions of mast cells include their role in innate immunity, host defence mechanisms against infestations, immune modulation, tissue repair and angiogenesis ¹. The mast cells are present in small numbers in normal dermis, generally concentrated about blood vessels, especially post-capillary venules ². The term ‘Mastocytosis’ is used to designate the entire class of morbid conditions characterised by abundant proliferation of mast cells.

Few studies on human skin tumors have highlighted mast cell alterations ³. The number has been reported to be markedly increased in the dermis in basal cell carcinoma. Increased mast cell density is observed in invasive melanoma. Number of mast cells in stroma of squamous cell carcinoma was found to be 2-30 times lower than the stroma of normal squamous epithelium or in connective tissue distant from neoplastic cells.

In the present study an attempt was made to evaluate the mast cell profile in some of the common pseudoneoplastic and neoplastic lesions of skin.

Aims and Objectives:

To evaluate and compare mast cell changes in skin neoplasms and some pseudo-epitheliomatous skin lesions.

2. MATERIALS AND METHODS

The study was carried out from the surgical pathology specimens received by the Department of Pathology, MR Medical College Kalaburagi.

Study included a total of 72 cases. A careful gross examination of the specimen was performed, tissue was fixed in 10% formalin and paraffin sections were stained with Hematoxylin and Eosin and 1% Toluidine blue stains. Mast cells with typical purple red metachromatic granules in Toluidine blue stained sections were counted in 10 consecutive high power fields, tabulated and statistically evaluated. Metachromasia of connective tissue was recorded as absent or present (diffuse or patchy). Statistical analysis was done and a value was considered significant if the P value was <0.05 and not significant if it was >0.05.

The present study was carried out in the department of pathology, MR Medical College, Gulbarga. A total 62 skin biopsies were included in the study, including 10 cases of normal skin tissue as control. A careful gross examination of the specimen was performed, tissue was fixed in 10% formalin and paraffin sections were stained with Hematoxylin and Eosin and 1% Toluidine blue stains. Mast cells with typical purple red metachromatic granules in Toluidine blue stained sections were counted in 10 consecutive high power fields, tabulated and statistically evaluated. Statistical analysis was done and a value was considered significant if the P value was <0.05 and not significant if it was >0.05.

3. OBSERVATIONS

The present study included squamous cell carcinoma 10 cases, basal cell carcinoma 10 cases, malignant melanoma

10 cases, seborrheic keratoses 6 cases, keratoacanthoma 6 cases, chronic nonspecific dermatitis with epidermal hyperplasia 10 cases, and normal skin tissue as control 10 cases.

Table 1: Mast cell distribution in various skin lesions

Skin lesions	Age range (mean) years	M:F ratio	Mast cell count: cells/10HPF (mean)
Squamous cell carcinoma	30-70 (53.6)	9:1	21-169 (71.6)
Basal cell carcinoma	26-70 (50.66)	4:1	80-413 (262.4)
Malignant melanoma	24-85 (57)	7:3	85-485 (178.3)
Keratoacanthoma	31-60 (46)	2:1	182-301 (230.8)
Seborrheic keratoses	31-63 (49.75)	1:1	132-521 (341.5)
Chronic nonspecific dermatitis with epidermal hyperplasia	7-60 (33.3)	4:1	73-475 (184.3)
Control			32-45 (39.1)

Squamous cell carcinoma: Mast cells were comparatively less around the islands of tumor cells and were more in cases which were associated with inflammatory infiltrates. P value >0.05, hence it was insignificant in relation to control.

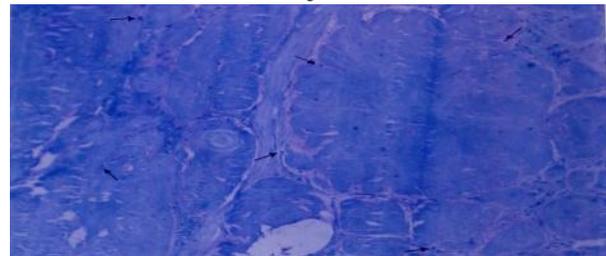


Fig 1: Basal cell carcinoma showing mast cell infiltration. Toluidine blue stains x400

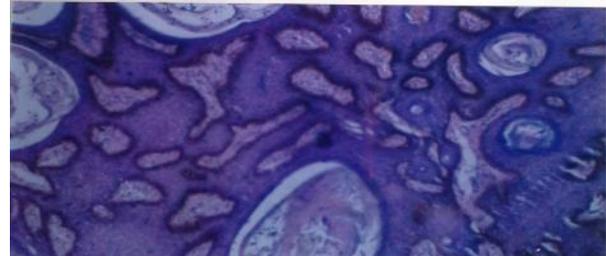


Fig 2: Seborrheic keratoses. Hematoxylin and Eosin x100

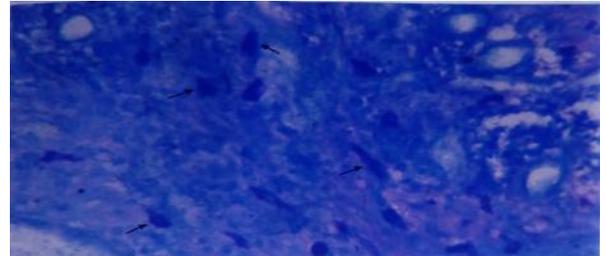


Fig 3: Seborrheic keratoses showing mast cell infiltration. Toluidine blue stains x1000

Basal cell carcinoma: Mast cells were distributed more around the tumor cell islands as compared to rest of the stroma (Fig.1). P value <0.05, which was significant.

During our study, a peculiar case of Nevoid basal cell carcinoma syndrome (Gorlin’s syndrome) was observed.

This patient was 46 years old male, having generalised, multiple, discrete hyperpigmented nodules and plaques. Patient also had bifid ribs, spina bifida oculata, dental abnormalities and ectopic calcification of falx cerebri and tentorium cerebri.

Malignant melanoma: The cases in the present study were of nodular melanomas. Mast cells were distributed more at the margin as compared to the centre of the lesion. P value <0.05, hence it was significant.

Seborrheic keratoses: Mast cells were noted more in the upper dermis and around the blood vessels (Fig.2,3). P value <0.01, hence it was highly significant.

Keratoacanthoma: Mast cell distribution was more in upper dermis. P value <0.02, therefore it was significant.

As a general observation, invasion of epithelial proliferations by leukocytes consisting mainly of neutrophils and disintegration of some of the epidermal cells was seen in the group of pseudoneoplastic skin lesions.

There was statistically significant increase in the mast cells in basal cell carcinoma, malignant melanoma, keratoacanthoma, seborrheic keratoses and chronic nonspecific dermatitis with epidermal hyperplasia when compared to normal skin.

Statistically significant increase was noted in mast cell counts in basal cell carcinoma, malignant melanoma, keratoacanthosis, seborrheic keratoses and chronic nonspecific dermatitis with epidermal hyperplasia cases when compared with mast cell counts in squamous cell carcinoma cases.

Mast cell count was significantly increased in seborrheic keratoses as compared to chronic nonspecific dermatitis with epidermal hyperplasia and malignant melanoma.

Statistically significant increase was noted in mast cell counts in pseudoneoplastic skin lesions taken all together when compared with mast cell counts in squamous cell carcinoma.

4. DISCUSSION

Mast cells with large battery of crucial chemical mediators and substances in their typical metachromatic granules are known to play a vital role in health as well as in various disease states in human beings.

The present study of mast cell profile in some common skin neoplasms and pseudoneoplastic skin lesions in a preliminary effort to probe into the mast cell distribution in skin neoplasms like squamous cell carcinoma, basal cell carcinoma and malignant melanoma and in pseudoneoplastic skin lesions like seborrheic keratoses, keratoacanthoma and chronic nonspecific dermatitis with epidermal hyperplasia. Although, the number of cases in the present study was not very large, it appears to be adequate to draw certain logical conclusions.

It is to be specially emphasized that after a careful search in literature, few studies were available on mast cells in neoplastic skin lesions and no reports were available

regarding the alterations or documentation of mast cells in pseudoneoplastic skin lesions. This study is a sincere attempt to probe the facets of mast cell alterations in these pseudoneoplastic skin lesions.

The mast cells adhere not only to matrix but to other cells as well. The biological consequence of this interaction includes mast cell trafficking, presentation of specific growth factors to mast cell activation. Activated mast cells form heterotypic aggregates with T lymphocytes. These observations suggest a functional relationship between mast cells and lymphocytes that relates to direct contact between these cells. The activation of mast cells not only causes the release of reformed granules associated mediators, but initiates de novo synthesis of lipid derived substances.

Mast cell distribution has been shown to be altered in various fibro proliferative disorders like wound healing, pterygium and rhinoscleroma. Prominent increase in mast cells was observed in fibro proliferative lesions of breast like mammary dysplasia, fibroadenoma and carcinoma of breast.

In the present study, the mast cell count in normal skin ranged from 32-45/10HPF with a mean of 39.1 cells.

The cases of squamous cell carcinoma in present study showed mast cell count ranging from 21-169cells/10HPR (mean being 71.6). Even though it was apparently more than that found in normal skin, the difference was statistically insignificant ($p>0.05$).

Coussens LM⁴ found that mast cells infiltrate in hyperplasia, dysplasias and invasive fronts of carcinomas, but not the core of solid tumors, where they degranulate in close opposition to the capillaries and epithelial basement membrane, releasing mast cell specific serine proteases, chymase, tryptase and other cytokines.

In cases of basal cell carcinoma, mast cell count ranged from 80-413 cells/10HPF (mean being 262.4). Mast cell count was significantly increased ($p<0.05$) when compared to control. The mast cell density was more around the tumor cell islands.

In malignant melanoma cases, the mast cell count ranged from 85-485cells/10HPF (mean 178.3). It was a significant increase ($p<0.05$) when compared to control. Duncan LM et al.⁵ also observed greatest density of mast cells in invasive melanoma as compared to benign nevi.

In cases of seborrheic keratoses, mast cell count ranged between 132-521cells/10HPF (mean 341.5). This was a statistically highly significant increase ($p<0.01$) when compared to control.

In keratoacanthoma cases, mast cell count ranged from 182-301cells/10HPF (mean 230.8). A highly significant increase ($p<0.01$) was noted.

In chronic nonspecific dermatitis with epidermal hyperplasia, mast cell count ranged from 73-475cells/10HPF (mean 184.3). The mast cell count was significantly increased ($p<0.02$) when compared with the control. Coussens LM et al.⁴ observed that mast cell infiltrate in skin hyperplasias, dysplasias and invasive fronts of cancer.

Since there are no documented reports in the literature on the mast cell alterations in pseudoneoplastic skin lesions, the present study is the first to document such alteration. The possible explanation regarding increased number of mast cells in these lesions may be that the chemical mediators like stem cell factors and cytokines like interleukins which are released in the malignant lesions might be released in these conditions. In addition, these lesions are accompanied by a significant inflammatory infiltrate in adjacent dermis and association of mast cells with inflammation is well recognised.

Mast cell count was significantly increased in all pseudoneoplastic skin lesions as compared to squamous cell carcinoma. Mast cell count was significantly increased in seborrheic keratoses as compared to that in chronic dermatitis with epidermal hyperplasias and that in malignant melanoma.

5. CONCLUSION

The present study concludes that mast cell alteration do occur in neoplastic and pseudoneoplastic skin lesions. The count was significantly increased in basal cell carcinoma, malignant melanoma and pseudoneoplastic skin lesions. This finding may prove to be of diagnostic and differential diagnostic relevance.

6. REFERENCES

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