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Original Research Paper

Pathology

MAST CELL PROFILE IN PROSTATIC LESIONS

Maharaj VM — Associate Professor, Department of Pathology, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka.

Shagufta R — Associate Professor, Department of Pathology, Al-Ameen Medical College, Vijaypura, Karnataka.

Pattankar VL — Associate Professor, Department of Pathology, Mahadevappa Rampure Medical College, Kalaburagi, Karnataka.

ABSTRACT Mast cell cytoplasmic granules contain chemical mediators, play vital role in various inflammatory and immunopathological reactions. An attempt was made to study the mast cell profile in the prostatic lesions in the surgical biopsy material. **Material and methods:** Twenty five cases were of benign prostatic hyperplasia, 10 cases of BHP with prostatitis, 3cases of tuberculous prostatitis and 6 cases of carcinoma of prostate. On the basis of observation an attempt was made to study distribution pattern of mast cells in relation to Prostatitis, BHP and Carcinoma of prostate. **Observations:** The age distribution of patients with BPH ranged from 42years to 85years, with a mean age of 60.6 years. The mast cell counts in cases of prostatitis ranged from 20-58/10HPF with a mean of 28.50, tuberculous prostatitis ranged from 21-31/10HPF with a mean of 26.0, and carcinoma prostate ranged 14-27/10HPF with a mean of 20.66. **Conclusion:** Highest mast cell concentrations were observed in benign prostatic hyperplasia, more so in fibromuscular hyperplasia than adenomatous hyperplasia, least counts were seen in carcinoma of prostate and in prostatitis.

KEYWORDS : Mast cells, Prostate

INTRODUCTION

Mast cell cytoplasmic granules contain substances like heparin, 5-H.T, various chemotactic factors, prostaglandins, etc. Thus play vital role in various inflammatory and immunopathological reactions, often linking the humoral and cell mediated phases of processes.

Mast cell distribution has been shown to be altered in various fibro-proliferative disorders, like pterygium,1 wound healing, Rhinoscleroma2.

Mast cells also have been reported to be increased in leiomyoma of Uterus3. Prominent increase in mast cell was observed in lesions of breast like mammary dysplasia, fibroadenoma and carcinoma of breast.

Mast cells are constantly present in human prostate during post natal life. Prostate is an endocrine dependent organ. Testicular androgens are considered important in controlling prostatic growth.3

Inflammation, benign nodular hyperplasia and carcinoma are three pathologic processes that affect prostate gland with significant frequency. There are scarce reports that the mast cells distribution gets altered in various forms of prostatic diseases4.

Mast cells may exert pro- / anti- tumoral roles, depending on tumor type, on microenvironmental signals, and on neighbouring interacting cells.

Keeping this in mind, an attempt is made to evaluate the mast cell profile in various commonly encountered prostatic lesions. The implications of this study may provide additional clues in the diagnosis, differential diagnosis and prognosis of commonly encountered lesions of the prostate gland.

AIMS AND OBJECTIVES:

An attempt is made in the present study to investigate the mast cell profile in the prostatic lesions in the surgical biopsy material, encountered in the Department of Pathology. M.R. Medical College, Kalaburagi.

A particular emphasis is made to compare and evaluate the mast cells in various prostatic lesions as follows.

1. Mast cell distribution in the inflammatory lesions of the prostate gland.
2. Mast cell alteration in benign nodular hyperplasia of prostate, especially in relation to adenomatous and fibromuscular hyperplasia of prostate.
3. Mast cell distribution in prostatic carcinomas.
4. A comparative evaluation of mast cell alteration in the various prostatic lesions.
5. To observe any significant variation in mast cells in any group, which may be an additional diagnostic parameter.

MATERIALS AND METHODS:

Present study was carried out in department of pathology, MR Medical College, Kalaburagi. Study included 25cases of benign prostatic hyperplasia, 10 cases of BHP with prostatitis, 3cases of tuberculous prostatitis and 6 cases of carcinoma of prostate.

The specimens were fixed in 10% formalin, gross features were noted. Paraffin embedded blocks were made. Tissue sections of 5micron were cut on microtome and slides were stained with routine Hematoxylin and Eosin (H&E) and 1% aqueous Toludine blue.

Mast Cell Staining And Counting:

To identify mast cells with typical metachromatic granules, special stains, 1% aqueous toluidine blue (at pH 4) was used.

Mast cell counting and observation: Toluidine blue stained sections were examined under high power magnification. The number of mast cells present in 10 consecutive high power fields were counted in all the sections and tabulated. The results were statistically evaluated. The metachromasia of the connective tissue was recorded as absent / present (diffuse /patchy) (fig.1).

On the basis of observation an attempt was made to study distribution pattern of mast cells in relation to Prostatitis, BHP and Carcinoma of prostate.

OBSERVATIONS:

The age distribution of patients with BPH ranged from 42years to 85years, with a mean age of 60.6 years. In patients of

prostatitis, age of patients ranged from 54 years to 76 years with a mean age of 61.6 years. In Tuberculous prostatitis, age of patients ranged from 45 to 60 years with a mean age of 52.5 years. In patient of carcinoma prostate, age range of patient was from 48 years to 75 years, with a mean age of 63.5 years (Table 2).

After performing mast cell counts of the toluidine blue stained sections in the various lesions, it was observed that mast cell distribution varies in various groups.

Mast cell distribution:

Table 2 depicts the mast cell distribution in various lesions. In BPH, the number of mast cells per 10HPF ranged from 16-71 with a mean of 38.80. The mast cells were mainly confined to perivascular and stromal areas.

The mast cell counts in cases of prostatitis(fig 2) ranged from 20-58/10HPF with a mean of 28.50 and were mainly increased granulation time. The mast cells in tuberculous prostatitis ranged from 21-31/10HPF with a mean of 26.0. The mast cells were confined to periphery of granulomas and were not seen in the centre. The mast cells were significantly less ($P<0.05$) in prostatitis as compared to BHP.

Since the number of tuberculous prostatitis cases was less, a statistical comparison with cases of prostatitis could not be made.

The mast cells in cases of carcinoma prostate (fig 3) ranged from 14-27/10HPF with a mean of 20.66. On comparison with BHP and statistical analysis, mast cells were found significantly less in carcinoma of prostate cases. The periacinar connective tissue metachromasia was strikingly absent around malignant prostatic acini.

Table 1: Age distribution

Age	BHP	Prostatitis	Tuberculous	Adenocarcinoma
Age range in years	42-85	54-76	45-60	48-75
Average age	60.6	61.6	52.5	63.5

Table 2: Mast cell distribution

Mast cells /10HPF	BHP	Prostatitis	Tuberculous	Adenocarcinoma
Range	16-71	20-58	21-31	14-27
Average	38-80	28-50	28.5	20-66

DISCUSSION:

This study is a preliminary approach to probe into the mast cell distribution in various prostatic lesions. The cases in the present study though not very large, appear to be quite significant to draw logical conclusions which might prove to be of additional and prognostic value.

The average mast cell count per 10HPF in BHP was 38.8 with a range of 16-71 and was significantly increased ($P<0.05$) as compared to those in carcinoma of prostate (mean mast cell count 20.66 with a range of 14-27) and those in prostatitis (mean28.50 with a range of 20-58). Focal periacinar connective tissue matachromasia was observed in BHP, where as it was absent in carcinoma.

Number of mast cells in hyperplastic tissues of prostate for exceed that seen anywhere else in the prostate gland and periacinar metachromasia was noted in all benign hyperplasia prostate cases although it was not seen around all acini5. The number of mast cells in human prostate increases with age in proportion to the development of connective tissue stroma and mast cells decrease in inflammation5. Many mast cells have been reported in vicinity of leiomyomas of uterus3. It was also observed many mast cells and connective tissue metachromasia in BHP.

The strikingly high incidence of mast cells in BHP cases needs a logical explanation. Although the aetiology of BHP is still uncertain, hormonal hypothesis seems possible. With aging estradiol levels increase in men (absolute or relative to testosterone). Despite the decreased testosterone with aging, increase of oestrogens sensitizes the prostate to the growth promoting effects of dihydro testosterone. Prostatic epithelial cells contain cytoplasmic receptors for dihydro testosterone, whose expression is enhanced by oestrogens.

The retardation of growth of metastatic prostatic carcinoma occurred by castration, oestrogen therapy or both emphasizing the role of androgens in prostatic carcinoma. Mast cells have been reported to be decreased with testosterone therapy6.

Vasoactive intestinal polypeptide (VIP) and Noradrenaline secreted during stress stimulate prostatic mast cells to produce abundant chondroitin sulphate which promotes fibromuscular hyperplasia of BHP5.

Aracadi JA7 documented that periacincar connective tissue metachromasia was absent around malignant acini in prostatic carcinoma unlike its presence in BHP. Salo et al.8 suggested that the substance that is staining meta-chromatically around acini of BHP is not seen in malignant acini either because it has not been produced or because it is destroyed by the enzymes produced by malignant cells.

Mast cells by virtue of secretion of heparin and other chemical mediators can cause vasodilatation, increase vascular permeability, edema with protein rich exudate. Perhaps such a milieu would favour tumor invasion and tumor spread. Heparin secreted by mast cells has been shown to suppress lymphocyte functions with resultant in inhibition of immunity9 . Considering the various facts it appears that Mast Cells response in relation to neoplasia appears to be an effect rather than a cause in the pathobiology of tumors.

Harendrakumar ML and Pattankar VL10, on studying mast cells in lymphnode disorders, have commented that relatively increased mast cells were observed low mast cell count were observed in low grade Non Hodgkins Lymphomas and relatively more mast cells were observed in metastatic lymph nodes.

Perhaps fewer mast cells in carcinoma prostate cases in the present study may suggest a relatively better prognosis.

It has been shown that mast cells alterations have been directly or indirectly associated with angiofibroblastic proliferation in various conditions such as wound healing11, pterygium, Rhino Scleroma, mammary dysplasia and fibro-adenoma. Mast cell play a role in acute inflammation through liberation of vasoactive and edematogenic substances11. Pharmacologic substances released by mast cells are mediators of inflammations thus mast cell provides a reserve of material readily available in any sudden physiological stress or damage to the tissue12.

These evidence may answer some facets about the variable number of mast cell count in tuberculous prostatitis was 26/10HPF with range of 21-31. Mast cells were not seen within the granuloma but were seen in the neighbourhood of granuloma. The present observation is similar to that of Mana Taweevisit andUbon Poumsuk 13 on studying mast cells in various granulomas have documented that few mast cells were seen in the periphery of tuberculous granulomas with absent mast cells in centre of granulomas. Mast cell

macrophage interactions may be involved in the development of epithelioid granulomas.

The present study of mast cell spectrum in prostatic lesions highlights that:

1. Mast cell response does occur in various inflammatory, BHP and neoplastic lesions of prostate.
2. Distinctive mast cell alterations occur in the prostatic lesions such as BHP, prostatitis and carcinoma of prostate
3. Significantly more mast cell counts were observed in a. Benign Hyperplasia in comparison to the carcinoma of prostate.

b. More mast cells were seen in predominantly fibromuscular hyperplastic areas than adenomatous areas.

4. Mast Cell profile may be an additional diagnostic/ prognostic parameter in the prostatic lesions such as benign hyperplasia of prostate and carcinoma of prostate and may contribute in the differential diagnosis of these lesions.
5. Possible explanatory mechanisms for the above alterations have been suggested.

Detailed in-depth study of mast cells offers a wide scope for future research. Modulation of the mast cells and their products by pharmacologic, immunologic or other means offers a favourable perspective in the host tumour interaction, inflammatory, states, hyper sensitivity disorders, tumour therapeutics and tumour biology.

CONCLUSION:

The present study of mast cell spectrum in prostatic lesions highlights:

1. Mast cell response does occur in various prostatic lesions.
2. Variability of mast cell response is certainly observed in the three main prostatic lesions.
3. Highest mast cell concentrations were observed in benign prostatic hyperplasia,more so in fibromuscular hyperplasia thanadenomatous hyperplasia, least counts were seen in carcinoma of prostate and in prostatitis.

Possible explanations for the variability of mast cells in there prostatic lesions are offered.

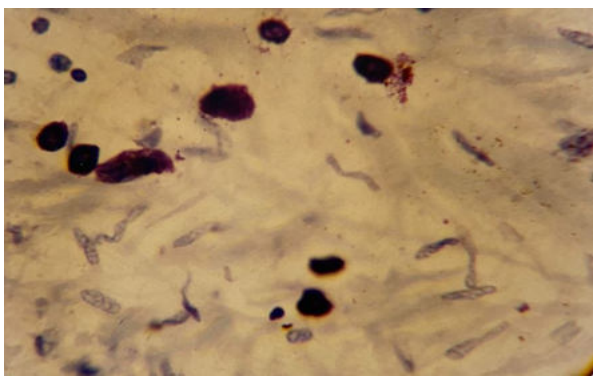

Figure: 1

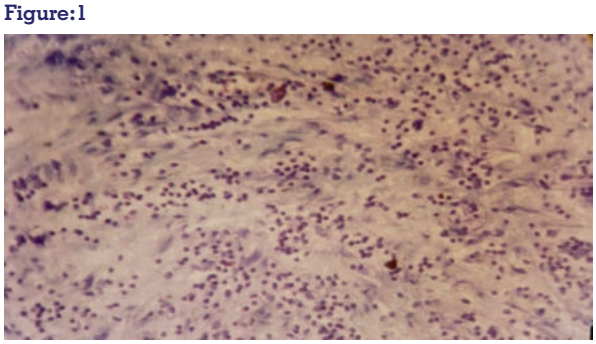

Figure: 2

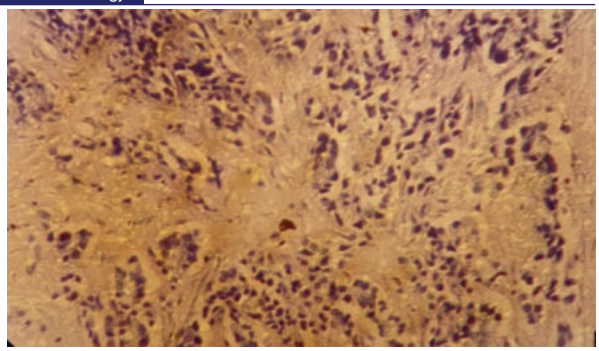

Figure: 3

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