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Mast cells in testicular lesions

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ABSTRACT

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The study was performed on orchidectomized tissue and testicular biopsies sent for histopathological examination which included; 9 cases of orchitis, 6 pyocele, 9 haematocele, 13 seminomas, 5 embryonal cell carcinoma, 2 teratocarcinoma, 2 lymphoma, 4 yolk sac tumor, 17 infertility lesions and 6 normal. Toluidine blue stained sections were examined under high power magnification (hpm) and the number of mast cell present in 10 consecutive fields was counted. There was a considerable variation in the number and distribution of mast cells in various testicular lesions. Mast cells were observed mainly in the areas of inflammatory infiltrate, granulation tissue and immature fibrous tissue. In infertility, interstitium and tubular walls were the areas of predilection for the presence of mast cells. The highest number of mast cells was noted in infertility (23/hpm), compared to inflammatory/reactive lesions (19/hpm) and testicular neoplasms (2/hpm). The highest and the lowest mast cell concentration were observed in infertility and testicular tumours compared to inflammatory/reactive lesions, respectively. The role of mast cells in the pathogenesis of infertility and testicular tumourogenesis requires further investigation.

INTRODUCTION

The mast cell is a connective tissue cell which possesses cytoplasmic granules that stain metachromatically with a variety of stains including cresyl violet, toluidine blue and Giemsa. It is found around the blood vessels, nerves, glandular duct (1) as well as in inflammatory and neoplastic foci (2–10). Mast cells contain important biologically active substances e.g. heparin, histamine and 5-OH-tryptamine (5HT). These substances are involved in various inflammatory and immunological reactions (11). Distribution of mast cells in different lesions involving lymph nodes

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(12), breast (6), uterus (13), cervix (14), and prostate (15) were studied, as well as its presence in wound healing (16), pterygium (17), atherosclerosis (18) and other disorders (2, 6, 7, 9). The presence of mast cells in normal testis of man and other species has been reported by various authors (1). However information about mast cell distribution in various testicular lesions is scanty. In this study, the distribution of mast cells in different testicular lesions was studied and their possible role in the pathogenesis of some testicular lesions is conveyed as well.

MATERIALS AND METHODS

Paraffin embedded orchidectomized tissue or testicular biopsies diagnosed at the department of pathology, M.R.Medical College, Gulbarga, India, were used in this study. The study was approved ethically.

Categories

The cases were divided among the following categories: normal testicular tissue, 6 cases, specific and non-specific orchitis, 6 cases, pyocele and haematocele, 15 cases, testicular tumours, 26 cases (13 seminomas, 2 lymphomas, 4 yolk sac tumours, 2 teratocarcinomas, 5 embryonal cell carcinomas), and 17 cases of infertility lesions.

Mast cell staining and counting

Sections of 4–5 microns thick were stained by hematoxylin and eosin (H & E) as routinely and also with 1% aqueous toluidine blue for mast cell. H & E stained sections were used to confirm the histological diagnosis whereas, toluidine blue stained sections were used to identify and to count the mast cell. The number of mast cell present in 10 consecutive high power fields was counted in all the sections. The mast cell count was expressed as mean and range of mast cells per hpm. Mast cell counts in various testicular lesions were tabulated and compared. The anatomical distribution of mast cell was also observed.

Statistical analysis

Mann-Whitney non-parametrical test was used for statistical analysis.

RESULTS

Mast cell count

The range and the mean number of mast cells per high power magnification (hpm) in normal testicles and various testicular lesions were shown in the table1. There was considerable variation in the number and distribution of mast cells in different testicular lesions. The least number of mast cells was observed in neoplastic (2/hpm) lesions, although not statistically significant but lower than their respective number in normal testicular tissue (8/hpm). The highest number of mast cells was seen in haematocele (30/hpm).The next highest was noted in testicular lesions of

Table 1. Mast cell count (mean and range) in various testicular lesions.

	Number of mast cell per hpm	
Category	Mean	Range
Normal	08	06–10
Haematocele	30*	07–44
Pyocele	20*	10–28
Infertility	23*	06–43
Tubercular orchitis	15	06–25
Non-specific orchitis	12	03–20
Testicular tumours	02	00–05

* $P < 0.05$ as compared to normal.

Table 2. Mast cell count (mean and range) in various group of lesions

	Number of mast cells per hpm	
Category	Mean	Range
Normal	08	06–10
Inflammatory/reactive	19*	03–44
Infertility	23*	06–43
Neoplastic	02	00–05

* $P < 0.05$ as compared to normal and neoplastic lesions.

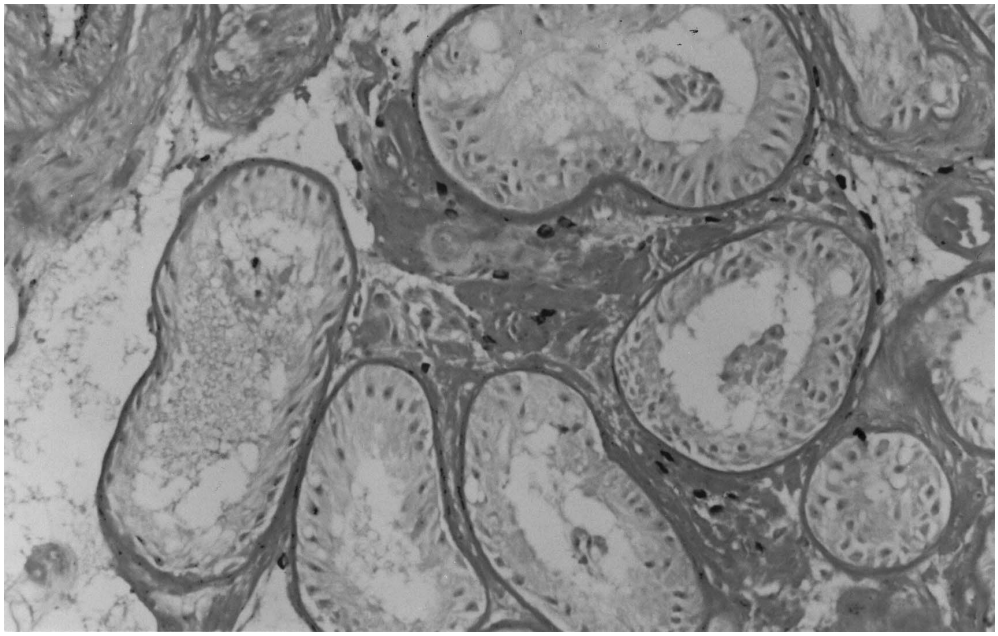
infertility (23/hpm) followed by pyocele, tubercular orchitis and non-specific orchitis showing a mean of 20, 15, and 12 per hpm, respectively. The mean number of mast cells in testicular tumours (2/hpm) was markedly lower than that of inflammatory and reactive lesions (orchitis, pyocele, haematocele) (19/hpm). The number of mast cells in infertility (23/hpm) was significantly higher than that of the latter group. $P<0.05$ (Table.2)

Mast cell distribution

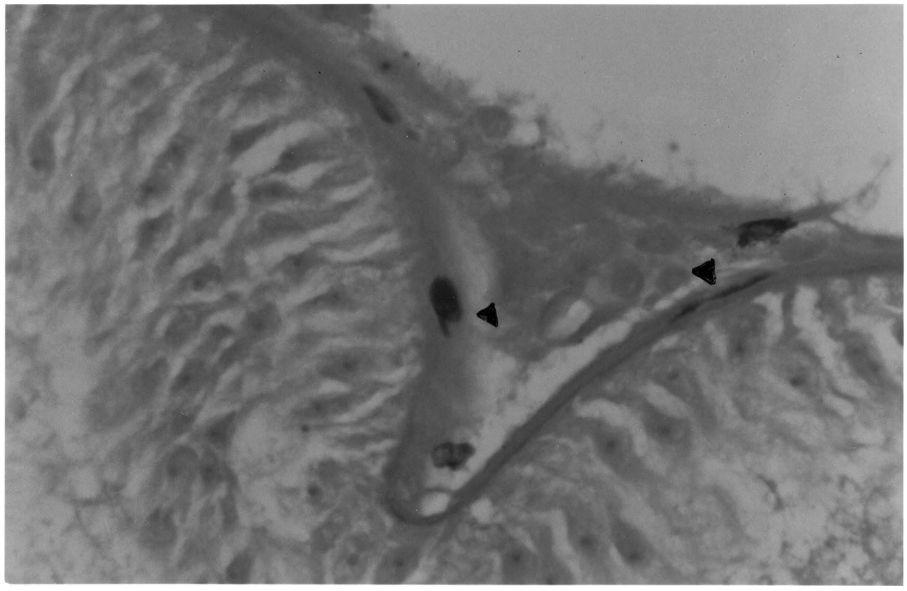
In haematocele and pyocele the mast cells were seen mainly in the tunica and the interstitium. They were concentrated in the areas of granulation tissue and immature connective tissue. In orchitis, they were seen mainly among other inflammatory cells and around epithelioid cell granulomas. In neoplastic lesions, when present they were mainly in the tunica and practically absent in the tumor parenchyma. The interstitium and seminiferous tubular walls were the areas of predilection for the presence of mast cells in cases of infertility.

DISCUSSION

The present study is a preliminary approach to comment on the mast cell distribution in various common testicular lesions. The mast cells with a battery of crucial chemical mediators and substances in their typical metachromatic granules are known to play a role in health and various disease states in man. Because of the



A



B

Fig.1. Testicular Atrophy.
A) Increased mast cells seen in the interstitium. (Toluidine blue, X 400)
B) Mast cell in the tubular wall (arrow head). (Toluidine blue, X 1000)

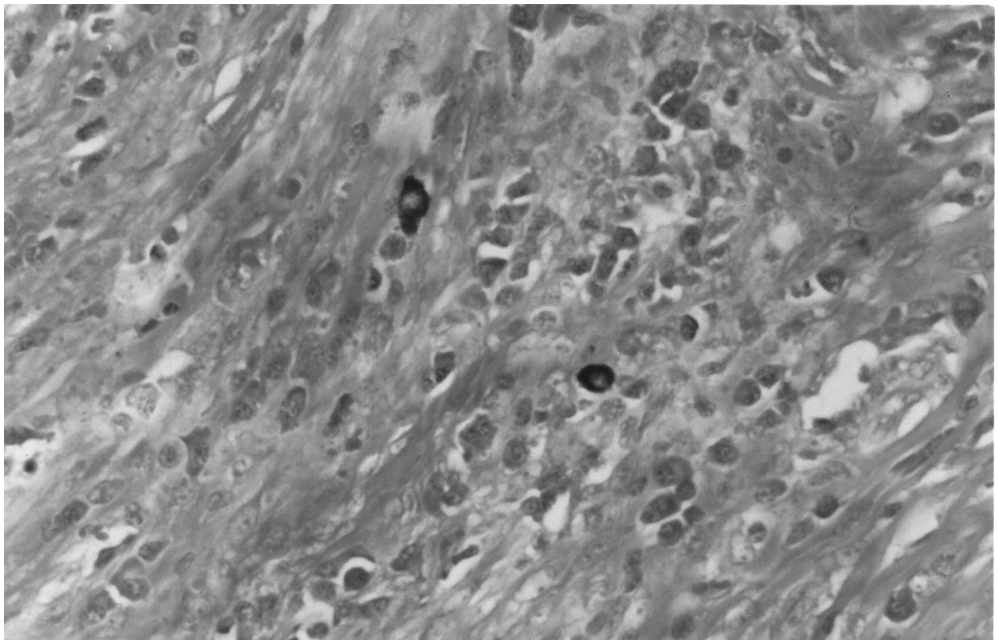


Fig.2. Non-specific orchitis. Note the presence of mast cells among inflammatory cellular infiltrate and in the premature fibrous tissue. (Toluidine blue, X 200)

multifarious role of mast cells in oedema formation, angiogenesis and fibrogenesis, it is logical to infer that mast cell alteration could be found in various inflammatory and neoplastic disorders (2, 3, 6, 7, 8, 9). Therefore our findings of increased mast cells in various testicular inflammatory/reactive lesions namely, pyocele, orchitis (specific/non-specific) and haematocele are not surprising.

The accumulation of mast cells within and around the tumour areas is well known (19–23). The interaction between the mast cell and tumour cell may play a role in the pathophysiology of host reaction to neoplasia. The exact functional significance of such phenomenon is a subject of controversy as in some studies mast cells have been shown to be cytotoxic for some tumours, while in other studies mast cell products was found to promote tumour growth and metastasis (24). In the present study the mast cells were markedly reduced or absent in testicular tumours. Similar observation was made in cervical (14) and prostatic neoplasia (15). This is in contrast to their prevailing presence in other tumours such as squamous cell carcinoma of oesophagus (19), lung adenocarcinoma (20), brain tumors (21), melanocytic tumors (22) and breast cancer (23). Since many years, it has been observed that, the testicle is an immunologically privileged site. An antigen within it fails to elicit immune response (25). It turns out that, cells in this site, namely Sertoli cell, differ from other cells of the body in that they express high levels of Fas-L. Thus, any cell that expresses Fas, perhaps may be killed when they enter this site

and the mast cell expresses this Fas (26). Would it be the mechanism behind the reduced number of mast cell in testicular neoplasms, compared to the other sites neoplasms? This needs precise investigation. Mast cell count can be used as a prognostic marker in tumours and their number may indicate poor prognosis (19, 20). In view of reduced number or absent mast cell in testicular tumours, a prognostic role is not valid but, they can have a role in differentiating between some neoplastic and inflammatory/reactive testicular lesions.

Our findings of significantly increased number of mast cells in testicular atrophy (23/hpm), compared to normal (08/hpm) are very interesting. The present results are similar to those published by others (27–29) who highlighted the increased number of mast cells in testicular lesions associated with infertility. Meineke et al (29) observed, as we did, a shift of mast cells from interstitium to tubular wall. Hashimoto et al (27) used a mast cell blocker for the treatment of patients with idiopathic infertility. An infertile male with idiopathic azoospermia was treated with administration of a mast cell-blocker, Tranilast (A.G. Scientific, Inc., San Diego, USA) for one year. The patient was found to have sperms within his ejaculate. However, the ultimate goal of pregnancy was not achieved. Recently, Hibi et al (30) reported a more significant effect of Tranilast on patients with idiopathic oligozoospermia. The number of sperms was significantly increased and pregnancy was achieved in three patients. Therefore, we believe that, mast cell may play a role in the pathogenesis of infertility, which has to be elucidated.

The cases in the present study though not very large, appear to be quite sufficient to draw logical conclusions which might prove to be of additional value. In conclusion, the number of testicular mast cells was significantly increased in various testicular inflammatory/reactive lesions and lesions associated with infertility, whilst their number in neoplasms was exceptionally reduced. The role of mast cell in the pathogenesis of infertility and testicular tumourogenesis needs further research.

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