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The study of Gleason's patterns in prostatic adenocarcinoma and correlation with PSA levels - An institutional experience

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ABSTRACT

Aim of the study – To determine the utility of PSA levels in diagnosis of Prostate carcinoma and correlation of PSA levels with Gleason pattern of on histopathology. Importance of preoperative total serum PSA levels with grades of adenocarcinoma of prostate.

Materials and methods –This is retrospective study performed at tertiary care hospital during the period of May 2018-June 2019.This study included 74 patients with the diagnosis of prostatic adenocarcinoma and all the 74 cases of prostatic adenocarcinomas were studied in detail correlating the clinical and histopathological findings. PSA Levels of all these patients were recorded.

Results -In this study we found that all the patients of prostatic cancer were in the older age group. The mean age was 68.66 years for prostatic adenocarcinoma. PSA levels range between 50-100ng/ml. High PSA levels(>100ng/ml) are seen in patients with Grade III Prostatic carcinoma (10 cases).In the present study, according to Modified Gleason's scoring system Majority of prostatic adenocarcinomas were in grade II(42 cases) with Gleason's score 6 (36.4%).Most common pattern being pattern 3 and 4.

Conclusion –With these observations, the present study indicates that all cases of prostatic adenocarcinoma should be meticulously graded according to Gleason's scoring system and preoperative PSA levels well correlated with the grade of the tumour, as it is helpful in treatment of high grade cases.

Key words – Prostatic adenocarcinoma,Gleason's patterns, Gleason's score, PSA,Grade of the tumour.

I. INTRODUCTION

Prostate cancer is one of the leading causes of death amongst men in the western world.Prostatic cancer is unique as it is an unpredictable tumour, aggressive in young adults and slow growing and potentially harmless in elderly individuals1,2. Histological grade and stage of prostatic carcinoma are vital in planning the treatment strategies and predicting survival rate.

Prostate specific antigen (PSA) is a glycoprotein enzyme secreted by epithelial cells of the prostate. PSA is an important tumor marker in the diagnosis of prostatic adenocarcinoma. PSA is present in serum of men, with normal prostate, but the levels are elevated in pathological conditions like prostatitis, hyperplasia and prostatic carcinoma3.

In conditions like inflammation, hyperplasia and malignancy, there is destruction of cell integrity whichleads to release of PSA into circulation. This produces increase in serum PSA level4,5. The malignant cells in most of the prostatic carcinoma are immunopositive for PSA and have been used for identifying the metastatic deposits.

In prostatic carcinomas, serum PSA value depends upon the differentiation of the tumor cells. The poorly differentiated prostatictumors will have low serum PSA levels when compared to well differentiated tumors6

II. MATERIAL AND METHODS

This is retrospective study performed at tertiary care hospital during the period of May 2015-June 2016. The data necessary for study has been retrieved from the histopathology records in the department.

This study included 74 patients with the diagnosis of prostatic adenocarcinoma and all the 74 cases of prostatic adenocarcinomas were studied in detail correlating the clinical and histopathological findings. The biopsy material was provided by the department of urology. Prostatic biopsy was collected from patients With high serum PSA levels who underwent transurethral or trans-rectal resection/ ultrasound guided biopsy of the prostate for prostatic lesion with suspicion of malignancy.

Multiple sections were studied from each tumour by paraffin embedding technique. Sections of 4 to 5 µ thickness were cut on a rotary microtome and the routine stain which has been used for all the tumours was Ehrlich's haematoxylin and eosin. A detailed microscopic examination has been carried out.

Preoperative serum PSA levels are noted in these cases. PSA levels in these cases were compared with the Gleason's grade of these tumours. Serum PSA was done on ACCESS-2 (BECKMAN COULTER) by chemiluminescence method. The range of PSA determination using this equipment is 0.1-150ng/ ml.

The applied nomenclature is adopted by the 2016 WHO classification.

The age of the study group patients ranged from 50 to 95yrs.

Inclusion criteria

1. All the cases with a diagnosis of prostatic adenocarcinoma with adequate and representative biopsies.

Exclusion criteria - Cases where biopsy material is inadequate are excluded.

III. RESULTS

Prostatic biopsy specimens obtained from 74 patients with diagnosis of prostatic adenocarcinoma. These cases were studied in relation to age and serum PSA levels. In all these malignant cases serum PSA levels were compared with grades of carcinoma.

Table 1: Prostatic lesions in relation to different age groups

Age group	Total number of malignant cases
50-59 yrs	14
60-69 yrs	26
70-79 yrs	20
80-89 yrs	12
90-99 yrs	2
total	74

Maximum numbers of malignant cases were in the group of 60 -69 years.

Table 2: Correlation of PSA levels with Prostatic adenocarcinoma.

PSA range (ng/ml)	Total number of malignant cases
<4	00
4-10	09
11-20	07
21-50	16
51-100	22
101-150	15
151-200	00
>200	05

In our study no case was found to have PSA levels less than 4ng/ml.

9 cases hadPSA levels in the range of 4.0 – 10ng/ml.In the PSA range of 10 -20 ng/ml, 07 cases were noted. 16 cases had PSA values in the range of 21 –50ng/ml. In the range of 50 – 100 ng/ml, 22 cases were noted. 15 cases had PSA values in the range of 101-150ng/ml. There were 5 cases which had PSA values of more than 200ng/ml

Table 3: Frequency distribution of different primary Gleason's patterns in prostatic adenocarcinomas

Sl No.	Gleason's Primary Pattern	Number of Cases	Percentage
1	Pattern 2	02	2.7%
2	Pattern 3	39	52.7%
3	Pattern 4	28	37.8%
4	Pattern 5	05	6.7%

Table 4: Frequency distribution of different secondary Gleason's patterns in prostatic adenocarcinomas

Sl No.	Gleason's Secondary Pattern	Number of Cases	Percentage (%)
1	Pattern 2	00	0%
2	Pattern 3	33	44.6%
3	Pattern 4	38	51.4%
4	Pattern 5	03	4%

Table 5: frequency distribution of Different Gleason's scores in prostatic adenocarcinomas

Sl No.	Gleason's Score	Number of Cases	Percentage
1	Score 5	2	2.7%
2	Score 6	27	36.4%
3	Score 7	25	33.7%
4	Score 8	12	16.2%
5	Score 9	8	10.8%

In the present study, according to Modified Gleason's scoring system majority of tumours fall into pattern 4 and majority constituted Gleason's score 6.

Table – 6 Distribution of different grades of prostatic adenocarcinomas

S.NO	Gleasons Grade	Total number of cases
1	Grade I	02
2	Grade II	42
3	Grade III	30

Table – 7 Distribution of different grades of prostatic adenocarcinoma in correlation with PSA levels

Gleasons Grade	PSA LEVELS 10-20ng/ml	PSA LEVELS 20-50ng/ml	PSA LEVELS 50-100ng/ml	PSA levels >100 ng/ml
Grade I	05	00	00	00
Grade II	02	16	18	04
Grade III	00	00	04	16

Majority of prostatic adenocarcinomas were in grade II with higher PSA levels (>100mg/ml) are seen in Grade III.

IV.DISCUSSION

Age incidence

In this study we found that all the patients of prostatic cancer were in the older age group. The mean age was 68.66 years for prostatic adenocarcinoma (Table 1). No significant age difference was detected between benign and malignant cases.

Men et al. found similar age incidence of 64.67 years for prostatic cancer.[7]

PSA levels

Among the 74 cases of carcinoma in the study, maximum number of cases of prostatic adenocarcinomas showed PSA levels between 50-100ng/ml, 7 cases had more than 80 ng/ml of PSA levels, while remaining cases show PSA levels below 80 ng/ml.(Table 2) Mean PSA was not significantly higher in carcinomas in the present study, which is also corroborated by the results of study by Aboseif etal.[8]

In the present study, prognostic importance of preoperative total serum PSA levels with grades of adenocarcinoma of prostate were studied. In our study maximum number of malignancies has serum PSA value of more than 50ng/ml which coincided with study done by Lennox Anderson Jackson et al.

In our study histological grade IIIcarcinomas were restricted to PSA levels of 50 and above, while grade I was restricted to PSA level of 10-20 ng/ml and grade IIcarcinomas did not have any correlation with specific PSA levels. In studies done by Lennox Anderson Jackson et al.[9], histological grade III adenocarcinoma had a PSA range of 76 to190 ng/ml, while grade II carcinomas

had PSA range of 20-100 ng/ml. Our study coincided with the conclusion drawn from the studies of Lennox Anderson Jackson et al. that histologically highergrades of prostatic carcinomas are associated with higher PSA levels. (Table 6 and 7)

Gleasons' pattern and score

All the 74 cases of prostatic adenocarcinomas in the study were graded using modified Gleason's scoring system. Primary grade is assigned to the dominant pattern and second grade is assigned to the pattern which occupies >5% of the tumour. Two numeric grades are added to obtain the combined Gleason's score. In tumours with one pattern of arrangement, the number is doubled. Majority of our cases showed moderate to poor differentiation.

Gleason's scores 2 and 3 are only exceptionally assigned, because Gleasons pattern 1 is unusual. Gleason's score 4 is also relatively uncommon because pattern 2 is usually mixed with some pattern 3 resulting in a Gleason's score 5. Gleason's score 2-4 tumour may be seen in TURP material sampling the transitional zone. However in core needle biopsy material, it has been proposed that a Gleason's score of 2-4 should not be assigned [10, 11] (Table 3,4)

In the present study Gleasons score 6 (moderately differentiated), was seen in 27 cases (36.41%). Similar observations are made in the studies of Micheal A Bean et al accounting for 49%[12].

Gleason's score of 7 was seen in 52 cases(33.7%),followed by Gleason's score of 8 in 12 cases (16.2%), Gleason's score of 9 in 8 cases (10.8%),Gleason's score of 5 in 2 cases(2.7%).

The earlier patterns of Gleason's score were not seen in our study, as compared with study done by Babaian Richard et al[13].

Criteria evaluated for diagnosis of Gleason's pattern 2, less uniform, medium sized glands separated by scanty stroma. These features were seen in two cases in the study. Gleason's grade 3 pattern (Fig 1a, 1b) of individual glands infiltrating stroma was seen in twenty cases. Micro acinar and small cribriform pattern were seen in the remaining cases. Gleason's grade 4 pattern (Fig2a,2b)showing fused glands was observed in eighteen cases, hypernephroid pattern was seen in seven cases, micropapillary pattern was seen two cases and large cribriform pattern seen in remaining cases. Gleason's grade 5 (Fig 3a, 3b) pattern showing solid sheets of tumour cells without gland formation was observed in seven cases. Comedonecrosis was seen in one case. (Table 5 and 6)

V. CONCLUSION

With these observations, the present study indicates that all cases of prostatic adenocarcinoma should be meticulously graded according to Gleason's scoring system and preoperative PSA levels well correlated with the grade of the tumour, as it is helpful in treatment of high grade cases.

Prostatic Adenocarcinoma with Gleason's pattern 3

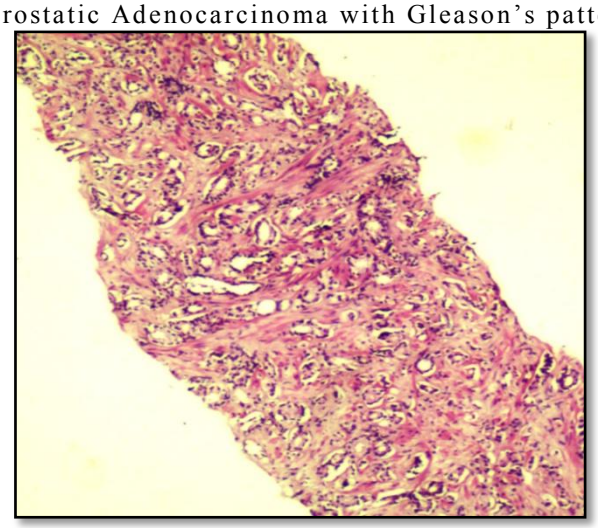

Fig 1a - scanner view (4x)
small irregular discrete glands invading stroma.

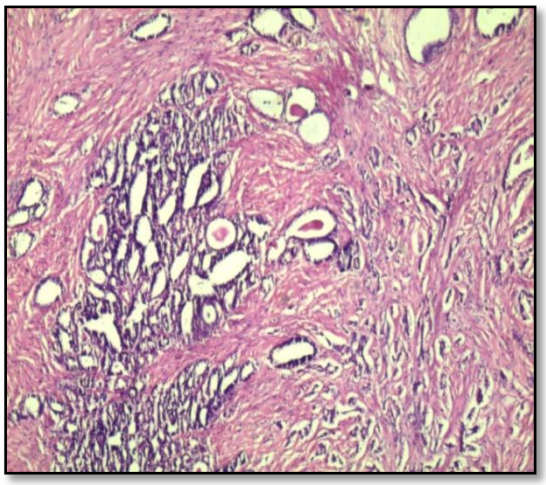

Fig 1b – Scanner view (4x) circumscribed nodule with varying sizes of packed glands

Prostatic adenocarcinoma with Gleason's pattern 4

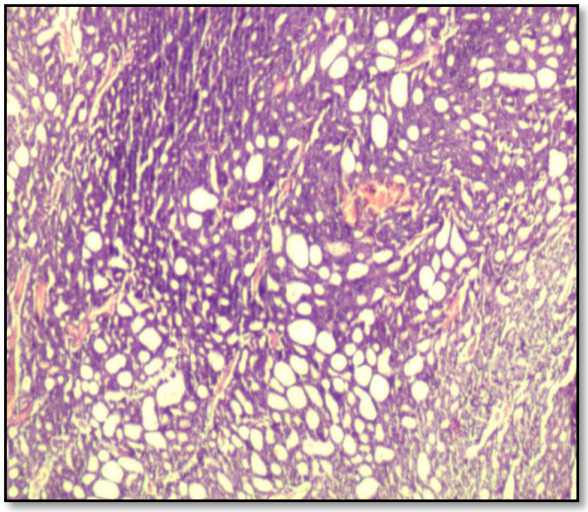

Fig 2a – Scanner view (4X) large cribriform patterns

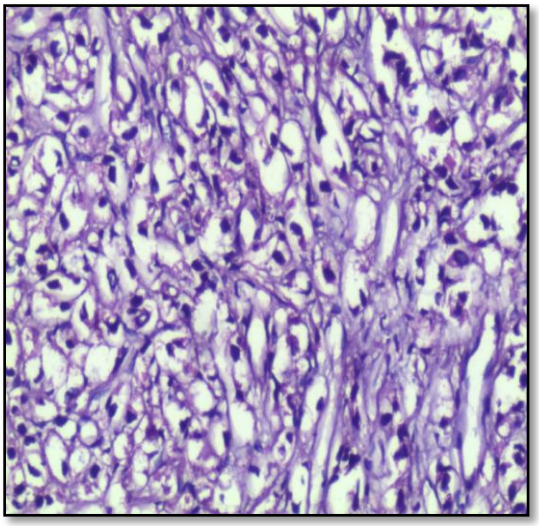

Fig 2b – High power view (40x) cells with clear cytoplasm

Prostatic adenocarcinoma with Gleason's pattern 5

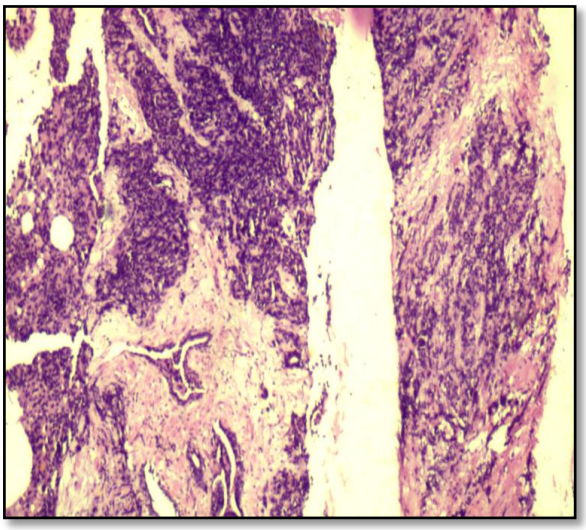

Fig 3a - Scanner view (4x) sheets of pleomorphic cells

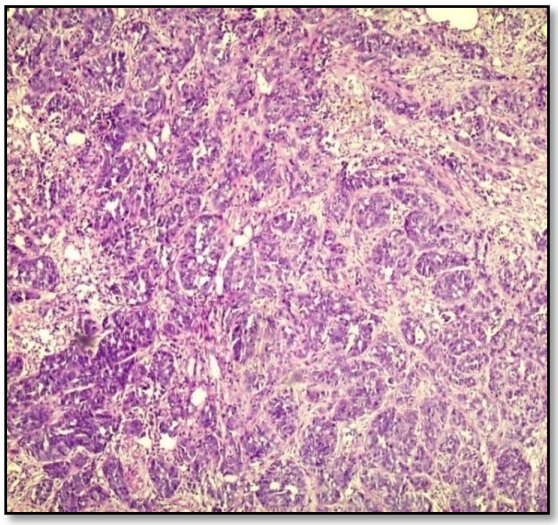

Fig 3b - Fig 14 – Scanner view (4x) cords of tumour cells

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