Original Article

Cytological Grading of Prostate Carcinoma: A Comparative Study with the International Society of Urologic Pathology Grading System

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Abstract

Introduction: The Gleason grading system is one of the most powerful prognostic predictors of carcinoma prostate. In 2014, a newer grading system, the International Society of Urologic Pathology (ISUP) grading system was proposed. The present study is a retrospective study conducted to compare the cytological grading of prostate carcinoma with the newly proposed ISUP grading system for prostate carcinoma. **Materials and Methods:** The present study is a retrospective study that included 42 cases of carcinoma prostate. The clinical data of the cases, fine-needle aspiration cytology slides, and histological slides were retrieved and reviewed. The cases were regraded using the ISUP grading system for prostate carcinoma. Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS). Data were statistically analyzed and Chi-square testing was used to compare the two grading systems. **Results:** A total of 42 cases were studied. The preoperative grade was assigned to the smears and 26.19% (11 cases) were categorized as grade 1, 40.47% (17 cases) as grade 2, and 33.3% (14 cases) as grade 3. Histological sections were also graded according to the ISUP/grade groups (GG) system and 26.19% (11 cases) were graded as GG 1, 33.3% (14 cases) as GG2, 19.04% (8 cases) as GG3, 16.67% (7 cases) as GG4, and 4.47% (2 cases) as GG5. **Conclusion:** In the present study, it was concluded that there is a direct concordance between the histologic grade as proposed in the ISUP grading system and the cytologic grade on FNA.

Keywords: Carcinoma, fine-needle aspiration cytology, Gleason's grade, International Society of Urologic Pathology grading system, prostate

Introduction

Fine-needle aspiration cytology (FNAC) is a proven diagnostic technique in clinical practice to diagnose and grade a malignancy, and in addition to that, FNAC provides information about intrinsic as well as prognostic features. FNAC of the prostate was first performed by Ferguson in the early 1930s.[1] However, initial reports were not very encouraging due to the lack of definite criteria for interpretation.

It was until the late 1980s, with the advent of radiologic-assisted aspiration was used in the prostate along with serum prostate-specific antigen, the FNAC of the prostate had been widely used by cytopathologists and clinicians for the diagnosis of carcinoma prostate. Several authors have discussed the cytological diagnosis of prostate carcinoma with different accuracy rates.[2-7] Although the results of FNAC were sensitive enough to diagnose the malignancy, still FNAC was replaced gradually by True-cut biopsy, where one can grade the carcinoma by the Gleason's grading system which had a great impact on prognosis as well as on the management plan.[8]

Considering this, many cytopathologists tried to grade the carcinoma on FNAC and found almost comparable sensitivity and specificity with the Gleason's grading system.[9-11] Despite many grading systems, there was no consensus among cytopathologists and clinicians to accept one of them as the gold standard, so even today many hesitate to grade prostate carcinoma on cytology.

Submitted: 21-Sep-2021 **Revised:** 08-Dec-2021
Accepted: 13-Dec-2021 **Published:** 30-Dec-2021

Access this article online

Quick Response Code:

Website: www.actamedicainternational.com

DOI: 10.4103/amit.amit_148_21

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How to cite this article: Kala C, Bajpai A, Kala S, Khan L. Cytological grading of prostate carcinoma: A comparative study with the International Society of Urologic Pathology grading system. Acta Med Int 2021;8:163-5.

Histologically, the Gleason grading system is one of the most powerful prognostic predictors of carcinoma prostate and from time to time, this system has undergone significant revisions to address potential deficiencies in the grading system. In 2014, a newer grading system, the International Society of Urologic Pathology (ISUP) grading system was proposed.[8,12,13] The ISUP grading system is more uniform, precise, clear, and allows better discrimination between individual groups compared to the previous Gleason grading system.[8,14,15] To date, the available literature compared the cytological grading of prostate carcinoma with Gleason's grade. This is the first time in the present study we compare the cytological grading with the newly proposed ISUP grading system retrospectively.

Materials and Methods

Study design and sample size

The present study is a retrospective study conducted in the Department of pathology and included 42 cases of carcinoma prostate. The data were collected from a period of 10 years from 2009 to 2019. The cases having complete clinical, cytological, and histological data were included in the study. The cases which do not fulfill the adequacy criteria both cytologically and histologically were not included in the study. The clinical data of the cases, FNAC slides and histological slides were retrieved and reviewed. The cases were regraded using the ISUP grading system for prostate carcinoma.

Study setting

The aspiration was performed using Franzen needle with a 22-gauge needle through the transrectal route. Since the institute does not have a facility of transrectal ultrasonography, hence the FNA procedure was attempted blindly. The smears prepared were processed as either alcohol-fixed hematoxylin and eosin stain or air-dried May-Grünwald -Giemsa stained smears. Smear adequacy criteria taken was the presence of 10–12 epithelial cell clusters. After cytological diagnosis and detailed investigation, patients were planned for surgery and the corresponding prostatectomy specimens were processed.

The cytological smears were graded by the Esposti grading system, which is considered as the most reliable method for cytological grading of prostate carcinoma.[16] Esposti grade prostate carcinoma was divided into three categories.

Grade 1/well differentiated: Well-differentiated prostatic carcinoma cytologically characterized by mildly pleomorphic nuclei and varying size and shaped nuclei and well-defined acini/gland formation.

Grade 2/moderately differentiated: Moderately differentiated prostatic carcinoma cytologically characterized by increased nuclear and cytological atypia, prominent nucleoli, and less well-defined acini/gland formation compared to grade 1 prostate carcinoma.

Grade 3/poorly differentiated: Poorly differentiated prostatic carcinoma cytologically characterized by marked cytologic and nuclear atypia with the predominance of isolated single cells.

Histological slides were also reviewed and a new ISUP grade was assigned according to the Gleason's score (GS) which consists of five grade groups (GG).[17]

GG1: GS = or <6

GG2: GS 3 + 4 = 7

GG3: GS 4 + 3 = 7

GG4: GS = 8

GG5: GS = or >9

Results of cytology were compared with histological findings. Data were statistically analyzed and Chi-square testing was used to compare the two grading systems. $P < 0.05$ was considered to be statistically significant.

Results

Total 42 cases were studied. On cytology, all cases met the adequacy criteria, with sufficient material for cytological diagnosis. The highest number of cases were found in the age group 61–70 years (40.4%, 17 cases) followed by 71–80 years (26.1%, 11 cases), 51–60 years (21.4%, 9 cases), 41–50 years (9.5%, 4 cases), and 81–90 years (2.3%, 1 case).

The preoperative grade was assigned to the smears and 26.19% (11 cases) were categorized as grade 1, 40.47% (17 cases) as grade 2, and 33.3% (14 cases) as grade 3. Histological sections were also graded according to the ISUP/GG system and 26.19% (11 cases) were graded as GG 1, 33.3% (14 cases) as GG2, 19.04% (8 cases) as GG3, 16.67% (7 cases) as GG4, and 4.47% (2 cases) as GG5.

Table 1 compares the cytological grading of prostate carcinoma with histologic grading based on the ISUP grade system. Chi-square statistics was 44.7048 and the $P < 0.00001$, and the results were significant. Thus, there is a strong concordance of the grading by cytology and grading by new ISUP grading on histology.

Discussion

Prostate cancer is a major health problem in both developing and developed countries. In developing countries such as India, it is one of the most common causes of mortality, the main reason being the lack of awareness among the patients. More so ever, there is no standardized screening protocol for the early detection of carcinoma prostate. With few initial hesitations, FNAC has gained popularity as a diagnostic and

Table 1: Distribution of cases of prostate carcinoma on the basis of cytohistologic grading

Grade	GG1	GG2	GG3	GG4	GG5	Total cases
Grade 1	9	2	-	-	-	11
Grade 2	2	10	5	-	-	17
Grade 3	-	2	3	7	2	14
Total cases	11	14	8	7	2	42

GG: Grade groups

screening method for prostate carcinoma as FNAC is a less traumatic, cost-effective outdoor procedure which is well tolerated by patients compared to the more invasive biopsy methods along with comparable accuracy rate.[3,18] In the present study also, the FNAC was well tolerated by patients with no complications.

Most of the studies grade the prostatic carcinoma on cytology based on the degree of cellular anaplasia and differentiation, while histologically, the grade is based on architectural pattern, completely ignoring the cytomorphological features.[19,20] Apart from this inherent difficulty in comparison, few studies have stated that compromised tissue sampling and specimen size also affect the overall grade and found that the agreement between cytologic and histologic grading ranged between 28% and 69%.[3,4,21] Contrary to this, there were studies which state that by screening a large sampling area, FNAC is less likely to miss an early malignant cell.[22,23] In the present study also, there was no case found with inadequate or insufficient material for grading and diagnosis of carcinoma.

Studies also had shown that cytological grading of carcinoma prostate correlates well with GS in biopsy and correlates well with clinical stage, therapeutic response, and survival rate.[9,20,24] In the present study, we graded the carcinoma prostate cytologically into well, moderate, and poorly differentiated carcinoma as Esposti graded in this study and found agreement with histopathology in 89% of cases.[16] Similarly, many other studies had also found agreement up to 70% of cases suggesting a strong correlation between cytologic and histologic grading.[3,20,25-26] In the present study also, we graded prostate carcinoma cytologically and found that there is direct concordance between the histologic grade as proposed in the ISUP grading system and the cytologic grade on FNA.

Conclusion

In our study data, there is a strong concordance of the grading by cytology and grading by new ISUP grading on histology which supports that we can grade carcinoma prostate on cytology efficiently, and cytological grading is as accurate as the ISUP histological grading and in resource poor areas where facility of core biopsy is not available, it can be used as screening and grading tool to diagnose and grade carcinoma cases.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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