Content available at: iponlinejournal.com

Indian Journal of Pathology and Oncology

Journal homepage: www.innovativepublication.com

Original Research Article

Diagnostic utility of core biopsy in histomorphologic evaluation of prostatic carcinoma

Disha Shetty[1,*], Karthik Hariprasad Shetty[2], Muktha R Pai[1]

[1]*Dept. of Pathology, AJ Institute of Medical Sciences & Research Centre, Mangalore, Karnataka, India*
[2]*Dept. of Surgery, Asian Cancer Institute, Mumbai, Maharashtra, India*

ARTICLE INFO

Article history:
Received 26-12-2019
Accepted 10-01-2020
Available online 25-05-2020

Keywords:
Prostate cancer
Core biopsy
Gleason
Prognostic grade group

ABSTRACT

Background: Core biopsy is a minimal invasive procedure that can help in a definitive diagnosis. Clinicopathological correlation is necessary for early detection of prostate cancer.
Objective: To correlate histomorphological features of prostatic lesions with clinical data by evaluating core biopsy.
Materials and Methods: The present study was conducted in Department of Pathology in a tertiary care hospital. Fifty eight prostatic core biopsies which were clinically suspicious of malignancy with Digital Rectal Examination, Prostate Specific Antigen (PSA) levels and Transrectal ultrasound (TRUS) /magnetic resonance imaging (MRI) findings were considered.
Results: Eighty six percent of the suspected cases turned out to be malignant. Most of the patients were of age group 66-75 years. The most common chief complaint was lower urinary tract symptoms. On Digital Rectal Examination, 64% of cases presented with hard prostate and prostatomegaly. 86% of the cases had PSA level >10ng/ml. TRUS was performed in 45% of cases and MRI in remaining 55% of cases. The commonest Prognostic Grade Group was V, Modified Gleason score was 9, Gleason pattern was 4. Prostatic intraepithelial neoplasia was associated in 45% of the cases. 21% of the cases presented with extraprostatic metastasis(bone).
Conclusion: Prostatic core biopsy along with clinical correlation stands out to be a good screening test in association with histomorphologic evaluation for the early diagnosis in clinically suspicious cases of prostatic carcinoma.

1. Introduction

Prostatic adenocarcinoma is the second leading cause of death in men after lung/bronchial cancers.[1] Core biopsy is a minimal invasive procedure that can help in a definitive diagnosis. Modified gleason score and prognostic grade group are important prognostic markers for prostate carcinoma. Clinicopathological correlation is necessary for the early detection of the disease. The combination of digital rectal examination [DRE], transrectal ultrasonogram [TRUS]/magnetic resonance imaging [MRI] and serum prostate specific antigen [PSA] estimation, supplemented with biopsy procedures represent a powerful diagnostic tool in the diagnosis of neoplastic lesions of prostate.

2. Objectives

1. To evaluate clinically and radiographically suspicious prostatic lesions.
2. To determine histomorphological features of prostatic carcinoma.
3. To grade these lesions using Prognostic grade grouping.

3. Materials and Methods

The present study was conducted in Department of Pathology in a tertiary care hospital for a period

* *Corresponding author*.
E-mail address: shettyds26@gmail.com (D. Shetty).

https://doi.org/10.18231/j.ijpo.2020.058

of two years from 2017-2019. Fifty eight prostatic core biopsies which were suspicious of malignancy on clinical examination [DRE], PSA levels and radiological investigations [TRUS/MRI] were included in the study. Relevant clinical data including chief complaints, PSA values and radiological findings in all the suspected cases of carcinoma prostate were recorded. The biopsy material included only needle biopsies. All the specimens were fixed in 10% neutral buffered formalin, processed and sections were cut and stained with haematoxylin and eosin stain (H & E stain). Then gleason pattern analysis was done. The modified gleason score was determined by adding the most common pattern with the highest grade pattern. Tertiary patterns are not recorded on needle biopsy. Prognostic grade grouping was derived from modified gleason score [Table 1].

4. Results

4.1. Clinical work up

On clinical examination, patients usually presented with lower urinary tract symptoms (LUTS) (68%). LUTS includes voiding or obstructive symptoms like increased frequency of micturition, hesitancy, poor stream, incomplete voiding, terminal dribbling, urinary retention or urge incontinence. Patients of age group 66-75yrs (42%) were commonly affected. On DRE, 64% of the patients with hard prostate were suspected for malignancy. PSA levels were estimated in 96% of the cases. Out of which, 86% of them had PSA level >10ng/ml. MRI / TRUS was done in all clinically suspicious cases. 55% of the cases were diagnosed on MRI. 45% of them were diagnosed by TRUS where 72.7% of those cases showed hypoechoic lesion or irregular nodularity, 6% of them showed hyperechoic and the rest with isoechoic lesion.

4.2. Histopathology

This study comprised of 58 cases, out of which 5% were benign, 9% were premalignant and 86% were malignant. On pattern analysis [Figures 2, 3, 4 and 5], the commonest gleason pattern noticed in our study was pattern 4 (84%). Modified gleason score was calculated, the commonest being score 9 (40%) [Figure 1]. Then, prognostic grade grouping was derived based on modified gleason score [Table 1]. Prognostic grade group V was the most common (47%) followed by grade group III (18%) [Table 2]. 45% of the cases (n=26) were associated with PIN [Figure 6]. Other important feature that we noticed was 21% of the cases presented with metastasis to bone especially to the vertebra. We also observed that metastasis was associated with higher grade groups, most common being grade group V(13%) followed by grade group IV(5%) and grade group III (3%)[Table 3].

Table 1: Prognostic grade grouping

Prognostic grade group	No. of cases	Percentage
I	5	9
II	7	12
III	10	18
IV	8	14
V	28	47

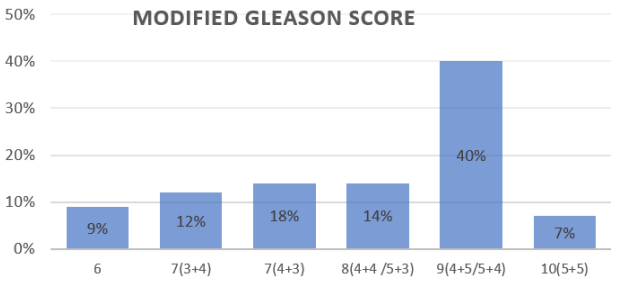

Fig. 1: Modified gleason score

Table 2: Prognostic grade group

Pattern	Gleason score	Prognostic Grade Group
3+3	<6	I
3+4	7	II
4+3	7	III
4+4 3+5 5+3	8	IV
5+4 4+5	9	V
5+5	10	V

Table 3: Metastasis to bone

Metastasis to bone	No. of cases	In percentage(%)
Grade group V	8	13
Grade group IV	3	5
Grade group III	2	3
Total	12	21

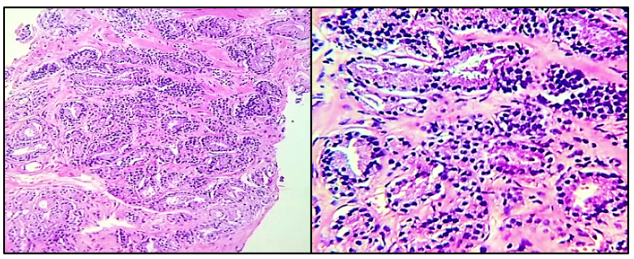

Fig. 2: Gleason Pattern 3-Discrete glandular units, marked variation in size and shape [H&E@10X & 40X]

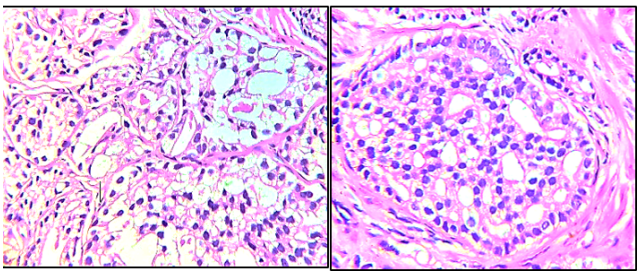

Fig. 3: Gleason pattern 4- Fused glands and Cribriform glands [H&E@40X]

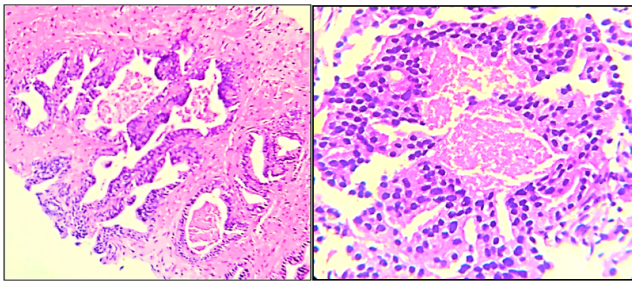

Fig. 4: Gleason pattern 5- Central comedonecrosis [H&E@10X &40X]

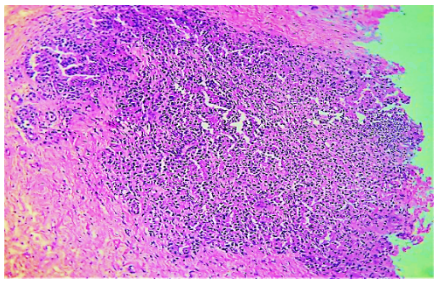

Fig. 5: Gleason pattern 5 - Solid sheets [H&E@40X]

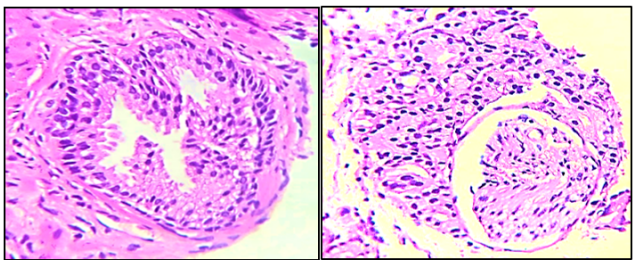

Fig. 6: High grade PIN exhibiting tufting and Perineural invasion [H&E@40X]

5. Discussion

The Gleason grading system has evolved from its original scheme established in the 1960s–1970s modified after two major consensus meetings conducted by the International Society of Urologic Pathology (ISUP) in 2005 and 2014.[2] Prognostic grading system has been incorporated into recent WHO classification of prostate cancer, CAP protocol, AJCC/ UICC staging system and NCCN guidelines as one of the key factors in treatment decision. Clinicopathological correlation with PSA levels, radiological investigations and core biopsy is essential for the early diagnosis.

Prostatic disorders are commonly encountered in elderly men. In our study, the mean age of presentation of prostatic carcinoma was 68 years. A. Josephine et al, in their study found the mean age for prostatic carcinoma to be 68.8yrs.[3] The maximum incidence of prostatic lesions in the present study was among 66-75yrs age group and the most common presentation being LUTS. Patients usually presented with LUTS having voiding /obstructive symptoms or storage/ irritative symptoms. Similar study conducted by Kohale et al found the common age group being 71-80 yrs presented with hematuria as the most common chief complaint.[4] On DRE, 64% of them presented with hard or irregular prostate. In the study conducted by Kohale et al, on DRE 71.43% of patients had hard or nodular prostate.[4]

PSA level alone is not the effective screening test of carcinoma prostate. Many causes like prostatitis, infarction, instrumentation of prostate, prostate needle biopsies are also responsible for the elevated PSA level. Moreover, PSA level is age specific. PSA velocity (rate of change of PSA level) is more specific. At least three PSA values are calculated over period of 1.5 to 2 years. Significant rise in PSA levels (>0.75ng/mL) even if latest PSA level is less than 4ng/mL, should prompt a work up.[5] Raised PSA level can categorise the patient as suspicious of prostatic neoplasm which would require further evaluation or follow up.

Radiographically, MRI guided prostate biopsy is more precise as it increases the accuracy of tumour detection, localisation as well as staging.[6] However, TRUS guided biopsy which is commonly practiced can miss out the lesions arising from anterior region of the prostate. Nowadays, transperineal biopsy is being done which easily detects tumours presenting anteriorly.

Prognostic grade grouping being the most powerful prognostic predictors in prostate carcinoma,[7] provides more accurate grade stratification than Gleason System. New Grading System is simple, with five Grade Groups ranging from I to V and lowest grade is grade group I as opposed to gleason score 6 in the gleason system.[8] In order to ease the transition to the new grading system, it was agreed upon that both the modified gleason grade and prognostic grade groups should be included in pathology reports.[8] It allows easier counselling of patients and has potentially increased predictive value over Gleason score. In the studies

conducted by Danneman et al[9] and Shah et al,[10] the most common modified gleason score was score 6 and prognostic grade group being grade group I. But in our study, we found modified gleason score 9 and grade group V to be the commonest. This shows that most of the patients presented lately either ignoring the symptoms or not aware of the disease and the investigations to be done.

In our study, 45% of the cases were associated with PIN. High grade PIN in a biopsy is one of the risk factors for the carcinoma prostate. Close monitoring of the patients is required in such cases. We also found that 21% of the cases presented with metastasis to bone especially to the vertebra. Out of which, 13% of the cases belonged to prognostic grade group V. Hence, we concluded that higher the prognostic grade group, there is more chance of metastasis. This could have been prevented if the screening were done earlier.

5.1. Importance of prognostic grade groups

Patients with Grade group 1 (Gleason score 6) are accepted for active surveillance.[11] It is postulated that Grade group 2 patients react to adjuvant therapy better and can be treated more conservatively (postop).[12] Even with Gleason score 7(3+4), if Pattern 4 is very sparse, active surveillance may be done.[13] Currently, there are different radiation therapy protocols for Gleason score (3+4)[Grade group 2] versus Gleason score (4 +3)[Grade group 3].[14] Gleason pattern 4 is cross road for metastatic potential. Cribriform pattern 4 has worse prognosis than other morphologic pattern 4. In the study conducted by Erickson et al, patients with Grade group 3 to 5 progressed to death.[15] Hence pathologists play a major role in diagnosing the patient and categorise him to right prognostic grade group for risk stratification [Table 4] and treatment planning.

Table 4: Risk stratification

Prognostic grade group	Risk stratification
1	Low
2	Intermediate(Favourable)
3	Intermediate(Unfavourable)
4	High
5	High

6. Limitation of prostatic core biopsy

The greatest drawback of the core biopsy is the needle-track seeding after prostate biopsy. It is possible that tumour cells can be displaced extraprostatically along a needle biopsy track and subsequently proliferate. However the chance of needle track seeding is extremely low.[16] This iatrogenically-induced extraprostatic extensions can cause a diagnostic dilemma regarding adjuvant treatment.[17] However, it is not practical to avoid biopsies in suspected cases, as the benefits of appropriate cancer diagnosis and management would usually outweigh any potential risks from seeding.[16] But measures can be taken to reduce this event where ever possible like avoiding repeated biopsies of known aggressive tumours, using closed biopsy methods to prevent spillage and reducing the overall number of cores taken by implementing imprint cytology which will assess the adequacy of the biopsy.

7. Conclusion

1. Prostatic core biopsy along with clinical correlation stands out to be a good screening test in association with histomorphologic evaluation.
2. Both pathologists and clinicians need to fully understand the principles and practice this Prognostic grading system.
3. Correct diagnosis and grading of prostate cancer is crucial for a patient's prognosis and therapeutic options.
4. Several deaths can be prevented on introduction of this screening test in a large scale for all clinically suspicious cases of prostatic carcinoma.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. *CA Cancer J Clin*. 2016;66(1):7–30.
2. Chen N, Zhou Q. The evolving Gleason grading system. *Chin J Cancer Res*. 2016;28:58–64.
3. Clinicopathological study of prostate biopsies. *J Clin Diagnostic Res*. 2014;8(9):4–06.
4. Kohale MG, Kulkarni N, Kulkarni SN, Surwade J. Clinical spectrum of prostatic lesions: A clinicopathological study. *MedPulse- Int Med J*. 2016;3(12):1046–50.
5. Epstein JI, Netto GJ. Biopsy interpretation of the prostate: Fifth edition. vol. 2014. Wolters Kluwer Health Adis;.
6. Turan T, Güçlüer B, Efiloğlu Ö, Şendoğan F, Atış RG, Çaşkurlu T. The factors predicting upgrading of prostate cancer by using International Society for Urological Pathology (ISUP) 2014 Gleason grading system. *Turk J Urol*. 2018;doi:10.5152/tud.2018.57946.
7. Gordetsky J, Epstein J. Grading of prostatic adenocarcinoma: current state and prognostic implications. *Diagnostic Pathol*. 2016;11(1):25.
8. Kryvenko ON, Epstein JI. Prostate cancer grading: A decade after the 2005 modified gleason grading system. *Arch Pathol Lab Med*. 2016;140(10):1140–52.
9. Danneman D, Drevin L, Robinson D, Stattin P, Egevad L. Gleason inflation 1998-2011: a registry study of 97168 men. *BJU Int*. 2015;115(2):248–55.
10. Shah MD, Parwani AV, Zynger DL. Impact of the pathologist on prostate biopsy diagnosis and immunohistochemical stain usage within a single institution. *Am J Clin Pathol*. 2017;148(6):494–501.
11. Kryvenko ON, Carter HB, Trock BJ, Epstein JI. Biopsy Criteria for Determining Appropriateness for Active Surveillance in the Modern Era. *Urol*. 2014;83(4):869–74.
12. Anne G, Parvizi N. Updates on the diagnosis and treatment of prostate cancer. *Br J Radiol*. 2017;90(1075). doi:10.1259/bjr.20170180.

13. Amin MB, Lin DW, Gore JL. The critical role of the pathologist in determining eligibility for active surveillance as a management option in patients with prostate cancer: consensus statement with recommendations supported by the College of American Pathologists, International Society of Urological Pathology, Association of Directors of Anatomic and Surgical Pathology, the New Zealand Society of Pathologists, and the Prostate Cancer Foundation. *Arch Pathol Lab Med*. 2014;138(10):1387–1405.
14. Amico AVD, Whittington R, Malkowicz SB, Schultz D, Blank K, Broderick GA, et al. Biochemical outcome after radical prostatectomy, external beam radiation therapy, or interstitial radiation therapy for clinically localized prostate cancer. *JAMA*. 1998;280(11):969–74.
15. Erickson A, Sandeman K, Lahdensuo K, Nordling S, Kallajoki M, Seikkula H, et al. New prostate cancer grade grouping system predicts survival after radical prostatectomy. *Human Pathol*. 2018;75:159–66.
16. Volanis D, Neal DE, Warren AY, Gnanapragasam VJ. Incidence of needle-tract seeding following prostate biopsy for suspected cancer: a review of the literature. *BJU Int*. 2015;115(5):698–704.
17. Johnson MH, Khani F, Schaeffer EM. Iatrogenic extraprostatic extension of prostate cancer from a needle biopsy. *Urol Case Rep*. 2015;3(3):56–8.

Author biography

Disha Shetty Postgraduate

Karthik Hariprasad Shetty Senior Surgical Resident

Muktha R Pai Professor and HOD

Cite this article: Shetty D, Shetty KH, Pai MR. Diagnostic utility of core biopsy in histomorphologic evaluation of prostatic carcinoma. *Indian J Pathol Oncol* 2020;7(2):304-308.