



# A Retrospective Clinicopathological Study of Prostatic Lesions in Surgical Specimens

Hanan M. Garalla<sup>1</sup> Khaled M. Ahmed Darraz<sup>2</sup> Magdi M.A. ESSA<sup>1</sup>

<sup>1</sup>Department of Pathology, Faculty of Medicine, Benghazi University, Libya

<sup>2</sup>Department of Urology, Faculty of Medicine, Benghazi University, Libya

Address for correspondence Hanan M. Garalla, MBChB, MSc, PhD, Department of Pathology, Faculty of Medicine, Benghazi University, Libya (e-mail: Hanan.garalla@uob.edu.ly).

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## Abstract

**Background** Prostatic diseases such as inflammation, benign prostatic hyperplasia, and tumors are prime causes of mortality and morbidity in males. The prevalence of these lesions increases with advancing age. The second most common cancer among males is prostate cancer, next to lung cancer worldwide.

**Aim** The present study was undertaken with the aim of studying the clinicopathological characteristics of prostate lesions in surgical specimens

**Methods** The present study was a retrospective study. A total of 212 prostate surgical specimens were included. Information provided in the requisition form regarding age, type of prostatic biopsy and clinical presentation, and histopathological diagnosis was taken into consideration and recorded. All specimens were fixed in 10% neutral buffered formalin and 5µ sections were stained with hematoxylin and eosin stain (H&E stain). Relevant clinical data including age, the presenting complaints, and S. PSA values were recorded. Data were collected and analyzed using simple statistical methods with Microsoft Excel 2016.

**Results** Out of 212 cases analyzed, 161 (76%) were transurethral resection of prostate (TURP) TURP specimens, 38 (18%) were trucut needle biopsies, and 13 (6%) were open prostatectomy specimens. The youngest patient was 48 years old while the oldest patient was 90 years old with a mean of  $71.7 \pm 8.2$  years. Of the total 212 surgical specimens, 174 (82%) cases were of benign prostatic hyperplasia (BHP), and 38 (18%) were prostatic adenocarcinoma (PAC). Also, 94 (44.3%) of BPH and carcinoma of the prostate cases were most common in the seventh decade of life (**61-70 years**). Difficulty in micturition was the most common presentation 82 (39%). A maximum number of the BPH cases 81 (46.5%) had the prostate-specific antigen range of 0 to 4 ng/mL. The highest value of serum PSA was noted among the PAC patients in the range of  $> 80$  ng/mL. Out of 38 cases of prostatic adenocarcinoma, moderately differentiated (Gleason scores 7) was the most common core and was seen in 42.1% of the PAC cases.

**Conclusion** The present study showed that the most frequently encountered prostatic lesion was BHP, commonly seen in the age group of 61 to 70 years. The PAC was common among males of more than 60 years. Histopathological examination is the best diagnostic tool for PAC

## Keywords

- ▶ prostate
- ▶ nodular hyperplasia
- ▶ adenocarcinoma
- ▶ TURP
- ▶ Gleason score

## ملخص المقال باللغة العربية

## دراسة إكلينيكية رجعية مستقبلية لأفات البروستاتا في العينات الجراحية

المؤلفون: حنان امساعد العوامي، خالد محمد درز<sup>1</sup>، مجدي مؤمن امعيزيق عيسى

قسم علم الامراض، وقسم جراحة المسالك<sup>1</sup>، كلية الطب البشري، جامعة بنغازي، بنغازي، ليبيا

المؤلف المسؤول: - حنان امساعد العوامي، يريد إلكتروني: Hanan.garalla@uob.edu.ly

**الخلفية:** أمراض البروستاتا مثل التهاب وتضخم البروستاتا الحميد والأورام هي الأسباب الرئيسية للوفيات والمرض عند الذكور. يزداد انتشار هذه الآفات مع تقدم العمر. تأتي أكثر أنواع السرطانات شيوعاً في جميع أنحاء العالم بين الذكور بعد سرطان الرئة هو سرطان البروستاتا.

**الهدف:** أجريت الدراسة الحالية بهدف دراسة الخصائص الإكلينيكية لأفات البروستاتا في عينات جراحية.

**الطرق:** هذه دراسة رجعية لـ 212 عينة جراحية للبروستاتا. تم تسجيل المعلومات المقدمة في نموذج الطلب فيما يتعلق بالعمر ونوع خزعة البروستاتا والمرض السريري والتشخيص المرضي للأنسجة ومستضد البروستاتا المحدد في الدم. تم التعامل مع جميع العينات في 10% من الفورمالين وتم تلوين 5 µ من العينة بصبغة الهيماتوكسيلين والأيوستين. تم تقديم البيانات كمنسوبة أو حساب الوسط وتطيلها باستخدام ميكروسوفت أكسل 2016.

**النتائج:** من بين 212 عينة، وجد أن 161 عينة (76%) تمت بواسطة استئصال البروستاتا عبر الإحليل، و 38 عينة (18%) كانت خزعة البروستاتا المنخوذة بالإبرة و 13 عينة (6%) كانت عينات استئصال البروستاتا المفتوحة. كان أصغر مريض يبلغ من العمر 48 عاماً بينما كان أكبر مريض عمره 90 عاماً بمتوسط  $8.2 \pm 71.7$  عاماً. من إجمالي 212 عينة جراحية، كانت 174 (82%) عينة تعاني من تضخم البروستاتا الحميد، و 38 عينة (18%) كانت سرطان غدة البروستاتا. وجد أن 94 حلة (44.3%) من حالات تضخم البروستاتا الحميد وسرطان البروستاتا أكثر شيوعاً في العقد السابع من العمر (61-70 عاماً). كانت صعوبة التبول هي العرض الأكثر شيوعاً في 82 (32%) من الحالات. كان الحد الأقصى لعدد حالات تضخم البروستاتا الحميد [81 حلة (46.5%)] تحتوي على مستضد البروستاتا بتركيز من 0-4 ناتوجرام/ملي لتر، كما لوحظت أعلى قيمة لمستضد البروستاتا في بلزما المرضى الذين يعانون من سرطان البروستاتا (>80 ناتوجرام/ملي لتر). من أصل 38 حلة من حالات سرطان البروستاتا، كن النماذج المتوسط هو اللب الأكثر شيوعاً وتروء في 42.1% من الحالات (7 من درجات غليسون).

**الاستنتاجات:** أظهرت الدراسة الحالية أن آفة البروستاتا الأكثر شيوعاً كفت تضخم البروستاتا الحميد، والتي تظهر بشكل شائع في الفئة العمرية 61-70 سنة. كان سرطان البروستاتا شائعاً بين الذكور الأكبر من 60 عاماً. يعد فحص الأنسجة المرضية أفضل أداة تشخيصية لسرطان البروستاتا.

**الكلمات المفتاحية:** البروستاتا، تضخم العقدي، السرطانية الغدية، استئصال البروستاتا عبر الإحليل، درجة غليسون.

## Introduction

With advancing age, the prostate is one of the most often affected organs in men, which contributes significantly to morbidity and mortality. Testicular androgens enhance prostatic cell growth and survival.<sup>1</sup> The three most significant prostatic disease subtypes are inflammatory lesions (prostatitis), nodular hyperplasia (benign prostatic hyperplasia), and cancer.

The most frequent urologic illness in males over the age of 40 years, between the ages of 80 and 90 years, is benign

prostatic hyperplasia (BPH). The prevalence of BPH rises with age; it is only 8% in the fourth decade, 50% in the fifth, and up to 75% in the eighth decade.<sup>2</sup> The incidence of prostate cancer rises with advancing age, making it the second most prevalent cause of cancer-related deaths in males over 50 years of age.<sup>3</sup> Prostatic pathology is a widespread disorder that significantly impairs aged men, particularly those who have symptoms of the lower urinary tract, such as urinary retention, dripping, hesitancy, and others.<sup>4</sup> Prostatic cancer can be an incidental pathological finding when surgically removed to relieve obstructive urinary symptoms from BPH.<sup>5</sup>

Prostatic-specific antigen (PSA) levels and digital rectal examination are used to identify the majority of individuals with prostatic cancer during screening in asymptomatic males. However, it is evident now that a raised PSA level can also occur in non-malignant conditions such as BPH, inflammation, and diagnostic and surgical procedures.<sup>6,7</sup>

Prostatic biopsies, specimens from complete prostatectomy procedures, and prostatic chips from transurethral resection of prostate (TURP) procedures make up a sizable portion of the surgical pathology material.<sup>8</sup>

In general, an accurate diagnosis of prostatic lesions needs a great deal of experience. Many researchers have investigated different histomorphological features and attempted to determine how helpful they are for diagnosing or ruling out prostatic adenocarcinoma. Additionally, accurate staging and grading of prostatic adenocarcinoma are essential for early diagnosis and therapy plans. The majority of urologists have used the grading system proposed by Gleason et al<sup>33</sup> in 1966 in an attempt to estimate the malignant potential of prostate cancer. He utilized glandular differentiation and growth pattern with respect to stroma to assess the tumor grades. This grading system was also shown to correlate well with survival.<sup>9</sup> The goal of the current research was to evaluate the histopathological diversity of prostatic lesions in surgical specimens and the correlation of clinical and demographic data with histological findings along with the scoring of carcinomas according to the Gleason scoring system.

## Materials and Methods

This retrospective study included histopathological reports of all patients who underwent histopathological examination of their prostatic biopsies for their whole prostates, TURP, or accurate cut biopsies between January 2009 and December 2011 received in the Department of Pathology, Faculty of Medicine Benghazi University. Additional data were collected from the medical records in the Urology Department at AL Hawari Hospital from January 2019 to May 2022. The prostatic material included prostatic trucut biopsies, transurethral resection of prostate [TURP] chips, and open prostatectomy specimens. The authors reviewed histopathology slides of cases within the study period (HG) to make a consensus diagnosis. As a routine, all prostatic specimens were fixed in 10% formalin, cut into 4 to 6  $\mu$  sections, and stained with routine hematoxylin and eosin stain. The various lesions of the prostate were listed and the focus was on histological types of benign and malignant lesions. Relevant clinical data including age, the presenting complaints, and PSA values of these cases were recorded before the surgical process. The serum samples were stored at  $-20^{\circ}\text{C}$  and were tested for S.PSA within 4 days. Free PSA was estimated by the sandwich ELISA technique. S.PSA values in selected cases were recorded. The cases of prostatic adenocarcinoma were graded and scored according to cases of prostatic adenocarcinoma were graded and scored according to the 2016 WHO classification, and histological grading was done using the modified Gleason system.

## Exclusion Criteria

Cases of prostatic lesions diagnosed by imaging, clinical examination, and/or hormonal profile alone were excluded from the study.

## Statistical Analysis

Data were entered in a Microsoft excel sheet and analyzed using descriptive analysis. The quantitative variables such as age are expressed as mean  $\pm$  SD (standard deviation), and qualitative variables such as histopathological diagnosis are represented by frequencies and percentages.

## Results

The majority of the 212 prostatic biopsies were transurethral resection of prostate [TURP] specimens 161 (76%), while 38 (18%) were trucut needle biopsies, and 13 (6%) were open prostatectomies as shown in (►Table 1). Out of these 212 cases, 174 (82%) were benign nodular hyperplasia (BPH), and 38 cases (18%) were prostatic adenocarcinoma. The majority of the BPH was common in the age group of 61 to 70 years followed by 71 to 80 years, with a mean age  $70.9 \pm 8.2$  (age range 48–88 years). In contrast, PAC was common in the age group of 61 to 70 years and 71 to 80 years with a mean age of  $73.1 \pm 9.4$  years (age range 48–90 years). The age distribution of studied cases is depicted in ►Table 2.

Microscopic features associated with BPH were observed and comprised nodular hyperplasia of glands with papillary folding, mixed glandular and stromal hyperplasia with cystic dilatation of gland (►Fig. 1). In contrast, 38 cases of prostatic carcinoma were adenocarcinoma. PAC morphologic features including infiltrative glandular growth patterns, absence of basal cells and nuclear atypia, nuclear hyperchromasia, and perineural invasion were noted as shown in ►Fig. 2. All 38

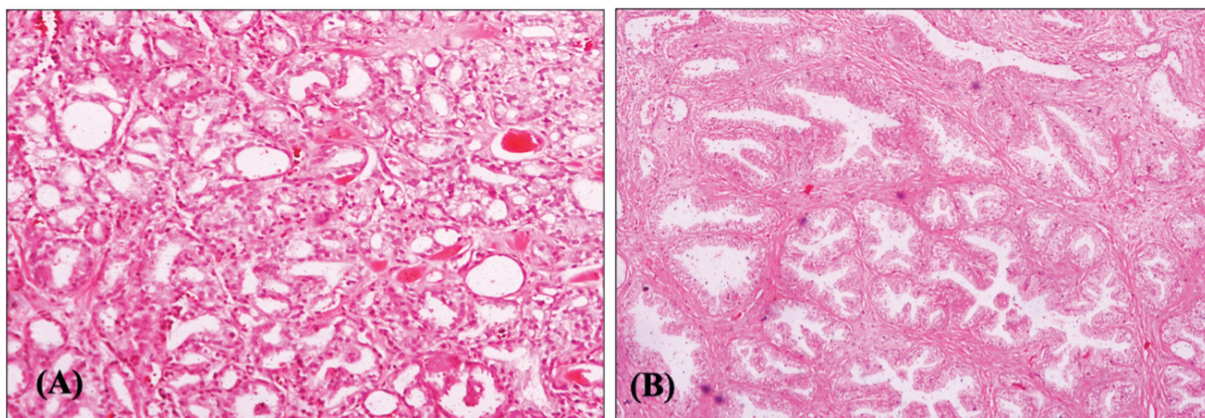
**Table 1** Distribution of cases in relation to surgical biopsy specimens ( $N = 212$ )

Surgical biopsy specimens	Total no. of cases	Percentage
Transurethral resection of the prostate	161	76
Trucut needle biopsy	38	18
Open prostatectomy	13	6

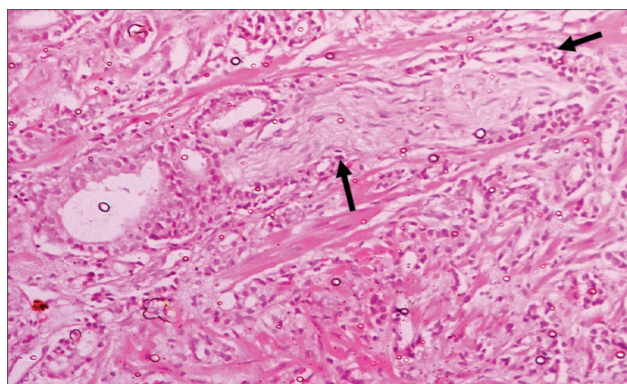
Note: It is in bold because of the highest percentage.

**Table 2** Distribution of cases in relation to age

Age group	No. of BPH cases $N$ (%)	No. of PAC cases $N$ (%)	Total No of case[s] (%)
41-50 y	1 (0.47%)	1 (0.47%)	2 (0.9%)
51-60 y	16 (7.5%)	2 (1%)	18 (8.5%)
<b>61-70 y</b>	<b>77 (36.3%)</b>	<b>17 (8%)</b>	<b>94 (44.3%)</b>
71-80 y	54 (25.5%)	12 (5.7%)	66 (31.2%)
81-90 y	26 (12.3%)	6 (2.8%)	32(15.1%)
Total	174 (82%)	38 (18%)	212(100%)



**Fig. 1** (A) Benign prostatic hyperplasia (BPH) of the prostate with predominant glandular hyperplasia. Well circumscribed glandular proliferation with variable sized glands with focal cystic dilatation, and Lumen of some glands shows corpora amylacea (H&E stain 40x). (B) BPH with hyperplastic glands variably sized glands with papillary infoldings (H&E stain 100x).



**Fig. 2** Prostatic adenocarcinoma. Gleason grade 3+4 = score of 7, predominantly well-formed glands with lesser component of poorly formed and fused glands. Perineural invasion of tumor cells as pointed by arrows (H&E stain 40x).

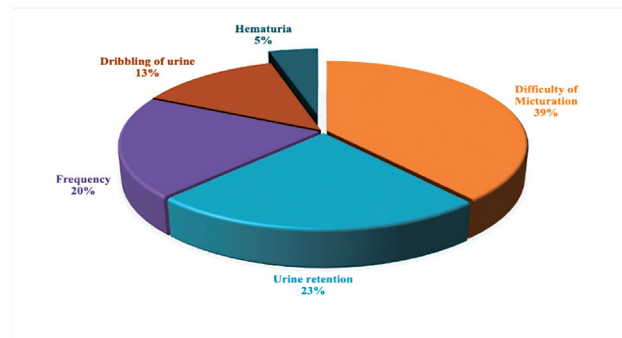
adenocarcinoma cases were graded using Gleason’s scoring. Gleason grading of 38 adenocarcinomas showed that moderately differentiated carcinomas (Gleason score of 6–7) comprised the largest group with 23 cases (60.5%), and poorly differentiated carcinomas (Gleason score of  $\geq 8$ ) were the next most frequent with 10 cases (25.6%); well-differentiated cancers with Gleason scores of 4 and 5 comprised 5 cases (13.2%). Also, 42.1% of prostatic adenocarcinoma cases were of Gleason score 7, which fell into the moderately poor category. In score 7, 10 cases were 3 + 4, and only 4 cases were 4 + 3 tumors as indicated in ► **Table 3**.

**Table 3** Pattern of distribution of prostatic adenocarcinoma as per Gleason’s scoring

Gleason’s score	No. of cases	Percentage
4	1	2.6
5	4	10.5
6	7	18.4
7	16	42.1
$\geq 8$	10	25.6
<b>Total</b>	<b>38</b>	<b>100%</b>

The most common complaint in patients with prostatic diseases was the difficulty of micturition 82 (39%), followed by urinary retention 50 (23%), and increased urinary frequency 42 (20%). Others presented with dribbling of urine 28 (13%), and the least presenting symptoms by patients with prostatic lesions are hematuria 10 (5%) as illustrated in ► **Fig. 3**.

► **Table 4** shows the detailed analysis of patient’s serum PSA levels. The data revealed that the maximum number (81 patients) with BPH had PSA range of 0 to 4 ng/mL. Except for one patient, the highest serum PSA level noted among



**Fig. 3** Clinical presentation of patients with prostatic disorder.

**Table 4** Correlation of PSA level and various prostatic lesions

PSA levels (ng/mL)	BPH (N, %)	Adenocarcinoma (N, %)
0- < 4	81 (46.5%)	0 (0%)
4- < 10	30 (17.2%)	0 (0%)
11-20	41 (23.5%)	2 (5.2%)
21-40	21 (12%)	2 (5.2%)
41-60	0 (0%)	4 (10.6%)
61-80	0 (0%)	5 (13.2%)
>80	1 (0.57%)	25 (65.8%)
<b>Total</b>	<b>174 (100%)</b>	<b>38 (100%)</b>

the BPH patients was < 40 ng/mL. Twenty-five cases of adenocarcinoma showed very high levels of serum PSA (>80 ng/mL). The results of the comparison of serum PSA levels in BPH and PAC reveal that a rising PSA levels are associated higher risk of malignant lesions.

## Discussion

BPH and prostate carcinoma are becoming more common with advancing age. Both react to the antiandrogenic medication. In the present study, 212 surgical specimens of the prostate were analyzed. TURP chips formed the bulk of the prostatic surgical specimens in our study as indicated in ►Table 1, accounting for 161(76%) of total specimens. This can be explained by the fact that TURP is the recommended treatment for BPH as it is a simple procedure with fewer complications as compared to open prostatectomy. Our results were in accordance with a study done by Sajjanar et al revealed that TURP chips comprised 83.7% of all 2,842 prostate specimens.<sup>10</sup>

The majority of cases were benign lesions, of which nodular hyperplasia alone constituted 82% of cases, followed by 18% of prostatic adenocarcinoma. Our data are in agreement with the study by Muthuel et al who showed that 92.98% of cases were of BPH followed by 7.02% of PAC cases.<sup>11</sup> The age of patients in our study ranged from 48 years to 90 years. The majority of cases were encountered in the age group of 61 to 70 years followed by 71 to 80 years as shown in ►Table 2. Both BPH and PAC cases were maximum in the sixth and seventh decades in our study which was similar to observations made by Josephine et al and Gajjar et al in that there was an increase in the frequency of BPH and PAC as age increased.<sup>12,13</sup> Additionally, this is similar to the results of Manek et al who showed that PAC most frequently affected people between the ages of 71 and 80 years.<sup>14</sup> In our study, histological findings of BPH cases predominantly showed a mixed glandular–stromal pattern of hyperplasia.

Hesitancy (difficulty in micturition), a weak stream, terminal dribbling, and acute or chronic urinary retention were all obstructive symptoms. Irritative symptoms included urgency, increased frequency, dysuria, and nocturia. In our study, the majority of patients presented with obstructive symptoms such as difficulty in micturition and urinary retention in 39%, and 23%, respectively. Our findings were in accordance with the other studies that revealed that obstructive symptoms were the most common presentation.<sup>15,16</sup>

Any condition that disrupts the normal architecture of the prostate leads to a rise in serum PSA levels. In the case of BPH, elevated serum PSA concentrations are based on the degree of obstruction and size of the prostate, and in PAC, the serum PSA level is increased depending on the volume of the tumor. Our study has demonstrated that elevations of serum PSA values were noticed in both carcinomas of the prostate and BPH. This is consistent with the observations made by other researchers who showed that the serum PSA levels are > 20 ng/mL in prostatic adenocarcinoma. A higher PSA level is indicative of disruption of the glandular epithelium as

in the case of BPH and cancer, but the chances of malignancy shows rising level.<sup>17</sup>

Based on the degree of glandular differentiation, prostatic adenocarcinomas are usually graded according to the Gleason scoring. The Gleason grade is linked with tumor volume, prognosis, and tumor aggressiveness.<sup>18</sup> In the present study, the most predominant Gleason score was 7, a similar result was obtained by Arshad et al who found a Gleason score of 7 to be the commonest.<sup>19</sup> A different study has reported that well-differentiated carcinoma (Gleason score 2–4) is the most frequently diagnosed carcinoma.<sup>20</sup>

## Conclusion

Among all surgical specimens included in this study, the most common were TURP specimens with BPH representing the commonest histological pattern. Adenocarcinomas were found in 18% of cases. Most prostatic lesions studied were found in the sixth to the eighth decade, and obstructive urinary symptoms were the most common mode of presentation. In this study, adenocarcinoma and high PSA values were strongly correlated. Finally, it is essential to evaluate a combination of architectural, cytoplasmic, and nuclear features together with additional characteristics when diagnosing prostatic cancer. The majority of patients had a Gleason score of 7 (moderately differentiated PAC).

## Limitations

The limitations of this study are that in some cases, the use of partial sampling methods may not truly reflect the true incidence of prostatic pathology, and the inadequate biopsy material may cause Gleason's score to be underestimated, thereby preventing patients from receiving the appropriate therapy.

### Future Work

1. Immunohistochemistry (IHC) should be included in next research because it plays an important role in the diagnosis of prostatic lesions and helps to differentiate malignant glands from benign lesions.
2. It is critical in understanding the mechanisms of cancer development, progression, and metastasis, which might provide a new route for cancer detection and treatment. It would be useful to extend this investigation to the study of associated proteins in more detail, especially through proteomic analysis.

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### Conflict of Interest

None declared.

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