Results of Transrectal Ultrasound-Guided Prostate Biopsy by the Method of 12 Cores at Can Tho University Hospital

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Abstract

Background: Prostate cancer is a common disease in men, with the second-highest incidence rate and the fifth-highest mortality rate worldwide. Diagnoses to determine prostate cancer need to be based on factors such as rectal examination, total PSA in serum, and the result of a prostate biopsy. Our study aimed to evaluate the results of rectal prostate biopsies of 12 cores under the direction of ultrasound.

Objectives: Assess results of transrectal ultrasound-guided prostate biopsy by the method of 12 cores.

Methods: This was cross-sectional research of 60 patients with prostate tumors with indications for biopsy from 5/2021 to 5/2022 at the Can Tho University of Medicine and Pharmacy Hospital.

Our research conducts medical history and patient history to score 2 points on IPSS (International Prostate Syndrome Score) and QoL (Quality of Life Index), and we use the descriptive statistic method to analyze data. The indications for the prostate biopsy were abnormal digital rectal examination findings and/or an elevated serum total prostate-specific antigen (PSA) level (greater than 10 ng/mL). The participants received prophylactic vein bacsofo (1000 mg) and oral metronidazol (500 mg) before and maintained continued after about 3 days. A Fleet enema was self-administered the night before the procedure for rectal cleansing.

Results: The average age of patients was 68.72, and the most common reason for hospitalization was dysuria at 80%. The average IPSS was 26.21 ± 4.49, the average QoL was 3.38 ± 0.67, and the average total PSA was 26.11 ng/mL. The prostate cancer detection rate after the biopsy was 40% (24/60). Gleason’s scores determined accounted for 45.83% (11/24) from 8 points or more. There were two cases of strong rectal bleeding (3.33%) and one case of strong hematuria (1.67%).

Conclusions: Transrectal ultrasound-guided prostate biopsy is valuable in the diagnosis of prostate cancer and feasible at our hospital.

Keywords: Prostate Biopsy, Prostate Cancer, Transrectal Ultrasound

1. Background

Prostate cancer is a fairly common disease in men today, with the second-highest incidence rate and the fifth-highest mortality rate for men worldwide (1). Diagnoses to determine prostate cancer need to be based on factors such as rectal examination, total PSA in serum, and the result of a prostate biopsy (2). According to the EAU, ultrasound-guided transrectal prostate biopsy is considered the gold standard in prostate histopathology (3). Can Tho University of Medicine and Pharmacy Hospital perform transrectal prostate biopsies under ultrasound guidance from 2020. Our study aimed to evaluate the results of rectal prostate biopsies of 12 cores under the direction of ultrasound.

2. Objectives

Assess results of transrectal ultrasound-guided prostate biopsy by the method of 12 cores

3. Methods

Our research was approved by the Science Council and Medical Ethics Council of Can Tho University
of Medicine and Pharmacy. Design of a non-control clinical intervention study in all patients presenting with symptoms of lower urinary tract disorders presenting to the Urology clinic and treated at Urology Center · HIFU of Can Tho University of Medicine and Pharmacy Hospital from 5/2021 to 5/2022 with sampling standard is:
- Clinical: a rectal examination of the prostate with a solid or nodular mass.
- Subclinical: Patients with whole blood PSA levels above 10 ng/mL.
- Diagnosis of image: ultrasound or CT or MRI with suspicious images (muffler drive, unbalanced prostate, break the prostate capsule,...), and there are no contraindications:
  - Blood clotting disorder, immunodeficiency, acute prostatitis.
  - The patient’s internal pathology is unstable; prostatic hyperplasia has complications such as bladder stones, urinary tract infections, and kidney failure.
  - Patients with anorectal diseases: hemorrhoids, anal infection - perineum, anal stenosis.
  - The patient refuses prostate biopsy when indicated.
- Ethical code
  The process of selecting patients with indications for prostate biopsy:
  All patients were surveyed according to the questionnaire with the following procedure: conduct a history of presenting complaints, past medical and surgical history, clinical examination carefully, and perform tests, to select research subjects that meet the specified criteria.
  All data are recorded in the study file or questionnaire. And we focus on using descriptive statistical methods to analyze data. Data were statistically analyzed using Statistical Package for the Social Sciences version 20.0 (SPSS Inc). As descriptive statistics for continuous variables mean ± standard deviation, and for categorical variables, rates and percentages were used.
  - Exploiting medical history, history of research subjects
    + Exploiting the subject’s administrative information.
    + Exploiting the patient’s reason for admission.
    + History of other diseases.
    - Clinical examination:
      + Conduct medical history and patient history to score 2 points on IPSS and QoL.
      + Performing a rectal exam after the patient has had blood drawn for testing:
        - Position of patient and doctor: patient lying in an obstetrical position (lie on your back, legs bent and spread out to the sides), and the doctor will stand to the right of the patient. If the patient is lying on the left side, the lower leg is extended, and the upper leg is bent, the doctor stands behind the patient’s back, lower than the patient’s buttocks.
        - Doctors wear gloves and apply lubricant. Insert your index finger slowly and gently into the anus. The finger must be rotated so that the entire circumference of the rectal ball can be examined. Palpate the superior surface of the rectum to determine the groove between the prostate and the 2 lateral lobes and assess the surface and density of the prostate.

3.1. Perform Paraclinical
  - The patient had taken blood for total PSA level before the rectal examination.
  - Abdomen ultrasound: When the patient is urinating, an abdominal ultrasound will be performed to estimate the prostate size and describe the observed prostate features. Also, record the volume of urine present in the bladder.
  - Have the patient urinate. Then, the patient underwent an ultrasound of the bladder to determine the residual urine volume.
  - From there, select patients with indications for prostate biopsy.

3.2. Research Materials
  - Data collection ballot.
  - Siemens ultrasound system is equipped at Can Tho University of Medicine and Pharmacy Hospital.
  - Hematology and biochemical testing machine at Can Tho University of Medicine and Pharmacy Hospital.
  - The prostate biopsy system equipped at Can Tho University of Medicine and Pharmacy Hospital includes the following:
    + Color ultrasound system with 7.5 MHz rectal transducers with synchronous integrated biopsy canal.
    + A Biopsy gun is compatible with a biopsy needle.
    + Prostate biopsy needle 18G, length 200mm, cores length 22 mm.

3.3. Steps to Take
  - Perform a transrectal biopsy of the prostate gland under ultrasound guidance:
    - Prepare the patient before the biopsy date:
      - Antibiotic treatment: bicefzidim 1g daily by slow intravenous injection 2 times, each time 1 vial, metronidazole 0.25 g orally 2 times per day, 2 tablets each time.
      - Diet: Soft food, easy to digest.
      - Prepare patient for biopsy:
        - The patient has completely fasted.
Colon preparation: fleet enema 2 tubes of anal pump 3 - 4 hours before the biopsy.

Introduce to the patient how to biopsy the prostate and explain the phenomena that may occur during the biopsy to help the patient prepare psychologically and cooperate well with the physician.

Take the patient’s vital signs before performing the biopsy.

+ Patient position: The patient lies on the left side, the thigh is perpendicular to the body, and the leg is perpendicular to the thigh.
+ Prepare means and instrument:
  + Disinfectant tools.
  + Check the operation of an ultrasound machine and probe.
  + Biopsy gun, biopsy needle.
  + Lidocaine 2%.
  + Sample vials with a solution for fixation of biopsy specimens (formalin) are numbered in order from 1 to 12.
+ Treatment steps:
  + Disinfection of the perineum, anus-rectum, and sterile towels.
  + Take the ultrasound probe into the rectum: move the probe to observe and determine the prostate and anesthesia around the prostate. Determine the site where the biopsy is needed, proceed to insert the biopsy gun into the biopsy canal, needle biopsy, take the biopsy sample and place it in the labeled fixative vial. Proceed to the next positions in turn.
  + Perform biopsies of 12 cores, 6 cores per lobe (left, right), and according to prostate location (top, center, base of prostate).
  + After completing the biopsy, regain vital signs if stable, let the patient down, and return to rest in the ward.
  + Send pathology 12 biopsies. Biopsy samples were read at the Pathology Department of Can Tho University of Medicine and Pharmacy Hospital.
+ Follow complications after biopsy:
  + Follow patients in the ward: pain, anal bleeding, urinary status after biopsy, infection after biopsy, ...

4. Results

According to our research on 60 patients who agreed to participate in the study, the following results were noted:

4.1. Age

In 60 patients who were biopsied, the average age was 68.72 years old, the highest was 95 years old, and the lowest was 53 years old. Concentrate more on the 60-69-year-old group, accounting for 50% (Table 1). Compared with some authors like Philip et al., who performed prostate biopsies for 445 patients with a mean age of 64.5 years (4). Shim et al. performed prostate biopsies on 516 patients in Korea with a mean age of 64.1 ± 7.8 years (5). The comparison age in our research is consistent with many authors.

Table 1. Distribution by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 59</td>
<td>8 (13.33)</td>
</tr>
<tr>
<td>60 - 69</td>
<td>30 (50)</td>
</tr>
<tr>
<td>70 - 79</td>
<td>13 (21.67)</td>
</tr>
<tr>
<td>≥ 80</td>
<td>9 (15)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100)</td>
</tr>
</tbody>
</table>

4.2. Reason for Hospitalization

There are 5 reasons why patients are hospitalized: dysuria, hematuria, nocturia, intermittent urination, and urinary retention. Symptoms of early prostate cancer are similar to those of benign prostatic hyperplasia; in the late stages, symptoms of metastasis may appear (spinal pain, pelvic pain,...). In our research group, patients admitted to the hospital with the main reason of having lower urinary tract disorders accounted for 86.67%. Dysuria is the cause, with the highest rate of 80% of the patients. There are 8 patients admitted to the hospital because of urinary retention, requiring urethral catheterization; urinary retention accounted for 13.33%, and there were no cases of hospitalization with symptoms of metastases (Table 2). Compared with the research of author Le in 73 patients with prostate biopsy 12 samples, 43.8% of patients with lower urinary tract disorders accounted for 86.67%. Dysuria is the cause, with the highest rate of 80% of the patients. There are 8 patients admitted to the hospital because of urinary retention, requiring urethral catheterization; urinary retention accounted for 13.33%, and there were no cases of hospitalization with symptoms of metastases (Table 2). Compared with the research of author Le in 73 patients with prostate biopsy 12 samples, 43.8% of patients with lower urinary tract disorders accounted for 86.67%.

Table 2. Reason for Hospitalization

<table>
<thead>
<tr>
<th>Reason for Hospitalization</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysuria</td>
<td>48 (80)</td>
</tr>
<tr>
<td>Hematuria</td>
<td>1 (1.67)</td>
</tr>
<tr>
<td>Nocturia</td>
<td>1 (1.67)</td>
</tr>
<tr>
<td>Intermittent urination</td>
<td>2 (3.33)</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>8 (13.33)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100)</td>
</tr>
</tbody>
</table>

4.3. IPSS Score at Hospital Admission

The average IPSS score was 26.21 ± 4.49 points. The highest was 33 points; the lowest was 8 points.
4.4. QoL Score at Hospital Admission

The mean QoL score was 3.38 ± 0.67 points. Most patients are admitted to the hospital in an acceptable condition with symptoms of the disease (QoL 3 - 4 points).

Clinical examination: A rectal examination of the prostate is very important to help guide the diagnosis and treatment. In this research, we recorded that 5/60 patients (8.33%) had signs of suspected cancer (hardcore, loose boundaries with the surrounding organization), and unsuspected prostate cancer accounted for 91.67% (Table 3). According to Vu Trung Kien (2020), during the rectal examination of the prostate, 27/120 (22.5%) patients had suspicious signs.

Table 3. Clinical Examination

<table>
<thead>
<tr>
<th>Rectal Examination</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected prostate cancer</td>
<td>5 (8.33)</td>
</tr>
<tr>
<td>Do not suspect prostate cancer</td>
<td>55 (91.67)</td>
</tr>
<tr>
<td>Total</td>
<td>60 (100)</td>
</tr>
</tbody>
</table>

4.5. Total PSA Concentration in the Blood

Prostate-specific antigen tests in the blood are very valuable in the early diagnosis of prostate cancer. When total PSA was < 4 ng/mL, the risk of prostate cancer was 11%. When 4 ng/mL < PSA < 10 ng/mL, the risk of prostate cancer was 79% (2). In our research, a prostate biopsy is indicated for patients with total PSA concentration > 10 ng/mL or if there are suspicious signs on rectal examination or diagnosis of image and recorded patients with very high levels of total PSA in the blood, an average of 26.11 ng/mL (10.1 - 232.4 ng/mL).

MRI / MSCT / Transabdominal ultrasound:
Help detect 5% (3/60) of patients with suspected prostate cancer, such as muffler drive; cancer breaks the capsule and invasion of seminal vesicles, and ureters cause hydronephrosis. The mean prostate mass determined by ultrasound was 44.83 grams. The largest is 126 grams; the smallest is 28 grams.

4.6. Complications of a Biopsy

Rectal bleeding and hematuria are the most common complications. When performing prostate biopsies for 60 patients, record the patient’s complications; specifically, 10% have rectal bleeding and 6.67% hematuria; most of these patients had mild bleeding, there were two cases of strong rectal bleeding and one case of strong hematuria, but they all go away on their own after 1-2 days of medical treatment. There were 5% of patients with urinary retention after catheter removal biopsy (Table 4). According to the research of Efesoy et al. evaluated complications of 2049 patients undergoing prostate biopsies, hematuria complications were 66.3%, rectal bleeding accounted for 28.4%, and genital tract infections accounted for 6.1% (7). According to author Le, gross hematuria complications accounted for 16.4%, pain after biopsy 28.8%, and there were no cases of urinary tract infections (6). Thereby, a transrectal prostate biopsy is a safe procedure if the patient is prescribed and fully prepared for the prescribed steps.

4.7. Prostate Biopsy Results

In 60 patients in the research, the prostate cancer detection rate accounted for 40% (24 patients) and 60% of benign prostatic hyperplasia (Table 5). According to Vu Le Chuyen (2009), when biopsied 87 patients had biopsy results (+) 11.5% (8), Le 26% (6), Vu 27.4% (9), Shim 27.8% (5), Vu Trung Kien (2020): In 120 biopsied patients, the prostate cancer outcome was 33.33%. Thereby, we found that our prostate cancer detection rate was much higher; the difference was statistically significant with P < 0.05.

4.8. Classification of Cancer Cells According to the Gleason’s Scale

The degree of differentiation, according to Gleason’s scale on our 60 patients, ranged from 3 - 9 points, which 45.83% of patients had Gleason’s score over 8 (Table 6). According to Epstein’s research, the Gleason score > 6 indicates the risk of advanced disease at a late stage (10). This shows that the majority of patients are detected at a late stage.

Thus, biopsies of 12 cores have a high positive diagnosis rate, and at the same time, the Gleason’s scale also allowed the prognosis and gave the appropriate treatment direction.

5. Discussion

Perform transrectal ultrasound-guided prostate biopsy by the method of 12 cores; we achieved a cancer detection rate after biopsies of 40%. Gleason’s score determined through biopsies over 8 points accounted for 45.83%.

Bleeding episodes take the lead among TRUS-guided prostate biopsies. Bleeding episodes can emerge as hematuria, hematospermia, and rectal bleeding, and it can be seen in a wide spectrum ranging from minor bleeding to life-threatening disseminated intravascular coagulopathy.

Hematuria is the most frequently seen complication following TRUS-guided prostate biopsy. As a minor
Table 4. Biopsy Accidents

<table>
<thead>
<tr>
<th>Complications</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No complications recorded</td>
<td>47 (78.33)</td>
</tr>
<tr>
<td>Complications</td>
<td></td>
</tr>
<tr>
<td>Anal-rectal bleeding</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Hematuria</td>
<td>4 (6.67)</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>3 (5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60 (100)</strong></td>
</tr>
</tbody>
</table>

Table 5. Prostate Biopsy Results

<table>
<thead>
<tr>
<th>Result</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate cancer</td>
<td>24 (40)</td>
</tr>
<tr>
<td>Benign prostatic hyperplasia</td>
<td>36 (60)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60 (100)</strong></td>
</tr>
</tbody>
</table>

Table 6. Classification of Cancer Cells According to Gleason’s Scale

<table>
<thead>
<tr>
<th>Score</th>
<th>Gleason</th>
<th>Frequency (%)</th>
</tr>
</thead>
</table>
| ≤ 6   |         | 6 (25)        

complication, hematuria which is frequently encountered after biopsy generally lasts briefly without any need for additional treatment. In the presence of marked rectal bleeding leading to hemodynamic impairment, intrarectal compression is applied on rectal bleeding points by finger, ultrasound probe, or anoscope to achieve hemostasis, or placement of an intrarectal tampon can achieve hemostatic control in most cases. If these methods fail, colonoscopic and endoscopic sclerotherapy might be required.

In 60 biopsied patients, 13 patients had complications. However, these complications were mild and resolved spontaneously after medical treatment.

In conclusion, TRUS-guided prostate biopsy is a tolerable procedure for patients which can be easily applied on an ambulatory basis. Thanks to the developments in the preparation of the patient before the biopsy and biopsy techniques, rates of serious and complex complications have decreased considerably, while rates of minor complications are still at higher levels. Since antibiotic prophylaxis has decreased infectious complications, anti biotherapy should be instituted for the short term in patients without any risk factors. However, high-risk patients should receive long-term antibiotic prophylaxis. Transrectal ultrasound-guided prostate biopsy by the method of 12 cores is a safe and effective method in the diagnosis of prostate cancer.

Footnotes

Authors’ Contribution: Hieu Trung Nguyen participated in designing the evaluation, performed all parts of the statistical analysis, and helped to draft the manuscript; also the main author of the article. Kien Trung Nguyen played the main role in our article, re-evaluated the clinical data, revised the manuscript and performed the statistical analysis, and revised the manuscript. Cuong Quoc Tran and Duong Van Huynh collected the clinical data, interpreted them, and revised the manuscript. Binh Thanh Le re-analyzed the clinical and statistical data and revised the manuscript. All authors read and approved the final manuscript. Tu Minh Hoang and Yen Tieu Luong are the corresponding authors of this article.

Conflict of Interests: The authors declare no conflict of interest for this article, and none of the authors are members of the editorial board.

Data Reproducibility: The data presented in this study are uploaded during submission as a supplementary file and are openly available for readers upon request.

Ethical Approval: Our research was approved by the Science Council and Medical Ethics Council of Can Tho University of Medicine and Pharmacy. Ethical approval code: 511/PCT-HDDD based on Decision No 421/QD-DHYD on May 4th, 2020.

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**Informed Consent:** It was not declared by the authors.

**References**