Transrectal ultrasound-guided biopsy for the diagnosis of prostate cancer

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Abstract

Transrectal ultrasound-guided prostate biopsy (TRUS) is considered the standard method in detecting prostate cancer. This paper presents the experience of Urology Clinic of Sibiu in transrectal ultrasound-guided prostate biopsy for the diagnosis of prostate cancer.

Materials and methods: Between January 2009 and December 2013, 435 patients (p) with clinical and paraclinical suspicion of prostate cancer were subjected to TRUS within the Urology Clinic of Sibiu. A number of 573 transrectal ultrasound-guided prostate biopsies were performed in 435 patients. The average age of cases was 62.7 years old (range 52 to 80). PSA value was between 2.21 ng / ml (but with high suspicion at DRE) and 2036 ng / ml. Mean prostate volume was of 44.2 cm³ (range between 35 and 83 cm³). Periprostatic anesthesia was performed using 10 ml of 1% lidocaine, injecting 5 ml at the base of each lobe of the prostate. Twelve fragments were taken using the Bard Magnum biopsy instrument, sampling six pieces from each lobe of the prostate.

Results: Within this study 435 patients were examined, being subjected to a total of 573 punctures, of which 207 were positive (36.12%). At 127 patients (22.16%) underwent a second transrectal ultrasound-guided prostate biopsy and 21 patients (3.66%) a third biopsy. Postinterventional complications were observed in 6 patients (1.04%) who returned with fever and hematuria.

Conclusion: Transrectal ultrasound-guided prostate biopsy is a method used in the detection of prostate cancer with a low rate of mortality. The increased number of biopsy fragments and sampling at the level of the prostatic capsule allow adequate staging of patients for radical prostatectomy. The transversal incidence used during puncture provides a good visual orientation for an accurate biopsy. Periprostatic anesthesia provides patient comfort during the procedure, without intra and postprocedural pain.

Keywords: prostate cancer, transrectal ultrasound prostate biopsy
Introduction

Prostate cancer is the most common cause of neoplasia, outnumbering lung and colorectal cancer with an incidence of 214 cases per 1000 men (1).

In Romania, 177 new cases of prostate cancer are diagnosed and about 7.3% of men die annually from this cause (2).

Transrectal ultrasound-guided prostate biopsy (TRUS-BP) is considered the standard method in detecting prostate cancer (3).

Early detection of prostate cancer is important both to improve and optimize the treatment of prostate cancer and to improve the survival of patients with this disease.

Over the last decade, the widespread acceptance of prostate specific antigen (PSA) measurement, as a method of detecting prostate cancer, enhanced by raising awareness as a common disease, led to an increase in prostate cancer detection. This growth would not have been possible without optimizing prostate puncture biopsy with the help of transrectal ultrasound.

In the past 20 years, prostate biopsy indications along with its accomplishing techniques and histopathologic interpretation became more refined.

Prostate biopsy has evolved from the blind finger-guiding the puncture needle under general anesthesia to systematic ultrasound-guided biopsies under periprostatic anesthesia.

Nowadays, prostate biopsy has become one of the most common procedures in urological practice.

Prostate biopsy indication is established based on serum PSA level, free PSA and / or DRE clinical suspicion.

Transrectal ultrasound-guided prostate biopsy is performed in men with consistency changes in digital rectal examination (DRE) and/or a high PSA serum level (> 4.0 ng / ml) or PSA velocity (rate of change) > 0.4 to 0.75 ng / ml.

Among the recommendations less agreed for the transrectal ultrasound-guided prostate biopsy, there are the PSA values relative to age groups, low levels of free PSA compared to total PSA and PSA density > 0.15, which represents the total amount of PSA related to the prostate volume in cubic centimetres or grams.

This paper presents the experience of Urology Clinic of Sibiu in transrectal ultrasound-guided prostate biopsy for the diagnosis of prostate cancer.

Materials and Methods

Between January 2009 and December 2013, 435 patients(p) with clinical and paraclinical suspicion of prostate cancer were subjected to TRUS-PB within the Urology Clinic of Sibiu. A number of 573 transrectal ultrasound-guided prostate biopsies were performed in 435 patients.

Table 1. TRUS-PB distribution.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of biopsies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>52 (9.0%)</td>
</tr>
<tr>
<td>2010</td>
<td>128 (22.3%)</td>
</tr>
<tr>
<td>2011</td>
<td>133 (23.2%)</td>
</tr>
<tr>
<td>2012</td>
<td>120 (20.9%)</td>
</tr>
<tr>
<td>2013</td>
<td>140 (24.5%)</td>
</tr>
</tbody>
</table>

The average age of cases was 62.7 years old (range 52 to 80).

PSA value was between 2.21 ng / ml (but with high suspicion at DRE) and 2036 ng / ml.

Mean prostate volume was of 44.2 cm³ (range between 35 and 83 cm³).

The patients were divided into 3 subgroups according to the volume of the prostate at the time of puncture: volume of less than 40 cm³ in 179 patients (41.1%), volume between 40 and 60 cm³ in 145 patients (33.3%) and 111 patients (25.6%) had a prostate volume of more than 60 cm³.

For the prevention of prostatitis and urosepsis postpuncture, ciprofloxacin was used, which was administered per os two times a day for 3 days. The first dose of ciprofloxacin was administered about 2 hours before the puncture. It was recommended that any platelet antiaggregation medication or nonsteroidal anti-inflammatory drugs should be discontinued 7 days, respectively 3 days before performing the puncture.

Periprostatic anesthesia was performed using 10 ml of 1% lidocaine, injecting 5 ml at the base of each lobe of the prostate.

Fig. 1. Bard Magnum biopsy instrument, periprostatic anesthesia needle and prostate biopsy 18 G
Twelve fragments were taken using the Bard Magnum biopsy instrument, sampling six pieces from each lobe of the prostate.

The fragments were collected using ultrasound-guided transversal sections according to the following scheme: two fragments of the prostate base, 2 medio-prostate fragments and 2 fragments from the apex for each prostate lobe.

The patients did not experience pain during the procedure and were released an hour after biopsy.

If the first sequence of biopsy was negative, the patients were subjected to a second biopsy 3 months after the initial biopsies (127 patients).

If after the second biopsy, the histopathologic result was still negative, the patients were subjected to a third biopsy at 12 months from the second biopsy (21 patients).

The indication for the second biopsy was based on high levels of PSA and its persistence, clinical suspicion at DRE and the high risk for neoplasia (high grade PIN).

Results

Within this study 435 patients were examined, being subjected to a total of 573 punctures, of which 207 were positive (36.12%).

<table>
<thead>
<tr>
<th>Biopsy</th>
<th>12 fragments</th>
<th>Positive results</th>
<th>Detection rate</th>
<th>False negative results</th>
<th>False negative results</th>
</tr>
</thead>
<tbody>
<tr>
<td>First biopsy</td>
<td>435 p</td>
<td>159 p</td>
<td>27.74%</td>
<td>29 p</td>
<td>5.06%</td>
</tr>
<tr>
<td>Second biopsy</td>
<td>127 p</td>
<td>45 p</td>
<td>35.43%</td>
<td>1 p</td>
<td>0.78%</td>
</tr>
<tr>
<td>Third biopsy</td>
<td>21 p</td>
<td>3 p</td>
<td>14.28%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>573 p</td>
<td>207 p</td>
<td>36.12%</td>
<td>33 p</td>
<td>5.75%</td>
</tr>
</tbody>
</table>

The detection rate was of 36.12% (207b/573b). The lowest detection rate was found in the group with a prostate volume ≥ 60 ml.

At 127 patients (22.16%) underwent a second transrectal ultrasound-guided prostate biopsy and 21 patients (3.66%) a third biopsy.

The second prostate biopsy was performed in the same manner as the first puncture using the same protocol.

The third puncture was performed by sampling 21 pieces of prostate (saturation biopsy).

Postintervention complications were observed in 6 patients (1.04%) who returned with fever and hematuria. They were hospitalized being treated with antibiotics and hemostatics having a favourable outcome.
Clinical studies

Table 6. Hystological Gleason distribution

<table>
<thead>
<tr>
<th>Gleason grade</th>
<th>High grade PIN</th>
<th>GL 2+3</th>
<th>GL 3+2</th>
<th>GL 3+3</th>
<th>GL 3+4</th>
<th>GL 4+4</th>
<th>GL 5+4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients / % (207 positive biopsies)</td>
<td>4 p (1.93%)</td>
<td>26 p (12.56%)</td>
<td>41 p (19.80%)</td>
<td>29 p (14%)</td>
<td>81 p (39.13%)</td>
<td>17 p (8.21%)</td>
<td>9 p (4.34%)</td>
</tr>
</tbody>
</table>

Discussions

Currently, prostate cancer is the most commonly diagnosed form of cancer in men.

In the last decades, two factors significantly influenced the growth of prostate cancer detection: the widespread use of PSA (prostate-specific antigen) as a screening instrument and biopsies mapping.

Prostate cancer can be detected by clinical examination (digital rectal examination), PSA and transrectal ultrasound.

Correct diagnosis is established after the histopathological examination and is compulsory before starting therapy. Needle aspiration cytology puncture is used, as well as prostate biopsy puncture or the endoscopic resection piece examination of prostate TUR-P.

In addition to the accuracy and certainty of diagnosis, information can be learned about the degree of tumour differentiation, tumour volume, location of cancer and the stage of disease.

The standard technique, widely used in the histopathological diagnosis is the transrectal ultrasound-guided prostate biopsy.

In the classic protocol conducted by Hodge, prostate is punctured at apex level, in its middle and its base on the midsagittal line between the lateral limit and the median line of the prostate at the level of each lobe (sextant puncture). Although it has been the standard method of transrectal biopsy, today many studies show that it fails between 10-30% of cancers. Laterally directed punctures significantly increase detection rates compared to the central ones. The schemes with 12 punctures, which include peripheral fragments, detect 30% more cancers than the sextant ones.

Transrectal ultrasound-guided puncture biopsy is performed in one day hospital admission system, the patients being prepared that morning and followed-up a few hours after the TRUS-BP.

Patients with negative urinalysis and coagulation tests in the normal range without treatment with aspirin or anticoagulants during the week of puncture are accepted.

Patients are placed in gynecological position and periprostatic anesthesia is practiced with 5 mL lidocaine 1% at the base of each lobe of the prostate.

Periprostatic anesthetic is superior to lidocaine gel, numerous studies show that local pain and discomfort are age related, occurring especially in the young patients. Djavan found that in 78% of the patients below 60 years of age, a significant discomfort appears (5).

Before carrying out the actual puncture biopsy, ultrasound evaluation of the prostate is performed, in order to capture the possible suspicious areas. Transrectal ultrasound allows zonal anatomy: peripheral prostate, seminal vesicles, bladder, periprostatic structures, needle path, hypoechoic lesions, and especially, it allows multiple sampling.

Biopsy fragments sampling was performed in transversal incidence allowing a better prostate topographical orientation.

Postintervention possible complications are: hematuria, hemospermia, rectorragia, acute urinary retention, prostatitis and urosepsis.

In the study group, 1.04% (6 patients) had fever and hematuria remitted under antibiotic and hemostatic therapy.

Saturation biopsy (21 prostate fragments) is reserved for cases with negative initial biopsies with persistent suspicion of prostate cancer. Periprostatic anesthesia provides good analgesia in saturation biopsy too.

Detection rate was 36.12% (207b/573b). The lowest detection rate of detection was in group with a prostate volume ≥60 ml. Maybe it is necessary to increase the number of cores that should be taken.

Conclusions

Transrectal ultrasound-guided prostate biopsy is a method used in the detection of prostate cancer with a low rate of mortality.

The increased number of biopsy fragments and sampling at the level of the prostatic capsule allow adequate staging of patients for radical prostatectomy.

The transversal incidence used during puncture provides a good visual orientation for an accurate biopsy.

Periprostatic anesthesia provides patient comfort during the procedure, without intra and postprocedural pain.
Clinical studies

References


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