

# THE INFLUENCE OF TRANSRECTAL MULTIFOCAL PROSTATE BIOPSY UNDER ULTRASOUND CONTROL ON THE DEGREE OF INFRAVESICAL OBSTRUCTION IN DIFFERENT GROUPS OF PATIENTS

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## Abstract

Prostate cancer – is a malignant neoplasm arising from prostatic epithelium [1]. It is well known, that prostate cancer is the most common cancer in men population. Most patients, who underwent a biopsy of prostate, have expressed varying degrees of benign prostatic hyperplasia and, accordingly, symptoms, specific to the disease, including symptoms of the lower urinary (LUTS) [2]. Uroflowmetry is a method widely used around the world to assess the degree of severity of infravesical obstruction [3].

The aim was to determine the degree of influence of transrectal multifocal biopsy of the prostate under ultrasound control on the degree of infravesical obstruction [4].

The study included patients with elevated serum PSA over 4 ng/ml with the volume (Vpr) of prostate from 20 cm<sup>3</sup> to 90 cm<sup>3</sup>, volume of residual urine no more than 50 cm<sup>3</sup>. Uroflowmetry was performed with the determination of the volume of residual urine at the primary treatment. At 21 day after transrectal multifocal prostate biopsy under Ultrasound control all patients underwent uroflowmetry. The age of patients ranged from 40 to 70 years. Patients were divided into 3 groups depending on the volume of the prostate gland. The first group consisted of 28 people where prostate volume ranged from 20 cm<sup>3</sup> to 40 cm<sup>3</sup>, in the second group, consisted of 25 persons, prostate volume ranged from 41 cm<sup>3</sup> to 60 cm<sup>3</sup>, and in the third group, consisted of 30 people, prostate volume ranged from 61 cm<sup>3</sup> to 90 cm<sup>3</sup>. The following indicators of uroflowmetry were determined as the following: voided volume, max flow rate, average flow, voiding time, flow time, time to max flow, and the volume of residual urine.

This study has demonstrated a high risk of complications in patients with prostate volume of more than 60 cm<sup>3</sup> caused by infravesical obstruction after prostate biopsy.

**Keywords:** uroflowmetry, urodynamics, prostate biopsy, prostate cancer.

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## 1. Introduction

Prostate cancer is a cause of nearly 10 % of cancer deaths in men, and is one of the main causes of death in older men [5].

Currently, the main method of diagnosis of prostate cancer is multifocal prostate biopsy under Ultrasound control [6]. While Biopsy provides the histological verification of diagnosis, it also allows estimating the prevalence of tumors, growth character, and degree of differentiation that provides the most accurate staging of the tumor and the selection of an adequate method of treatment [7].

An important advantage of this method is the high tolerance in patients, consequently, its availability and the ability to be performed in outpatient conditions [8]. However, it is known that most patients who underwent prostate biopsy have expressed varying degrees of benign prostatic hyperplasia and, accordingly, symptoms, specific to the disease, including symptoms of infravesical obstruction [9].

To assess the severity of infravesical obstruction around the world, the most common method is uroflowmetry – integrated assessment of integrative activity of the bladder and its outlet division emptying phase, which is based on the direct registration of changes of the volumetric flow rate of urine during the micturition. An important advantage of uroflowmetry is the accessibility, physiological easiness and non-invasive character of this method. Also, an objective method for studying the degree of infravesical obstruction is the ultrasound of the bladder with determination of the volume of residual urine after micturition [10–20].

## 2. Aim

Determination of the degree of influence of transrectal biopsy of the prostate under ultrasonic control on the severity infravesical obstruction.

## 3. Materials and methods

This study was conducted in the urology Department of Polyclinic No. 195, branch No. 2 of the city of Moscow. The study included patients with elevated serum PSA over 4 ng/ml, with the volume of the prostate (Vpr) from 20 cm<sup>3</sup> to 90 cm<sup>3</sup>, volume of residual urine not more than 50 cm<sup>3</sup>. Uroflowmetry was performed with the determination of the volume of residual urine at the primary treatment. All patients underwent repeated uroflowmetry at 21 day after transrectal multifocal prostate biopsy under ultrasound control. The Age of patients ranged from 40 to 70 years. 83 patients participated in the study from March to August 2014. The patients were divided into 3 groups depending on the volume of the prostate gland.

**Table 1**

The distribution of patients in groups

	N (number)	V prostate (cm <sup>3</sup> )	Age (average)
1 group	28	20–40	52,4
2 group	25	41–60	53,6
3 group	30	61–90	58

During the initial inspection, the following procedures were conducted: anamnesis, physical examination, digital rectal examination, as well as the following laboratory methods: General clinical blood and urine tests, biochemical blood analysis, coagulogram, endorectal ultrasound of the prostate, and bladder echographic examination with the determination of the volume of residual urine. All patients underwent cleansing enema the day before and the day of the biopsy. In order to reduce possible infectious complications the day before the prostate biopsy patients took medication of levofloxacin (Hileflo<sup>®</sup> HiGlance) 500 mg. once. Patients in the studied group did not receive drugs Alpha-adrenergic antagonist either before or after the manipulation.

Prostate Biopsy was performed using ultrasonic scanner LOGIQ P6 pistol for conducting prostate biopsy ProMag, biopsy needles Bloodline size 18/25 and automatic needle biopsy HTR 18/25 of 12 points. As anesthetic and antiseptic drug local effect we used product containing lidocaine hydrochloride+chlorhexidine dihydrochloride (Cathejell<sup>®</sup>, Montavit). The drug was introduced in the rectum of the patient for 5 minutes before the biopsy of prostate. Uroflowmetry was performed using Urocap III vehicle in the day of biopsy immediately before its execution. Re-uroflowmetry was performed in 21 days after prostate biopsy.

## 4. Results

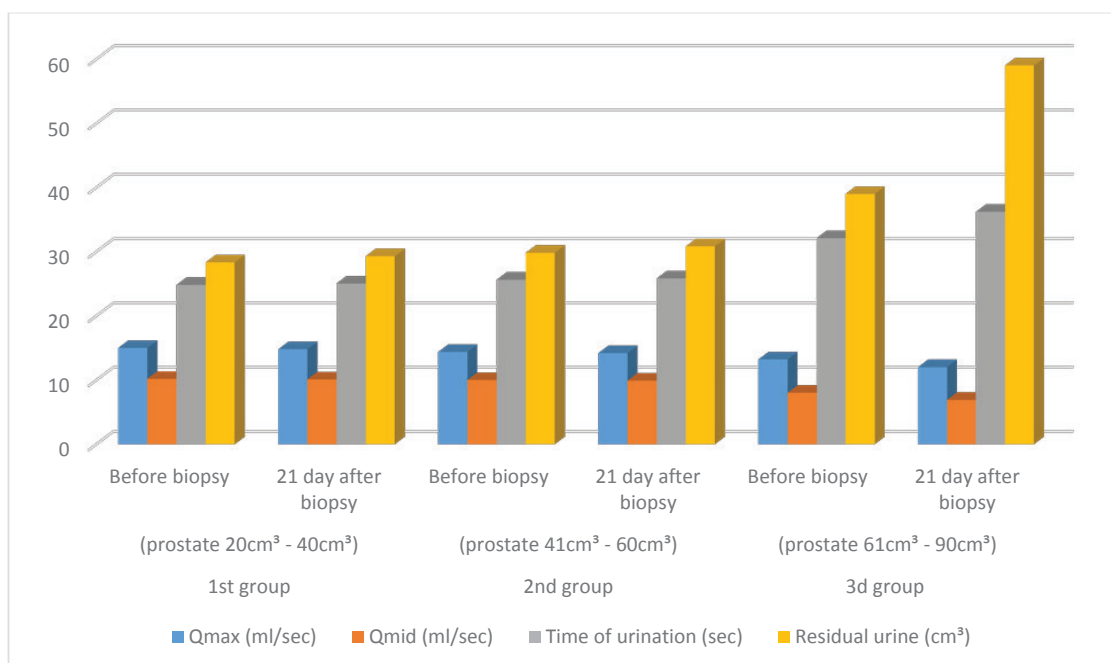
83 patients took part in the 6 months study. One patient of the total number, from group 3 had complication of acute prostatitis, and therefore, the patient was excluded from the study. In the first group, the average rate, and the maximum volume of urine flow rate (Q max) before performing prostate biopsy was 14,98 ml/sec, in 3 weeks after the biopsy – 14,78 ml/sec.

The average index of the middle volumetric rate of urination (Q mid) before performing prostate biopsy was 10,2 ml/sec, in 3 weeks after the biopsy – 10,1 ml/sec. The average time of

urination (T) before performing prostate biopsy was 24.8 seconds, in 3 weeks after the biopsy – 25.03 seconds. The average volume of residual urine before performing prostate biopsy was 28,3 cm<sup>3</sup>, in 3 weeks after the biopsy – 29,27 cm<sup>3</sup>.

In the second group, the average rate, and the maximum volume of urine flow rate (Q max) before performing prostate biopsy was 14,38 ml/sec, in 3 weeks after the biopsy – 14,19 ml/sec. The average index of the middle volumetric rate of urination (Q mid) before performing prostate biopsy was 10 ml/sec, in 3 weeks after the biopsy – 9.9 ml/sec. The average time of urination (T) before performing prostate biopsy was 25.6 seconds, in 3 weeks after the biopsy – 25.8 seconds. The average volume of residual urine before performing prostate biopsy was 29,8 cm<sup>3</sup>, in 3 weeks after the biopsy – 30,8 cm<sup>3</sup>.

The third group, the average rate, and the maximum volume of urine flow rate (Q max) before performing prostate biopsy was 14.98 ml/sec, in 3 weeks after the biopsy – 14,78 ml/sec. The average index of the middle volumetric rate of urination (Q mid) before performing prostate biopsy was 10,2 ml/sec, in 3 weeks after the biopsy – 10,01 ml/sec. The average time of urination (T) before performing prostate biopsy was 32.1 seconds, in 3 weeks after the biopsy 36.2 seconds. The average volume of residual urine before performing prostate biopsy was 39.1 cm<sup>3</sup>, in 3 weeks after the biopsy – 59,41 cm<sup>3</sup>.



**Fig. 1.** Urodynamic indicators before and after prostate biopsy

## 5. Discussion

Thus, after 21 days of performing transrectal multifocal biopsy of prostate under ultrasound control, the following changes of studied parameters took place:

- index of maximal volume of urine flow rate (Q max) of patients in the first group declined by 1.34 % in patients in the second group – 1.32 %, in third group of patients – 9.09 %;
- index of the average volumetric speed urination (Q mid) patients in the first group declined by 0.98 % in patients in the second group – 1 %, in third group of patients – 13.75 %;
- Index of the average time of urination (T) the first group of patients declined by 0.93 % in patients in the second group – 0.78 %, in third group of patients – 12.74 %;
- index of volume of residual urine after urination in the first group declined by 3.43 % in patients in the second group – 3.36 %, in third group of patients – 51.28 %.

Indicators of the maximum volume of urine flow rate, the average volumetric rate of urination and the average urination time, and the volume of residual urine before and 21 days after the puncture

transrectal multifocal prostate biopsy were not significantly different in patients with prostate volume up to 60 cm<sup>3</sup> ( $p>0,05$ ). In the third group of patients, influence prostate biopsy on these indicators was statistically significant ( $p<0.001$ )

## 6. Conclusions

Thus, based on this analysis of three groups of patients after puncture transrectal multifocal prostate biopsy under ultrasound guidance, development of complications associated with bladder outlet obstruction were higher in patients with prostate volume more than 60 cm<sup>3</sup>. In patients with prostate volume from 20 to 60 cm<sup>3</sup> there is no significant changes in the maximum volume of urine flow rate, the average volumetric rate of urination and the average urination time, and the volume of residual urine before and 21 days after the puncture transrectal multifocal prostate biopsy.

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