

## CHANGES IN ERECTILE FUNCTION BEFORE AND AFTER PROSTATE BIOPSY

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### ABSTRACT

**Objective:** To evaluate erectile function before and after transrectal ultrasound (TRUS) guided prostate biopsy using International Index of Erectile Function-5 (IIEF-5) and Erection Hardness Score (EHS) instrument. **Material & Method:** We conducted a study on 17 BPH LUTS patients who underwent TRUS guided prostate biopsy from January to April 2011 in Urological Minimal Invasive Installation (IIU) Dr. Soetomo Hospital. Out of 17 patients, three patients had mild ED, while 14 other patients had normal erectile function before the procedure. After TRUS guided prostate biopsy, we performed erectile function assessment using the IIEF-5 and EHS at weeks I, II, and IV. **Results:** Pathological examination of all specimens from prostate biopsy results revealed BPH. There were 2 patients with hematuria and 1 patient with rectal bleeding shortly after the biopsy, which resolved spontaneously less than 24 hours. Based on the IIEF-5 there were 4 patients (23,5%) with decreased erectile function in the evaluation of first week after prostate biopsy, and it reduced to 2 patients (11,7%) whose erectile function was still decreasing in the evaluation week II, while in fourth week evaluation there was 1 patient (5,9%) with decreased erectile function. Based on EHS data obtained, there were 5 patients (29,4%) with decreased scores in evaluations week II, and in the evaluation of week IV there were no patients having erectile function problems compared with EHS data before prostate biopsy. **Conclusion:** TRUS guided prostate biopsy can have temporary effect on erectile function.

**Keywords:** Erectile dysfunction, prostate biopsy, international index of erectile function-5, erection hardness score.

### ABSTRAK

**Tujuan Penelitian:** Menilai perbedaan fungsi ereksi sebelum dan sesudah dilakukan tindakan biopsi prostat transrektal dengan menggunakan International Index of Erectile Function-5 (IIEF-5) dan instrumen Erection Hardness Score (EHS). **Bahan & Cara:** Kami melakukan penelitian terhadap 17 pasien BPH LUTS yang dilakukan tindakan biopsi prostat dengan tuntunan transrektal sejak bulan Januari sampai dengan April 2011 di Instalasi Minimal Invasif Urologi (IIU) RSU Dr. Soetomo Surabaya. Dari 17 pasien tersebut terdapat 3 pasien dengan DE ringan, sedangkan 14 pasien lainnya dengan fungsi ereksi normal sebelum dilakukan tindakan. Setelah dilakukan biopsi dilakukan penilaian fungsi ereksi dengan menggunakan IIEF-5 dan EHS pada minggu I, II, dan IV. **Hasil Penelitian:** Semua spesimen biopsi prostat penelitian ini didapat hasil patologi adalah hiperplasia prostat jinak. Terdapat 2 pasien dengan hematuria dan 1 pasien dengan perdarahan rektum sesaat setelah biopsi, yang sembuh spontan dalam kurang dari 24 jam. Berdasarkan data IIEF-5 didapatkan 4 pasien (23,5%) yang mengalami penurunan fungsi ereksi pada evaluasi minggu I setelah biopsi prostat, dan berkurang menjadi 2 pasien (11,7%) yang masih mengalami penurunan fungsi ereksi pada evaluasi minggu II, sedangkan pada evaluasi minggu IV masih terdapat 1 pasien (5,9%) yang mengalami penurunan fungsi ereksi. Berdasarkan data EHS didapatkan 5 pasien (29,4%) yang mengalami penurunan skor EHS pada evaluasi minggu II, dan pada evaluasi minggu IV tidak ada pasien yang mengalami gangguan fungsi ereksi dibandingkan dengan data EHS sebelum biopsi prostat. **Simpulan:** Biopsi prostat transrektal dapat mempengaruhi fungsi ereksi secara temporer.

**Kata Kunci:** Disfungsi ereksi, biopsi prostat, international index of erectile function-5, erection hardness score.

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### INTRODUCTION

Erectile dysfunction (ED), according to the United States National Institutes of Health and the American Urological Association, is defined as the

inability to achieve or maintain an erection sufficient for sexual satisfaction. The Massachusetts Male Aging Study (MMAS) reported that between 13 to 28% of men aged 40-80 years are suffering from ED.<sup>1</sup>

ED can be caused by various factors, including organic and psychogenic factors. In addition, ED can also occur after surgery, both invasive and minimally invasive, including prostate biopsy, which is done routinely in patients with benign prostatic hyperplasia (BPH) with malignant suspicion<sup>2,3</sup>

BPH is a benign enlargement of the prostate in an adult male. Changes in the structure of the prostate in BPH include changes in volume and histology. Prostate volume changes in variation with the age and generally occurs over 50 years of age.<sup>4</sup> Part of the physical examination in patients with BPH is digital rectal examination to estimate prostate volume and determine signs of prostate malignancy. Another recommended examination is Prostate Specific Antigen (PSA) to rule out the possibility of early stage prostate cancer. This examination is offered to patients who have not reached 70 years of age. The presence of prostate nodules or elevated PSA levels require prostate biopsy to assess the presence of malignancy.<sup>5</sup> Some of the methods have been developed to enhance the specificity of PSA, including the measurement of PSA density (PSAD). PSAD is defined as total serum PSA divided by prostate volume, as determined by measurements with transrectal ultrasonography (TRUS).

TRUS examination can be used to determine prostate volume and the presence or absence of suspected malignancy. TRUS prostate examination was introduced for the first time by Watanabe et al 1968, and continuously evolves with the development of ultrasound. Broadly speaking, the probability rate of prostate suspicion of cancer by TRUS examination is 60-88%.<sup>6,7</sup>

In 1989, Hodge et al introduced TRUS-guided biopsy and became a gold standard for early diagnosis of prostate cancer in developing countries. By then Hodge et al. used the technique of sextant biopsy scheme (one biopsy in the basal, mid, and apex bilaterally).<sup>7</sup> Some other researchers had made modifications by adding biopsies to lateral prostate (systematic biopsy scheme) to take samples from the peripheral zone.<sup>8</sup> Chen et al. reported that 74% of prostate cancers arise in peripheral zone, especially in the anterior part of the prostate base and apex of the prostate near the center line.<sup>9</sup>

Although it is quite easy and relatively safe, one of the complications of this procedure is erectile dysfunction resulting from direct trauma or secondary hematoma or edema affecting the

neurovascular bundle. Erectile function is an important factor for all sexually active men and affects the quality of life of the patients.<sup>10</sup> Therefore, the provision of clear and complete information about DE as one of the complications that may occur after prostate biopsy is essential. Goldstein et al. in their study stated that to get a more satisfying sexual experience, the level of erection hardness is as important as the ability to achieve and maintain an erection.<sup>11</sup> Erection hardness is one of the most influential components in erectile function. The research of Asia Pacific Sexual Health and Overall Wellness (APSHOW) states that there is a correlation between erection hardness and the quality of life. The higher the level of erection hardness, the higher the sexual satisfaction and ultimately it will increase self-confidence and overall quality of life.<sup>10,12</sup>

In this study we assessed the differences in erectile function before and after TRUS guided prostate biopsy using IIEF-5 (International Index of Erectile Function-5) and the level of erection hardness using EHS (Erection Hardness Score) instrument. EHS is a simple self-test, validated, and may indicate the level of erection hardness.<sup>11,13</sup>

## OBJECTIVE

To prove there is a difference in erectile function using IIEF-5 and EHS scores before and after TRUS guided prostate biopsy in patients with LUTS.

## MATERIAL & METHOD

This was an observational analytic study conducted from January to April 2011 by comparing erectile function in patients with LUTS before and after prostate biopsy using IIEF-5 and EHS.

The sample in this study were 17 LUTS patients associated with BPH to undergo TRUS guided prostate biopsy in Urological Minimal Invasive Installation (IIU), Dr. Soetomo Hospital, Surabaya, according to one of the following indications: 1) digital rectal examination revealed hard prostate consistency, the presence of nodules, or asymmetrically enlarged prostate, 2) presence of hypoechoic or hyperechoic lesions in TRUS examination, 3) PSA > 4 ng/mL, or 4) PSAD > 0,15.

Inclusion criteria for this study were 1) LUTS patients to undergo TRUS guided prostate biopsy as indicated, 2) age between 50-70 years,

3) BPH patients with normal erectile function or mild ED prior to TRUS guided prostate biopsy.

Data were analyzed descriptively and analytically. Before testing the hypothesis, we tested the data distribution and homogeneity. The difference between IIEF-5 and EHS scores prior to TRUS guided prostate biopsy and 1, 2, and 4 weeks after TRUS guided prostate biopsy were assessed using Wilcoxon statistical test.

**RESULTS**

From 17 patients studied, only three patients had mild ED, while the other 14 patients had normal erectile function. Pathological examination of all patients who underwent prostate biopsy revealed BPH. The majority of patients had no complications after the biopsy. Only 2 patients complained of hematuria and 1 patient with rectal bleeding shortly after the biopsy. However, such complaints spontaneously disappeared in less than 24 hours. All patients in this study did not have problems with their sexual lives.

Based on IIEF-5 data, there were 4 patients (23,5%) who had decreased erectile function in the evaluation in week I after prostate biopsy, and it decreased to 2 patients (11,7%) who still had decreasing erectile function in evaluation week II. In evaluation week IV there was one patient (5,9%) who had decreased erectile function. Based on data

obtained, 5 (29,4%) EHS patients had decreased scores in evaluation EHS week I, where 4 patients improved and only 1 patient still had decreasing EHS scores in evaluation week II, and in evaluation week IV there was no patient with erectile function compared to EHS data before prostate biopsy.

Results of descriptive calculation (Table 1) show that the mean prostate volume in this study were 41,94 cc in the range of 36,13 to 50,86 cc with a median 41,2 cc. The mean PSA value was 7,43 ng/mL in the range of 5,7 to 9,6 ng/mL with a median 7,3 ng/mL. The mean PSAD was 0,18 in the range 0,12 to 0,22 with a mean 0,17.

The average IIEF-5 scores before prostate biopsy was almost equal to the average score of IIEF-5 on the second and fourth weeks. The decrease of IIEF-5 scores occurred in week I. The results of the calculation of the median and mode were the same in the entire data. Data range also showed similarities of EHS in weeks I and II, which was between 2-4, and the range of EHS in evaluation IV was between 3-4 weeks. Data on a range of EHS before biopsy 3-4.

The mean age of patients was 57,53 years with a range of 53 to 61 years with a median age of 58 and the most frequent (mode) 57 years.

Table 2 shows that age is not correlated with the IIEF-5 and EHS prior to biopsy, indicating that age is not a confounding variable.

**Table 1.** Description of age, prostate volume, PSA and PSAD.

Variables	Mean	Median	Modus	Std. Deviation	Range
Age	57,53	58	57	2,00	53 - 61
PSA	7,43	7,3	8,1	1,11	5,7 - 9,6
PSAD	0,18	0,17	0,16	0,02	0,12 - 0,22
IIEF-5 Pre	22,71	23	25	2,23	18 - 25
IIEF-5 Week I	20,88	23	23	4,12	12 - 25
IIEF-5 Week II	22	23	23	2,29	18 - 25
IIEF-5 Week IV	22,76	23	25	2,36	18 - 25
EHS PRE		3	3		3 - 4
EHS Week I		3	3		2 - 4
EHS Week II		3	3		2 - 4
EHS Week IV		3	3		3 - 4

**Table 2.** The correlation of age with the IIEF-5 and EHS prior to biopsy.

Spearman's rho	Age with IIEF Pre	Age with EHS Pre
Correlation Coefficient	-0,264	-0,384
p	0,306	0,128

**Table 3.** IIEF-5 test results in week I, II, and IV.

Variables	n	Mean Rank	p Wilcoxon test	Notes
IIEF category week 1	17	2,50	0,063	No significant difference
IIEF category pre		0,00		
IIEF category week 2	17	1,50	0,157	No significant difference
IIEF category pre		0,00		
IIEF category week 4	17	1,50	0,157	No significant difference
IIEF category pre		0,00		

**Table 4.** EHS test results in week I, II, and IV.

Variables	n	Mean Rank	p Wilcoxon test	Notes
EHS category week 1	17	3,00	0,025	Significant difference
EHS category pre		,00		
EHS category week 2	17	1,00	0,317	No significant difference
EHS category pre		,00		
EHS category week 4	17	1,00	0,317	No significant difference
EHS category pre		,00		

The results of Wilcoxon calculation on IIEF-5 data that have been categorized (Table 3) showed no significant difference between the IIEF-5 before biopsy with week I with  $p = 0,063$  ( $p > 0,05$ ). In IIEF-5 data before biopsy and week II also showed no significant difference with  $p = 0,157$  ( $p > 0,05$ ). Similarly, in IIEF-5 data before biopsy with IV weeks also showed no significant differences, with  $p = 0,157$  ( $p > 0,05$ ).

The results of Wilcoxon calculations on EHS data (Table 4) show significant differences between EHS prior to biopsy and the first week after biopsy with  $p = 0,025$  ( $p < 0,05$ ). EHS Data prior to biopsy and week II after biopsy had no significant difference with  $p = 0,317$  ( $p > 0,05$ ). Similarly, the EHS before biopsy and week IV after biopsy showed no significant difference with  $p = 0,317$  ( $p > 0,05$ ).

## DISCUSSION

All patients participated in this study did not have mental problems that could interfere with their sexual lives before and until 4 weeks after prostate biopsy. This is very important because psychological problems affects the sexual life of the patient and IIEF-5 and EHS measurements. Erectile function of a person is influenced by the hypothalamus, limbic system and cerebral cortex and requires good coordination between the central nervous system, peripheral nerves, hormonal, and vascular systems.<sup>14</sup> Therefore, erectile function is strongly influenced by the psychological condition of an individual.

Shabsigh in 2006 mentions that the majority ( $> 65\%$ ) of ED causes are psychogenic, caused by the central obstacle in the process of erection without the involvement of physical factors.<sup>15,16</sup>

Side effects resulting from prostate biopsies in this study, in addition to DE, were hematuria and rectal bleeding, which occurred in 3 patients. All were resolved in less than 24 hours and did not affect the patient's sexual activity. Major complications requiring hospitalization were very rare, less than 10%.<sup>17</sup> Bleeding is the most common complication after prostate biopsy despite normal coagulation parameters. In the study by Akbal and Zisman, there was no correlation between erectile dysfunction arising from prostate biopsies and other minor complications also arising due to prostate biopsy. However, in patients with major complications that lead to hospitalization, it greatly affected the patient's erectile function.<sup>10,18,19</sup>

Mean prostate volume in this study was 41,94 cc with lowest prostate volume of 36,13 cc and the highest of 50,86 cc. The mean PSA value was 7,43 ng/mL with mean PSAD 0,18. Prostate volume, PSA and PSAD values had no effect on the incidence of ED after prostate biopsy procedure. Research by Akbal in 2007 found that patients' age, prostate volume, and PSA values did not significantly affect the incidence of ED after prostate biopsy.<sup>18</sup> Erectile dysfunction occurring after prostate biopsy is caused by damage to neurovascular bundle that runs on the posterolateral side of the prostate due to direct trauma by a needle biopsy or due to secondary

damage caused by the suppression of edema or hematoma. This may explain that the prostate volume and PSA values have no effect on the incidence of ED after prostate biopsy. However, if high PSA values is accompanied with malignancy, confirmed by pathology of prostate biopsy, this may affect erectile function. Erectile dysfunction that occurs in prostate adenocarcinoma may be caused by cancer cells in neurovascular bundle that interfere the process of erection and also due to patients' anxiety on the disease severity.<sup>10,18</sup>

In this study, based on categorized IIEF-5 data (Normal, mild ED, moderate ED, or severe ED), there was decreased erectile function in 23,5% of the patients in week I after biopsy evaluation, decreased to 11,7% in week II evaluation, and only 5,9% of the patients still reported decreased erectile function in week IV compared to baseline. However, statistical data showed no significant difference between the IIEF-5 before biopsy and the week I, II, and IV after prostate biopsy. Based on EHS data, there were 29,4% of the patients experienced a decrease in EHS evaluation scores in week I evaluation, only 5,9% of the patients week II evaluation, and in week IV evaluation no patients experienced a decrease in erectile function compared to EHS data before prostate biopsy. Statistically, significant differences were found between EHS prior to biopsy and week I after biopsy only, while the comparison of EHS before biopsy and week II and IV after biopsy showed no significant difference.

In a study by Zisman et al. in 2001, in 21 out of 218 (9,7%) patients who had prostate biopsy, ED resolved in 2 weeks, but 4 of them persisted until week 4.<sup>10</sup> A study by Akbal et al. in 2007 reported 150 patients to undergo prostate saturation biopsy were evaluated with IIEF-5, in which 64% of the patients had no ED and 34% had mild ED prior to prostate biopsy. In week 2 evaluation, 11,6% of the patients had ED, while in week 4 and month 6 evaluations, ED was no longer present.<sup>18</sup> The percentage of ED in this study was higher than the incidence of ED in previous studies because this study used a small number of samples. However, the statistical calculation shows that the decrease was not significant. This suggests that prostate biopsy procedure can be considered as a simple and safe procedure for patients, especially in regard with the possibility of ED.

In all previous studies and also in this study, erectile dysfunction occurring in some patients was transient. Erectile dysfunction can be caused by a

direct injury to the neurovascular bundle that plays a role in the process of erection, or can also be caused by suppression of the neurovascular bundle secondary to hematoma or edema. The damage can be temporary, which can return to normal after the suppression of the inflammatory process or resolution of hematoma.<sup>10</sup> In this study, it appears that the erectile ability of the patients in week IV evaluation returned to pre biopsy values, both in IIEF-5 and EHS.

Another erectile function that can be evaluated is the level of erection hardness. The quality of erection depends on how optimal penile response to sexual stimulation. In 2004, the meeting of the 2<sup>nd</sup> International Consultation on Erectile and Sexual Dysfunction raised the issue of erection hardness. In that meeting it was recommended to use the degree of erection hardness as a method for assessing erectile function as part of the diagnosis in men with erectile dysfunction complaints. Erection Hardness is a major component in the assessment of erectile function. Since 1998 it has been proved that EHS is a specific tool, self-contained and easy to be monitored in explaining the presence of erectile dysfunction in patients, and is a practical method to measure the level of erection hardness.<sup>13,20</sup>

Many studies prove that EHS is an effective tool to assess the level of erection hardness. This was shown in a multinational double-blind control trial study using sildenafil. Statistical analysis proved that EHS is an easy, reliable, and valid test to assess the level of erection hardness in clinical studies.<sup>13,20</sup>

Manuel in his study in 2009, used EHS as a tool for the evaluation of erection hardness in patients with erectile dysfunction treated with sildenafil 50 mg and 100 mg. Research by Kaminetsky in the USA in approximately 1200 adult men also used this tool to monitor and evaluate ED who received sildenafil therapy, and in this study it was stated that the EHS 3 and 4 patients were satisfied with the quality of erections. In multicenter study in 24 centers in Brazil, Italy, Germany, Poland, and Turkey in more than 300 patients suffering from ED and then treated with Sildenafil, it was found that erection hardness correlates positively to the IIEF scores, improved function and emotional well-being, and the level of patient satisfaction in sexual life.<sup>12,21,22</sup>

## CONCLUSION

TRUS guided prostate biopsy can have temporary and reversible effects on erectile function.

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