



The Effect of Prostate Biopsy on Erectile Functions

Ali Atan^{1*}, Ersin Koseoglu² and Altug Tuncel²

¹Department of Urology, Gazi University, Ankara, Turkey

²Department of Urology, Ankara Numune Training and Research Hospital, Ankara, Turkey

*Corresponding author: Ali Atan, MD, Professor, Department of Urology, Gazi University, Emniyet, 06560 Yenimahalle/Ankara, Turkey, Tel: +90 312 202 4444, Fax: +90312 2213202, E-mail: aliatanpitt@hotmail.com

Abstract

Prostate cancer (PCa) is the most common malignancy among men in the United States of America (USA). Tissue samples should be taken from different parts of prostate by transrectal ultrasound guided prostate needle biopsy (TPNB) and these samples should be examined histopathologically for the diagnosis of PCa. In recent years, the serum prostate specific antigen (PSA) measurement and number of prostate biopsies performed have become more frequent. Re-biopsy should be considered in the patients with persistent high serum prostate specific antigen level and/or abnormal digital rectal examination without malignancy in first biopsy, the patients with multiple high grade prostatic intraepithelial neoplasia (PIN) and/or atypical small acinar proliferation (ASAP) in first biopsy, the patients on active surveillance (AS). TNPB is not a fully innocent method. ED has been always neglected as a complication following TPNB. There is an increasing tendency towards relationship between ED after TPNB. The studies including relationship between ED after TPNB are evaluated in this review. The possible etiological factors of permanent erectile dysfunction (ED) after prostate needle biopsy are psychological and organic factors. Temporary inflammatory and neurovascular damage are likely important, possibly combined with the impact of TPNB. Furthermore increased anxiety at the time of screening, biopsy, and immediately following biopsy. Also other possible etiological factors are number of needle cores, use of periprostatic nerve block, disease involving neurovascular bundles. In light of literature, there is a strong relationship between ED after TPNB but the exact etiology is still conflicting.

Keywords

Erectile dysfunction, Prostate cancer, Prostate needle biopsy, Repeat prostate biopsy, Saturation prostate biopsy

Introduction

PCa is the most common malignancy among men in the United States of America (USA) [1]. Digital rectal examination (DRE) and PSA are the first investigations for the diagnosis of PCa [2]. PCa could only be diagnosed exactly by tissue examination. In recent years, the serum PSA measurement and number of prostate biopsies performed have become more frequent. Tissue samples should be taken from different parts of prostate by transrectal prostate biopsy and these samples should be examined histopathologically.

Re-biopsy should be considered in the patients with persistent high serum prostate specific antigen level and/or abnormal digital

rectal examination without malignancy in first biopsy, the patients with multiple high grade PIN and/or ASAP in first biopsy, the patients on AS [3]. While transrectal ultrasound guided prostate biopsies were first performed in the early 1980's [4], sextant prostate biopsy became a standart procedure in 1989 [5]. According to the prostate volume, 8-12 cores of prostate biopsies including lateral/far lateral regions were found to be more convenient and sextant biopsies were found not to be sufficient in later studies [6]. Saturation biopsies of 20-45 cores under general anesthesia were defined for the patients with persistent high PSA levels and normal prostate biopsy histories [7-10]. Prostate biopsy could also be used for the patients' AS [11].

Prostate needle biopsy is not a fully harmless and innocent method. Prostate biopsies have traumatic, infectious and psychological complications. Rectal bleeding, vasovagal syncope, acute prostatitis, prostate abscess, urine retention, hematuria, hematospermia, fever and sepsis are other complications. In 64-78% of patients, at least one complication occurs [12]. Mortality is a rare condition [13-15]. Acute prostatitis, prostate abscess, fever and sepsis should be treated by parenteral antibiotics [16-21]. ED has been always neglected as a complication following TPNB. Although there are some studies investigating the relationship between TPNB and ED, the data are limited and conflicting. While some studies show that TPNB has no significant adverse effects on erectile function, others indicate that TPNB causes ED in the short and long terms. We strongly believe that there is a close connection between TPNB and ED. There is an increased interest on this topic in the international literature. There are new studies investigating a relationship between prostate biopsy and erectile function. Recent studies aiming to evaluate ED after TPNB are searched on Pubmed. The studies are categorized as one set, re-biopsy or saturation biopsies. The results are discussed in light of our point of view.

Negative Effects of One Set Standart Needle Biopsy of Prostate on Erectile Function

Chrisofos, et al. evaluated erectile functions in 46 patients by the first 5 item version of International Index of Erectile Function (IIEF-5) on the first and the third month after sextant prostate biopsies. The erectile dysfunction rate was 6.5% and 4.3% on the first month and the third month, respectively (Table 1). They concluded that prostatic biopsy did not induce ED in a statistically significant manner [22].

Zisman, et al. studied 211 consecutive men who underwent a total

Table 1: ED rates on the 1st, 3rd and 6th months of TPNB according to IIEF-5 scores.

Study	Number of patients those undergone TPNB	1 st month ED rates (%)	3 rd month ED rates (%)	6 th month ED rates (%)
Chrisofos, et al.	46	65	4.3	
Zisman, et al.	218	15		
Tuncel, et al.	97	41.3		15.2
Akyol, et al.	136			2.6

TPNB: Transrectal Prostate Biopsy; ED: Erectile Dysfunction; IIEF-5: The first 5 item version of International Index of Erectile Function.

of 218 biopsy events using a questionnaire-based survey that focused on pain, anxiety, and erectile function. The whole patients were potent before the biopsies. Patients' erectile functions were evaluated on the first week and the first month after biopsies by survey. The authors reported that ED was attributed to anxiety in anticipation of biopsy in 7% of cases and 15% of previously potent patients reported ED in the first month after biopsy (Table 1). The authors advocated that ED associated with the prostate biopsy should be discussed with potent patients [23].

We performed a study to evaluate sexual functions in 97 men who have undergone TPNB and their female partners [24]. Erectile function before biopsy and the first and sixth months after the biopsy in men were evaluated with IIEF-5. Female Sexual Function Index (FSFI) was used for the female partners in the same periods together with the men. Before TPNB, 46 (47.4%) patients did not have ED and 51 (52.6%) patients had ED. According to IIEF-5, ED rates were 41.3% at the first-month evaluation in 46 patients who were previously potent patients. At the sixth month, there was ED in 15.2% of previously potent patients without ED-related systemic disease and/or medications (Table 1). ED can negatively impact the man's female sexual partner with significant declines observed in partner desire, arousal, orgasm, satisfaction, and frequency of sexual activity [25]. In our study, total FSFI scores and all FSFI subscores significantly deteriorated at the first and sixth month after the biopsy in accordance with IIEF-5 scores. Our study showed that TPNB alone seemed to have an important potential risk for ED and that female sexual dysfunction may be seen in women with male partners who have ED due to prostate biopsy.

Akyol and Adayener wrote a letter to the editor entitled as Transient Impotence after TPNB [26]. They stated that ED occurred in only 3 of 136 patients underwent TPNB biopsies during a 1-year period. ED in these patients lasted for 2-4 weeks. These patients had normal erectile function before the biopsy. They had no metabolic or neurologic disorders that may have caused ED. After 6-12 months follow-up, all 3 patients had normal erectile function (Table 1). They thought ED to occur as a result of possibility of nerve damages by extracapsular extension of needle during lateral core biopsies. In this letter, authors mentioned that ED was a transient complication after prostate biopsies and that this complication should be included in informed consent documents prior to the biopsies.

Palumbo, et al. studied the effect of TPNB on erectile function in 240 patients. Erectile function was evaluated by IIEF-5 questionnaire during the initial consultation. IIEF-5 was re-completed 30 days following disclosure of results and, in all cases of confirmed malignancy, at pre-surgical admission. In this study, there was no direct correlation between prostate cancer diagnosis and ED in patients. Authors pointed out that the only seemingly correlative factor between ED and prostate cancer is biopsy itself [27].

Murray, et al. evaluated IIEF-5 scores in 220 patients before biopsy, and 1, 4 and 12 weeks after the biopsies [28]. There was a significant reduction in IIEF-5 score at 1 week after biopsy. Reduction in IIEF-5 scores stayed constant at 4 and 12 weeks after biopsies. Authors mentioned that it is important to be aware of these transient effects and the patients can be appropriately counselled.

Negative Effects of Re-Biopsy of Prostate on Erectile Function

Re-biopsy should be considered in the patients with persistent high serum prostate specific antigen level and/or abnormal digital

rectal examination without malignancy in first biopsy, the patients with multiple high grade PIN and/or ASAP in first biopsy, the patients on AS. The patients on AS is recommended to undergo at least 1 repeat PNB in the first 1 to 2 years [29] but it is not clear how often the patients with persistent high serum prostate specific antigen level and/or abnormal digital rectal examination without malignancy in first biopsy and the patients with multiple high grade PIN and/or ASAP in first biopsy should undergo prostatic biopsy. There are some studies investigating the effect of repeated prostatic biopsy on erectile function.

Hilton, et al. investigated erectile functions in 427 men on AS who underwent repeated prostatic biopsy [30]. During a median 3.2 years of follow up, patients' Sexual Health Inventory for men scores were evaluated. In this study, prostate biopsy seemed to have negligible effects on erectile functions.

Fujita, et al. reported that annual serial prostate biopsies were associated with increased risk of ED in men with prostate cancer on AS [11]. Biopsy number was found to be significantly associated with decreasing Sexual Health Inventory for Men (SHIM). The risk was showed to be increased by more than 3 prostate biopsies with normal IIEF-5 scores prior to biopsies. In this study, the patients with PCa were included. PCa diagnosis could cause ED by itself. Therefore, as ED could be a result of biopsies or PCa diagnosis, the effect of serial biopsies on erectile function might not be well determined.

Braun, et al. also evaluated erectile functions in 342 men on AS [31]. In this study, erectile function was reported to decrease 1 point per year in IIEF-5 score. Phosphodiesterase - 5 inhibitors' usage was also increased from 5% to 27% on AS. The authors mentioned that it was not possible to declare that the cause of ED was a result of natural aging process or was the effect of multiple biopsies.

In a recent study, Pham, et al. evaluated the impact of multiple prostate needle biopsies on long term erectile functions [29]. In this study, it is showed that repeat biopsies in 12 months after the first biopsies worsened erectile functions. As a result of this study, transient erectile dysfunction was found to be a result of prostate biopsy while in the long term prostate biopsy seemed to have no effects on erectile functions.

Men who underwent 1 or more TPNBs to determine whether TPNB was an independent risk factor for ED and whether undergoing multiple TPNBs was associated with ED. There was no significant deviation from the expected rates of any ED for men who had never undergone or had undergone 2 or 3 or more TPNBs.

Men at risk for CaP and those electing AS will undergo 1 or more TPNB during their lifetime, and will require appropriate counseling on the risks and potential long-term morbidity of TPNB. Earlier detection of PCa and increased use of AS to manage low risk PCa has resulted in a greater number of patients undergoing repeat TPNBs.

Negative Effects of Saturation Biopsy of Prostate on Erectile Function

Pepe, et al. studied incidence of erectile dysfunction (ED) following repeat saturation prostate biopsy (SPBx). A median of 28 cores were taken. IIEF-5 was used for the evaluation of erectile function at baseline and 1, 3 and 6 months from SPBx. They found that 5% of the men had a mild ED in first month control after biopsy and this problem disappeared in third and sixth months control [32].

Akbal, et al. evaluated erectile functions using IIEF-5 in 150 patients who underwent saturation biopsies caused by persistently

elevated PSA levels [10]. A median of 22-core saturation biopsies was taken. According to the IIEF-5, for patients who were previously potent and found to be free of prostate cancer, the ED rates were 11.6% at the first month, and no ED was reported at the sixth month of evaluation. Therefore, this study showed that there was a statistically significant difference between baseline and first-month scores for erectile function, but not between baseline and sixth month scores. Authors concluded that ED was a temporary complication after prostate biopsies [10].

Etiological Factors of Erectile Dysfunction After Prostate Biopsy

Most of the men who underwent TPNB have normal erectile function. However, erectile function are generally ignored before prostatic biopsy. The exact etiology of erectile problems following prostate biopsy is unknown. Erectile function after prostatic biopsy may occur due to organic factors or psychogenic factors. Temporary inflammatory and neurovascular damage are likely important, possibly combined with the impact of TPNB. Furthermore, the impact of anxiety and psychological factors is relevant, with some studies showing increased anxiety at the time of screening, biopsy, and immediately following biopsy [33].

A minimal risk of temporary ED following prostate biopsy has been correlated with the increasing number of needle cores, use of periprostatic nerve block, disease involving neurovascular bundles, anxiety and diagnosis of PCa [34-37]. It is found that ED after prostatic needle biopsy may be related to anxiety [34]. One month after TPNB, anxiety had waned and patients had been informed of pathology results. However, 9.7% of biopsy negative cases were left with acute ED with no overt etiology. The authors suggest that in these patients ED might have been caused by direct neurovascular bundle damage or via nerve compression due to hematoma or edema. Given that TPNBs are increasingly directed laterally, where the nerves that facilitate erections are located, it is important to address the long-term impact of repeated TPNBs on erectile function [35].

There is a strong psychogenic impact of knowing one has PCa that can also contribute to ED. Men with biopsy-proven cancer had significantly greater changes in postbiopsy IIEF-5 compared to men without cancer [36]. One study demonstrated a trend toward higher ED rates when using periprostatic local anesthetic nerve blocks [37].

Regarding vascular factors, in one of our study, 42 patients who had undergone TPNB were evaluated for the impact of TPNB on erectile function and on the prostate and bilateral neurovascular bundles using power Doppler ultrasonography imaging of the prostate. For patients who were previously potent in the prebiopsy period, the ED rate was 40% (n = 4/10) at the 3rd month evaluation. In these patients, all the resistivity index values were significantly decreased [38].

Conclusion

As a result, there could be ED after prostate biopsies temporarily or permanently. The possible etiological factors of permanent ED after TPNB are psychological and organic factors. We do not have enough data to prove the exact etiological factor yet. Further studies are needed to determine the etiology and mechanism of ED after prostate biopsies.

Conflict of Interest

No potential conflicts of interest. No financial support.

References

- Goins RT, Schure MB, Noonan C, Buchwald D (2015) Prostate Cancer Screening Among American Indians and Alaska Natives: The Health and Retirement Survey, 1996-2008. *Prev Chronic Dis* 12: E123.
- Cooner WH, Mosley BR, Rutherford CL Jr, Beard JH, Pond HS, et al. (1990) Prostate cancer detection in a clinical urological practice by ultrasonography, digital rectal examination and prostate specific antigen. *J Urol* 143: 1146-1152.

- Hemai ML, Taneja SS (2009) Prostate biopsy: contemporary ultrasound guided biopsy indications, techniques and future directions. *AUA Update Series* 28: 198-207.
- Fornage BD, Touche DH, Deglaire M, Faroux MJ, Simatos A (1983) Real-time ultrasound-guided prostatic biopsy using a new transrectal linear-array probe. *Radiology* 146: 547-548.
- Hodge KK, McNeal JE, Terris MK, Stamey TA (1989) Random systematic versus directed ultrasound guided transrectal core biopsies of the prostate. *J Urol* 142: 71-74.
- Raja J, Ramachandran N, Munneke G, Patel U (2006) Current status of transrectal ultrasound-guided prostate biopsy in the diagnosis of prostate cancer. *Clin Radiol* 61: 142-153.
- Borboroglu PC, Comer SW, Riffenburgh RH, Amling CL (2000) Extensive repeat transrectal ultrasound guided prostate biopsy in patients with previous benign sextant biopsies. *J Urol* 163: 158-162.
- Stewart CS, Leibovich BC, Weaver AL, Lieber MM (2001) Prostate cancer diagnosis using a saturation needle biopsy technique after previous negative sextant biopsies. *J Urol* 166: 86-92.
- Jones JS (2007) Saturation biopsy for detecting and characterizing prostate cancer. *BJU Int* 99: 1340-1344.
- Akbal C, Türker P, Tavukçu HH, Simşek F, Türkeri L (2008) Erectile function in prostate cancer-free patients who underwent prostate saturation biopsy. *Eur Urol* 53: 540-544.
- Fujita K, Landis P, McNeil BK, Pavlovich CP (2009) Serial prostate biopsies are associated with an increased risk of erectile dysfunction in men with prostate cancer on active surveillance. *J Urol* 182: 2664-2669.
- Rodriguez LV, Terris MK (1998) Risks and complications of transrectal ultrasound guided prostate needle biopsy: a prospective study and review of the literature. *J Urol* 160: 2115-2120.
- Spera RV Jr, Kaplan MH, Allen SL (1992) Clostridium sordellii bacteremia: case report and review. *Clin Infect Dis* 15: 950-954.
- Borer A, Gilad J, Sikuler E, Riesenber K, Schlaffer F, et al. (1999) Fatal Clostridium sordellii ischio-rectal abscess with septicaemia complicating ultrasound-guided transrectal prostate biopsy. *J Infect* 38: 128-129.
- da Silva E, Pereiro Alvarez B, Garimaldi Pérez S, Sonzini C, Meijiderico F, et al. (1999) Peritonitis following transrectal biopsy of the prostate. *Arch Esp Urol* 52: 167-168.
- Djavan B, Waldert M, Zlotta A, Dobronski P, Seitz C, et al. (2001) Safety and morbidity of first and repeat transrectal ultrasound guided prostate needle biopsies: results of a prospective European prostate cancer detection study. *J Urol* 166: 856-860.
- Raaijmakers R, Kirkels WJ, Roobol MJ, Wildhagen MF, Schroder FH (2002) Complications rates and risk factors of 5802 transrectal ultrasound-guided sextant biopsies of the prostate within a population-based screening program. *Urology* 60: 826-830.
- Lee G, Attar K, Laniado M, Karim O (2006) Safety and detailed patterns of morbidity of transrectal ultrasound guided needle biopsy of prostate in a urologist-led unit. *Int Urol Nephrol* 38: 281-285.
- Chiang IN, Chang SJ, Pu YS, Huang KH, Yu HJ, et al. (2007) Major complications and associated risk factors of transrectal ultrasound guided prostate needle biopsy: a retrospective of 1875 cases in Taiwan. *J Formos Med Assoc* 106: 929-934.
- Toren P, Razik R, Trachtenberg J (2010) Catastrophic sepsis and hemorrhage following transrectal ultrasound guided prostate biopsies. *Can Urol Assoc J* 4: 12-14.
- Akduman B, Crawford ED (2010) Transrectal ultrasound-guided prostate biopsy: current approach. *Turk J Urol* 36: 25-32.
- Chrisofos M, Papatsoris AG, Dellis A, Varkarakis IM, Skolarikos A, et al. (2006) Can prostate biopsies affect erectile function? *Andrologia* 38: 79-83.
- Zisman A, Leibovici D, Kleinmann J, Siegel YI, Lindner A (2001) The impact of prostate biopsy on patient well-being: a prospective study of pain, anxiety and erectile dysfunction. *J Urol* 165: 445-454.
- Tuncel A, Kirilmaz U, Nalcacioglu V, Aslan Y, Polat F, et al. (2008) The impact of transrectal prostate needle biopsy on sexuality in men and their female partners. *Urology* 71: 1128-1131.
- Meston CM, Bradford A (2007) Sexual dysfunctions in women. *Annu Rev Clin Psychol* 3: 233-256.
- Akyol I, Adayener C (2008) Transient impotence after transrectal ultrasound-guided prostate biopsy. *J Clin Ultrasound* 36: 33-34.
- Palumbo F, Bettocchi C, Spilotros M, Vavallo A, Palazzo S, et al. (2010) A prospective study on patient's erectile function following transrectal ultrasound guided prostate biopsy. *Arch Ital Urol Androl* 82: 265-268.

28. Murray KS, Bailey J, Zuk K, Lopez-Corona E, Thrasher JB (2015) A prospective study of erectile function after transrectal ultrasonography-guided prostate biopsy. *BJU Int* 116: 190-195.
29. Phan KN, Johnston RB, Jeldres C, Lewinshtein DJ, Porter CR (2015) The impact of multiple prostate needle biopsies on long term erectile dysfunction. *Urol Prac* 2: 85-89.
30. Hilton JF, Blaschko SD, Whitson JM, Cowan JE, Carroll PR (2012) The impact of serial prostate biopsies on sexual function in men on active surveillance for prostate cancer. *J Urol* 188: 1252-1258.
31. Braun K, Ahallal Y, Sjoberg DD, Ghoneim T, Dominguez Esteban M, et al. (2014) Effect of repeated prostate biopsies on erectile function in men on active surveillance for prostate cancer. *J Urol* 191: 744-749.
32. Pepe P, Pietropaolo F, Dibenedetto G, Aragona F (2013) Erectile function after repeat saturation prostate biopsy: our experience in 100 patients. *Arch Ital Urol Androl* 85: 130-132.
33. Dale W, Bilir P, Han M, Meltzer D (2005) The role of anxiety in prostate carcinoma: a structured review of the literature. *Cancer* 104: 467-478.
34. Glaser AP, Novakovic K, Helfand BT (2012) The impact of prostate biopsy on urinary symptoms, erectile function, and anxiety. *Curr Urol Rep* 13: 447-454.
35. Scattoni V, Zlotta A, Montironi R, Schulman C, Rigatti P, et al. (2007) Extended and saturation prostatic biopsy in the diagnosis and characterisation of prostate cancer: a critical analysis of the literature. *Eur Urol* 52: 1309-1322.
36. Helfand BT, Glaser AP, Rimar K, Zargaroff S, Hedges J, et al. (2013) Prostate cancer diagnosis is associated with an increased risk of erectile dysfunction after prostate biopsy. *BJU Int* 111: 38-43.
37. Klein T, Palisaar RJ, Holz A, Brock M, Noldus J, et al. (2010) The impact of prostate biopsy and periprostatic nerve block on erectile and voiding function: a prospective study. *J Urol* 184: 1447-1452.
38. Tuncel A, Toprak U, Balci M, Koseoglu E, Aksoy Y, et al. (2014) Impact of transrectal prostate needle biopsy on erectile function: results of power Doppler ultrasonography of the prostate. *Kaohsiung J Med Sci* 30: 194-199.