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ORIGINAL ARTICLE

The impact of pre-procedural waiting period and anxiety level on pain perception in patients undergoing transrectal ultrasound-guided prostate biopsy

Tülay Saraçoğlu, Alparslan Ünsal, Füsun Taşkın, Levent Sevinçok, Can Zafer Karaman

PURPOSE
To investigate the effect of pre-procedural waiting period and anxiety level on pain perception during transrectal ultrasound-guided prostate biopsy.

MATERIALS AND METHODS
Sixty patients who had undergone transrectal ultrasound-guided prostate biopsy were enrolled in this prospective study. The subjects were asked to fill out the State-Trait Anxiety Inventory Scale-1 to measure the level of state anxiety at three times: 1) at the time of the procedure request, 2) before the procedure, and 3) before getting the result. Just after biopsy, the patients were asked to fill out a visual analog scale to evaluate pain perception resulting from the biopsy.

RESULTS
The mean pre-procedural level of state anxiety score was well correlated with the visual analog scale score (r=0.498; $P < 0.001$). The mean level of state anxiety scores before biopsy (39.7±9.4) and before getting the result (39.9±8.4) were significantly higher than the mean level of state anxiety score when the procedure was requested (31.4±7.9) ($P < 0.001$ for both). The patient group was divided into two subgroups according to the waiting time between the request and the procedure itself; the cut-off value between the short and long groups was 10 days. The difference between the mean visual analog scale scores from transrectal ultrasound-guided prostate biopsy patients with the short (n=23, 1.49±0.95) and long (n=37, 2.35±1.12) waiting periods was statistically significant ($P = 0.003$).

CONCLUSION
In conclusion, performing the transrectal ultrasound-guided prostate biopsy procedure as soon as possible and using more effective anesthetic methods, especially for patients with high level of state anxiety scores, may have a positive impact on patient tolerance.

Key words: • *ultrasonography* • *biopsy* • *prostate* • *anxiety* • *pain perception*

From the Departments of Radiology (T.S., A.Ü. ✉ *aunsal@adu.edu.tr*, F.T., C.Z.K.), and Psychiatry (L.S.), Adnan Menderes University School of Medicine, Aydın, Turkey.

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Transrectal ultrasound-guided systematic prostate biopsy (TRUS-Bx) is still the gold standard in early diagnosis of potentially curable and organ-confined prostate cancer, which is the most frequent malignant disease in the older male population and is the second most common cause of cancer-related death in this age group, after lung cancer (1, 2). Almost all patients declare that the biopsy procedure is painful; approximately 20% of patients suffer from severe pain. Rectal topical gel application and periprostatic local anesthetic infiltration are the most frequently used methods to relieve pain during TRUS-Bx (3, 4).

Anxiety level is an important aspect in the case of invasive interventions like TRUS-Bx. There are several recent papers in the literature about the correlation between pre-procedural anxiety levels and pain perceptions during various radiological interventions (5, 6). However, as far as we can determine in the English language literature, there is no data about these parameters during TRUS-Bx. The aim of this study therefore was to determine anxiety and pain perception levels of patients undergoing TRUS-Bx and to correlate these parameters with each other and with the pre-procedural waiting period.

Materials and methods

Between January and June of 2008, 60 patients (age range, 52–77 years; mean age, 64.6±6.7 years) with abnormal digital rectal examination findings or high levels of prostate-specific antigen (PSA) were enrolled into the patient group of this prospective study. The study was carried out according to the regulations of the local ethics committee of our institution. The patients were informed about the biopsy procedure and the potential complications, and then informed consent was obtained from all participants. Uncooperative patients were excluded.

The patient TRUS-Bx appointments were randomly arranged to take place between one and 55 days after the decision to have the procedure done. The patients were asked to fill out the "State-Trait Anxiety Inventory Scale-1" (STAI-1) to determine the immediate anxiety level at the arrangement of the biopsy date (7, 8). The STAI-1 scale used in this study, which has been accepted as the global gold standard to determine the level of state anxiety (LSA), consisted of 20 statements (10 direct and 10 reverse statements) with the following answers: 1) never, 2) slightly, 3) substantially, and 4) exactly (Table 1). The same questionnaire was repeated just before the procedure and then before getting the pathological results.

Patients using anticoagulants were asked to cease medication under medical supervision at least 10 days before TRUS-Bx. The following oral antibiotic prophylactic was given: 1 tablet of 400 mg ofloxacin (Tarivid, Aventis Pharma, İstanbul, Turkey) for five days, starting from one day before biopsy. The bleeding parameters were analyzed before biopsy,

Table 1. Sample of the State-Trait Anxiety Inventory Scale-1 (STAI-1) questionnaire used in this study

	Never	Slightly	Substantially	Exactly
I feel calm	1	2	3	4
I feel safe	1	2	3	4
I am uneasy	1	2	3	4
I am remorseful	1	2	3	4
I feel comfortable	1	2	3	4
I have bothering feelings	1	2	3	4
Potential worrisome events make me sad	1	2	3	4
I feel relaxed	1	2	3	4
I am anxious	1	2	3	4
I feel myself in a relaxed condition	1	2	3	4
I trust in myself	1	2	3	4
I feel myself angry	1	2	3	4
There is something annoying	1	2	3	4
I feel stressful	1	2	3	4
I feel peaceful	1	2	3	4
I am glad	1	2	3	4
I am worried	1	2	3	4
I feel excited and confused	1	2	3	4
I feel happy	1	2	3	4
Everything is OK	1	2	3	4

and the patients were asked to use a rectal cleansing enema (Fleet Enema, Kozmed Farmasotik, Ankara, Turkey) just before the procedure. Biopsy procedures were carried out at the left lateral decubitus position after rectal lidocaine gel application (Cathejell, Taymed, İstanbul, Turkey). Ten systematic quadrant biopsy samples of the prostate were obtained with an 18 G×25-cm, side-notched tru-cut biopsy needle (Bard Magnum Core Biopsy Needle, Bard Inc., Tempe, Arizona, USA) mounted on an automated biopsy gun (Bard Magnum, Bard Inc.). Additional samples were obtained in the cases of suspicious peripheral zone nodule(s). The same operator performed all of the biopsies. The core biopsy samples were sent to the pathology department in separate containers for exact localization.

Just after biopsy, the patients were asked to fill-out a visual analog scale (VAS) to evaluate the pain perception resulting from the biopsy procedure in reference to previous pain experiences of the patients. Each patient responded to 21 statements and scored between 0 and 10 points, where 0 represented no pain and 10 denoted the worst condition the patient had ever experienced (Table 2).

Statistical analysis was done with Statistical Package for the Social Sciences software (version 14.0, SPSS Inc., Chicago, Illinois, USA). Friedman and Wilcoxon signed-rank tests were used to evaluate the difference between the LSA scores obtained at three different time periods. Student t test was used to compare the results, and Pearson's correlation coefficients were calculated to evaluate the relationship between the pre-procedural waiting period, anxiety level, and pain perception; $P = 0.05$ was accepted as the cut-off for statistical significance.

Results

On histopathological examination, 19 cases (31.6%) were diagnosed as prostate adenocarcinoma. The remaining patients (n=41, 68.4%) were diagnosed with high-grade prostatic intraepithelial neoplasia, chronic prostatitis or benign prostatic hyperplasia. The mean VAS score was 1.94±1.35 for the 19 malignant patients and 2.07±1.03 for the other patients, and the difference was statistically insignificant ($P = 0.717$).

The mean VAS score of the patient group was 2.02±1.13 (range, 0.14–4.43). There was not a statistically significant correlation between the mean LSA score at the time of admission (31.4±7.9, r=0.138, $P > 0.05$) and the VAS score; on the other hand, both mean LSA scores, just before biopsy (39.7±9.4, r=0.498, $P < 0.001$) and before getting the pathological results (39.9±8.4, r=0.450, $P < 0.001$), correlated well with the mean VAS score. The mean LSA and VAS scores of the whole patient group are summarized in Table 3. Both of the LSA scores, just before biopsy and before the receipt of the pathological results, were higher than the initial LSA score, and the difference between these score sets was significant (Table 4).

For another perspective, the patient group was divided into two arbitrary subgroups according to the timing of the procedure. The first subgroup consisted of 23 patients (38.4%) who underwent TRUS-Bx within 10 days after admission; the remaining 37 patients (61.6%) were examined after a longer waiting period that varied between 10 and 55 days (mean, 20.3±8.7 days). The STAI-1 scores of both subgroups were similar at the time of admission; however, the patients in the second subgroup had higher mean STAI-1 scores just before biopsy and before getting the pathological results. The mean VAS score of these patients was also higher than the patients in the first subgroup. The difference between the STAI-1 and VAS scores of the subgroups was statistically significant. The mean STAI-1 scores and VAS scores of these subgroups are summarized in Table 5.

No statistically significant correlation was found between a patients' age, prostatic volume or pathologic diagnosis, and the pain perception.

Discussion

Radiological imaging has an important role in the diagnosis of prostate cancer. With the increasing use of PSA screening as a widely accepted tool to

Table 2. Sample of the visual analog scale (VAS) sheet used in this study

		Unimportant				Mild			Moderate			Severe	The worst condition I have ever experienced
1	Pre-procedural waiting period	0	1	2	3	4	5	6	7	8	9		10
2	Anxiety of biopsy	0	1	2	3	4	5	6	7	8	9		10
3	Anxiety of an unknown procedure	0	1	2	3	4	5	6	7	8	9		10
4	Needle fear	0	1	2	3	4	5	6	7	8	9		10
5	Can I cope with the procedure?	0	1	2	3	4	5	6	7	8	9		10
6	Feeling disarmed	0	1	2	3	4	5	6	7	8	9		10
7	Fear of being unaided	0	1	2	3	4	5	6	7	8	9		10
8	Fear of being humiliated	0	1	2	3	4	5	6	7	8	9		10
9	Anxiety of being naked during the procedure	0	1	2	3	4	5	6	7	8	9		10
10	Fear of being damaged during the procedure	0	1	2	3	4	5	6	7	8	9		10
11	Anxiety of unseeing the ongoing procedure	0	1	2	3	4	5	6	7	8	9		10
12	Disturbance during the procedure	0	1	2	3	4	5	6	7	8	9		10
13	Feeling pain during the procedure	0	1	2	3	4	5	6	7	8	9		10
14	Disturbance due to sounds heard during the procedure	0	1	2	3	4	5	6	7	8	9		10
15	Fear of urinary incontinence during the procedure	0	1	2	3	4	5	6	7	8	9		10
16	Fear of bleeding during the procedure	0	1	2	3	4	5	6	7	8	9		10
17	Fear of bleeding after the procedure	0	1	2	3	4	5	6	7	8	9		10
18	Fear of getting infected due to the procedure	0	1	2	3	4	5	6	7	8	9		10
19	Anxiety of waiting for the biopsy result	0	1	2	3	4	5	6	7	8	9		10
20	Anxiety of the biopsy result	0	1	2	3	4	5	6	7	8	9		10
21	Fear of unknown conditions related with biopsy	0	1	2	3	4	5	6	7	8	9		10

Table 3. Relationship between mean LSA scores and mean VAS score

	LSA score	VAS score	Correlation coefficient	*P*
Admission	31.4±7.9	2.02±1.10	0.138	> 0.05
Before the procedure	39.7±9.4		0.498	< 0.001
Before getting the result	39.9±8.4		0.450	< 0.001

LSA, level of state anxiety; VAS, visual analog scale.

Table 4. Comparison of mean LSA scores

	LSA score	Mean rank[a]
Admission	31.4±7.9	1.28
Before the procedure	39.7±9.4	2.27
Before getting the result	39.9±8.4	2.46

LSA, level of state anxiety.
[a] $P < 0.001$, Friedman test

determine high-risk patients, the necessity of TRUS-Bx also increases each year. Despite technological advances in radiological modalities and interventions, biopsy procedures are still invasive in nature, and pain is an important problem to solve. Several papers in the literature reveal a high percentage of pain and discomfort, up to 65%–90% during TRUS-Bx (9, 10). In addition, the widespread use of multiquadrant biopsies, sampling of younger individuals and increased re-biopsy rates raise the perceived pain during the procedure (11).

According to Zisman et al. (12), the most distasteful factors are the physical and psychological trauma related to the procedure. In another study, Gustaffson et al. (13) state that even the planning of the biopsy procedure alone may be a source of emotional stress, according to their study on plasma cortisol levels of such patients. The probability of cancer and the use

Table 5. Relationship between mean LSA score and mean VAS score in the subgroups divided according to the pre-procedural waiting period

		LSA score	VAS score
Procedures within 10 days of request	Admission	31.1±8.0	1.49±0.95[c]
	Before the procedure	35.7±9.5[a]	
	Before getting the result	37.6±8.6[b]	
Procedures after 10 days of request	Admission	31.5±8.0	2.35±1.12[c]
	Before the procedure	42.2±8.5[a]	
	Before getting the result	41.3±8.1[b]	

LSA, level of state anxiety; VAS, visual analog scale.
[a] $P < 0.001$
[b] $P < 0.001$
[c] $P = 0.003$

of a rectal route for this potentially painful intervention raise the anxiety levels among the patient group. In the presented study, the mean LSA score of TRUS-Bx patients at the time of admission had no correlation with the mean VAS score during the procedure. On the other hand, the mean LSA scores just before biopsy and before learning the pathological result were significantly higher than at the time of admission. These last two figures also have a strong correlation with the mean VAS score. In other words, inherently more anxious patients may have higher levels of pain perception and also higher levels of anxiety during the receipt of the pathological results. These findings suggest that both physical and emotional stress factors may play a significant role in both the pain perceived during the procedure and in the compliance of the patients with such an invasive intervention.

There may be a reciprocal relationship between anxiety levels and pain perceived. Anxious patients feel much more pain, and/or patients with a low pain threshold may be more anxious. To determine which statement is more accurate is not necessarily important; however, the most important point in this situation is to decrease the pain perceived during the procedure and to increase compliance in those patients with high LSA scores with a procedure that has the potential to be repeated at some point in the future. The most widely used pain-relieving applications are rectal topical lidocaine gel (as used in this study) and periprostatic local anesthetic infiltration. There are many papers in the literature comparing the efficiency of these two applications (both supporting and opposing any of them) (14–17), and the results are outside the scope of the present study. As mentioned above, each patient should be considered with his/her own factors, and a more potent way of pain relieving should be selected individually; this may be a subject for potential prospective studies.

Another interesting result of the present study is the significant difference between the mean LSA and VAS scores of patient sub-groups divided according to the timing of the procedure. Several previous papers emphasize that various factors, such as operator experience, intellectual level of the patients, previous intervention history, number of biopsy samples, and prostate volume, may have a positive or negative effect on patient tolerance and pain perception (18–28). However, as far as we could tell from the web-based English language literature, the present study is the first one that investigated the potential correlation between the pre-procedural waiting period, anxiety level and pain perception for TRUS-Bx. As our results demonstrate, the anxiety levels of patients who wait more than 10 days for the procedure are significantly higher than that of the other sub-group, both before the procedure and before getting the pathological results, although their initial mean LSA scores are similar. There is also a strong correlation between anxiety levels and the mean VAS scores of these sub-groups.

The relatively limited number of the cases is a potential drawback in this study. Also, the difference between the efficacies of various anesthetic methods on pain perception was not assessed. Nevertheless, the present study may be accepted as a preliminary work, inspiring further prospective studies, such as the comparison and selection of anesthetic methods among patients with different levels of pre-procedural anxiety.

In conclusion, performing the TRUS-Bx procedure as soon as possible, and using more effective anesthetic methods, especially for patients with high levels of anxiety, may have a positive impact on patient tolerance.

Conflict of interest disclosure

The authors declared no conflicts of interest.

References

1. Greenlee RT, Hill-Harmon MB, Murray T, Thun M. Cancer statistics 2001. CA Cancer J Clin 2001; 51:15–36.
2. Raja J, Ramachandran N, Munneke G, Patel U. Current status of transrectal ultrasound-guided prostate biopsy in the diagnosis of prostate cancer. Clinical Radiology 2006; 61:142–153.
3. Medina Marquez C, Cadena Gonzalez Y, Guerra Garzon A, Hidalgo PJM. Local anesthetic versus ultrasound-guided lidocaine enjection for pain control in patients undergoing prostate biopsy. Actas Urol Esp 2006; 30:987–990.
4. Philip J, Mccabe JE, Roy SD, Samsudin A, Campbell IM, Javle P. Site of local anesthesia in transrectal ultrasonography-guided 12-core prostate biopsy: does it make a difference? BJU 2006; 97:263–265.
5. Medd JCC, Stockler MR, Collins R, Lalak A. Measuring men's opinion of prostate needle biopsy. ANZ J Surg 2005; 75:662–664.
6. Mueller PR, Biswal S, Halpern EF, Kaufman JA, Lee MJ. Interventional radiologic procedures: patient anxiety, perception of pain, understanding of procedure and satisfaction with medication-a prospective study. Radiology 2000; 215:684–688.
7. Spielberger CD, Gorsuch RL, Lushene RE. Manual for the state-trait anxiety inventory. Palo Alto, California: Consulting Psychologists Press, 1970.
8. Spielberger CD, Reheiser EC, Ritterban LM, Sydeman SJ, Unger KK. Assessment of emotional states and personality traits: measuring psychological vital signs. In: Butcher JN, ed. Clinical personality assessment: practical approaches. New York: Oxford University Press, 1995.
9. Clements R, Aideyan OU, Griffiths GJ, Peeling WB. Side effects and patient acceptability of transrectal biopsy of the prostate. Clin Radiol 1993; 47:125–126.
10. Collins GN, Lloyd SN, Hehir M, McKelvie GB. Multiple transrectal ultrasound guided prostatic biopsies—true morbidity and patient acceptance. Br J Urol 1993; 71:460–463.

11. Irani J, Fournier F, Bon D, Gremmo E, Dore B, Aubert J. Patient tolerance of transrectal ultrasound-guided biopsy of the prostate. Br J Urol 1997; 79:608–610.
12. Zisman A, Leibovici D, Kleinmann J, Diegel YI, Lindner A. The impact of prostate biopsy on patient well-being: a prospective study of pain, anxiety and erectile dysfunction. J Urol 2001; 165:445–454.
13. Gustaffson O, Theorell T, Norming U, Perski A, Ohström M, Nyman CR. Psychological reactions in men screened for prostate cancer. Br Urol 1995; 75:631–636.
14. Jones JS, Zippe JD. Rectal sensation test helps avoid pain of apical prostate biopsy. J Urol 2003; 170:2316–2318.
15. Mallick S, Humber M, Braud F, Fofana M, Blanchet P. Local anesthesia before transrectal ultrasound guided prostate biopsy: comparison of 2 methods in a prospective, randomised, clinical trial. J Urol 2004; 171:730–733.
16. Desgrandchamps F, Meria P, Irani J, Desgrippes A, Teillac P, Le Duc A. The rectal administration of lidocaine gel and tolerance of transrectal ultrasound guided biopsy of the prostate: a prospective randomised placebo-controlled study. BJU Int 1999; 83:1007–1009.
17. Stirling BN, Shockley KF, Carothers GG, Maatman TJ. Comparison of local anesthesia techniques during transrectal ultrasound-guided biopsies. Urology 2002; 60:89–92.
18. Aykent R, Kocamanoğlu S, Üstün E, Tür A, Şahinoğlu H. Preoperatif anksiyete nedenleri ve değerlendirilmesi. APAIS ve STAI skorlarının karşılaştırılması. Türkiye Klinikleri J Anest Reanim 2007; 5:7–13.
19. Trento M, Tomelini M, Brancato R, et al. Perception of, and anxiety levels induced by laser treatment in patients with sight-threatening diabetic retinopathy. A multicentre study. Diabet Med 2006; 23:1106–1109.
20. Hopper KD, Houst PS, Tenhave TR, Matthews YL, et al. The effect of informed concent on the level of anxiety in patients given IV contrast material. AJR Am J Roentgenol 1994; 162:531–535.
21. Maxwell JR, Bugbee ME, Wellisch D, et al. Imaging-guided core needle biopsy of the breast: study of psychological outcomes. Breast J 2001; 6:53–61.
22. Ng CC, Lai FM, Yeo GS. Assessment of maternal anxiety levels before and after amniocentesis. Singapore Med J 2004; 45:370–374.
23. Schupp CJ, Berbaum K, Lang EV. Pain and anxiety during interventional radiologic procedures: effects of state anxiety at baseline and modulation by nonpharmacologic analgesia adjuncts. J Vasc Interv Radiol 2005; 16:1581–1584.
24. Aus G, Hermansson CG, Hugosson J, Pedersen KV. Transrectal ultrasound examination of the prostate: complications and acceptance by patients. Br J Urol 1993; 71:457–459.
25. Westenberg AM, Cossar EH, Lorimer LB, Costello JP. The acceptability of transrectal ultrasound guided prostatic biopsy without anaesthesia. NZ Med J 1999; 112:231–232.
26. Turgut AT, Yılmaz Ö, Ölçücüoğlu E, Koşar P, Geyik PÖ, Koşar U. Transrektal ultrasonografi eşliğinde prostat biyopsisinde hasta rahatsızlığına ilişkin risk faktörlerinin değerlendirilmesi. Turkish Medical Journal 2007; 1:145–149.
27. Yun TJ, Lee HJ, Kim SH, et al. Prospective analysis on the relation between pain and prostate volume during transrectal prostate biopsy. Korean J Radiol 2007; 8:231–235.
28. Bastide C, Lechevallier E, Eghazarian C, Ortega JC, Coulange C. Tolerance of pain during transrectal ultrasound-guided biopsy of the prostate: risk factors. J Urol 2003; 28:234–236.