Does Experimental Pain Assessment Before Biopsy Predict for Pain During Transrectal Ultrasound-Guided Prostate Biopsy?

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OBJECTIVES To evaluate whether assessment of experimental pain perception using the modified tourniquet test before a biopsy procedure could predict the pain scores during transrectal ultrasound-guided prostate biopsy. However, the relationship between the experimental pain assessment before prostate biopsy and the pain scores during the biopsy procedure has not been established.

METHODS A total of 67 men who underwent transrectal ultrasound-guided 12-core prostate biopsy were prospectively enrolled in the study. The day before biopsy, a modified submaximal effort tourniquet test was performed on all patients. During the test, pain scores were recorded at 30, 60, 90, and 120 seconds after inflation of the blood pressure cuff. Pain scores were also recorded during probe introduction into the rectum and prostate biopsy. Pain was assessed using a visual analogue scale (VAS).

RESULTS A significant correlation was found between the VAS scores in the tourniquet test and the VAS scores during probe introduction and the VAS scores during prostate biopsy ($P < 0.0001$). The most significant correlation was found between the VAS scores during prostate biopsy and the VAS 60-second scores during the tourniquet test ($P < 0.0001$, $r = 0.756$). No significant relation was found between the VAS scores and age, prostate volume, or prostate-specific antigen level ($P > 0.05$).

CONCLUSIONS Our results have shown that a simple and quick tourniquet test could be useful in identifying those men who will experience greater pain during transrectal ultrasound-guided prostate biopsy. In the light of these data, additional studies will be planned to evaluate whether experimental pain assessment before the procedure could predict the analgesic potency of pain-relieving treatment during prostate biopsy. UROLOGY 70: 681–684, 2007. © 2007 Elsevier Inc.

Prostate cancer is a major health issue in the world, and transrectal ultrasound (TRUS)-guided prostate biopsy is critical for its detection.[1] Although this diagnostic procedure is considered safe and is commonly performed on an outpatient basis, it is invasive and often needs to be repeated. The pain from TRUS-guided prostate biopsy itself is one of the most common side effects. Previous studies have reported that about 25% of men experience moderate to severe pain during TRUS-guided prostate biopsy.[2] Additionally, considerable number of studies have evaluated the role of different anesthetic methods to relieve this pain.[2,3]

Pain is a subjective experience, and the patient's perception of pain during TRUS-guided prostate biopsy changes from person to person.[2] Additionally, the analgesic requirement during the procedure is highly variable among men. Although several studies have examined the experimental pain response as a predictor of outcomes after pain-producing interventions,[4] the relationship between the experimental pain assessment before prostate biopsy and the pain scores during the biopsy procedure has not been established. The aim of the present study was to evaluate whether the assessment of experimental pain perception using the modified tourniquet test before the biopsy procedure could predict the pain scores during TRUS-guided prostate biopsy.

MATERIAL AND METHODS

From October 2005 to February 2006, 67 men undergoing TRUS-guided prostate biopsy were prospectively enrolled in the study. Before attending for TRUS-guided prostate biopsy, all study participants read and signed an informed consent form. The indications for prostate biopsy were abnormal digital rectal examination findings and/or elevated serum prostate-specific antigen. Patients were excluded from the study if they had chronic pain conditions, including fibromyalgia, arthritis, anal or perianal disorders that might lead to pain; were using any

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Table 1. Age, prostate volume, and prostate-specific antigen results

Variable	Mean (SD)
Age (yr)	64.1 (8.8)
Prostate volume (cm^3)	57.7 (39.4)
PSA (ng/mL)	15.9 (8.3)

PSA = prostate-specific antigen.

analgesic agents; had a history of transrectal prostate biopsy, acute urinary retention, or medical or surgical treatment of benign prostatic hyperplasia; had a systemic disorder, including diabetes mellitus or neurologic disease; had bleeding diathesis; were receiving anticoagulation therapy; or were suspected of having urinary tract infection or prostatitis.

All the participants received a prophylactic oral antibiotic. A Fleet enema was self-administered a few hours before biopsy. No participant was given sedation or local anesthesia. The prostate biopsy was performed using a 6.5-MHz transrectal probe, and a total of 12 biopsy cores were taken using an automatic spring-loaded, 18-gauge needle in the left lateral decubitus position. All procedures were performed on an outpatient basis by the same urologist (S.S.).

The day before TRUS-guided prostate biopsy, a modified submaximal effort tourniquet test was performed on all patients.[5] In brief, the nondominant arm was occluded with a standard blood pressure cuff inflated to 20 mm Hg greater than the patient's systolic blood pressure. Patients were then instructed to perform 20 hand grip exercises. During the test, pain scores were recorded at 30, 60, 90, and 120 seconds after inflation of the cuff. We also recorded the pain scores during probe introduction into the rectum and prostate biopsy. The pain scores were recorded using a visual analogue scale (VAS). According to the VAS, 0 corresponded to no pain and 10 to the greatest pain imaginable. For analysis, numbers have been given to the verbal categories; a total pain score of 0 was evaluated as "no pain," a score of 1 to 3 as "mild pain," a score of 4 to 6 as "moderate pain," and any score greater than 6 as "severe pain." The relationships between the VAS scores in the tourniquet test and those during probe introduction and prostate biopsy were examined.

The Statistical Package for Social Sciences, version 13.0, for Windows (SPSS, Chicago, Ill) was used for data analysis. All data are expressed as the mean ± standard deviation. The relationship between the VAS scores during the biopsy procedure and tourniquet test was evaluated using Pearson's correlation analysis. A P value of less than 0.05 was considered statistically significant.

RESULTS

The demographic information and mean VAS scores are shown in Table 1 and Figure 1. Of the 67 patients, 55 (82%) and 37 (55.2%) had moderate to severe pain

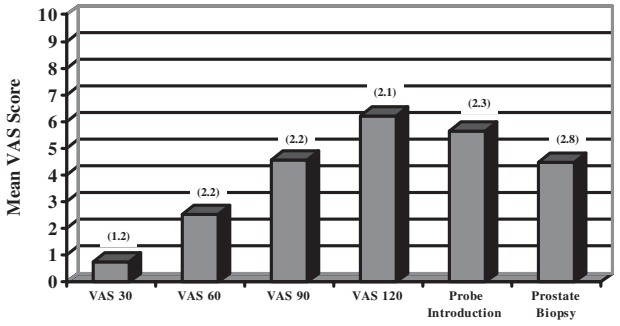

Figure 1. Mean VAS scores in tourniquet test and biopsy procedure (standard deviations indicated on bar).

Table 2. Pearson correlation coefficient between visual analog scale scores in tourniquet test and prostate biopsy

Tourniquet Test (s)	Probe Introduction		Prostate Biopsy	
	r	*P* Value	*r*	*P* Value
VAS 30	0.425	<0.0001	0.587	<0.0001
VAS 60	0.541	<0.0001	0.756	<0.0001
VAS 90	0.435	<0.0001	0.722	<0.0001
VAS 120	0.455	<0.0001	0.713	<0.0001

VAS = visual analog scale.

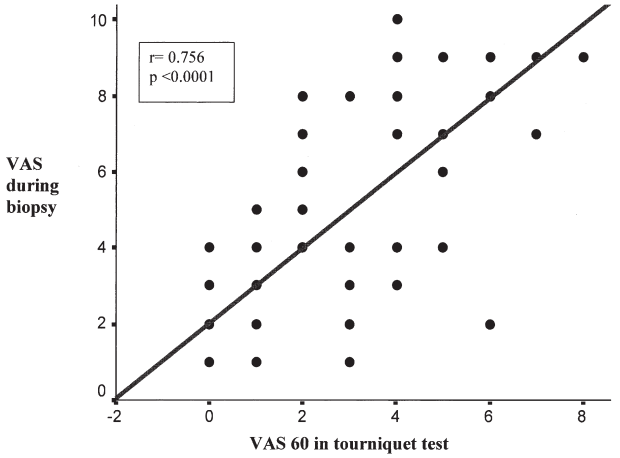

Figure 2. Correlation between VAS scores during prostate biopsy and VAS 60-second scores in tourniquet test.

during probe introduction and prostate biopsy, respectively. A significant correlation was found between the VAS scores in the tourniquet test and those during probe introduction and those during prostate biopsy (P <0.0001; Table 2).

The most significant correlation was found between the VAS scores during prostate biopsy and the VAS 60-second scores in the tourniquet test (P <0.0001, r = 0,756; Table 2 and Fig. 2). In the patients who had moderate to severe pain during the procedure, the VAS 60-second scores were highly predictive, with an area under the curve of 0.89 (95% confidence interval 0.81 to 0.98). Of the 67 men, 23 (34.3%) had moderate to severe pain during the tourniquet test (VAS 60-second scores). No significant relation was found between the VAS

scores and age, prostate volume, or prostate-specific antigen level ($P > 0.05$).

COMMENT

TRUS-guided prostate biopsy has evolved into a standard procedure for the diagnosis of prostate cancer. During the past decade, the tendency has been to take more biopsy cores and the procedure often needs to be repeated.[1,3] Pain is one of the most important complaints of TRUS-guided prostate biopsy. Some individuals seem to be highly sensitive to pain during this procedure and others do not.[2]

Because the pain experienced during TRUS-guided prostate biopsy is highly variable among men, the level of pain intensity is critical. Zisman *et al.*[6] reported that 96% of their patients had immediate pain during the procedure. However, 7% of patients considered the procedure to be painful in the study conducted by Aus *et al.*[7] We performed 12-core prostate biopsy and found that a considerable number of patients had moderate to severe pain during probe introduction and prostate biopsy. In addition to individual differences in pain sensitivity, the different pain ratios referred to above can be explained in part by variations in the pain assessment method and variable number of biopsy cores taken.

In the present study, we found that the pain scores assessed by the modified tourniquet test before biopsy correlated significantly with the pain scores during TRUS-guided prostate biopsy. In recent years, experimental human pain models have been widely used, and preoperative pain sensitivity has been found by several investigators to predict for the severity of postoperative pain.[4] Granot *et al.* [8] reported that preoperative experimental pain measurement is useful in identifying those women who will experience greater pain after cesarean section. Another study showed correlation between preoperative experimental pain and postoperative pain in patients who underwent laparoscopic cholecystectomy.[9] Among individuals undergoing limb amputation, the preamputation experimental pain thresholds were significantly inversely correlated with postamputation stump pain and phantom pain.[10] Werner *et al.*[11] reported that preoperative ratings of an intense noxious thermal stimulus correlated strongly with joint pain ratings after anterior cruciate ligament repair.

The experimental pain test has been used not only to evaluate pain treatment outcomes, but also as a predictor of postprocedure pain.[4] The successful results of those previous studies led us to investigate an experimental human pain model for TRUS-guided prostate biopsy. Although several studies have examined the experimental pain response as a predictor of outcomes after pain-producing interventions, the relationship between the experimental pain assessment before prostate biopsy and pain scores during the procedure has not been previously reported. The most commonly used methods of experimental human pain assessment include electrical, heat, pressure, ice water, and ischemic pain.[4,5] However, no single best experimental pain test has been accepted in published reports. We used a modified submaximal effort tourniquet test as an ischemic pain procedure. To our knowledge, the present study is the first to show that experimental pain assessment before biopsy can serve as a predictor of the pain experienced during TRUS-guided prostate biopsy.

Although it is important to determine which patients will experience pain during prostate biopsy, a debatable issue is whether all levels of pain intensities during prostate biopsy can be prevented.[2] In the present study, the best correlation was found between the VAS 60-second scores in the tourniquet test and the VAS scores during probe introduction into the rectum and prostate biopsy. We found that the VAS 60-second scores were highly predictive, with an area under the curve of 0.89 (95% confidence interval 0.81 to 0.98) in patients who had moderate to severe pain during the procedure. In this respect, the VAS 60-second scores in this experimental pain model might be useful in identifying those men who will experience greater pain during TRUS-guided prostate biopsy. It is important to know which patients are more likely to have great pain and to identify this group. Identifying this patient population before biopsy in a cost-effective way could also result in cost savings. Certain analgesics could be reserved for those identified as being at risk of pain intolerance. In addition, targeting this group before biopsy could help eliminate not taking the planned number of biopsy cores or interruption of the procedure secondary to pain intolerance.

Different methods have been established to reduce the pain experienced during TRUS-guided prostate biopsy.[2] Of these, periprostatic injection of local anesthetic was used in most of the studies.[3] However, no consensus has been reached regarding the dosages of anesthetic or the injection sites.[2,3] To date, the analgesic potency of periprostatic anesthetic infiltration has not been investigated in experimental human pain models. In the present study, we did not perform periprostatic anesthetic infiltration. If a local anesthetic block or other methods of decreasing pain had been performed in the present study, the pain intensity would have been reduced and it would not have been possible to evaluate the relationship between the experimental pain assessment before prostate biopsy and the pain scores during the biopsy procedure. However, the aim of our study was to evaluate whether an assessment of experimental pain perception using the modified tourniquet test before biopsy could predict the pain scores during TRUS-guided prostate biopsy. The present study is the first to show the relationship between the experimental pain assessment scores before prostate biopsy and the pain scores during the procedure.

Experimental pain models have also been used to investigate analgesic drug effects and are important tools for comparing the analgesic potency of different drugs.[4] In light of our findings, additional prospective studies are necessary to evaluate whether an experimental pain assessment before

the procedure could predict the analgesic potency of pain-relieving treatment during TRUS-guided prostate biopsy.

CONCLUSIONS

Pain during TRUS-guided prostate biopsy is highly variable among men, and the analgesic requirement during the procedure is highly variable. The results of our study have emphasized that a strong correlation exists between the experimental pain assessment before biopsy and the amount of pain experienced during TRUS-guided prostate biopsy. It is important to know which patients are more likely to have severe pain during biopsy. Certain analgesics could be reserved for those identified at risk of pain intolerance. We believe that identifying those men who might experience severe pain before prostate biopsy could lead to changes in practice that will be cost-effective and time-efficient and will improve patient satisfaction. Additional studies will also be planned to evaluate whether experimental pain assessment before the procedure could predict the analgesic potency of pain-relieving treatment during prostate biopsy.

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