Comparison of two different anesthetic methods on pain perception in prostate biopsy

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Abstract

Aim: In this study, we aimed to compare the efficiency of two different local anesthetic techniques in transrectal ultrasound (TRUS) guided prostate biopsy. Material and Method: The medical records of 798 patients who underwent 12 core transrectal ultrasound guided prostate biopsy were evaluated retrospectively. The patients were divided into 2 groups to receive two different kinds of anesthesia during the procedure as follows: Group 1, rectal application of 2% lidocaine gel and Group 2 periprostatic nerve block. The perception of pain during the insertion of the probe and during the biopsy procedure was scored for each group separately by using a visual analog scale (VAS). Results: The mean age, mean total PSA level and mean prostate volume of the patients in Group 1 were 67.67 ± 8.91 years, 12.57 ± 17.67 ng/ml and 51.41 ± 22.62 ml respectively. The mean age, mean total PSA level and mean prostate volume of the patients in Group 2 were 64.64 ± 7.63 years, 13 ± 18.02 ng/ml and 53.44 ± 44.01 ml respectively. The mean VAS scores of Group 1 and Group 2 during probe insertion were 4,87 ± 1,14 and 5,19 ± 1,16 respectively ($p<0.001$). The mean VAS scores during biopsy were 3,56 ± 1,43 for Group 1 and 2,5 ± 0,91 for Group 2. The difference between these scores was statistically significant ($p<0.001$). Discussion: Using of lidocaine gel for analgesia in TRUS-guided prostate biopsy significantly decreases the perception of pain experienced during the probe insertion procedure. On the other hand, PPNB is more effective than the using of lidocaine gel in pain control when the level of pain experienced during the biopsy is examined. Analgesia is substantially ensured by using PPNB, but analgesia combined with topical anesthetic agents could provide a more comfortable biopsy procedure.

Keywords

Cancer; Pain; Periprostatic Nerve Blockage; Prostate Biopsy.

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Introduction

Prostate cancer (PCa) is the most frequently described cancer in men and although with decreasing rates in recent years, it is still the second leading reason of cancer-related death rate in the aged male population [1]. The serum prostate-specific antigen (PSA) levels, TRUS, digital rectal examination, and multiparametric MR are currently used as diagnostic tools, but the definitive diagnosis of PCa is confirmed by histopathological examination of prostatic tissue [2].

Transrectal ultrasonography-guided prostate biopsy (TRUS-Bx) is the standard diagnostic method to establish PCa diagnosis in men with high levels of serum PSA and/or with suspected prostate cancer in the digital rectal examination. About 800000 prostate biopsies are performed in the USA for the diagnosis PCa in a year [3]. It is well known that this intervention is an invasive and painful procedure. Therefore some preparations are needed to decrease the infection risk and potential anxiety due to the intervention. It can be performed in outpoint clinics with an acceptable rate of complication and without the need for hospitalization. In 1989, Hodge et al. first described the systematic six-core biopsy of prostate with TRUS guidance [4]. However, subsequent studies have revealed that a higher number of biopsy cores are required to diagnose prostate cancer with higher rates [5].

In the literature, there is no standard way of bowel preparation of the patient for TRUS- Bx and analgesia type during the procedure. During or after TRUS-Bx several complications such as hematospermia, rectal bleeding, hematuria, fever, sepsis, urinary retention, and pain have been reported [6]. International Association for the Study of Pain definition of pain: "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" [7]. Pain is quite an important problem for the patients during the TRUS-Bx procedure. In the beginning, the prostate biopsy procedures had been performed without local anesthesia but as a result of increasing number of biopsy cores, an increase in procedure-related pain and complication has been observed. Thus,this situation yielded a need for effective analgesia method during the biopsy procedure both for patient comfort and facilitation of the procedure. However, researches to find out an efficient analgesic method during TRUS-Bx are still ongoing. The method of pain control may be either i.v. sedation, intrarectal local analgesia or periprostatic infiltration of the local anaesthetic such as 2% lidocaine, depending on the preference and experience of the clinician [3].

In this study, it was aimed to evaluate and compare the pain tolerance of patients who underwent TRUS-Bx with two different local anesthesia methods, which were namely transrectal lidocaine injection and periprostatic nerve blockage.

Material and Method

Between January 2009 and January 2014, 798 patients who received TRUS-Bx with increased PSA level and/or abnormal rectal examination findings were included in the study. All patients have given their informed consent for participating in this retrospective study. In our study, the exclusion criteria were as follows: age over 80 years, active urinary tract infection, bleeding diathesis, rectal disorders, and recent urologic interventions. All of the patients received ciprofloxacin prophylaxis for three days (500-milligram dosage taken two times a day) and completed written informed consents were obtained before the procedure. All of the patients in the study had undergone TRUS-Bx at the Urology Department of Gaziosmanpaşa University Hospital. All of the ultrasonographic examination and biopsy procedures were executed by using Diagnostic Ultrasound System 3535 (B&K Medical, Herlev, Denmark) with a 7.5-MHz probe in the left lateral decubitus position and a standard 12 core biopsy protocol was performed for all patients.

The patients were classified into two groups based on the anesthesia technique administered before the prostate biopsy procedure. The first group (Group 1) included 407 patients for whom 5% lidocaine pomade was applied to the rectal area for local anesthesia and waited for ten minutes to ensure adequate anesthesia which was described by Tuncel et al. [8]. The second group (Group 2) included 391 patients for whom PPNB was performed by injection of 5cc 2% lidocaine solution around the prostatic neurovascular bundles and periprostatic areas bilaterally under the guidance of ultrasonography with a 21-gauge anesthetic needle, immediately before proceeding to biopsy [9]. During both insertions of probe and biopsy procedure, VAS scores were determined for both Group 1 and Group 2. Additionally, the patients were grouped according to prostate volume as small prostate (<40 ml, SP) and large prostate (≥40 ml, LP) groups and VAS scores were determined for both group SP and group LP. Patient discomfort and general contentment levels during the processing were assessed by direct questions about widespread lateral effects using VAS. The VAS gave a range of potential scores (from 0 to tens with) a score of 0 reflecting minimum discomfort and maximum satisfaction [10]. Kolmogorov-Smirnov test was used to evaluate whether the distribution of variables was normal. Mann-Whitney U-test was used to compare the continuous variables between the groups. The continuous variables were presented as the mean and standard deviation. A p-value <0.05 was considered significant. Analyses were performed using commercial software (IBM SPSS Statistics, Version 23.0. Armonk, NY: IBM Corp.)

Results

The mean age, mean total PSA level and mean prostate volume of the patients in Group 1 were 67.67 ± 8.91 years, 12.57 ± 17.67 ng/ml and 51.41 ± 22.62 ml respectively. The mean age, mean total PSA level and mean prostate volume of the patients in Group 2 were 64.64 ± 7.63 years, 13 ± 18.02 ng/ml and 53.44 ± 44.01 ml respectively. There was no statistically difference between Group 1 and 2 in terms of mean PSA levels and prostate volumes (p >0.05). The mean VAS scores during the insertion of the trans rectal probe for Group 1 and 2 were 4.87 ± 1.14 and 5.19 ± 1.16 respectively and the difference was statistically significant (p <0.001). The VAS scores during the biopsy procedure for Group 1 and 2 were 3.56 ± 1.43 and 2.5 ± 0.91 respectively and the difference was statistically significant (p <0.001) (Table 1).

When the patients were classified according to prostate volumes between <40 ml and ≥40 ml for analysis, there was no statistically significant difference between the mean VAS scores during the insertion of the transrectal probe for both

Group 1 and Group 2 (p >0.05). In the analysis of VAS scores during the biopsy procedure according to prostate volumes, there was no statistically significant difference between the mean VAS scores during the biopsy procedure for both groups (p >0.05) (Table 2).

Table 1. Patient characteristics of Group 1 and Group 2

Characteristic	Total	Group 1: (n=407)	Group 2: (n=391)	p
Age (year)	66.19±8.44	67.67±8.91	64.64±7.63	<0.001
PSA Level (ng/dl)	12.78±17.83	12.57±17.67	13±18.02	0.586
Prostate Volume (cc)	52.41±34.79	51.41±22.62	53.44±44.01	0.821
Probe VAS (mean)	5.03±1.16	4.87±1.14	5.19± 1.16	<0.001
Biopsy VAS (mean)	3.04±1.31	3.56±1.43	2.5±0.91	<0.001

Group 1, 5% lidocaine pomade; Group 2, PPNB; PPNB, periprostatic block; VAS, visual analogue scales.

Table 2. Comparisons of VAS scores according to prostate volume characteristics in groups

Groups	VAS	SP (n=125)	LP (n=261)	p
Probe VAS	Group 1 (n=407)	4.93±1.15	4.83±1.14	0.454
	Group 2 (n=391)	5.19± 1.16	5.2±1.16	0.855
Biopsy VAS	Group 1 (n=407)	3.52±1.44	3.58±1.44	0.755
	Group 2 (n=391)	2.44±0.99	2.54±0.85	0.168

SP, small prostate (prostate volume <40cc); LP, large prostate (prostate Volume ≥40cc); VAS, visual analogue scales.

Discussion

The biopsy procedure is usually performed in patients who are awake under local anesthesia in the outpatient clinical settings. Although it is well tolerated by many patients, the process can cause severe pain and disturbance in some patients. In a previous study, more than half of the patients reported that they had a moderate toll-free pain, even with pre-procedural intrarectal lidocaine administration [11]. The pain has been encountered mostly during the insertion of the probe and the tissue sampling [12]. Although it is generally considered as a safe procedure, the prostate biopsy is an invasive procedure [6]. The prostate biopsy procedure is performed by some clinicians without analgesia [13]; however, several randomized controlled studies have demonstrated that local anesthesia during the procedure reduces pain significantly especially in young patients [3].

In recent years, some anesthetic techniques were introduced for TRUS-Bx performed in an office setting, but intrarectal local analgesia and PPNP are still the most commonly used anesthesia techniques. Because of its low cost and safely application properties intrarectal lidocaine gel was first and most used technique [14]. An important reduced VAS score of pain due to probe insertion was shown in pooled analysis results of previous studies using intrarectal lidocaine gel [8]. This result could be attributed to the short-lasting analgesic activity of lidocaine gel with insufficient coverage for the whole biopsy procedure [14]. A prospective study including 50 patients showed that intrarectal 10 ml 2% lidocaine gel was more effective in pain management in comparison to placebo [15]. However, two separate placebo-controlled studies by Desgrandchamps et al. [16] and Chang et al. [17] found no statistically significant difference in pain tolerance between an ultrasonic gel and intrarectal 2% lidocaine gel applications.

In the classical practice, which is the most common and has become a standard, pain is managed by using a local anesthesia technique which is the injection of lidocaine into the area between seminal vesicles and prostate (periprostatic nerve block) [3]. Nash et al. first defined the periprostatic nerve block in 1996. The researchers made an evaluation by performing a unilateral prostatic nerve block and found a significantly lower level of pain in patients in the injected site compared with the non-injected site [11]. A meta-analysis including 994 patients demonstrated that pain management and analgesia induced by PPNP during transrectal prostate biopsy was more effective in comparison to control groups [18]. Another meta-analysis by Richman et al. also revealed similar results in which PPNB decreased pain significantly in comparison to the placebo group during prostate biopsy procedure [19]. In a different meta-analysis including 1685 patients, it was reported that PPNB was effective and safe in reducing the pain from transrectal ultrasound biopsy of the prostate [20]. On the other hand, there are some other studies in the literature reporting pain management by using different techniques of local anesthesia. A current review and meta-analysis with 18 studies and 2076 male patients emphasized that PPNB alone provided pain management but optimum analgesia was achieved when topical anesthetic agents were added [14]. In another clinical study, Song et al. evaluated 90 patients who received a transrectal prostate biopsy. According to the control group, periprostatic local anesthesia injection reported effective pain control in the group. However, in the same study, they reported that they did not have enough results in terms of pain control in the administration of intrarectal lidocaine gel [9]. The present study compared the rectal application of 5% lidocaine pomade and PPNB using 2% lidocaine solution as anesthetic agents. The pain score was lower in the topical analgesic administered group during probe insertion (p<0.001), but during the biopsy procedure the pain score was lower in the PPNB group (p<0.001). In a recent study, Luan et al. reported that prostate volume showed a significant effect in pain reduction with PPNB anesthesia during prostate biopsy. They also concluded that in patients with large prostate volume, the analgesic effect of PPNB is inefficient [21]. Conversely, in our study, prostate volume did not effect VAS scores in both groups.

In the prostate biopsy, various other analgesia methods were investigated using intravenous conscious sedation (fentanyl and midazolam), nitrous oxide inhalation, oral analgesia (paracetamol/codeine), intrarectal diclofenac and 40% dimethyl sulfoxide [22,23]. Obek et al. showed a meaningful reduced level of pain with local lidocaine gel application before PPNB whereas tradamol and periprostatic blockage had similar effects [24]. The study by Turgut et al. evaluated patients by classifying into three groups, as PPNB with lidocaine, sedoanalgesia with midazolam and non-anesthesia, and showed that the pain score was significantly higher in the non-anesthesia group compared with the others, however, there was no statistical difference in pain score between sedoanalgesia and PPNB [25].

Conclusions

In conclusion, the TRUS-guided prostate biopsy is a painful intervention with adverse effects on patient comfort, and therefore analgesia must be administered during the procedure. The present study showed that intrarectal 2% lidocaine gel provided convenience and reduced the pain during the insertion of ultrasound probe, and provided mild analgesic benefit during the needle biopsy. Periprostatic nerve block considerably reduced pain during the needle biopsy; however, it was not effective during probe insertion. As a result of this study, analgesia was substantially ensured by using PPNB, but we believe that analgesia combined with topical anesthetic agents could provide a more comfortable biopsy procedure, specifically in individuals with anal/rectal area sensitivity.

Although our study includes too many patients, it is a retrospective study and this fact can be considered as the limitation of our study.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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