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ORIGINAL PAPER

Lidocaine spray administration in transrectal ultrasound-guided prostate biopsy: Five years of experience

Lucio Dell'Atti

Department of Urology, University Hospital "S. Anna", Ferrara, Italy.

Summary *Objectives: We report in this single-center study our results of a five-year experience in the administration of lidocaine spray (LS) during ultrasound-guided prostate biopsy (TPB).*
Material and Methods: Between August 2008 and July 2013 a total of 1022 consecutive male patients scheduled for TPB with elevate PSA (≥ 4 ng/ml) and (or) abnormal digital rectal and (or) suspect TRUS were considered eligible for the study. Each patient was treated under local anaesthesia with LS (10 gr/100 ml), applied two minutes before the procedure. TPB was performed with the patient in the left lateral decubitus using multi-frequency convex probe "end-fire". Two experienced urologists performed a 14-core biopsy, as first intention. After the procedure each patient was given a verbal numeric pain scale (VNS). The evaluation was differentiated in two scales VNS: VNS 1 for the insertion of the probe and the manoeuvres associated, while VNS 2 only for the pain during needle's insertion.
Results: Pain scores were not statistically significant different with regard to the values of PSA and prostate gland volume. Pain score levels during probe insertion and biopsy were significantly different: the mean pain score according to VNS was 3.3 (2-8) in the first questionnaire (VNS1) ($p < 0.001$) and 2.1 (1-7) in the second one (VNS2) ($p < 0.125$). The 8.2% of cases referred severe or unbearable pain (score ≥ 7), 74% of patients referred no pain at all. Only 21 patients would not ever repeat the biopsy or would request a different type of anaesthesia, while 82% of them would repeat it in the same way. In only eight patients we have not been able to insert TRUS probe.
Conclusions: Our pain score data suggest that LS provides efficient patient comfort during TPB reducing pain both during insertion of the probe and the needle. This non-infiltrative anaesthesia is safe, easy to administer, psychologically well accepted by patients and of low cost.

KEY WORDS: *Prostate biopsy; Lidocaine spray; Pain; Anaesthesia; Age.*

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INTRODUCTION

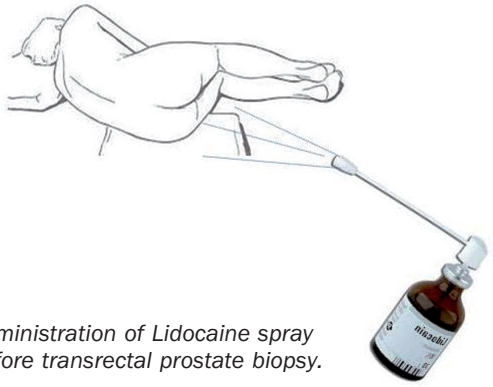
Transrectal ultrasound-guided prostate biopsy (TPB) is the most commonly used procedure to detect prostate cancer. During the last decade, the number of needle biopsy cores taken has increased, as have biopsies in younger patients and repeated biopsies (1). Currently, there is no universally accepted anaesthetic method for prostate biopsy as evidenced by numerous methods that have been tried and published in the literature. Two factors are usually responsible for pain during TPB: anal pain due to ultrasound probe, that causes pressure and stretching of muscle fibres, and insertion pain of the needle through the prostate (2). There are several different approaches that can be used for this purpose, including a rectal lidocaine gel, a periprostatic nerve blocks, sedation and caudal blockage (3-5).
The selection of a method includes patient tolerance to pain, existing pathologies (especially anorectal diseases), medical history, biopsy experience, socio-cultural level and age (6). We report in this single-centre study, our results of five years of experience in the use of lidocaine spray (LS) administration TPB. To knowledge, this is the first study analysing LS as local anaesthetic technique for prostate biopsy (7).

MATHERIALS AND METHODS

Between August 2008 and July 2013 a total of 1022 consecutive male patients scheduled for TPB with elevate PSA (≥ 4 ng/ml) and (or) abnormal digital rectal and (or) suspect TRUS were considered eligible for the study. Patients were excluded if they had a history of previous prostate biopsy, had chronic prostalgia/pelvic pain syndrome, anal surgery, concomitant analgesic medication or any other medical condition that could potentially interfere with pain assessment. Patients on anticoagulation/antiplatelet therapy were considered eligible for the study, providing they had followed the instructions of stopping antiplatelet drugs at least 5 days before the biopsy, or stopping anticoagulation drugs and replacing them with low molecular weight heparin at least 5 days before the biopsy. Patients were instructed to take antibiotics, usually levofloxacin 500 mg orally, for 5 days starting the evening before the procedure and a small evacu-

No conflict of interest declared.

Figure 1.



Administration of Lidocaine spray before transrectal prostate biopsy.

Table 1. *Patiens' clinical characteristics and VNS results.*

Variables	
N° of patients	1022
Age (yrs)	68 (48-78)
Serum PSA (ng/ml)	8.2 (2.5-17.8)
Prostate volume (ml)	57 (36-135)
N° of biopsy	14 (6-21)
Pain VNS 1	3.3 (2-8)
Pain VNS 2	2.1 (1-7)
Patients not able to insert probe – Fibrous anal – Severe haemorrhoidal prolapse	8 6 2

ative enema two hours before the procedure. All procedures were performed after emptying of the bladder, since we believe that even the state of bladder repletion may be an element of discomfort during the performance of mapping biopsy. Each patient was treated under local anesthesia with LS (10 gr/100 ml), applied two minutes before the procedure (Figure 1). TPB was performed with the patient in the left lateral decubitus using an General Electric Logiq 7 machine equipped with a 5-9 MHz multi-frequency convex probe "*end-fire*". Each transrectal ultrasound that was performed included an assessment of the prostatic diameter, the volume of the whole prostate, the transition zone, capsular and seminal vesicle characteristics, as well as morphological description of potential pathological features.

After imaging of the prostate, sampling was carried out with a 18-Gauge Tru-Cut needle powered by an automatic spring-loaded biopsy disposable gun.

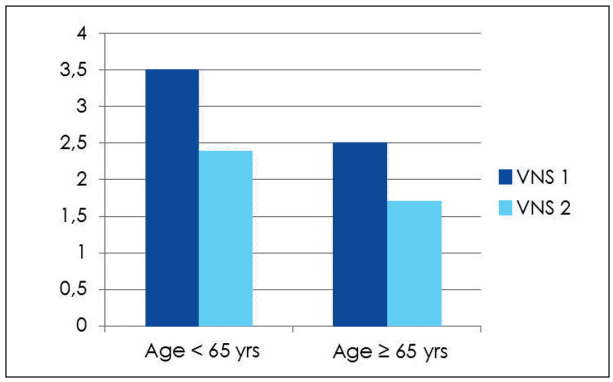
Two experienced urologists performed a 14-core biopsy, as first intention, including 2 lateral peripheral (1 basal and 1 apical), the 3 conventional parasagittal, and 2 midline peripheral samples (1 basal and 1 apical) on each side. After the procedure each patient was given a verbal numeric pain scale (VNS), which was designed with 0 representing absence of pain and 10 the maximum pain they perceived in life. The evaluation was differentiated in two scales VNS: VNS 1 for the insertion of the probe and the manoeuvres associated, while VNS 2 only for insertion pain of the needle through the prostate biopsy. Additionally, was determined the relationship between the level of pain, prostate volume, age and PSA. After the procedure, all patients underwent follow-up for at least one hour for any complications and were discharged.

Chi square test was used to assess differences in the response between the two questionnaires and Fisher's test if necessary. P value less than 0.05 was considered statistically significant.

Results

In only eight (0.8%) patients we were not able to insert TRUS probe: in six of them because of the presence of fibrous anal lesion and in the other two cases the reason was the presence of a severe haemorrhoidal prolapse. The mean age of patients was 68 years (range 48-78), the mean value of the PSA ng/ml was 8.2 (range 2.5-17.8), total prostate mean volume was 57 ml (range 36-135). The number of biopsies performed in each patient was 14 (range 6-21). A statistically difference was determined when VNS1 and VNS2 were evaluated; in fact pain score levels during probe insertion and biopsy were significantly different: the mean pain in the visual numerical scales in patients was 3.3 (2-8) in the first questionnaire (VNS1) ($p < 0.001$), 2.1 (1-7) in the second one (VNS2) ($p < 0.125$) (Table 1). The 8.2% of cases (83/1014) referred severe or unbearable pain (score ≥ 7), 749 patients (74%) referred no pain at all. Only 21 patients would not ever repeat the same biopsy or would request a different type of anaesthesia, while 831 (82%) of them would repeat it in the same way. The relationship between the level of patient pain, age, PSA and prostate volume was analysed. It was determined that pain level decreased, whereas age increased (≥ 65 years old), and this result was statistically significant ($p = 0.001$). It is also shown that subjects aged ≥ 65 years tolerate the procedure better in the two questionnaires (average pain was respectively VNS1: 2.4 and VNS2: 1.7) (Figure 2). The patients were homogeneous in terms of pain with regard to the values of PSA and prostate gland volume and pain scores were not statistically significant. Prostate cancer was diagnosed in 35% (357/1014) of patients who had undergone biopsy. Pain scores were compared

Figure 2.
Comparison of pain score between patients ≥ 65 years old and patients < 65 years old.



between the 357 patients with prostate cancer (VNS 1: 3.4 and VNS2: 1.9) and the 657 patients (65%) without cancer (VNS 1: 3.6 and VNS2: 2.5). We found out that pain scores were statistically lower in VNS 2 of patients with prostate cancer ($p < 0.001$). A minimal rectal bleeding was observed in 38% of the patients after the biopsy. A short duration of hypotension was detected in ten patients, but the patients recovered from this condition in a short time. Complication requiring active treatment occurred in 1.3% (13/1014): 4 acute urinary retention, 6 rectal bleeding and 3 urosepsis.

Discussion

Pain during TPB can occur during transrectal probe insertion and when the needle pierces the capsule of the prostate through the rectal wall. Lidocaine was synthesized by Lofgren and Lundqvist in Sweden in 1943 and introduced into clinical practice in 1947 (8). *Lidocaine gel* (LG) is the most widely used lubricant agent during TPB, but its efficacy when instilled transrectally is controversial (9, 10). LG has a small effect on anal sphincter tone and low efficacy for the insertion and movements of the probe during the procedure (11). In fact, intrarectal lubricant agents with LG alone had no impact on the general tolerance of TPB compared to placebo. Thus, the analgesic efficacy of this method has not been universally confirmed (12, 13).

After the introduction of *periprostatic nerve block* (PPNB) by *Nash et al.* (14), several studies reported the necessity of local anesthesia, because the pain during TPB from insertion and movements of the probe is somatic, as the rectum is innervated by the inferior rectal branches of the pudendal nerve (15).

In another study from *Philip et al.* (16), the Authors concluded that the introduction of the TRUS probe was significantly more painful than the biopsy after the application of PPNB anaesthesia and suggested the use of a topical perianal anaesthetic/muscle relaxant, especially in young patients.

To our knowledge, this is the first study analysing LS as local anaesthetic technique for prostate biopsy (7).

The present study is focused on the comparison of pain scores between patients who underwent TPB receiving LS as the only form of local anaesthesia, due to the fact that in our opinion probe insertion and movements were more painful than needle puncture of the prostate capsule, requiring some form of anaesthesia. LS applied at anal sphincter's level has a rapid and effective action on muscle fibres causing a reduction of the secretion of cytokines, prostaglandins and leukotrienes associated with pain during TPB (17). The analgesic effect starts two minutes after application. The goal of clinicians should be the reduction of the pain and discomfort associated with TPB. Acceptable pain scores were reported in patients who received LS; in fact the 82% of them would repeat it in the same way. In only eight patients we have not been able to insert TRUS probe for anal diseases and a short duration of hypotension was detected in ten patients, but the patients recovered from this condition in a short time.

However, an important result is the fact that subjects aged ≥ 65 years tolerated the procedure better in the two questionnaires.

Many factors may contribute to reducing pain perception, including the decrease in the number of nociceptors; nociceptive afferents account for the high threshold and tolerance pain, reduction of nociceptive information related to the multiplicity of stimuli and reduced ability to discriminate of older, probably a consequence of a disease process rather than ontogenetic changes or development dependent on age (6, 18).

Our study had three several limitations: the first concerns the study design and the statistical power related to the lack of a placebo group that influenced the statistical results; the second one was that impossibility in determine the optional dosage of LS for the muscle fibres of anal sphincter anaesthesia.

Finally, the third limitation is that it represents a single-centre study that should be extended to other urological departments and experienced by various specialists.

Conclusions

In our experience, TPB is generally well tolerated with LS as the only anaesthesia. Our pain score data suggest that LS provides efficient patient comfort during TPB by reducing pain both during insertion probe and needle. This new technique represents an excellent alternative to those currently practiced by most urologists, causing a sharp reduction of anal sphincter tone with better patient compliance and tolerability to the ultrasound probe in the performance of biopsies. This non-infiltrative anaesthesia is safe, easy to administer, psychologically well accepted by patients and low cost. To determine the optimal dose of LS for anal sphincter anaesthesia, further well-designed, placebo-controlled prospective studies involving larger populations will be needed.

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Correspondence
Lucio Dell'Atti, MD, PhD (Corresponding Author)
dellatti@hotmail.com
Department of Urology
University Hospital "S. Anna"
Via A. Moro 8 - 44124 Cona, Ferrara, Italy