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Less pain perceived in transrectal ultrasound of prostate using microconvex transducer as compared to biplaned linear transducer

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ABSTRACT

Objective: Evaluate the difference in the subjective pain of using different probes for transrectal ultrasound of prostate.
Materials and Methods: From July 2014 to December 2014, patients undergoing transrectal ultrasound (TRUS) of prostate were randomly divided into two groups and using two different probes. A visual analogue scale (VAS) was used to evaluate subjective perception of pain in these patients.
Results: A significant difference was found in VAS between the two groups. The patient felt less pain during TRUS examination when using a microconvex transducer. Additionally, patients with external hemorrhoid, longer prostate sagittal length, image artifacts caused by stool, and deeper probe insertion depth were all found to be associated with more pain. The usage of a microconvex transducer can help reduce pain for patients with external hemorrhoids, whereas there was no difference in pain perception when the patient had previous rectal surgery or image artifacts caused by stool.
Conclusion: We identified the factors of pain associated with TRUS. The microconvex transducer caused less TRUS-associated pain as compared to using a biplaned linear transducer.

1. Introduction

Prostate cancer is the second most common malignancy in men worldwide[1] and was ranked as the fifth most prevalent malignancy in Taiwan in 2011.[2] Benign prostate hypertrophy (BPH) affects 40–50% of the male population aged 51–60 years.[3] Prostate medical condition should not be underestimated given its importance to male quality of life. Transrectal ultrasound (TRUS) of prostate is a commonly used image modality for the detection of prostate abnormalities, such as benign prostatic hyperplasia, prostate carcinoma, prostatitis, prostatic abscess, and prostatic calculi.[4] The prostatic urethral angle measured by TRUS is associated not only with the severity of male lower-urinary tract symptoms, but also the treatment efficacy of alpha blockers.[5] Given that TRUS plays an important role in the evaluation of benign and malignant prostate diseases, the procedure should be made as comfortable as possible. Factors have been identified to associate procedure-related pain during TRUS biopsy,[6] but no study has been undertaken to evaluate the pain experienced by patients during TRUS. The purpose of this study is to validate TRUS-associated pain experienced by patients by using different probes.

2. Materials and methods

This study was approved by the Institutional Review Board at Chang-Gung Memorial Hospital, Kwei-Shan, Tao-Yuan, Taiwan. We evaluated patients undergoing TRUS of prostate from July 2013 to December 2014 at our institution. The indications for TRUS were preoperative assessment of transurethral resection of prostate (TURP), an elevated PSA, and/or an abnormal digital rectal examination. Before the examination, patients underwent a detailed medical history review and physical examination and patient age, body mass index (BMI), and previous anal operative history were recorded. The anus was carefully inspected and the presence of external hemorrhoids recorded. Patients were excluded if they had dementia, disabilities that interfered with verbal communication, or neurological diseases that potentially influenced pain assessment. Patients who had prostatitis or had received TURP were also

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excluded. The examinations were performed in two different branches of our hospital by a single urologist. The patients of Linko branch would undergo procedures using a biplaned linear transducer (Group 1) and the patients of Taoyuan branch would undergo procedures using a microconvex transducer (Group 2). The biplaned linear transducer is from ALOKA SSD-A6 (Hitachi-Aloka Medical Ltd., Taipei City, Taiwan) with a 7.5-MHz biplanar transrectal probe (Figure 1), while the microconvex transducer is a Philips BP10-5ec (Philips Healthcare Ltd., Taipei City, Taiwan) with an 8.5-MHz probe (Figure 2). The probes were covered with a sterile condom filled with ultrasound-scanning gel and the lubricating jelly without analgesics was applied to cover the surface of the condom before rectal insertion. During the examination, patients were placed in the left lateral decubitus position. The prostate volume was measured using the ellipse formula (transverse × AP diameter × longitudinal diameter × $\pi/6$).[7] Patient perception of pain was assessed immediately by VAS following examination. The deepest probe insertion lengths during every procedure were also recorded. The variables of interest were presence of prostate calcification, image artifact caused by stool, previous anal surgery history, and presence of external hemorrhoid. All factors were correlated to the pain scores using a Chi-square test and an unpaired Student *t* test.

3. Results

The characteristics of the 337 enrolled patients are summarized in Table 1. There were no significant differences between the two groups in regards to age, BMI, prostate volume, and prostate sagittal length. The percentage of external hemorrhoids, prostate calcification, previous anal surgical history, and image artifacts caused by stool was also similar in the two groups, however, Group 1 patients had a greater mean probe-insertion depth as compared to that of Group 2 patients (10.7 ± 1.73 cm vs. 6.8 ± 1.79 cm, $p < 0.001$). The mean pain score was statistically significant in that patients in Group 2 reported less pain experienced as compared to Group 1 (2.46 ± 2.00 vs. 3.35 ± 2.20, $p < 0.001$).

Figure 1. Biplane transducer.

Figure 2. Micro-convex transducer.

Table 1
Comparison of patient variables between Group 1 and Group 2.

	Group 1 ($n = 185$)	Group 2 ($n = 152$)	p
Age (y)	64.10 ± 1.12	63.84 ± 12.13	0.2173
BMI	24.67 ± 3.15	25.13 ± 4.97	0.1146
Prostate volume (g)	38.16 ± 21.23	38.51 ± 21.36	0.8803
Prostate sagittal length (cm)	4.55 ± 0.86	4.59 ± 0.71	0.6781
Probe insertion depth (cm)	10.7 ± 1.73	6.8 ± 1.79	<0.001*
External hemorrhoids	63 (34.05)	48 (31.58)	0.7155
Prostate calcification	49 (26.48)	56 (36.84)	0.0549
Anal surgical history	17 (9.19)	10 (6.58)	0.4991
Image artifact by stool	31 (16.76)	14 (9.21)	0.0628
Mean pain score	3.35 ± 2.20	2.46 ± 2.00	< 0.001*

Data are presented as *n* (%) or mean ± SD.
* Unpaired Student *t* test to examine numerical variables and Chi-square to examine qualitative variables.
BMI = body mass index; SD = standard deviation.