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Original article

Direct observation of procedural skills to improve validity of students' measurement of prostate volume in predicting treatment outcomes

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ABSTRACT

Objective: To evaluate whether using the direct observation of procedural skills (DOPS) tool improves the accuracy of students' performance for clinical skill assessment.
Materials and Methods: Outcome- and clinical-based evidence results were analyzed for prostate size measurement for benign prostatic hyperplasia (BPH), including digital rectal examination (DRE) and transrectal ultrasonography (TRUS). Patients were stratified into three clinical groups based on the results of DRE and TRUS. Clinical outcomes were correlated between DRE and TRUS for prostate size. We designed a DOPS study in a clinical setting with actual patients in which DRE and TRUS results for prostate volume measurement were compared in order to determine their correlation.
Results: The DRE of patients with mild, moderate, and severe BPH showed prostate size variations. The correlation between DRE and TRUS showed that DRE underestimated prostate size in the severe hyperplasia group (>60 mL) and was more accurate in the moderate hyperplasia group (40–60 mL). The implementation of DOPS for prostate size measurement improved students' self-assessed communication and counseling skills. The study results show that the DOPS tool improved students' prostate measurement techniques and skills (Cronbach's $\alpha > 0.70$).
Conclusion: We demonstrated that students' clinical skills for the measurement of prostate size improved after the implementation of the DOPS tool in DRE to determine prostate size accurately in the clinical teaching program. Clinicians can enhance clinical skills education in certain circumstances with strategic incorporation of tools for direct observation into medical student training programs. By using the DOPS scoring system and reviewing faculty feedback, trainees can improve their accuracy of prostate size measurements.

1. Introduction

The prostate is a superficial male organ, which is palpable transrectally.[1–3] The prostate is composed of 70% glandular elements and 30% fibromuscular stroma. The prostate originates from the urogenital sinus through dihydrotestosterone stimulation. The prostate contributes approximately 0.5 mL of volume to the seminal plasma (average: 3 mL), along with the volumes contributed by the seminal vesicles (1.5–2 mL), Cowper's gland, and glands of Littre (0.1–0.2 mL).[4] Approximately 60% of the male patient will have enlarged prostate glands.[5,6]

Benign prostatic hyperplasia (BPH) is the most common benign neoplasm in men. The etiology includes epithelial and stromal proliferation stimulated by androgens and growth factors.[3,6–8] The prevalence of BPH, which increases with age, is approximately 20% in men in their 40s and increases to 90% in men in their 70s.[3,6–8] Prostate growth may lead to urethral obstruction that causes lower urinary tract symptoms, such as weak or intermittent urine flow, nocturia, and urinary incontinence, all of which interfere with normal activities. Most patients are treated using pharmacotherapeutic agents, such as alpha blockers and 5α-reductase inhibitors.

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However, the different sizes of the prostate provide different benefits in disease management and outcome. The potentially progressive nature of the disease has been associated with an increased risk of acute urinary retention and the option of surgery. Digital rectal examination (DRE) is the only way to evaluate the prostate physically, but the results are variable and DRE lacks a good performance scoring system. In addition, DRE is a poor predictor of actual prostate size to correlate the transrectal ultrasonography (TRUS) scan results. Nonetheless, TRUS prostate measurement has about 30% variability among different examiners.[7–13] Direct observation of medical trainees with patients by their clinical supervisors and assessment of their clinical and communication skills are useful tools for improving student' clinical and communication skills. A recent report by the Institute of Medicine called for improved supervision of trainees to enhance patient safety and quality of clinical education.[14] The Liaison Committee on Medical Education and Accreditation Council for Graduate Medical Education requires ongoing assessment that includes direct observation of trainees' clinical skills.[14–16] By observing and assessing learners with patients and providing feedback, faculty can help trainees to acquire and improve skills and help patients through better supervision of clinical care.[14–16] Direct observation of procedural skills (DOPS) occurs infrequently and inadequately.[15,16] End-of-rotation global rating forms are often completed by supervisors who have not directly observed trainees with patients.[16] Nonetheless, assessment based on direct observation should be an essential component of outcome-based education and certification.[16] With the current interest in establishing an evidence-based medical education system that enhances trainee development and patient safety, there is a great need for robust work-based evaluation tools. A rigorous study of teaching urological procedural skills has not been performed to relate the utility and quality of the direct observation and assessment of urological residents working with actual patients. We therefore prospectively reviewed our database to determine the tools available for direct observation by supervisors to assess trainees' clinical skills with actual patients. The aims of this study were to clarify the relationship between DRE and TRUS to evaluate their validity relating to outcomes and for providing medical educators with an evidence-based assessment of the prostate size. In addition, we also evaluated the usefulness of the DOPS tool in teaching the trainees the importance of understanding the outcome of the prostate volume assessment.

2. Materials and methods

2.1. Data collection

The aim of this retrospective study is to characterize patients with BPH based on the prostrate size and use these data to design the DOPS tool. The students performed DRE on actual patients while being observed by their supervisors. We retrospectively reviewed the records of 114 patients with BPH who were admitted to the general urology ward from December 2006 to December 2010. The patients underwent DRE or TRUS when they were admitted for diagnosis of the BPH. Patients were selected based on the results of DRE and TRUS. Informed consent was obtained from all the patients.

Patients were divided into three groups (mild, moderate, and severe BPH) according to the prostate size assessed by DRE: (1) mild prostate enlargement group, prostate size $<$ 40 mL; (2) moderate prostate enlargement group, prostate size 40–60 mL; and (3) severe prostate enlargement group, prostate size $>$ 60 mL. All prostate volume calculations were performed with a 2102 Bruel and Kjaer 7.0-MHz biplanar ultrasound probe used for TRUS. The prostate volume was calculated as follows: $(\pi/6) \times$ (transverse) $\times$ (longitudinal) $\times$ (anteroposterior). Pearson correlation analyses were used to calculate the percentage of variation in prostate volume, peak urinary flow rate, and body mass index (BMI). We demonstrated the correlation between DRE and TRUS in the prostate size study. Our results were analyzed to understand that the DRE procedure has some limitations in correlation analyses. Physicians who want to carry out DRE for prostate size measurements are limitated by personal experience. We used clinical data to evaluate factors that would disturb the DRE procedure during prostate size evaluation.

2.2. DOPS study selection

We designed a DOPS study (Table 1) in a clinical setting with actual patients in which DRE and TRUS for prostate volume measurement were compared to determine their correlation. We designed a modified measurement method to teach the trainees how to perform DRE. In this clinical setting, we used DOPS to score prostate measurements, and the data are then compared with that obtained using TRUS. The modified training method was used to teach students how to perform DRE for prostate volume measurement. The DRE procedure was rated using a three-setting scale: 0 ($<$2 widths of the finger), 1 ($\geq$2 and $<$3 widths of the finger), and 2 ($\geq$3 widths of the finger; Fig. 1). We also compared the DRE prostate measurement with TRUS data to correlate this scale system with the TRUS data. The interns and junior residents were randomly assigned to assist in determining prostate sizes of actual patients. Trainees were requested to use the DRE rating scale system to evaluate the prostate volume. We did not standardize the patients or utilize the simulated settings without actual patients.

2.3. Statistical analysis

Differences between DRE and TRUS in some groups were assessed using the Mann–Whitney *U* test and Chi-square test. The statistical significance was set at $p < 0.05$. All analyses were performed using SPSS/PC version 11 (SPSS Inc., Chicago, IL, USA).

3. Results

3.1. Correlation between DRE and TRUS

We prospectively evaluated our records of 114 patients for this analysis. The mean age of the patients was 73 years (range: 54–95 years). In the DRE group, 14 patients (12.3%) had mild BPH, 65 patients (57%) had moderate BPH, and 35 patients (30.7%) had severe BPH. Table 2 shows the DRE and TRUS patient characteristics. In the mild BPH group (TRUS volume $<$40 mL), BMI, prostate-specific antigen (PSA), and patient age did not differ statistically in either the DRE or TRUS groups. In the moderate BPH group (TRUS volume: 40–60 mL), BMI and PSA differed statistically ($p < 0.05$). In the severe BPH group, both TRUS and PSA had statistically significant difference ($p < 0.05$). In the mild BPH group, there were six (42.9%) patients with prostate sizes $<$40 mL and eight (57.1%) patients with sizes $>$40 mL, resulting in underestimation of prostate size in the mild group determined by DRE (Fig. 2). In the moderate BPH group, there were 24 (36.9%) patients with prostate sizes between 40 mL and 60 mL, 20 (30.7%) patients with prostate sizes $<$40 mL, and 21 (18.4%) patients with sizes $>$60 mL (Fig. 3). In the severe BPH group, there were 20 (57.1%) patients with prostate sizes $>$60 mL, but 15 (42.9%) patients with sizes $<$60 mL, and thus, the severity was overestimated (Fig. 4). Fig. 5 shows much variation between TRUS and DRE.