



ORIGINAL ARTICLE

Predicting the resected tissue weight from a digital rectal examination and total prostate specific antigen level before transurethral resection of the prostate



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KEYWORDS

PSA;
TURP;
Prostate volume;
Resected tissue weight;
DRE

ABBREVIATIONS

AUC, area under the curve;
BMI, body mass index;
ROC, receiver operating characteristic;

Abstract Objective: To determine the use of the prostate specific antigen (PSA) level and digital rectal examination (DRE) findings to estimate the resected tissue weight (RTW) before transurethral resection of the prostate (TURP).

Patients and methods: We retrospectively analysed 983 patients who underwent TURP between December 2006 and December 2012. The primary outcome was the RTW required for clinical improvement, and was not associated with re-intervention. Age, PSA level, body mass index (BMI) and DRE findings were correlated and modelled with the RTW. The DRE result was defined as DREa (small vs. large) or DREb (small vs. moderate vs. large) according to the surgeon's report. Equations to calculate RTW were developed and tested using receiver operating characteristic (ROC) curve analyses.

Results: There were significant correlations between PSA level ($r = 0.4$, $P < 0.001$) and RTW, whilst BMI and age showed weak correlations. The median (range) RTW was 45 (7–60) vs. 15 (6–60) g for small vs. large prostates (DREa)

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RTW, resected tissue weight;
PV, prostate volume

($P < 0.001$), respectively. Similarly, the median (range) RTW was 11 (6–59) vs. 26.2 (6–60) vs. 42 (7–60) g in small vs. moderate vs. large prostates (DREb) ($P < 0.001$), respectively. Using PSA level and DREb (model 3) there was a significantly better ability to estimate RTW than using PSA and DREa (model 2) or PSA alone (model 1) based on ROC curve analyses. The equation developed by model 3 ($RTW = 1.2 + (1.13 \times PSA) + (DREb \times 9.5)$) had a sensitivity and specificity of 82% and 71% for estimating a RTW of > 30 g, and 84% and 63% for estimating a RTW of > 40 g, respectively.

Conclusions: The PSA level and DRE findings can be used to predict the RTW before TURP.

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Introduction

Although new technologies are increasing dramatically TURP continues to be the referent for all procedures treating obstructive LUTS in men. Before surgery an estimation of prostatic volume (PV) is mandatory as it is related to disease progression, unfavourable outcomes, surgical guidance and is a good estimate of the response to surgery [1,2]. The most reliable method to calculate PV is by TRUS [3,4]. Nevertheless, there are many concerns about the results of TRUS. It has been shown that the measured PV can vary with the experience of the operator, the size of the prostate and the presence of a third lobe [5,6]. In addition, conventional bi-dimensional ultrasonography has been shown to be less accurate than three-dimensional ultrasonography [6].

The relationship between PSA level and TRUS-measured PV was assessed in many previous publications. This strong relationship was confirmed in patients in China [7], Korea [8,9], Taiwan [10] and Netherlands [11]. Even in a large population of patients undergoing screening, PSA levels correlate well with the PV measured by a DRE [12]. In addition, recently the metabolic syndrome and obesity have been shown to influence both PSA levels and PV to a great extent [13–16]. Therefore, it was suggested that for an accurate estimation of PV, PSA measurements and obesity indices should be included [13,17].

TRUS-based measurements of PV have shown a strong correlation with resected tissue weight (RTW) [18,19], as during TURP only adenomatous tissue is resected. Although the RTW might not be an indicator of the degree of clinical improvement after TURP [20], it might be an indicator of further prostatic growth and the need for re-treatment [21,22]. Furthermore, predicting the RTW might aid adequate surgical planning before surgery. As there are no previous studies that have correlated PSA level or obesity indices with RTW, in the present study we determined the utility of preoperative variables for estimating the RTW before TURP.

Patients and methods

After obtaining internal review board approval, we retrospectively reviewed our electronic databases for patients who underwent surgery for obstructive LUTS related to BPH between December 2006 and December 2011 and who had completed ≥ 6 months of follow-up (983 men). Only patients who had a standard monopolar TURP were included. Patients were excluded if they had undergone any surgical procedure other than TURP (37) and those with missing data for PSA or RTW (207). For the purpose of obtaining an homogeneous data distribution, patients with a PSA level of > 20 ng/mL (31) and a RTW of > 60 (18) were also excluded. All patients with a preoperative PSA level of > 4 ng/mL had biopsy-confirmed BPH before surgery.

For each patient the electronic database was reviewed for their demographics, including, age, presentation, associated medical comorbidity and BMI. Each patient had a DRE before TURP, carried out by the surgeon. The approximate size of the prostate was reported as 'mild enlargement' if the size was the same as the distal phalanx of the index finger, 'marked' if the boundaries could not be felt digitally, and 'moderate' for any other sizes. Preoperative laboratory investigations included measurements of the preoperative total PSA, serum creatinine and haemoglobin levels. A flow curve and post-void residual urine volume were routinely assessed before surgery. The TRUS-measured PV was not routinely obtained in every patient.

All patients underwent a standard monopolar TURP, with documented resection of most of the adenomatous tissue. Patients with documented tunnelling only or with incomplete removal of the adenoma were excluded. After resection the removed adenomatous tissue was compressed and immediately weighed before being examined histopathologically. Patients were maintained on quinolone antibiotics for 2 weeks after removal of the urethral catheter. To confirm any clinical improvement, all patients had their postvoid residual estimated and a flow curve assessed at least once during the follow-up.

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