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Original Article

Impact of Residual Prostate Weight Ratio on Clinical Outcome after Turp in Benign Prostatic Hypertrophy Patients

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Abstract

Introduction: Burden of symptomatic benign prostate hyperplasia increases with increasing age and transurethral resection of prostate (TURP) is the gold standard, safe, and effective treatment for it. However, after TURP symptomatic improvements are not achieved completely in some patients. Prostate size which usually not correlated with lower urinary tract symptoms in benign prostate hyperplasia patients has strong relation with treatment methods and outcome after treatment.

Purpose: The present study aims to determine the correlation between one of the parameters that are residual prostate weight ratio (RPWR), on clinical outcomes which are measured by the International Prostate Symptom Score (IPSS) and Peak Flow Rate (Q_{max}) after TURP in BPH.

Materials and Methods: This is a prospective study to determine the impact of the tissue resection extent on outcome after TURP in men with symptomatic benign prostatic enlargement by determining correlation of a variable the residual prostatic weight ratio (RPWR) with outcome parameters such as International Prostate Symptom Score (IPSS) and Peak Flow Rate (Q_{max}). This study was conducted in the Department of Urology and Renal Transplantation, SCB Medical College and Hospital, Cuttack between 2017 and 2019.

Results: A total of 52 patients were evaluated. RPWR is the ratio of prostate weight after TURP and initial weight of prostate. In the present study, RPWR ranges from 0.38–0.67 with a mean of 0.5015 and median of 0.505. The correlation coefficient (r) of RPWR was found to be inversely related to the volume of prostate tissue resected and the outcome variables such as ΔIPSS (r = 0.19, P <0.187) and ΔQmax (r = 0.167, P <0.238).

Conclusion: RPWR was found to have a significant correlation with the clinical outcome. Amount of tissue resection has strong impact on symptomatic improvement after TURP and the lesser the value of RPWR after TURP, the better the clinical outcome in terms of IPSS and peak flow rates.

Key words: Lower urinary tract symptoms, Peak flow rate, Symptomatic improvement, Symptom score, Tissue resection

INTRODUCTION

The prostate, which occupied from bladder base to membranous urethra, is a pyramidal fibromuscular gland and it surrounds the prostatic urethra. The small size prostate without any evidence of BPH is described as a croissant shape (short anterior commissure, prominent apical notch, and posterior lip of prostatic tissue), and the bigger gland is more doughnut shaped.[1] BPH initiates as small micronodules in the transitional zone and gradually grow and coalesce to form macronodules. Benign prostatic hyperplasia (BPH) which is the most common disorder of the prostate gland in aging male is a pathologic disease process which has significant contributions to lower urinary tract symptoms (LUTS). LUTS can be either obstructive/voiding related (hesitancy, intermittency, post-voidal dribbling, straining, and weak

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stream) or irritative/storage related (frequency, urgency, and nocturia).[2] International Prostate Symptom Score (IPSS) is a self-administered tool for clinical research of LUTS in BPH which graded severity of symptoms.[3] Infravesical obstruction can be measured by invasive pressure-flow studies, in which peak flow rate or Qmax provides an indirect measure probability of bladder outlet obstruction.[4]

There are various surgical and minimally invasive techniques such as intraprostatic stents (temporary/permanent), Transurethral Needle Ablation of the Prostate (TUNA), Transurethral Microwave Therapy (TUMT), Transurethral vaporization of prostate (TUVP), Transurethral Incision of the Prostate (TUIP), and Lasers (Nd: YAG, Ho: YAG, KTP, Diode, Thulium laser), but transurethral resection of the prostate (TURP) is a "gold standard" surgical treatment yet. After TURP, outcome is assessed by improvement of symptoms urinary flow rate measured by uroflowmetry.

Prostate size is determined by various methods which include digital rectal examination, cystourethroscopy, and ultrasonography.[5-8] Watanabe *et al.* used transrectal ultrasound to evaluate prostate size and reported accurate results.[9] Residual prostatic weight ratio (RPWR) was evaluated to know the correlation between prostate size and outcome. RPWR value after TURP gives a good estimate of the clinical outcome regardless of prostate size or patient's age. In the present study, RPWR measured before and after TURP and correlated with outcome parameters IPSS and Q_{max}.

MATERIALS AND METHODS

The present study which was prospective observation conducted in 52 patients in the department of urology and renal transplantation between 2017 and 2019. All patients with symptomatic BPH who have indication of surgery and were planned for TURP included in the study. All other BPH Patients who either managed conservatively or have features of prostatic malignancy were excluded from the present observation. All patients evaluated by detail clinical history and physical examination. All baseline investigations related to patients, serum prostatic specific antigen, transrectal ultrasonography (TRUS), uroflowmetry (Q_{max}), and histopathological examination of the resected tissue of prostate were done. Standard monopolar transurethral resection of prostate was done in all included symptomatic BPH patients. IPSS was recorded in pre-operative and post-operative (after 4 months) time. The patient is followed on outdoor patient department basis for a minimum of at least 4 months.

The clinical outcomes were measured by the difference (Δ) in IPSS score and difference in peak flow rate Q_{max} before and 4 months after TURP.

Estimated total prostate wt. = 0.52 × length × width × height × specific gravity of the prostate (1.010)

RPWR = Prostate weight after TURP/Initial weight of prostate before TURP.

Prostatic weight after TURP was derived by substracting the TURP specimen weight from initial weight of prostate.

The data were collected and stored in Microsoft Excel 2013© Microsoft Office. These collected data were statistically analyzed using descriptive statistics by SPSS version 16. Continuous variables were expressed as either the mean ± standard deviation or median. All statistical outcomes were presented at 95% confidence intervals based on a two-sided test. Correlation analysis and the paired *t*-test were used for statistical assessment and were considered significant at $P < 0.05$.

Informed consent was taken from all patients before including in the present observation.

RESULTS AND OBSERVATIONS

All patients of symptomatic BPH who fulfills the indication of surgical treatment were admitted for definitive treatment in the form of transurethral resection of prostate in this present study. A total of 52 patients were included for observation prospectively. Most of the patients were of more than 55 years with mean age is 62.1 years. Mean prostate volume before TURP was 62.6 g and after TURP its mean value was 31.9. RPWR is the ratio of prostate weight after TURP and initial weight of prostate. In the present study, RPWR ranges from 0.38 to 0.67 with a mean of 0.5015 and median of 0.505. Mean value of pre-operative IPSS score was 21.42, whereas 12.04 was post-operative IPSS value. Peak flow rate was measured by uroflowmetry in pre-operative and 4 month after TURP. Mean peak flow rate (Q_{max}) was 9.21 in pre-operative time and 16.15 in post-operative time after 4 month of TURP. When calculated, the correlation coefficient (r) of RPWR was found to be inversely related to the volume of prostate tissue resected and the outcome variables such as ΔIPSS ($r = 0.19$, $P < 0.187$) and ΔQmax ($r = 0.167$, $P < 0.238$) [Figures 1 and 2].

Figure 3 shows percentage of patients showing with different value of RPWR.

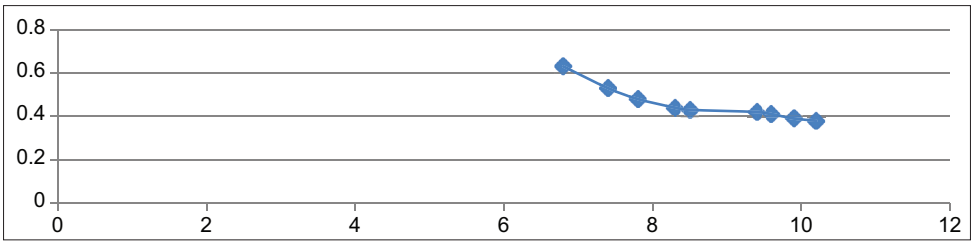

Figure 1: Correlation of RPWR with change in IPSS

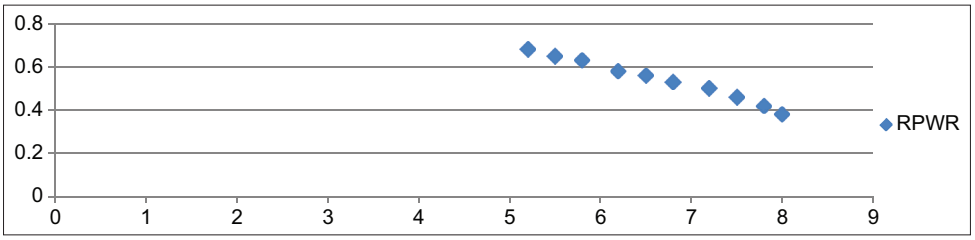

Figure 2: Correlation of RPWR with change in Q_{max}

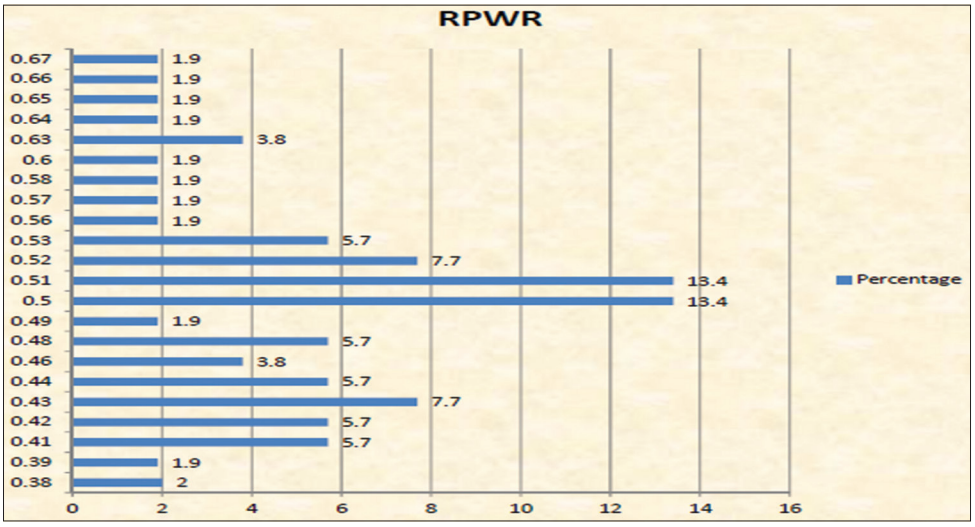

Figure 3: Patients percentage with different value of RPWR

DISCUSSION

Benign prostatic hyperplasia (BPH) is a highly prevalent disorder affecting elderly male. Besides LUTS, it can also cause more serious complications such as urinary retention, urinary tract infections, renal insufficiency, and hematuria.[10] All patients with moderate-to-severe symptoms score or its complications undergo transurethral prostatic resection which is the widely accepted as "gold standard" surgical treatment.[11]

Park *et al.* studied to determine prostate size using ellipse volume calculation (height × length × width × π/6).[12] Prostate volume measured by TRUS correlated closely with real specimen volume.

RPWR was measured by dividing the weight of prostate after TURP by the prostatic initial weight. Milonas *et al.* studied to establish the operative parameters influences on TURP outcomes.[13] In their study, residual prostatic weight ratio (RPWR) has strong impact on outcomes after 6 months of TURP. In the present study, impact was analyzed after 4 month of surgry.

Chen *et al.* studied prospectively 40 men from April 1996 to June 1997 at Division of Urology, Taipei Municipal Jen-Ai Hospital, School of Medicine, Taiwan and assessed residual prostatic weight ratio (RPWR) in clinical outcome after TURP) and found that mean age 70.4 years.[14] In the present study, mean age was 62.1 years. They evaluated outcome parameters before TURP and then 16 weeks after TURP. The estimated total prostate weight was measured by formula 0.52 × length × width × height × the specific gravity of the prostate (1.010). In the present study, same derivative formula was used. The RPWR was calculated

as the residual prostate weight after TURP divided by the initial weight of prostate. Prostatic weight after TURP was derived by substracting the TURP specimen weight from initial weight of prostate. They founded a close correlation between the estimated prostate weight and the actual weight of the TURP specimen ($r = 0.82$ and 0.80 for the adenoma and total prostate, respectively). They found negative correlation between the RPWR and the change in symptom score, and change in peak flow rate. In the present study, also there is a negative correlation between RPWR and delta IPSS and delta Q_{max}.

Songra *et al.* did a prospective study to know the effect of the extent of tissue resection on symptom improvement after TURP in men with symptomatic BPH.[15] RPWR was derived by dividing the weight of prostate after TURP by the initial weight of prostate. Difference in AUA score, Q_{max}, and Q_{avg} measured before operation and 2 months after surgery was used as clinical outcome parameters. There was a significant improvement in AUA score, Q_{max}, and Q_{avg} post-operatively. Maximum numbers of patients undergoing TURP had RPWR in the range of 51–60% (mean RPWR 49.9%). In the present study, about 40% have RPWR in between 0.49 and 0.57. Mean overall change in AUA Score (Δ AUA), Δ Qmax and ΔQavg was 12.04, 8.27 ml/sec and 6.64 ml/sec respectively, which is almost comparable to findings of the present study. Smaller the value of RPWR, larger is the Δ AUA, Δ Qmax and Δ Qavg and vice versa. There was negative correlation between the RPWR and the ΔgativeQ$_{max,}$ and ΔQavg ($r = -0.42, -0.067$, and -0.09, respectively). Similar trends of observations also found in the present study. Residual prostatic weight ratio (RPWR) and residual prostatic weight emerged as significant influencer on benign prostatic hyperplasia surgery outcome.

CONCLUSION

Symptomatic improvement after TURP will depend on the amount of tissue removed RPWR that is one of the significant parameter which has impact on clinical outcomes. RPWR inversely correlated with clinical outcome parameters. Treatment was considered effective when post-operative results were excellent and good.

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