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THE NATURAL HISTORY OF LOWER URINARY TRACT DYSFUNCTION IN MEN: MINIMUM 10-YEAR URODYNAMIC FOLLOWUP OF TRANSURETHRAL RESECTION OF PROSTATE FOR BLADDER OUTLET OBSTRUCTION

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ABSTRACT

Purpose: Despite long-term symptomatic and uroflowmetry studies following transurethral prostate resection (TURP) there are sparse pressure flow data. Consequently there is minimal information to account for the long-term symptomatic failure and flow rate decrease seen with time following early improvements after surgery.

Materials and Methods: Men older than 45 years who were investigated at our department between 1972 and 1986, diagnosed with bladder outlet obstruction and elected surgical intervention were invited for repeat symptomatic and urodynamic assessment. Identical methods were used, allowing direct comparison of results.

Results: A total of 1,068 men were initially diagnosed with bladder outlet obstruction, of whom 428 (40%) died in the interim. Of the men who were followed 217 underwent TURP with a mean followup since surgery of 13.0 years. A significant, sustained decrease in the majority of symptoms and improvements of urodynamic parameters was seen. Long-term symptomatic failure and decreased flow rate were principally associated with detrusor under activity (DUA) rather than obstruction. Presentation predictive factors for the future development of DUA were decreased detrusor contractility and a lesser degree of obstruction.

Conclusions: This unique long-term study provides valuable information on surgically treated bladder outlet obstruction. The association of long-term failure following surgery with DUA emphasizes the importance of pressure flow studies before repeat surgery. However, our faith in the long-term efficacy of TURP is justified.

KEY WORDS: bladder, bladder neck obstruction, transurethral resection of prostate, urodynamics, natural history

The histological diagnosis of benign prostatic hyperplasia with the secondary effect of benign prostatic enlargement and its associated complications, including bladder outlet obstruction (BOO) and lower urinary tract symptoms (LUTS), are some of the most prevalent disorders that affect men today. Transurethral resection of the prostate (TURP) remains the gold standard treatment for benign prostatic obstruction. The majority of followup series provide subjective data demonstrating symptomatic improvements following surgery, although there is symptom deterioration with time. Few studies provide objective results following TURP and those providing pressure flow study (PFS) data are mainly short-term followup studies.[1–3] They show excellent improvement in maximum flow (Qmax) and BOO relief up to 1 year following surgery. Long-term PFS followup information is lacking with objective data derived principally from uroflowmetry studies only.[4,5] These studies demonstrate a gradual deterioration in flow rates with time after significant initial postoperative improvements. Jensen et al proposed that this decrease was related to repeat obstruction after surgery.[5] To our knowledge there are no long-term pressure flow data following TURP to explain any symptomatic and uroflowmetry changes with time. We primarily assessed the long-term urodynamic outcomes and secondarily assessed associated changes in symptoms in men who underwent TURP for BOO.

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MATERIALS AND METHODS

Study population. Our institution is probably unique, in that it has had a well established urodynamic unit for the last 30 years, during which urodynamic and symptomatic information on all patients has been maintained. As well as urodynamic note review, hospital notes were reviewed to determine the timing and type of treatment interventions subsequent to the initial urodynamic investigation.

Men originally seen at our unit between 1972 and 1986 who were referred for assessment of LUTS with subsequent pressure flow studies demonstrating BOO were traced and invited to the department for repeat assessment. BOO was defined as the obstructed zone on the International Continence Society pressure flow nomogram.[6] The upper line on this nomogram delineates the lower limit for obstruction and corresponds to a BOO index (BOOI)[7] of 40 using the equation, BOOI = pdet Qmax − 2 Qmax, where pdet Qmax represents detrusor pressure at Qmax. Only men older than 45 years at presentation were included due to the increasing likelihood of a diagnosis of benign prostatic obstruction with age. The definition of detrusor under activity (DUA) used in this study was pdet Qmax less than 40 cm H_2O with Qmax less than 15 ml per second. This definition is similar to the poor contractility zone of the recently described bladder contractility nomogram.[7]

Mortality data and patient tracing. With such long followup a proportion of the cohort inevitably would have died in the intervening period. Mortality data were obtained from the United Kingdom Government Office for Population and

Census Studies and by extensive search of hospital records. Death certificates were obtained providing the cause of death. Patient tracing was performed using the original urodynamic records, hospital records and telephone directory/directory inquiry searches, and by liaison with Community Family Practitioners, the Family Health Services Association and the National Health Service patient tracing service.

Symptomatic evaluation of patients. The original physician completed symptom questionnaire that had been in use from 1972 to 1986 was completed to assess current symptoms. Patients were also asked to complete a 7-day frequency volume chart prior to the clinic appointment. The chart format has remained unchanged since 1972 and all patients had completed the chart as part of their original assessment, allowing direct comparison. Patients also completed the International Prostate Symptom Score (I-PSS) questionnaire at followup.

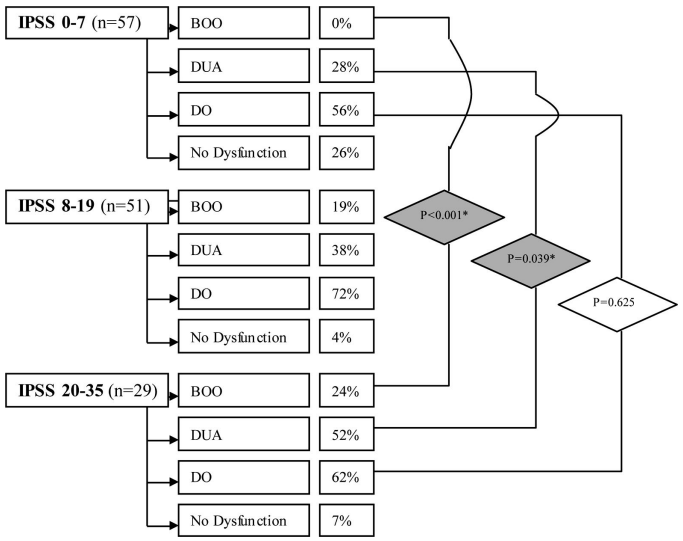
Urodynamic assessment. Uroflowmetry: Flow is expressed as the nearest 1 ml per second. Residual urine was estimated after each flow test using ultrasonography.

PFS: Standard pressure flow studies and urethral pressure profilometry (the Brown-Wickham technique) were performed using the techniques that have remained unchanged since 1972, allowing direct comparison of results. Machine calibration, reference levels, quality control and trace interpretation were performed according to the recommendations of the International Continence Society.[6] All original traces were available for inspection and, therefore, new methods of urodynamic analysis were applied retrospectively. Pressure is expressed as the nearest 1 cm H_2O. All patients had a midstream urine specimen sent for microbiological analysis to exclude infection.

Detrusor function was assessed using 2 parameters. The bladder contractility index (BCI) was calculated using the formula, pdetQmax + 5 × Qmax (with BCI less than 100 indicative of poor detrusor contraction). Bladder voiding efficiency (BVE) was calculated using the formula, voided volume/cystometric capacity and is expressed as a percent.[7]

Retrospective hospital notes analysis. Hospital records of followed patients referred to our unit were searched for interventional details after presentation, including preoperative, perioperative and postoperative information. The initial decision to proceed to TURP was made by the original referring clinician who requested the urodynamic investigation. It was based on PFS results and patient symptom severity.

Data handling and statistical analysis. The paired Student t test was used to compare presentation with followup results for normally distributed data with the Wilcoxon signed ranks test used for skewed data. The 2-sample unpaired t test was used to compare normally distributed presentation data between different groups with the Mann-Whitney test used for skewed data. The chi-square test with the Yates correction when appropriate was used for the remaining analyses. Two-tailed statistical significance was considered at the 5% level.



Lower urinary tract dysfunction associated with differing symptomatic outcomes based on I-PSS at long-term BOO followup after TURP. Asterisk indicates statistically significant.

RESULTS

An algorithm summarizing the demographics of the study population has previously been published.[8] Briefly, 2,066 men were referred for assessment of LUTS and underwent pressure flow urodynamics, uroflowmetry and symptomatic evaluation between 1972 and 1986. A total of 1,068 neurologically normal men older than 45 years had a diagnosis of BOO, of whom 581 (54.4%) were alive at the time of this followup study. Of these men 358 (61.6%) were reassessed, including 223 (62.3%) with full reevaluation, 43 (12.0%) with uroflowmetry and for symptoms, and 92 (25.7%) with symptomatic appraisal only. Of the men who were followed 188 (52.5%) underwent primary TURP after the original PFS assessment, while 170 (47.5%) elected a conservative watchful waiting policy. Of those not offered initial surgery 29 (17.1%) presented again, including 7 in acute urinary retention and 22 with worsening LUTS. These 29 men subsequently underwent TURP.

Tables 1 and 2 list overall symptomatic and urodynamic findings in men who underwent TURP for BOO. Mean followup ± SD since initial urodynamic investigation was 14.3 ± 3.9 years (range 10 to 24) with a mean time since surgery of 13.0 ± 4.1 years (range 5 to 24). The difference between diagnosis and definitive treatment was accounted for principally by waiting list times in the United Kingdom. There was a significant decrease in all symptomatic parameters, even urgency and urge incontinence, despite the observed increase in detrusor overactivity (DO). The notable exception was a nonsignificant increase in the symptom of intermittence. Intermittence at followup was significantly associated with DO ($p = 0.008$). As described, DUA is a significant cause of lower urinary tract dysfunction in the long term following TURP.

Uroflowmetry data corroborated findings at pressure flow assessment, demonstrating significant improvement in Qmax and voided volume with decreased of post-void residual urine (PVR). PFS also demonstrated increased bladder capacity and a long-term decrease in BOO. However, a significant decrease in bladder contractility was seen. Of note despite several previous reports of the resolution of DO in the short term following TURP in our study there was a marked, significant increase in the number of patients with DO at long-term followup.

Table 3 shows long-term followup stratified by Qmax, demonstrating the principal urodynamic diagnoses associated with a decreased flow rate at followup. Cases of significantly impaired flow (Qmax less than 10 ml per second) were equally associated with BOO (30%) and DUA (43%) ($p = 0.150$). Cases of slightly better flow (Qmax 10 to 15 ml per second) were principally associated with detrusor failure. All patients with Qmax greater than 15 ml per second had normal PFS.

The figure shows long-term symptomatic failure following TURP. Patients were stratified by long-term followup I-PSS score. As seen for flow rates, long-term symptomatic failure was also principally associated with DUA with obstruction the cause in the minority of patients. We compared mild (I-PSS 0 to 7) symptoms at followup with severe (I-PSS 20 to 35) symptom scores. BOO and DUA at followup were each a predictor of a poor symptomatic outcome. However, DO at followup was not predictive of a poor symptomatic result.