The changing practice of transurethral resection of the prostate

MJ Young, M Elmussareh, T Morrison, JR Wilson

York Teaching Hospital NHS Foundation Trust, UK

ABSTRACT

INTRODUCTION Transurethral resection of the prostate (TURP) is considered the gold standard surgical treatment for lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia. The number of TURPs performed has declined significantly over the last three decades owing to pharmaceutical therapy. TURP data from a single institution for the years 1990, 2000 and 2010 were compared to assess the difference in performance.

METHODS A retrospective analysis was undertaken of all patients who underwent TURP between January and December 2010. These findings were compared with historical data for the years 1990 and 2000: 100 sets of case notes were selected randomly from each of these years.

RESULTS The number of TURPs performed fell from 326 in 1990 to 113 in 2010. The mean age of patients increased from 70.6 years to 74.0 years. There was also a significant increase in the mean ASA grade from 1.9 to 2.3. The most common indication for TURP shifted from LUTS to acute urinary retention. No significant change in operating time was observed. The mean resection weight remained constant (22.95g in 1990, 22.55g in 2000, 20.76g in 2010). A reduction in transfusion rates was observed but there were higher rates of secondary haematuria and bladder neck stenosis. There was an increase from 2% to 11.5% of patients with long-term failure to void following TURP.

CONCLUSIONS The number of TURPs performed continues to decline, which could lead to potential training issues. Urinary retention is still by far the most common indication. However, there has been a significant rise in the percentage of men presenting for TURP with high pressure chronic retention. The number of patients with bladder dysfunction who either have persistent storage LUTS or eventually require long-term catheterisation or intermittent self-catheterisation has increased markedly, which raises the question of what the long-term real life impact of medical therapy is on men with LUTS secondary to benign prostatic hyperplasia who eventually require surgery.

KEYWORDS

Lower urinary tract symptoms – Benign prostatic hyperplasia – Transurethral resection of the prostate – Simulation – Training

Accepted 16 October 2017

CORRESPONDENCE TO

Matthew Young, E: mjoyoung88@doctors.org.uk

Transurethral resection of the prostate (TURP) has long been the ‘gold standard’ for the management of male patients with lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia (BPH). It also has a role in the management of patients with LUTS caused by advanced prostatic malignancy.

Despite being considered by many as a ‘bread and butter’ urological procedure, TURP may be associated with significant morbidity. Bleeding remains the main complication of the procedure, with transfusion rates ranging from 2.9% to 5.9%.^{1,2} Contemporary papers still report bleeding following surgery to be as high as 4.8% for monopolar TURP.⁵ Interestingly, a Chinese group discovered an increasing rate of returns to theatre to control bleeding (from 0.4% to 2.7% over a 15-year period).⁴

Transurethral resection syndrome is also a well recognised complication, some theorists noting an incidence of

1–2.4%.^{1,5,5} Overall failure to void (which is likely to be secondary to detrusor failure) is reported to occur in 5.8–6.5% of cases.^{1,2} Historically, procedural mortality has been quoted as 0.25%² but over the last two decades, large scale series have had mortality rates of 0–0.1%.^{1,6,7} The technology used in TURP has improved, with bipolar technology being increasingly advocated owing to a reduction in complications and similar efficacy to monopolar surgery.⁸

In an attempt to delay or avoid TURP surgery and its complications, alternative pharmacological treatments (eg 5 α -reductase inhibitors and α_1 -adrenergic receptor antagonists) have become increasingly popular over the last 20–30 years. The development of less invasive surgical procedures such as transurethral needle ablation, transurethral microwave thermotherapy and high intensity focused ultrasonography failed to replace the classic monopolar TURP owing to poorer patient outcomes.^{9,10} During the last

decade, other invasive alternatives such as holmium enucleation and GreenLight™ (Boston Scientific, Marlborough, MA, US) laser therapy have been popularised.

Since the introduction of these alternative treatments, the number of TURPs performed has declined, both in the US and across Europe.¹¹ Medical therapy has now replaced TURP as the first-line treatment for BPH. As a result, failed medical therapy is now the most common indication for TURP.¹¹

This 20-year study was undertaken to assess whether our busy district general hospital was performing TURP less frequently. The aim was to compare our practice over the study period to see whether TURP is still being performed on the same cohort of patients and to assess our outcomes. With fewer TURPs being undertaken annually, there is a risk that urology trainees will become less skilled at this procedure, and that this will be reflected in patient mortality and morbidity.

Our unit has already published a ten-year series for TURP outcomes between 1990 and 2000.¹² Since then, simulation training in TURP has become increasingly popular, enhancing training and making up for the reduction in TURP cases being performed.

Methods

All patients who underwent TURP at York District Hospital between 1 January and 31 December 2010 were included in the study. Their notes were reviewed retrospectively, and information was collected from patient records and operation reports. This included age and ASA (American Society of Anesthesiologists) grade, indication for TURP, previous medical therapy for LUTS, time in theatre, weight of resected tissue, histology results and postoperative complications. Patient satisfaction was also documented.

Statistical comparisons between datasets were performed using Student's t-test. The data for 2010 were compared with historical data from 1990 and 2000; 100 randomly chosen TURP cases were selected from each year (1990 and 2000).

For cases performed in 1990, patient preoperative assessment and listing for surgery were carried out by the consultant urologist. From 2000, a nurse practitioner-led

prostate assessment clinic was in existence. However, definitive decisions regarding listing for theatre and preoperative assessment were still undertaken by the operating surgeon.

Theatre time was obtained from the theatre diaries. The operating time was deemed to start the moment the patient was received in theatre from the anaesthetic room and finish the moment they left to go to the post anaesthetic recovery unit. Although this was not a true operating time, it was considered adequate for the purposes of this study as it was reproducible between cases and a constant over the decades.

Results

A total of 326 TURPs were performed in our institution in 1990 by two consultants. This number fell to 223 by 2000 despite there being four consultants and a specialist registrar working in the department. This represents a 31.6% decline in ten years. By 2010, with a department of four consultants and two specialist registrars, only 113 TURPs were performed (67 by registrars), a decline of 50.4% from 2000 and 65.3% from 1990.

In 1990 the mean age of patients undergoing TURP was 70.6 years (range: 58–95 years). This had increased to 73.4 years by 2000 (range: 45–90 years). This was a statistically significant difference ($p<0.01$) but the increase to 74.0 years (range: 58–93 years) in 2010 was not significant. The mean ASA grade was similar for 1990 and 2000 (1.90 vs 1.91 respectively), with no statistically significant difference being demonstrated. By 2010 the mean ASA grade had risen to 2.30 ($p<0.0001$).

The clinical indications for TURP for the three individual years studied are given in Table 1. The number of patients presenting with urinary retention increased from 35% in 1990 to 58% in 2000 and 68% in 2010. Conversely, the proportion of patients undergoing TURP for LUTS fell from 65% in 1990 to 42% in 2000 and 26% in 2010. A continuing rise in the use of prostatic pharmacological therapies was observed over the study period. In 1990 only 2% of TURP patients were treated with prostatic medical therapy. By 2000 this stood at 17% while by 2010 this had risen dramatically to 43%.

Table 1 Indications for transurethral resection of the prostate

Indication	1990	2000	2010
Lower urinary tract symptoms	65	42	29
Acute urinary retention	33 (1 high pressure chronic retention)	58 (7 high pressure chronic retention)	77 (20 high pressure chronic retention)
Recurrent visible haematuria	2	0	1
Recurrent urinary tract infection	0	0	4
Bladder stones	0	0	2
Total	100	100	113

Table 2 Postoperative complications following TURP

Complication	1990	2000	2010
Mortality rate	0	1 (myocardial infarction)	0%
Blood transfusion rate	6	8	3.5%
Required 're-do' TURP within 1 year	3	3	5 (4.4%)
Secondary haematuria	3	1	6 (5.3%)
Long-term failure to void requiring ISC/LTC	2	3	13 (11.5%)
Bladder neck stenosis	2	1	5 (4.4%)
Stress incontinence	2	0	0 (0%)
Storage LUTS	1	6	9 (7.9%) (incl 2 with urinary incontinence)
Urethral stricture	1	5	6 (5.3%)
Transurethral resection syndrome	0	2	0 (0%)

TURP = transurethral resection of the prostate; ISC = intermittent self-catheterisation; LTC = long-term catheterisation; LUTS = lower urinary tract symptoms

The mean weight of tissue resected remained similar: 22.95g in 1990 (range: 3–70g), 22.55g in 2000 (range: 1.5–94g) and 20.76g in 2010 (range: 1.9–100g). This was not statistically significant ($p=0.49$).

In 1990 all TURPs were performed by a consultant urologist. In 2000 75% were performed by consultants and 25% by registrars under supervision. By 2010, 59% of these cases were performed by registrars under supervision. In 2000 the mean weight of resected tissue in cases performed by consultants was 21g; in those performed by registrars it was 28g ($p>0.05$). In 2010 the mean resection weights for consultants and registrars were 23g and 19g respectively ($p=0.24$).

The mean resection time in 1990 was 26.2 minutes. This increased to 32.1 minutes by 2000 but then fell to 30.3 minutes by 2010. In 2000 the mean resection time for consultants and registrars was 31.4 minutes and 34.3 minutes respectively. In 2010 this was 26.6 minutes for consultants and 31.8 minutes for registrars.

Prostatic adenocarcinoma was detected in 11% of patients in 1990 (9% were *de novo* diagnoses). In 2000 the proportion of patients with adenocarcinoma had increased to 22% (17% *de novo* diagnoses). This had fallen slightly by 2010 to 19% (9% *de novo* diagnoses).

Table 2 highlights the postoperative complications observed over the study period. Of note, there was a reduction in blood transfusion rates between 2000 and 2010. Only one death was recorded in the postoperative period during this study. This patient was an 85-year-old man with ischaemic heart disease and hypertension. He suffered a myocardial infarction and cardiac arrest on the fourth postoperative day.

Discussion

TURP has been the backbone of the surgical management of BPH for many years and is still regarded as the gold

standard for management of bladder outflow surgery in male patients.^{9,15} Following on from our previously published series,¹² the increased use of alternative treatments for BPH has continued to drive down the number of TURPs being performed. This is also reflected in contemporary systematic reviews.⁹ Our results highlight that patients were statistically older in 2000 compared with those in 1990 but with no significantly increased co-morbidity. Conversely, patients in 2010 were not statistically older than in 2000 but there was a significantly higher rate of co-morbidity.

Fewer patients are now presenting for TURP with LUTS than two decades ago. Retention of urine is currently the most common indication for TURP. There has been a significant increase in the proportion of patients presenting with high pressure chronic retention (1% in 1990, 7% in 2000 and 18% in 2010, $p<0.005$), continuing the trend observed in our previous series, with patients now presenting with complications of BPH (retention and obstructive renal failure) rather than simply with LUTS.¹² This trend mirrors the increased use of medical therapy for initial treatment of LUTS caused by BPH.^{11,14}

Despite the later presentation of patients for TURP, the weight of resected tissue over the study period has remained fairly constant (mean weight of 22.9g, 22.5g and 20.7g in 1990, 2000 and 2010 respectively) and is in line with contemporary published literature.⁹ This was also the case for length of operating time. Higher rates of bladder neck stenosis and secondary haematuria were observed in the 2010 cohort.

In the final cohort of cases (2010), the number of patients who had bladder dysfunction who either had persistent storage LUTS or who eventually required long-term catheterisation or intermittent self-catheterisation had markedly increased. This raises the question of what the long-term real life impact of medical therapy is in men presenting with LUTS caused by BPH who eventually

require surgery. This is echoed in the contemporary literature. A systematic review by Meyer *et al* of 67 studies over a period of 20 years demonstrated an increase in prostate volume and postoperative failure-to-void rates⁹ although the latter was still lower than in our series (6.8% vs 11.5%), supporting the argument that long-term primary medical therapy for uncomplicated LUTS can lead to detrusor dysfunction and an increased risk of failure to void after bladder outflow surgery.

Izard and Nickel suggested that medical therapy for LUTS is having a 'filtering effect', and that some patients are avoiding TURP by being treated solely with medical therapy.¹¹ They did note, however, that the complication rate for those patients who do require TURP had been increasing over the last two decades (from 14.6% to 31.0%), with 28.6% of patients being discharged with a catheter in 2008 compared with 3.2% in 1988. A similar trend found by a Chinese group over a 21-year period with an increased return-to-theatre rate to control bleeding following surgery (from 0.4% to 2.7%).⁴

The ongoing decline in the number of TURPs being performed raises a potential training issue for future urological trainees. The development of alternative techniques such as holmium enucleation and GreenLight™ laser therapy have the potential to compound this problem further.¹⁵ Over the last ten years, high fidelity virtual reality simulators have begun to play an increasing role in surgical training, with positive results.^{16–18} By incorporating the use of TURP simulators into current urological training, the reduced exposure in clinical practice to this procedure could be addressed, allowing trainees to enter the clinical environment armed with the basic skills to resect safely, thereby maximising the more limited exposure to TURP in modern urological practice in order to master this procedure.

Study limitations

The data used for operating time were collected retrospectively from theatre diaries. It is accepted that these are often inaccurate. Nevertheless, this was a consistent and repeatable record of a patient's duration in theatre throughout the study period. It also allowed for a direct comparison to be made between this dataset and our historical paper published in 2004.¹² It would also have been useful to have patient reported satisfaction and outcomes included in this study. Owing to the retrospective nature of the study, however, this was not possible.

Conclusions

The number of TURPs performed continues to decline, which could lead to potential training issues. Urinary retention is still by far the most common indication. However,

there has been a significant rise in the percentage of men presenting for TURP with high pressure chronic retention. The number of patients with bladder dysfunction who either have persistent storage LUTS or eventually require long-term catheterisation or intermittent self-catheterisation has increased markedly, which raises the question of what the long-term real life impact of medical therapy is on men with LUTS secondary to benign prostatic hyperplasia who eventually require surgery.

References

1. Reich O, Gratzke C, Bachmann A *et al*. Morbidity, mortality and early outcome of transurethral resection of the prostate: a prospective multicenter evaluation of 10,654 patients. *J Urol* 2008; **180**: 246–249.
2. Mebust WK, Holtgrewe HL, Cockett AT, Peters PC. Transurethral prostatectomy: immediate and postoperative complications. A cooperative study of 13 participating institutions evaluating 3,885 patients. *J Urol* 1989; **141**: 243–247.
3. Elsakka AM, Eltawy HH, Almekaty KH *et al*. A prospective randomised controlled study comparing bipolar plasma vaporisation of the prostate to monopolar transurethral resection of the prostate. *Arab J Urol* 2016; **14**: 280–286.
4. Guo R, Yu W, Zhang K, Xu B. Impact of changing trends in medical therapy on transurethral resection of the prostate: two decades of change in China. *Urology* 2016; **92**: 80–86.
5. Marszałek M, Ponholzer A, Pusman M *et al*. Transurethral resection of the prostate. *Eur Urol Suppl* 2009; **8**: 504–512.
6. Madersbacher S, Marberger M. Is transurethral resection of the prostate still justified? *BJU Int* 1999; **83**: 227–237.
7. Horninger W, Unterlechner H, Strasser H, Bartsch G. Transurethral prostatectomy: mortality and morbidity. *Prostate* 1996; **28**: 195–200.
8. Al-Rawashdah SF, Pastore AL, Salhi YA *et al*. Prospective randomized study comparing monopolar with bipolar transurethral resection of prostate in benign prostatic obstruction: 36-month outcomes. *World J Urol* 2017; **35**: 1,595–1,601.
9. Mayer EK, Kroeze SG, Chopra S *et al*. Examining the 'gold standard': a comparative critical analysis of three consecutive decades of monopolar transurethral resection of the prostate (TURP) outcomes. *BJU Int* 2012; **110**: 1,595–1,601.
10. D'Ancona FC, Francisca EA, Witjes WP *et al*. Transurethral resection of the prostate vs high-energy thermotherapy of the prostate in patients with benign prostatic hyperplasia: long-term results. *Br J Urol* 1998; **81**: 259–264.
11. Izard J, Nickel JC. Impact of medical therapy on transurethral resection of the prostate: two decades of change. *BJU Int* 2011; **108**: 89–93.
12. Wilson JR, Urwin GH, Stower MJ. The changing practice of transurethral prostatectomy: a comparison of cases performed in 1990 and 2000. *Ann R Coll Surg Engl* 2004; **86**: 428–431.
13. Kaplan SA. Transurethral resection of the prostate – is our gold standard still a precious commodity? *J Urol* 2008; **180**: 15–16.
14. Kirby RS. The natural history of benign prostatic hyperplasia: what have we learned in the last decade? *Urology* 2000; **36**(5 Suppl 1): 3–6.
15. Gill JD, Stewart LF, George NJ, Eardley I. Operative experience of urological trainees in the UK. *BJU Int* 2012; **109**: 1,296–1,301.
16. Bright E, Vine S, Wilson MR *et al*. Face validity, construct validity and training benefits of a virtual reality TURP simulator. *Int J Surg* 2012; **10**: 163–166.
17. Forster JA, Browning AJ, Paul AB, Biyani CS. Surgical simulators in urological training – views of UK Training Programme Directors. *BJU Int* 2012; **110**: 776–778.
18. Källström R, Hjertberg H, Svanvik J. Impact of virtual reality-simulated training on urological residents' performance of transurethral resection of the prostate. *J Endourol* 2010; **24**: 1,521–1,528.