TRANSURETHRAL MICROWAVE THERMOTHERAPY (TUMT) FOR BENIGN PROSTATIC HYPERPLASIA (BPH) – OUR FIRST 100 CASES

K T Lee, H H Tan, M K Li, W S Cheng, I R Rekhraj, K T Foo

ABSTRACT

One hundred consecutive cases treated by Transurethral Microwave Thermotherapy (TUMT) since October 1991 were analysed to assess its efficacy and safety. Out of these, 28 were in urinary retention. Patients were selected based on Madsen Symptom Score (MSS), Uroflowmetry, Transrectal Ultrasound Scanning (TRUS) plus biopsy and flexible cystoscopy.

In the non-retention group, symptomatic improvement was 81%; mean MSS dropped from 13.6 to 2.6 at one year. Objective improvement was less marked: mean peak urine flowrate (PFR) (+45%), mean residual volume (–63%) and mean prostatic volume (–15%). 8.3% had failed TUMT requiring TURP.

In the retention group, 79% was able to void freely after TUMT. Fourteen percent underwent TURP.

Based on given criteria, the overall response rate for MSS and PFR averaged 71% at 3 months, 72% at 6 months and 84% at 1 year. Sixty-seven percent of patients who responded to a phone interview were satisfied with TUMT treatment.

Minimal morbidity was encountered: temporary retention for non-retention group (24%), UTI (9%), haematuria (7%), impotence (2%) and fistula (1%). There was no treatment – related death.

The results showed that TUMT is a viable alternative and safe treatment of BPH.

Keywords: *Transurethral microwave thermotherapy, benign prostatic hyperplasia*

SINGAPORE MED J 1995; Vol 36: 181-184

INTRODUCTION

Revolutionary changes are fast taking place in urological practice through a combination of innovative ideas and technological advances[1,2]. These result from the search for cheaper, safer and less invasive treatment modalities.

In the treatment of benign prostatic hyperplasia (BPH), the gold standard treatment for the last 2 decades in Singapore has been by transurethral resection of the prostate (TURP). Recently, a number of new treatment modalities were introduced to serve as alternative treatment for BPH[1]. One such treatment modality is thermotherapy[2].

Thermotherapy of the prostate gland is a new application of an old idea. Heat treatment has been used for various ailments in ancient China and Egypt. Application in prostatic diseases (including Ca prostate and prostatitis) started in 1982[3], initially via the transrectal route and shortly afterwards, the transurethral route[4].

Transurethral microwave thermotherapy (TUMT) works firstly, by using heat to induce thermal necrosis and subsequent shrinkage of prostatic tissue, thereby relieving the mechanical obstruction to the bladder outlet. It is also postulated that it works by its effect on the adrenergic nerve endings around the bladder neck and prostatic urethral region. During thermotherapy, a temperature of >45°C is obtained within the prostatic tissue to achieve the desired effect. Simultaneous cooling of the urethral mucosa available in some machines serves to minimise pain as well as prevent injury to the mucosa[2,5].

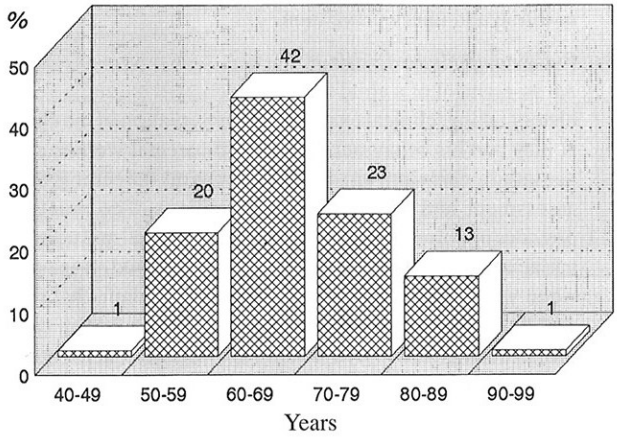
The aim of this paper is to evaluate the efficacy of TUMT in the treatment of BPH.

MATERIALS AND METHODS

This is a study of 100 consecutive patients treated with TUMT using the Prostatron machine (Technomed) in our Department from October 91 to December 92. Seventy-two of the patients were treated for symptoms of bladder outlet obstruction. The remaining 28 patients were in retention and had each failed at least one trial of catheter removal earlier.

The patients ranged from 49 to 95 years in age, with a mean age of 68 years. The age distribution can be seen in Fig 1.

Fig 1 – Age Distribution of patients under transurethral microwave thermotherapy (TUMT)



Department of Urology
Singapore General Hospital
Outram Road
Singapore 0316

K T Lee, FRCS (Edin), FRCS (Glas)
Registrar

H H Tan, FRCS (Edin), Dip in Urology (Lond), FRCS (Urol)
Consultant

M K Li, FACS, FRCSI, FRCS (Glas), FAMS
Senior Consultant

W S Cheng, FRCS (Edin), FRCS (Glas), M Med
Consultant

I R Rekhraj, FRACS, FAMS
Senior Consultant

K T Foo, FRCS (Edin), FAMS
Head and Senior Consultant

Correspondence to: Dr K T Lee

The majority (69%) of the non-retention patients were of ASA (American Society of Anaethesiologists) Grade 1 medical status. The remaining 31% were either of ASA grade 2 or 3. On the other hand, in the retention group, 68% of patients were of ASA Grade 2 or 3. Only 32% of cases were of ASA Grade 1.

All non-retention patients had significant symptoms of bladder outlet obstruction. Using a symptom score based on Madsen-Iversen Scoring System, all patients had a score of at least 8 out of a total of 27 points (except one patient who had a score of 7). Other evaluations included uroflowmetry, residual urinary volume, and prostatic volume estimated on Transrectal Ultrasound (TRUS). Peak urinary flowrate was <15 ml/sec in all patients except in one who had flowrate of 15.7 ml/sec but had bladder outlet obstruction confirmed by urodynamic study. Residual urinary volume was <300 ml and prostate volume between 30 to 70 ml in all cases.

Patients with bladder pathology (ie stones, tumour, severe bladder decompensation or neurogenic bladder) and prostate pathology other than BPH (ie prostatitis and Ca prostate) were excluded. The general contraindications are listed in Table I.

Table I – General Contraindications

1. Mental incapacity or inability to cooperate.
2. Neurogenic lesions affecting bladder function.
3. Recent uncontrolled cardiac arrhythmias or on pacemaker.
4. Significant peripheral vascular disorders.
5. Previous major pelvic/prostate surgery or radiotherapy.
6. Metallic pelvic implants.

In the pre-treatment assessment, urinalysis and if necessary urine culture were done in all cases to exclude a urinary tract infection (UTI). Urea/Creatinine and ultrasound kidneys were also done to rule out obstructive uropathy. Prostatic Specific Antigen (PSA) level was done in all cases and if indicated, biopsy was performed during the routine TRUS to detect Ca prostate. A flexible cystoscopy was also done routinely to exclude urethral stricture, enlarged median lobe of prostate that would prevent proper placement of the treatment probe as well as to exclude any bladder pathology.

TUMT treatment was done on an ambulatory basis in a single session. All patients were given prophylactic antibiotics. The only analgesic required was lignocaine jelly instilled for insertion of the treatment catheter. A rectal probe containing 3 thermosensors was inserted into the rectum to monitor the temperature achieved. The prostate was then heated to between 45°C and 60°C for 55 minutes. Transabdominal ultrasound was done regularly at 15 minutes interval to ensure proper placement of the treatment catheter.

Following the TUMT session, the non-retention patients were observed for passage of urine, failing which a urethral catheter was inserted. A catheter was reinserted in all cases with prior retention.

All patients were evaluated at one week, one month, 3 months, 6 months and one year after TUMT. So far non-retention cases which went into retention after TUMT were given a trial of catheter removal on a weekly basis from the first week post-treatment. Those who were already in retention were similarly given trial of catheter removal from the second week.

The median follow-up period was 8.5 months.

RESULTS

The results were assessed in terms of improvement in mean Madsen Symptom score, mean peak flow rate, mean residual urine volume and mean prostatic volume as shown in Tables II to V.

Table II – Results: Mean Madsen Symptom Score (MSS)

	Mean MSS	Range	% Change
Pre-treatment	13.6	8-21	
3 months	6.6	0-19	–51%
6 months	4.8	0-16	–65%
1 year	2.6	0-10	–81%

Table III – Results: Mean Peak Flow Rate (PFR)

	Mean PFR (ml/sec)	Range	% Change
Pre-treatment	8.7	2.7 - 15.7	
3 months	11.8	4.2 - 20.9	+36%
6 months	10.9	3.7 - 24.7	+25%
1 year	12.6	5.8 - 26.6	+45%

Table IV – Results: Mean Prostatic Volume (TRUS Vol)

	Mean RU (ml)	Range	% Change
Pre-treatment	40.3	22.0-82.0	
3 months	35.8	20.3-58.0	–11%
6 months	37.3	23.5-70.0	–7%
1 year	34.4	19.2-51.0	–15%

Table V – Results: Mean Residual Urine Volume (RU)

	Mean RU	Range	% Change
Pre-Treatment	102 ml	0-250	
3 months	56 ml	0-130	–45%
6 months	62 ml	0-270	–39%
12 months	38 ml	0-100	–63%

Generally, subjective improvement was more marked than objective improvements as shown. All parameters showed improvements at all stages of follow-up except for TRUS prostatic volume at one month which was 40.8 ml, an increase of 1.2% over the pre-treatment volume. However there is a 10% observer variation in measuring prostate volume and changes less than 10% are not significant. Although the above results showed significant improvements over pre-treatment parameters, they do not give an idea how the patients responded after TUMT.

Poincelet and Cathaud proposed strict criteria to define clinical responses as shown in Table VI. Partial response was defined as cases whose response does not satisfy either the complete response criteria or the non-response criteria.

Table VI – Definition of Clinical Response (Poincelet & Cathaud)

1) Complete Responders (CR):
* Peak flow rate post-treatment 15 > ml/sec and increase > +50%
* Madsen Symptom Score post-treatment < 3 and decrease > -50%
* Residual Urine post-treatment <100 ml and decrease >-50%
2) Non-Responders (NR):
* Peak Flow Rate post-treatment < 10 ml/sec and increase < +20%
* Madsen Score Symptom post-treatment > 5 and decrease < -50%
* Residual urine post-treatment > 200 ml and decrease <-50%

Based on these criteria, our response rates for Madsen Symptom score and Peak Flow Rate were shown in Tables VII and VIII as well as Fig 2 and 3. We did not evaluate the response for residual volume as we felt that inter-observer variations and variations at different time of assessment were too great; causing marked response variability. This is confounded by the fact that the denominator can be zero causing meaningless percentage change.

Table VII – Response: Madsen Symptom Score

	3 Months	6 Months	12 Months
Complete response	23%	46%	39%
Partial response	43%	29%	44%
No response	34%	25%	17%

Table VIII – Response: Peak Flow Rate

	3 Months	6 Months	12 Months
Complete response	15%	14%	23%
Partial response	61%	55%	62%
No response	24%	31%	15%

Fig 2 – Response : Madsen Symptom Score

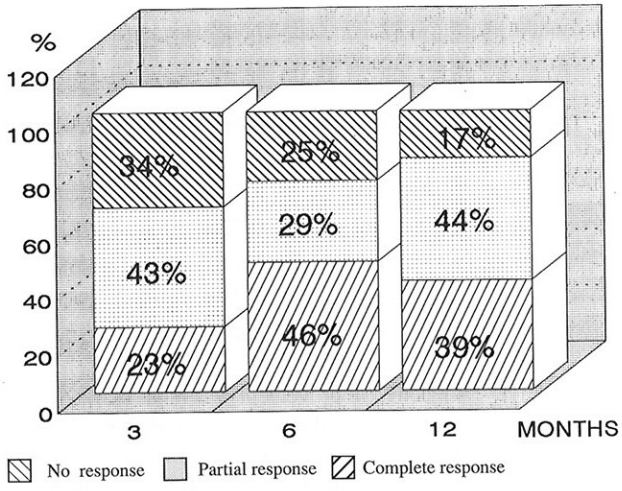
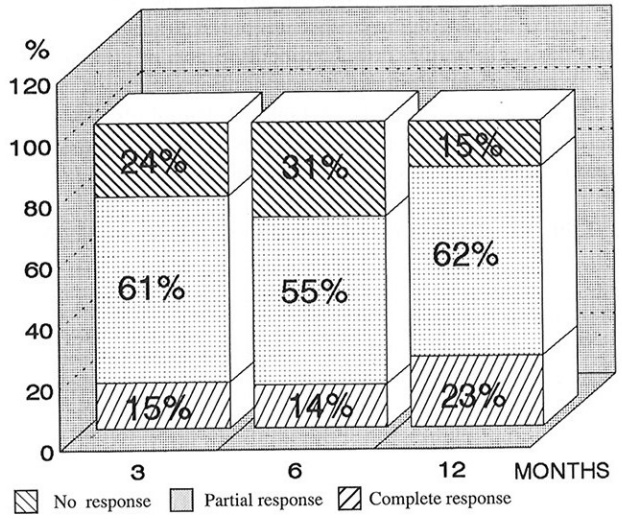


Fig 3 - Peak Flowrate



The results showed that total response rate for Madsen Symptom score (Complete Response and Partial Response) accounted for 66% at 3 months, 75% at 6 months and 83% at one year. For the Peak Flow Rate (PFR), the total response rate was 76% at 3 months, 69% at 6 months and 85% at one year.

Failures were defined as those who required another definitive treatment ie a TURP or a repeat TUMT. In our non-retention series, 7 patients (9.7%) were considered failures. Six had undergone TURP and responded well. One of the 6 had a failed repeat TUMT as well. The remaining 7th patient had a repeat TUMT recently.

Failure was seen in 6 out of the 28 patients with retention (21%). Four had TURP and 2 opted for indwelling catheter for health reasons.

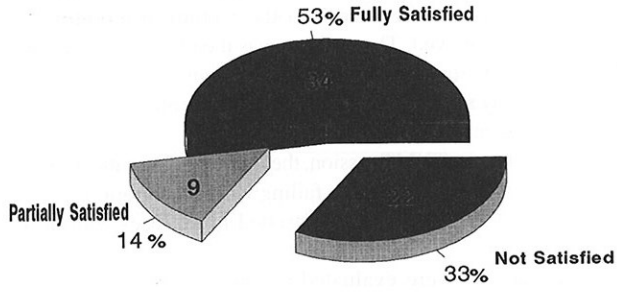
Morbidity rate was low; temporary retention was the most common complication following TUMT in 17 patients (24%) from the non-retention group. Only one patient could not be weaned off catheter and subsequently required a TURP. Six (8%) had gross haematuria not requiring intervention and 3 (4%) had urinary tract infection (UTI). Two patients claimed to be impotent following TUMT. On the contrary, one patient claimed to have increased sexual libido post-treatment. There was no patient complaining of retrograde ejaculation which is a common side-effect of TURP.

UTI was the commonest complication in the retention group; 4/28 (14%). Gross haematuria occurred in one patient. One patient had bulbo-cutaneous fistula but we were not certain whether it was directly related to TUMT or to prolonged indwelling catheter which he had for 6 weeks prior to fistula formation.

There was no mortality directly related to TUMT. Ten patients died during the course of follow-up due to various other illnesses.

We conducted telephone interviews to assess patients' overall satisfaction with TUMT results. Patients who died during follow-up were excluded. There was a response of 72% rate (sixty-five out of ninety patients); 53% (34/65) of the responders were fully satisfied with the results. Nine patients (14%) were partially satisfied while the remaining twenty-two patients (33%) were not satisfied. The latter group included the thirteen failures who required another definitive treatment. The responses can be seen at Fig 4.

Fig 4 – Satisfaction Index (Based on Telephone Interview)



Note: Responders 65/90 (72%). 10 patients dead at the time of study were excluded.

On the whole, tolerance for the TUMT session was high. Only one patient complained of severe discomfort during treatment that the session had to be terminated prematurely at 45 minutes. Three other successfully treated patients feared going through repeat TUMT treatment should the symptoms recur claiming that the treatment caused severe discomfort.

DISCUSSION

BPH is a common problem of the elderly. The gold standard treatment presently is TURP. Although results of TURP are superior to most other available forms of treatment; it is not without significant morbidity and mortality especially in those with poor medical status[7]. Moreover, a common side-effect ie retrograde ejaculation is unacceptable in sexually active patients.

Alternatives to TURP include TUMT; we assessed the results above and found that there was good subjective response and satisfactory objective response to TUMT treatment. These findings were similar to those done elsewhere[8,9]. The procedure was found to be well tolerated by most patients. In addition, there was minimal morbidity and no mortality related to TUMT. Being an ambulatory procedure; patients need not be hospitalised. Thus, there was minimal disruption to work or lifestyle. These would translate into health costs savings in the long run, an important consideration in view of rapidly rising health costs. However, for patients with severe obstruction resulting in high residual urine and back pressure changes, TURP is still the gold standard in the surgical management.

In conclusion, we found that TUMT is a viable alternative to TURP as a treatment for BPH in a select group of patients. Further studies would need to be done to enable better selection of patients for optimal results[10,11].

ACKNOWLEDGEMENTS

The authors would like to thank Sr S/N Tee Beng Guat, Ms Nuraini Sawi and Ms Angie See for their kind assistance.

REFERENCES

1. Khoury S. Future directions in the management of benign prostatic hyperplasia. Br J Urol 1992; 70 (Suppl 1): 27-32.
2. Devonec M, Ogden C, St. Carter SC. Microwave thermotherapy in benign prostatic hypertrophy. Curr Opin Urol 1993; 3:202-8.
3. Servadio C, Leib Z, Lev A. Diseases of prostate treated by local microwave hyperthermia. Urology 1987; 30:97-9.
4. Blute ML, Lewis RW. Local microwave hyperthermia as a treatment alternative for BPH. J Andrology 1991; 12:429-34.
5. Ogden CW, Reddy P, Johnson H, Ramsay JWA, St. Carter SC. Sham versus transurethral microwave thermotherapy in patients with symptoms of benign prostatic bladder outflow obstruction. Lancet 1993; 341:14-7.
6. Poincelet E, Cathaud M. Personal Communication. Oct 26, 1992.
7. Dahlstrand C, Fall M, Geirsson G, Petterson S. Transurethral microwave thermotherapy versus transurethral resection for BPH: Results of a randomised study AUA 1993 88th Annual Meeting.
8. Blute ML, Tomera KM, Hekkerstein DK, Mckiel Jr CF, Lynch JH, Sankey NE. Transurethral microwave thermotherapy: An alternative for the treatment of BPH. One year clinical results of the Prostatron Group. AUA 1993 88th Annual Meeting.
9. Carter S, Patel A, Reddy P, Royer P, Ramsay JWA. Single session transurethral microwave thermotherapy for the treatment of benign prostatic obstruction. J Endourol 1991; 5:137-44.
10. Berg C, Choi N, Colombeau P, Debruyne P, Hallin A, Perrin P, et al. Responders versus non-responders to thermotherapy in BPH: A multicentre retrospective analysis of patient and treatment profile. J Urol 1993; 149:251A.
11. Fendler JP, Nasser M, Devonec M. The clinical response to transurethral microwave thermotherapy is dose-dependent: From thermo-coagulation to thermo-ablation. AUA 1993 88th Annual Meeting.