

# Bipolar transurethral vapourisation versus monopolar transurethral resection of prostate: a randomised controlled trial

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## KEY MESSAGES

1. Transurethral resection in saline bipolar vapourisation of the prostate achieved a shorter urethral catheter time and hospital stay than monopolar transurethral resection of the prostate.
2. At 6-month follow-up, both methods achieved similar outcome in terms of symptoms and quality of life.

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## Introduction

Among Asian men, >60% aged 40 years or above experience moderate-to-severe lower urinary tract symptoms, based on the International Prostate Symptom Score.<sup>1</sup> Benign prostatic enlargement is a major culprit. As many as 30% of patients fail to achieve sufficient symptom relief with medical therapy, lifestyle adjustment, and fluid management, and may eventually require more invasive treatment.

Monopolar transurethral resection of the prostate (TURP) remains the gold standard for surgical management. Nonetheless, it is associated with the risk of transurethral resection syndrome when glycine solution is used for irrigation. The absorption of glycine and irrigation fluid from extended resection can lead to glycine toxicity and hyponatraemia.

Bipolar surgery of the prostate uses isotonic saline solution for irrigation and thus minimises the risk of transurethral resection syndrome. Transurethral resection in saline (TURis) bipolar vapourisation is one of the popular modalities. It uses a 'button' electrode instead of a resection-based loop electrode for tissue removal. Bleeding rate is reduced compared with its monopolar counterpart.<sup>2</sup> This study aimed to determine whether TURis bipolar vapourisation of the prostate results in a shorter hospital stay compared with monopolar TURP, and thus reduction in costs and improvement in effectiveness and outcome. We also aimed to establish the safety and efficacy profiles of TURis bipolar vapourisation.

## Methods

This was a two-centre, double-blind, prospective, randomised controlled trial to compare the outcome

of TURis bipolar vapourisation of the prostate versus monopolar TURP. The primary outcome measure was length of hospital stay. The secondary outcome measures included duration of catheter time (hours), dysuria score (0-10, visual analogue scale), and maximal flow (Qmax) on uroflowmetry at 3 and 6 months after surgery.

Men aged 50 to 75 years in whom medical therapy failed to relieve lower urinary tract symptoms or who had urinary retention were recruited. Details of the inclusion/exclusion criteria are listed in Table 1.

Subjects were randomised to undergo either TURis bipolar vapourisation of the prostate or monopolar TURP. Postoperative bladder irrigation was started with 0.9% saline for 6 hours for both treatment arms, unless haematuria was significant according to a standardised colour chart. Bladder irrigation was continued until the urine was sufficiently clear. The catheter was removed and the patient was discharged at the discretion of the managing clinician.

The operating surgeon and theatre staff were informed of the type of surgery one day before. They did not participate in subsequent postoperative clinical care of patients. Both patients and assessors were blinded to the mode of surgery until completion of 6-month follow-up.

The prostate volume was assessed before surgery using transrectal ultrasonography. The dysuria score was assessed using a visual analogue scale when the patient started to self-void following urethral catheter removal. Subjects were followed up in an out-patient clinic at 3 and 6 months for prostate volume, uroflowmetry, International Prostate Symptom Score, and quality of life (QoL) score. Any adverse event was documented.

Descriptive statistics were used for

TABLE 1. Inclusion and exclusion criteria

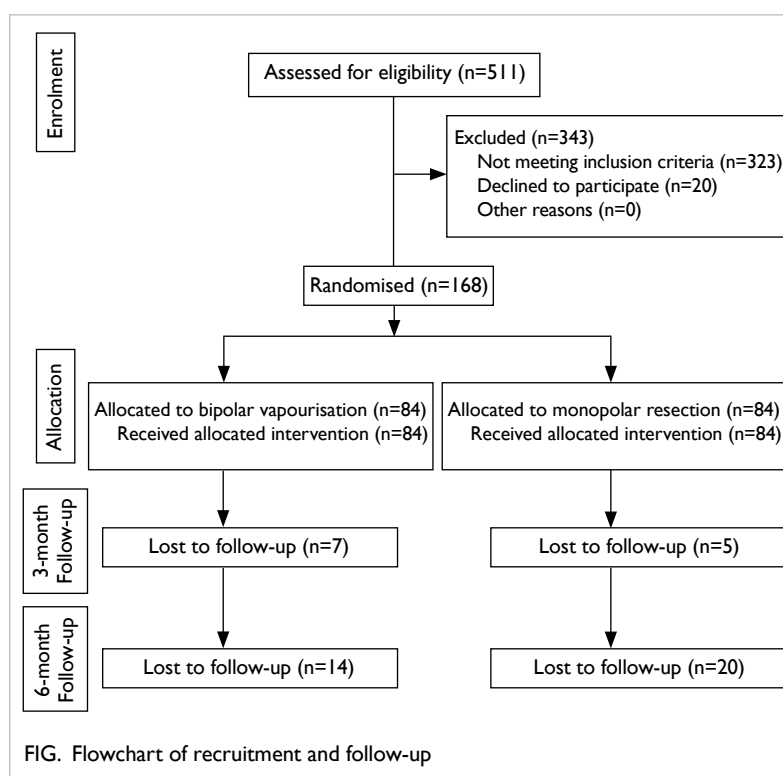
Inclusion criteria	
1.	Men aged 50 to 75 years with benign prostatic enlargement
2.	American Association of Anesthesiology grade $\leq 2$
3.	Compliant patients with
i.	Activities of daily living independent or largely independent
ii.	Agreeable to the principle of short stay surgery
iii.	Can have access to hospital care within 15 minutes of travel
And either one of the following conditions:	
4.	Failed medical therapy with alpha-blockers or 5-alpha reductase inhibitors, with International Prostate Symptom Score $\geq 18$ and/or maximal flow rate $\leq 15\text{mL/s}$
5.	Urinary retention status
Exclusion criteria	
1.	Previous transurethral resection of prostate or other forms of surgical intervention for benign prostatic enlargement
2.	Patient confirmed to have carcinoma of prostate
3.	Patients with known neurogenic bladder, bladder stone, or urethral stricture

uroflowmetry results, prostate volume, International Prostate Symptom Score, QoL score, peri-operative parameters, and length of stay. Comparison of continuous data between two arms was performed using T test if the data were normally distributed or Mann-Whitney *U* test if the data were ordinal or skewed. Categorical data were analysed using Chi-square test or Fisher's exact test where appropriate. Multivariable logistic regression was performed to determine predictors of length of hospital stay and QoL score. Reference was made to prior randomised controlled trials and systematic review. We assumed that hospitalisation was 60 hours for the monopolar group and 42 hours for the bipolar group, with a pooled standard deviation of 36 hours. It was estimated that at least 84 subjects in each arm were needed to detect a difference of 18 hours at a power of 80% with two-sided test of significance of 5% and an attrition rate of 25%. A *P* value of  $<0.05$  was considered statistically significant.

## Results

Between January 2013 and December 2013, 511 men in whom TURP was indicated were assessed for eligibility. Of them, 168 (mean age,  $65.0 \pm 5.6$  years) were randomised to the TURis bipolar vapourisation group ( $n=84$ ) or monopolar TURP group ( $n=84$ ) [Fig]. The two groups were comparable in terms of patient characteristics.

Compared with the monopolar group, the bipolar group had a longer operative time ( $51.6 \pm 24.5$  vs  $38.5 \pm 20.3$  mins,  $P < 0.001$ ), a shorter catheter time ( $33.6 \pm 23.7$  vs  $40.8 \pm 29.4$  hours,  $P = 0.013$ ), a shorter length of hospital stay ( $43.14 \pm 18.79$  vs  $52.33 \pm 30.58$  hours,  $P = 0.013$ ), and a higher dysuria score ( $5.1 \pm 2.3$



vs  $3.9 \pm 2.4$ ,  $P = 0.005$ ) [Table 2]. The two groups did not differ significantly in bladder irrigation time or complication and readmission rates (Table 2).

In multivariable logistic regression, the type of surgery was associated with the length of hospital stay (monopolar TURP: odds ratio=3.139, 95% confidence interval=1.548-6.364,  $P = 0.002$ ).

At 3 months, 156 of 168 patients were reviewed.

TABLE 2. Peri- and post-operative outcome

Outcome	Mean±SD		P value	
	Overall	Bipolar group		Monopolar group
Operating time (mins)	45.0±23.3	51.6±24.5	38.5±20.3	<0.001
Haemoglobin drop (g/dL)	0.70±0.87	0.61±0.72	0.78±0.99	0.229
Bladder irrigation (hours)	12.03±7.13	11.0±6.09	13.04±7.94	0.135
Catheter time (hours)	37.2±26.8	33.6±23.7	40.8±29.4	0.013
Dysuria score (0-10)	4.5±2.4	5.1±2.3	3.9±2.4	0.005
Length of hospital stay (hours)	47.74±25.72	43.17±18.79	52.33±30.58	0.014

The two groups did not differ significantly in QoL score or uroflowmetry results. Similar findings were noted at 6-month follow-up.

### Discussion

Monopolar TURP is the gold standard for surgical management of benign prostatic enlargement. Nonetheless, TURis bipolar vapourisation is simpler and less costly with comparable clinical benefits to other bipolar techniques. We observed that early severe irritative complications were slightly more frequent in the TURis bipolar vapourisation group than in the monopolar TURP group. Our trial is the first to quantify and compare dysuria severity using a visual analogue scale. The difference in the dysuria symptom score between the two groups could be due to a deeper coagulation depth in TURis bipolar vapourisation. With a larger surface area of the button vapourisation electrode, the extent of thermal injury is accentuated. This may account for a higher dysuria score in the bipolar than monopolar group. Future research should aim to relieve this peri-operative nuisance to improve early operative outcome.

Our current study demonstrated TURis bipolar vapourisation to be superior to monopolar TURP in terms of catheter time and length of hospital stay, with a potentially shorter bladder irrigation time than our current 6-hour protocol. The decreased length of hospital stay is a major contributor to the cost of TURP. The impact of prolonged hospitalisation can be more important than the type of surgery on cost savings. One study reported a cost reduction by 45.6% if the hospital stay for prostate surgery was reduced from 3 to 2 days.<sup>3</sup> Our trial demonstrated an almost 10-hour difference in the mean length of stay between the two groups. Such difference could mean an extra night in hospital.

There are limitations to our study. Operations in our series were not performed by a single surgeon. Differences in technique by different surgeons might alter the homogeneity of intervention. Nonetheless, for classic surgery such as TURP, the difference in execution should be minimal. Furthermore,

the follow-up was relatively short. A longer-term comparison would enable more comprehensive appreciation of the outcome of TURis bipolar vapourisation of prostate.

### Conclusions

TURis bipolar vapourisation of the prostate is a safe alternative to monopolar TURP, with a reduced length of hospital stay and comparable outcome over a period of 6 months. Nonetheless, longer follow-up would enable a more comprehensive assessment. Shortening hospital stay would contribute to a more efficient use of healthcare resources.

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