

Transurethral bipolar prostatectomy: Where do we stand now?

Hesham M Fathy, Hussein A Hussein, Hosny K Salem, Sherif S Azab, Hany M ElFayoumy

Hesham M Fathy, Hussein A Hussein, Hosny K Salem, Hany M ElFayoumy, Urology Department, Kasr Al Aini Hospital, Faculty of Medicine, Cairo University, Cairo 11562, Egypt
Sherif S Azab, Urology Departments, 6 October University, Giza 12585, Egypt

Author contributions: Fathy HM, Hussein HA and Azab SS contributed to the scientific writing; Salem HK contributed to the scientific writing and revision of the work; ElFayoumy HM contributed to the collection of studies, scientific writing and revision of work.

Conflict-of-interest: The authors declare no conflicts of interest regarding this manuscript.

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Correspondence to: Hany M ElFayoumy, MD, MRCS, FEBU, Assistant Professor of Urology, Urology Department, Kasr Al Aini Hospital, Faculty of Medicine, Cairo University, 52-A Cournish El Maadi, Cairo 11431,

Egypt. hany.elfayoumy@kasralainy.edu.eg

Telephone: +20-12-23239100

Fax: +20-23-3052200

Received: May 9, 2014

Peer-review started: May 9, 2014

First decision: June 27, 2014

Revised: December 2, 2014

Accepted: December 16, 2014

Article in press: December 17, 2014

Published online: March 24, 2015

its effective long term results with low incidence of complications. Far away from excellence, it associated with blood loss, and TUR syndrome particularly in patients with larger prostates. For this reasons, many minimally invasive new techniques have been implemented in recent years. Bipolar technique has recently been introduced, to minimize the complications of the standard TURP technique.

Key words: Transurethral; Endoscopic; Benign prostatic hyperplasia; Bipolar; Prostatectomy

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Core tip: This is a review article about the current status of clinical applications of bipolar technology for endoscopic treatment of bladder outlet obstruction caused by benign prostatic hyperplasia. Also contains valuable updated comparisons to the transurethral resection of the prostate procedure using monopolar technology.

Fathy HM, Hussein HA, Salem HK, Azab SS, ElFayoumy HM. Transurethral bipolar prostatectomy: Where do we stand now? *World J Clin Urol* 2015; 4(1): 64-67 Available from: URL: <http://www.wjgnet.com/2219-2816/full/v4/i1/64.htm> DOI: <http://dx.doi.org/10.5410/wjcu.v4.i1.64>

Abstract

Transurethral resection of the prostate (TURP) is considered the gold standard surgical treatment of symptomatic benign prostatic hyperplasia. TURP has gained ground in urologic centers of excellence for

INTRODUCTION

Transurethral resection of the prostate (TURP) is considered the gold standard surgical treatment of symptomatic benign prostatic hyperplasia^[1].

TURP has gained ground in urologic centers of excellence for its effective long term results with low incidence of complications^[2]. Far away from excellence, it associated with blood loss, and TUR syndrome

particularly in patients with larger prostates^[3] particularly in patients with larger prostates^[4].

For this reasons, many minimally invasive new techniques have been implemented in recent years^[5]. Bipolar technique has recently been introduced, to minimize the complications of the standard TURP technique^[6].

BASIC PRINCIPLES AND PHYSICS

In bipolar electro surgery, the same electrode contains both the active and passive poles and the energy is confined to the site of surgery. While the standard monopolar technique, the energy travel through the body toward skin pad. Also monopolar systems require more voltage to produce its effect. Advanced bipolar systems can modify the voltage delivered to the tissue according to the tissue reaction during resection^[7].

The main advantage of the bipolar technique that we can use normal saline as an irrigation fluid while in the standard monopolar technique we can use glycine, sorbitol, and mannitol as irrigation fluids. This will avoid the incidence of dilutional hyponatremia and TUR syndrome increasing the safety profile of the surgery even in large prostate^[7].

The first bipolar TURP system was developed in the 1990s using the PlasmaKinetic® (PK) technology (Gyrus-ACMI, South-borough, MA) and consisted of a vaporizing electrode (PK V electrode) using saline as an irrigating fluid. The invention of the current 4-mm loop configuration electrode improved this technique^[7].

The loop in bipolar system made of platinum iridium to withstand the electrical and thermal stresses of plasma, while in the standard monopolar technique; it is made of tungsten.

In the bipolar technique, the mechanism for coagulation starts by dissipation of the energy as heat within the vessel walls; a coagulum will be formed from the blood and the tissues to seal the bleeding vessel. This will be associated with white blanching of tissue indicating the formation of coagulum and shrinkage of the collagen. The lower voltage and temperatures minimizes charring of the tissue^[7].

In the standard TURP technique, no enough time is available to do simultaneous hemostasis during resection. The reduced voltage in bipolar technique provides time to do simultaneous hemostasis during the resection^[7].

Three technique of bipolar prostatectomy are available; the first technique is Bipolar plasma vaporization which requires a bipolar high-frequency generator with the power output set at 290W and 120W for vaporisation and coagulation modes, respectively. A continuous-flow irrigation is mandatory to improve the visibility and elimination of bubbles associated with vaporization. The technique starts at the bladder neck, then the lateral lobes followed by the anterior lobe, and, at the end, the apical part of the prostate^[8]. The second technique is Enucleation (Plasmakineticenucleation of the prostate)

which is similar to HoLEP, and it was previously designed by Hochreiter *et al*^[9]. Bladder irrigation is necessary until hematuria sufficiently resolved^[10]. The third technique is Bipolar TUR-P (TURIS) which is similar to monopolar TURP^[11].

DISCUSSION

According to the data from 10 randomized controlled trials comparing bipolar technique and the standard TURP technique which were analyzed by Ahyai *et al*^[11], the amount of resected tissue was not statistically significantly between the two techniques^[12,13]. Also, the functional outcome in terms of symptoms score, Q max, PVRU and quality of life was not statistically significantly between the two techniques. Pressure flow study showed similar results at 12 mo after the two techniques^[14].

The length of catheter time after monopolar TURP appeared slightly longer compared to the bipolar technique. Blood loss and blood transfusion was comparable in both techniques. TUR syndrome was not reported as a complication after the bipolar technique. The operation time was always more than one hour, and with the resected tissue did less than 37 g^[15]. Postoperative urinary retention, clot retention, and UTI were significantly less common in bipolar technique than in the mono polar technique^[15].

Three studies showed a higher incidence of stricture formation in the bipolar technique after one year follow up^[15-17] while two studies showed similar results between the two techniques^[13,18].

Mamoulakis *et al*^[19] in their Meta analysis 2009 concluded that bipolar TURP had higher safety profile than the mono polar technique on the short term follow up data while long term follow up data is still missing particularly the incidence of urethral stricture.

According to four randomized controlled trials done between 2003 and 2007, with follow up data available at 3 year^[20-23], the change in IPSS, QoL, and PVRU was comparable between the two techniques. The improvement of Qmax was statistically significant in favor of TURP.

The catheter time was longer after mono polar technique compared to the bipolar technique (mean: 2.8 d vs 1.3 d). Intra operative and peri operative complications were more statistically significant in the standard mono polar TURP compared to the bipolar TURP. Postoperative AUR was relatively higher in the bipolar technique compared to the mono polar technique. Fung *et al*^[12] and Dunsmuir *et al*^[20] reported AUR rates following the bipolar technique of 19% and 30%, respectively. Eleven percent incidence of clot retention has been reported in the bipolar technique^[22].

According to the study of Kaya *et al*^[23] with 3 year of follow-up, the improvement in IPSS and Qmax were significantly worse and that the need for secondary surgery was significantly more after bipolar technique (12%) compared to the monopolar technique (6.6%).

However, this study has limitations of small sized sample 15 monopolar techniques vs 25 bipolar techniques^[23].

Tefekli *et al*^[21] at a mean follow-up of one and half a year, demonstrated that postoperative severe storage symptoms, acute urinary retention, and urethral stricture formation were higher in the bipolar technique compared to the monopolar technique^[21].

A recently published randomized controlled study was published by Komura *et al*^[24] in 2014 comparing conventional monopolar TURP to TUR is in 136 patients and they concluded that urethral stricture was significantly higher with TUR is especially in patients with prostate volumes larger than 70 gm. Those findings are interesting and are contrasting with the findings of Fagerström *et al*^[25] in 2011 which show no difference in complications after both procedures.

CONCLUSION

Although the short term outcome efficacy and safety profile of bipolar TURP is promising, however the midterm clinical outcome is fair and the long term outcome need further multicentre RCTs with long-term follow up data.

REFERENCES

- 1 **Wei JT**, Calhoun E, Jacobsen SJ. Urologic diseases in America project: benign prostatic hyperplasia. *J Urol* 2005; **173**: 1256-1261 [PMID: 15758764 DOI: 10.1097/01.ju.0000155709.37840.fe]
- 2 **Thomas AW**, Cannon A, Bartlett E, Ellis-Jones J, Abrams P. The natural history of lower urinary tract dysfunction in men: minimum 10-year urodynamic followup of transurethral resection of prostate for bladder outlet obstruction. *J Urol* 2005; **174**: 1887-1891 [PMID: 16217330 DOI: 10.1097/01.ju.0000176740.76061.24]
- 3 **Rassweiler J**, Teber D, Kuntz R, Hofmann R. Complications of transurethral resection of the prostate (TURP)--incidence, management, and prevention. *Eur Urol* 2006; **50**: 969-979; discussion 980 [PMID: 16469429 DOI: 10.1016/j.eururo.2005.12.042]
- 4 **Reich O**, Gratzke C, Bachmann A, Seitz M, Schlenker B, Hermanek P, Lack N, Stief CG. 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 [PMID: 18499179 DOI: 10.1016/j.juro.2008.03.058]
- 5 **Yu X**, Elliott SP, Wilt TJ, McBean AM. Practice patterns in benign prostatic hyperplasia surgical therapy: the dramatic increase in minimally invasive technologies. *J Urol* 2008; **180**: 241-245; discussion 245 [PMID: 18499180 DOI: 10.1016/j.juro.2008.03.039]
- 6 **Alschibaja M**, May F, Treiber U, Paul R, Hartung R. Recent improvements in transurethral high-frequency electrosurgery of the prostate. *BJU Int* 2006; **97**: 243-246 [PMID: 16430621 DOI: 10.1111/j.1464-410X.2006.05872.x]
- 7 **Tubaro A**. BPH treatment: a paradigm shift. *Eur Urol* 2006; **49**: 939-941 [PMID: 16647187]
- 8 **Reich O**, Schlenker B, Gratzke C, Tilki D, Riecken M, Stief C, Seitz M, Bachmann A. Plasma vaporisation of the prostate: initial clinical results. *Eur Urol* 2010; **57**: 693-697 [PMID: 19482414 DOI: 10.1016/j.eururo.2009.05.031]
- 9 **Hochreiter WW**, Thalmann GN, Burkhard FC, Studer UE. Holmium laser enucleation of the prostate combined with electrocautery resection: the mushroom technique. *J Urol* 2002; **168**: 1470-1474 [PMID: 12352420 DOI: 10.1016/S0022-5347(05)64476-X]
- 10 **Liu C**, Zheng S, Li H, Xu K. Transurethral enucleation and resection of prostate in patients with benign prostatic hyperplasia by plasma kinetics. *J Urol* 2010; **184**: 2440-2445 [PMID: 20952005 DOI: 10.1016/j.juro.2010.08.037]
- 11 **Ahyai SA**, Gilling P, Kaplan SA, Kuntz RM, Madersbacher S, Montorsi F, Speakman MJ, Stief CG. Meta-analysis of functional outcomes and complications following transurethral procedures for lower urinary tract symptoms resulting from benign prostatic enlargement. *Eur Urol* 2010; **58**: 384-397 [PMID: 20825758 DOI: 10.1016/j.eururo.2010.06.005]
- 12 **Fung BT**, Li SK, Yu CF, Lau BE, Hou SS. Prospective randomized controlled trial comparing plasmakinetic vaporessection and conventional transurethral resection of the prostate. *Asian J Surg* 2005; **28**: 24-28 [PMID: 15691793 DOI: 10.1016/S1015-9584(09)60253-0]
- 13 **Michielsen DP**, Debacker T, De Boe V, Van Lersberghe C, Kaufman L, Braeckman JG, Amy JJ, Keuppens FI. Bipolar transurethral resection in saline--an alternative surgical treatment for bladder outlet obstruction? *J Urol* 2007; **178**: 2035-2039; discussion 2039 [PMID: 17869297]
- 14 **Iori F**, Franco G, Leonardo C, Laurenti C, Tubaro A, D-Amico F, Dini D, De Nunzio C. Bipolar transurethral resection of prostate: clinical and urodynamic evaluation. *Urology* 2008; **71**: 252-255 [PMID: 18308095 DOI: 10.1016/j.urology.2007.09.064]
- 15 **Seckiner I**, Yesilli C, Akduman B, Altan K, Mungan NA. A prospective randomized study for comparing bipolar plasmakinetic resection of the prostate with standard TURP. *Urol Int* 2006; **76**: 139-143 [PMID: 16493215 DOI: 10.1159/000090877]
- 16 **Nuhoğlu B**, Ayyıldız A, Karagüzel E, Cebeci O, Germiyanoglu C. Plasmakinetic prostate resection in the treatment of benign prostate hyperplasia: results of 1-year follow up. *Int J Urol* 2006; **13**: 21-24 [PMID: 16448427 DOI: 10.1111/j.1442-2042.2006.01218.x]
- 17 **Ho HS**, Yip SK, Lim KB, Fook S, Foo KT, Cheng CW. A prospective randomized study comparing monopolar and bipolar transurethral resection of prostate using transurethral resection in saline (TURIS) system. *Eur Urol* 2007; **52**: 517-522 [PMID: 17416453]
- 18 **Autorino R**, De Sio M, D'Armiendo M. Bipolar plasmakinetic technology for the treatment of symptomatic benign prostatic hyperplasia: evidence beyond marketing hype? *BJU Int* 2007; **100**: 983-985 [PMID: 17578467]
- 19 **Mamoulakis C**, Ubbink DT, de la Rosette JJ. Bipolar versus monopolar transurethral resection of the prostate: a systematic review and meta-analysis of randomized controlled trials. *Eur Urol* 2009; **56**: 798-809 [PMID: 19595501]
- 20 **Dunsmuir WD**, McFarlane JP, Tan A, Dowling C, Downie J, Kourambas J, Donnellan S, Redgrave N, Fletcher R, Frydenberg M, Love C. Gyrus bipolar electrovaporization vs transurethral resection of the prostate: a randomized prospective single-blind trial with 1 y follow-up. *Prostate Cancer Prostatic Dis* 2003; **6**: 182-186 [PMID: 12806380 DOI: 10.1038/sj.pcan.4500631]
- 21 **Tefekli A**, Muslumanoglu AY, Baykal M, Binbay M, Tas A, Altunrende F. A hybrid technique using bipolar energy in transurethral prostate surgery: a prospective, randomized comparison. *J Urol* 2005; **174**: 1339-1343 [PMID: 16145415 DOI: 10.1097/01.ju.0000173075.62504.73]
- 22 **Hon NH**, Brathwaite D, Hussain Z, Ghiblawi S, Brace H, Hayne D, Coppinger SW. A prospective, randomized trial comparing conventional transurethral prostate resection with PlasmaKinetic vaporization of the prostate: physiological changes, early complications and long-term followup. *J Urol* 2006; **176**: 205-209 [PMID: 16753403 DOI: 10.1016/S0022-5347(06)00492-7]
- 23 **Kaya C**, Ilktac A, Gokmen E, Ozturk M, Karaman IM. The long-term results of transurethral vaporization of the prostate using plasmakinetic energy. *BJU Int* 2007; **99**: 845-848 [PMID: 17378844 DOI: 10.1111/j.1464-410X.2006.06683.x]
- 24 **Komura K**, Inamoto T, Takai T, Uchimoto T, Saito K, Tanda N, Minami K, Oide R, Uehara H, Takahara K, Hirano H, Nomi H, Kiyama S, Watsuji T, Azuma H. Higher Incidence of Urethral Stricture after Bipolar Transurethral Resection of the Prostate Using TURis? - Results from a Randomized Trial. *BJU Int* 2014 Jun 9; Epub ahead of print [PMID: 24909399 DOI: 10.1111/bju.12831]

25 **Fagerström T**, Nyman CR, Hahn RG. Complications and clinical outcome 18 months after bipolar and monopolar transurethral

resection of the prostate. *J Endourol* 2011; **25**: 1043-1049 [PMID: 21568691 DOI: 10.1089/end.2010.0714]

P- Reviewer: Naselli A **S- Editor:** Ji FF **L- Editor:** A
E- Editor: Lu YJ





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