

Does prostate size impact upon perioperative outcomes associated with photoselective vaporization of the prostate using the 180W lithium triborate laser?

Kellie E. West, Henry H. Woo

Sydney Adventist Hospital Clinical School, University of Sydney, Sydney, Australia

Abstract

Introduction: Photoselective vaporization of the prostate (PVP) has been widely adopted as a surgical treatment for lower urinary tract symptoms due to benign prostatic hyperplasia (BPH). Recently, a high-powered 180 W lithium triborate (LBO) laser has become commercially available and there is relatively little information on the impact of this very high-powered laser on perioperative outcomes. Even more so is the impact of the laser on outcomes according to prostate size.

Objectives: The objective of this study was to evaluate perioperative outcomes after PVP with the 180W laser, relative to prostate size.

Patients and Methods: A prospectively maintained institutional ethics approved database was retrospectively reviewed. Subjects were analyzed according to transrectal ultrasound and categorized into groups namely 0-39 mL, 40-79 mL, 80-120 mL and >120 mL. Perioperative measures included energy utilized, length of operation, duration catheterization, post operative length of stay (POLOS), Clavien-Dindo adverse events and number discharged home within 24 hours catheter free.

Results: With increasing prostate size, there was a statistically significant increase in energy utilization and operation time ($P < 0.01$ between groups). Duration of catheterization, POLOS, incidence of Grade 3 and above Clavien-Dindo adverse events and discharge home catheter free within 24 hours was not statistically significant across groups.

Conclusions: Prostate volume impacts upon energy utilized with PVP surgery. Prostate volume does not influence duration of catheterization or POLOS. Clavien-Dindo Grade 3 or greater adverse events were low and do not appear to be influenced by prostate size. The ability to be discharged home catheter free within 24 hours likewise does not appear to be influenced by prostate size.

Key Words: Benign prostatic hyperplasia, laser prostatectomy, photoselective vaporization prostate

Address for correspondence:

Prof. Henry H Woo, SAN Clinic, Suite 406, 185 Fox Valley Road, Wahroonga, New South Wales - 2076, Sydney, Australia. E-mail: hwoo@urologist.net.au

Received: 02.12.2013 Accepted: 01.04.2014

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/0974-7796.148579

INTRODUCTION

Lower urinary tract symptoms (LUTS) are a common problem in older men. Although trans-urethral resection of the prostate using electro-cautery techniques is still considered the gold standard, the efficacy and safety of photoselective vaporization of the prostate (PVP) provide a basis to challenge this assertion.^[1-3]

The first commercially available version of PVP, released in 2001, was the 80 W potassium titanyl phosphate (KTP) machine, and superseded in 2007 by the 120 W lithium triborate (LBO) machine in 2007. This was superseded in 2010 by the current technology, the 180W LBO laser. Although the older technology is supported by an abundance of clinical data, the 180 W LBO laser has only been the subject of a few clinical reports to date.^[1,2]

A significant enhancement to the 180W LBO laser is a liquid cooled irrigated fiber which minimizes fiber damage that would otherwise occur with inadvertent tissue contact. Early data indicates shorter operating times with this much more powerful laser compared to earlier versions. While some early clinical data on the efficacy and safety of this new laser have been published, there is limited data available regarding perioperative outcomes, particularly in relation to prostate size. The purpose of this study was to evaluate the impact that prostate size has upon perioperative parameters associated with the surgical treatment of benign prostatic hyperplasia (BPH) using the 180W LBO laser.

PATIENTS AND METHODS

A total of 137 men were treated for BPH with PVP using the 180W LBO laser between July 2010 and October 2012 at the Sydney Adventist Hospital. Data was collected prospectively in an ethics approved database with retrospective analysis of the data.

Patients were selected for treatment based on accepted indications for the surgical treatment of BPH.^[4,5] Patients with a history of prostate cancer or urethral stricture disease were excluded from this database. Prostate volume was measured via transrectal ultrasound measurements using the ellipsoid formula (width × height × length × 0.52).

Patients were then categorized into groups based on the following prostate volume ranges: <40 cc, 40-79 cc, 80-120 cc and >120 cc.

Perioperative factors examined included total operation time, laser time and energy utilized. Operative time was defined from the insertion of the cystoscope to urethral catheterization at the completion of surgery. Laser time was

defined as the total duration of laser treatment as is measured automatically by the laser console. The total energy (kilojoules) utilized is also calculated by the laser console. Additionally, duration of catheterization, post-operative length of stay in hospital (POLOS), Clavien-Dindo classified adverse events were also analyzed.

Microsoft Excel was used to perform Chi-square tests of discrete variables and Student t tests of continuous variables. A *P* value of less than 0.05 was considered statistically significant. Results were reported as follows: number of cases (percentage) for categorical and mean (\pm SD) for continuous variables.

RESULTS

Of the 137 men treated in this series, the mean age of subjects was 68.0 years (\pm 10.1 years). The median prostate volume of the population was 67 cc (interquartile range 45-95 cc). A total of 24 men were anticoagulated (17.5%) and 30 were in urinary retention (21.9%).

A statistically significant increase in operation time and energy utilization was observed ($P < 0.01$ between groups). Duration of catheterization, POLOS and discharge home catheter free within 24 hours was not statistically significant across groups. Incidence of Grade 3 and above Clavien-Dindo adverse events was low across all prostate volume categories and there appeared to be no difference between groups. For specific values see Table I.

DISCUSSION

The present study suggests that the 180 W laser demonstrates a consistency in perioperative outcomes irrespective of prostate size. Not surprisingly, an increase in energy utilization and operative time has been observed with increasing prostate volume. There did not appear to be any increase in the rate of perioperative complications with increasing prostate size. CD complications >2 were no more prevalent in larger prostate volumes than in men with smaller glands. Length of catheterization and post-operative length of stay were no different between groups. The number of men sent home catheter-free within 24 hours was also similar across prostate volume groups.

Table 1: Measured outcomes according to prostate size

Prostate size category (n)	<40 (27)	40-79 (56)	80-119 (38)	>120 (22)
Prostate volume (cc)	29 (\pm 11)	59.5 (\pm 16.5)	91.5 (\pm 17.5)	142.5 (\pm 48)
Energy utilized (kJ)	162 (\pm 101.5)	314.5 (\pm 152.2)	533.5 (\pm 201.75)	782 (\pm 371.75)
Duration catheter (hr)	14 (\pm 4)	13 (\pm 3.25)	14 (\pm 5.75)	12 (\pm 3.75)
POLOS (hr)	20 (\pm 4.5)	19 (\pm 5.25)	20.5 (\pm 6.75)	20 (\pm 15.5)
CD>2 complications	1	3	4	3
Catheter free <24 hr (n)	22 (81.48)	44 (78.57)	28 (73.68)	18 (81.81)
Preop retention (n)	4 (18.52)	8 (14.29)	9 (23.68)	9 (40.9)
Op time (min)	34 (\pm 14.5)	50.5 (\pm 22.25)	75 (\pm 23.25)	109.5 (\pm 43.25)
Anticoagulated (n)	4 (14.81)	5 (8.93)	10 (26.31)	5 (22.73)

These findings contribute to the relatively small amount of data available regarding the effect of prostate volume on PVP, particularly with this new high-powered laser. Men can be counseled on peri-operative outcomes being consistent across all prostate volumes.

When comparing earlier versions of PVP (80 W KTP and 120 W LBO) with TURP, PVP has been shown to result in shorter duration of catheterization and shorter hospital stay as well as fewer complications including clot retention and blood transfusion.^[3] While the current study does not attempt to compare directly with TURP, the short duration of catheterization and length of stay in hospital is similar to reports of earlier PVP versions. Early reports on the 180 W LBO laser appear to demonstrate much shorter operating times compared to the 120 W LBO systems.^[1,6] Further advantages for the use of PVP is the efficacy in men with larger prostate glands, which has been considered a relative contraindication for TURP. Previous studies using the 120 W laser have found that PVP using this laser has been safe and efficacious in men with prostate glands greater than 80 cc^[7] and greater than 120 cc.^[8]

As a new version of a LBO laser, there has been little comparison with other technologies. Just recently, the Goliath study^[9] has been published where a randomized controlled trial comparing peri-operative and functional outcomes between PVP using the 180W LBO laser and TURP. This study demonstrated a lack of inferiority of the LBO laser compared to TURP in terms of IPSS and peak urinary flow rates. The LBO laser had a lower proportion of patients who experienced complications as well as a lower rate of early reinterventions. The rates of reinterventions of any type were however similar out to 6 months follow up.

This study has several shortcomings. One limitation is that we categorized prostate volume into four groups rather than performing analysis as a continuous variable -with a larger number of cases, this could potentially be performed as a future analysis. Given the absence of differences between the four groups in our study, we do not believe that this would significantly alter the finding. Additionally, other parameters that could influence the results such as age and medical co-morbidity could influence the risk of complications and this has not been factored into this study. It is however our view that age and medical comorbidity would be less likely to influence energy utilization and operative time.

Another shortcoming is that this is a non-randomized, single-center study and the results from a single surgeon. The lack of higher-level evidence with respect to transurethral surgery of the prostate has been discussed extensively.^[10,11] Also, the surgeon was highly experienced in performing PVP and has

published extensively on the subject. It is possible that these results may not be replicated for a less experienced surgeon.

Furthermore, there is an absence of functional outcomes including objective measures of improvement in LUTS including IPSS, Qmax and PVR. The objectives of this study were however to evaluate perioperative outcomes rather functional outcomes. Longer term outcomes were also not included due to the short follow-up period between the procedures and this study but in the assessment of peri-operative outcomes, we believe this to be less of an issue compared to studies specifically assessing functional outcomes and long-term complications.

CONCLUSION

As expected, increasing prostate volume was associated with increased energy utilized and operation time. However, prostate volume does not influence peri-operative factors such as duration of catheterization, POLOS and the ability to be discharged home catheter free within 24 hours. Likewise, prostate size does not appear to influence the likelihood of Clavien-Dindo Grade 3 or greater adverse events which were in any case low.

REFERENCES

1. Bachmann A, Muir GH, Collins EJ, Choi BB, Tabatabaei S, Reich OM, *et al.* 180-W XPS GreenLight laser therapy for benign prostate hyperplasia: Early safety, efficacy, and perioperative outcome after 201 procedures. *Eur Urol* 2012;61:600-7.
2. Chung AS, Chabert C, Yap HW, Lam J, Awad N, Nuwayhid F, *et al.* Photoselective vaporization of the prostate using the 180W lithium triborate laser. *ANZJ Surg* 2012;82:334-7.
3. Thangasamy IA, Chalasani V, Bachmann A, Woo HH. Photoselective vaporisation of the prostate using 80-W and 120-W laser versus transurethral resection of the prostate for benign prostatic hyperplasia: A systematic review with meta-analysis from 2002 to 2012. *Eur Urol* 2012;62:315-23.
4. McVary KT, Roehrborn C, Avins A, Barry MJ, Bruskewitz RC, Donnell RF, *et al.* Clinical practice guideline: Management of BPH 2010. American Urological Association website. Available from: <http://www.auanet.org/common/pdf/education/clinical-guidance/Benign-Prostatic-Hyperplasia.pdf>. [Last accessed on 2013 Sept 30].
5. Oelke M, Bachmann A, Descazeaud A, Emberton M, Gravas S, Michel MC, *et al.* Guidelines on the Management of Male Lower Urinary Tract Symptoms (LUTS), Incl. Benign Prostatic Obstruction (BPO) 2012. European Association of Urology website. Available from: http://www.uroweb.org/gls/pdf/12_Male_LUTS_LR.pdf. [Last accessed on 2013 Sept 30].
6. Campbell NA, Chung AS, Yoon PD, Thangasamy I, Woo HH. Early experience photoselective vaporisation of the prostate using the 180W lithium triborate and comparison with the 120W lithium triborate laser. *Prostate Int* 2013;1:42-5.
7. Woo H, Reich O, Bachmann A, Choi B, Collins E, de la Rosette J, *et al.* Outcome of GreenLight HPS 120-W laser therapy in specific patient populations: Those in retention, on anticoagulants, and with large prostates. *Eur Urol Suppl* 2008;7:378-83.
8. Woo HH. Photoselective vaporization of the prostate using the 120-W lithium triborate laser in enlarged prostates (>120 cc). *BJ Urol* 2011;108:860-3.
9. Bachmann A, Tubaro A, Barber N, d'Ancona F, Muir G, Witzsch U, *et al.* 180-W XPS GreenLight Laser vaporisation versus transurethral resection

of the prostate for the treatment of benign prostatic obstruction: 6-month safety and efficacy results of a European multicenter randomised trial-the GOLIATH study. *Eur Urol* 2014;65:931-42.

10. Bachmann A, Woo HH, Wylter S. Laser prostatectomy of lower urinary tract symptoms due to benign prostate enlargement: A critical review of evidence. *Curr Opin Urol* 2012;22:22-33.
11. Madersbacher S. After three randomised controlled trials comparing 120-W high-performance-system potassium-titanyl-phosphate laser vaporisation to transurethral resection of the prostate (TURP), is this

procedure finally first-line, outdated, or still not surpassing TURP? *Eur Urol* 2012;61:1174-7.

How to cite this article: West KE, Woo HH. Does prostate size impact upon perioperative outcomes associated with photoselective vaporization of the prostate using the 180W lithium triborate laser?. *Urol Ann* 2015;7:17-20.

Source of Support: Nil, **Conflict of Interest:** None.