Photoselective Vaporisation of the Prostate - Independent Surgical Experience Following Comprehensive Resident Training in the Technique.

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Abstract

INTRODUCTION

Photoselective vaporisation of the prostate (PVP) is an established treatment option for bladder outlet obstruction (BOO). PVP has demonstrated durable clinical efficacy equivalent to other endoscopic procedures at 5 years [1]. Furthermore, PVP has demonstrated superior haemostatic properties compared with other endoscopic treatments for Benign Prostatic Hyperplasia (BPH) [2]. Despite this many Urological Surgeons trained in Australasia are not trained in PVP. Therefore, many urologists attempt to overcome the learning curve after a mentorship of only a handful of cases. Herein, we evaluate the first 53 cases performed independently by a single surgeon following comprehensive resident training in the technique.

METHODS

One surgeon (DS) performed all procedures in this study. DS had been supervised and mentored for 30 cases by a recognised world expert in PVP whilst in the Australasian Urology training program. A prospective database was collected and retrospectively reviewed. Between February 2011 and September 2011, all men who were booked on to DS's operating list for bladder outlet disobstructive surgery were offered PVP. All patients came from a communal waiting list which 15 Urological Surgeons contributed to. Therefore, the patient series was not made up of carefully selected cases; rather it represented 'all comers'.

In total 53 men underwent PVP during this period. Total operative time, energy utilisation, anti-coagulation status, catheter status and length of hospital stay were recorded. Operative time was calculated from the time that the laser pedal was first depressed to the time that the operation was completed.

All men underwent general anaesthesia for their procedure. The procedure was carried out using a standardized technique as previously described by the International Greenlight User's Group [3]. The lateral lobes of the prostate were initially treated and a working space was created. While establishing a working space, the laser power is set at 80W. Once the working space is established, power was immediately increased to 120W for the remainder of the case. To assist visibility, a standard arthroscopy giving set with a hand pump was used for the 23Ch continuous flow laser cystoscope irrigation. Thus mucosal contact bleeding or vaporization bubbles are dispersed improving visibility [2].

A 22 French 3 way catheter was inserted at the end of the procedure. The irrigation channel was spigotted. Irrigation was commenced in line with standard nursing care should significant haematuria develop. A Trial Of Void (TOV) was carried out at 0600 hours the following morning if the urine was clear. Routine full blood count and electrolytes were performed on all patients on the first day post operatively. We defined a significant Hb drop as a post operative Hb < 100g/l. The standard irrigation fluid used throughout the procedure was saline.

RESULTS

Of the initial 53 cases, two cases had to be converted to TURP and consequently their data was excluded from analysis. In both cases excessive bleeding was encountered with PVP. Additionally, PVP was used in one case to control post operative haemorrhage after Holmium Laser Enucleation of the Prostate (HoLEP). This data was omitted as the procedure was performed to control transfusion dependent haemorrhage in a high risk anticoagulated patient rather than for tissue ablation.

The mean operative time was 61.16 minutes (SD 28.6, range 10 - 140 mins). This time is recorded by the laser console. The mean energy used was 301.01 kJ (SD 112.9, range 22.2 – 400.1kJ). The average length of stay was 1.4 days (SD 0.57, range 1 – 3 days), and 64% of patients were able to be discharged on day one post operatively catheter free.

Pre-operatively 34% of patients were catheterised. Patients continued their anticoagulant medication throughout the perioperative period. In total, 42% of patients were anticoagulated during their procedure. 10% of patients continued therapeutic warfarin, 8% of patients continued clopidogrel, and 1 patient continued both clopidogrel and aspirin. A further 11 (22%) patients continued aspirin (table 1).

Figure 1

Anticoagulation - table 1

	Number	%
Aspirin	11	22
Warfarin	5	10
Clopidogrel	4	8
Aspirin and Clopidogrel	1	2
Total anticoagulated	21	42

In the peri-operative period, there were no complications related to PVP. No patient had a significant drop in hemoglobin (Hb). No patient required blood transfusion. No patients developed dilutional hyponatraemia.

Complications were limited to 17 patients. These complications are presented in table 2. Complications were graded using the Clavien-Dindo [4] system. Five (10%) patients failed a post procedure trial of void and went home with an indwelling catheter. Two patients developed stress urinary incontinence post operatively, which completely resolved with pelvic floor physiotherapy in one. Five patients developed acute urinary retention due to a secondary haemorrhage. All occurred between day 10 and 16 post operatively. This was managed with urethral catheterisation and bladder irrigation. Only one of these patients was anticoagulated (warfarin) during the perioperative period.

Figure 2

Complications - table 2

	Number	%	Clavien Dindo
Failed TOV	5	10	II
Acute Urinary Retention	5	10	II
Stress Urinary Incontinence	2	4	II
Epididymo-orchitis	1	2	II
Haematuria	4	8	IIIa
Total no complications	17	34	

DISCUSSION

PVP is gaining popularity in Australia with over 30 machines now in public and private hospitals. Bouchier-Hayes et al demonstrated a 22% cost advantage of PVP over TURP [5]. As a result of this the Victorian Department of Human Services (DHS) funded a project to address investment and disinvestment in health technologies. The Sustainability in Healthcare by Allocating Resources Effectively (SHARE) Steering Committee identified the transition from TURP to PVP as a 'disinvestment' project. Consequently six PVP machines to have been purchased for Victorian public hospitals over the last 2 years.

The cost advantage that PVP enjoys over TURP is due to the decreased length of stay and shorter duration of catheterisation [5]. Similarly our study demonstrated satisfactory TOV and discharge of 64% of patients on day one postoperatively. Thus a more rapid TOV is possible in PVP patients due to its superior haemostatic properties. Wendt-Nordahl et al demonstrated that the average bleeding rate for TURP was 20.14g/min [3]. In contrast, Heinrich et al (2010) showed a significantly decreased bleeding rate of 0.65g/min for PVP [6].

Furthermore, the ability to operate on anti-coagulated patients is a significant advantage over TURP [2, 7]. Anticoagulant and anti-platelet medication use has increased significantly in recent years. An increased risk of bleeding complications must be weighed against the potential consequences of stopping these medications during the preoperative period. It is accepted practice to cease such agents in the pre and peri-operative period for traditional TURP [2]. Thus, PVP overcomes the dilemma of ceasing anticoagulant medications in patients with cardiac and other co-morbidities. In our series 42% of patients continued their anticoagulant medication throughout the perioperative period.

The superior haemostatic properties of PVP make it ideal for very large glands or anti-coagulated patients. However, it also means that surgeons who are novices in this technique are potentially performing their initial cases in a subset of patients who pose a higher risk of perioperative morbidity. The two cases that had to be converted to TURP in our series also demonstrate that PVP does not result in a completely bloodless field.

Whilst PVP has excellent haemostatic properties, the standard size sheath is only 23Ch for the 120W laser. A

23Ch sheath has significantly poorer flow characteristics compared with a 26Ch sheath, as used for a continuous flow resectoscope. In the two cases that had to be converted to TURP in our series there was sufficient irrigation flow once the 26Ch sheath was in place. This issue has been rectified with the new 180W PVP as it requires a 26Ch sheath.

We recognise the limitations of our study. Due to tissue vaporisation, the amount of tissue removed during surgery is not easily quantifiable. Preoperative and postoperative PSA measurements would have been helpful to estimate the volume of tissue removed. Unfortunately the 53 patients in this study came from a communal waiting list of 15 surgeons. As a result the preoperative workup was heterogeneous. Uniform measurement of preoperative prostate size, PSA level, IPSS, or voiding flow rate was not carried out.

The strength of our study is that it is a consecutive series evaluating the first 53 independent PVP cases our surgeon performed following comprehensive registrar training. Furthermore, as 15 surgeons contributed to the waiting list and DS performed PVP on all patients booked on his list for bladder outlet disobstructive surgery, this series is far more reproducable than a group of carefully selected and screened cases. Additionally, given that our surgeon has been formally trained and the preoperative catheterisation rate was 34% whilst only five patients failed a trial of void, we feel that the tissue removal rate was satisfactory.

The cause of failing a TOV postoperatively may have been due to detrusor failure or insufficient tissue ablation. As all patients who failed a postoperative TOV were preoperatively catheterised we feel that detrusor failure is more likely, regardless urodynamic evalution would be required to prove this. Stress urinary incontinence occurred in two patients. This was likely due to undermining of the external urethral sphincter and resulted in DS modifying his technique to clear a channel at the apex rather than trying to ablate all apical tissue.

Mentorship is important with this technology as keeping the side firing laser close enough to the tissue to achieve vaporisation, whilst far enough away to avoid contact requires patience and practise. Additionally PVP is a significantly different technique to other endoscopic Urological procedures. Our surgeon achieved an average operative time for PVP of 61 minutes. While our surgeon's mentor recently published his series of PVP in which his mean operative time was 70 minutes [7]. This study also highlights the other advantages of PVP, namely, short hospital stay and the ability to continue anticoagulation pre and peri-operatively [2,7].

Despite appropriate training and mentorship of our surgeon, postoperative complications occurred in 34% of cases. This complication rate is similar to the complication rate of experienced PVP surgeons recently published in the ANZ Journal of Surgery (28%) [8]. However, DS' complication rate of 34% is better than the complication rate of novice PVP surgeons (43%) [8].

Despite the superior haemostatic properties of PVP five patients developed acute urinary retention due to a secondary haemorrhage. All occurred between day 10 and 16 post operatively. As only one of these patients was anticoagulated (warfarin) during the perioperative period the secondary haemorrhage is likely due to infection or sloughing of the prostatic fossa. Thus it would appear that the haemostatic benefit that PVP enjoys over other modalities is confined to the immediate perioperative period only.

This study demonstrates that surgeons who 'grow up' with PVP technology whilst in the training program are able to adopt it to their independent practise. Moreover, their results are similar to an 'experienced' specialist PVP surgeon. Regardless there is an ongoing learning curve and constant review of one's technique and complications will improve patient safety and postoperative outcomes.

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