European Urology

European Urology 48 (2005) 965–972

Photoselective Vaporization (PVP) versus Transurethral Resection of the Prostate (TURP): A Prospective Bi-Centre Study of Perioperative Morbidity and Early Functional Outcome

Alexander Bachmann[a,*], Leander Schürch[b], Robin Ruszat[a], Stephen F. Wyler[a], Hans-Helge Seifert[a], Alexander Müller[a], Kurt Lehmann[b], Tullio Sulser[a]

[a]*Department of Urology, University of Basel, Spitalstr. 21, CH-4031 Basel, Switzerland*
[b]*Department of Urology, Cantons Spital Baden, Switzerland*

Accepted 1 July 2005

Available online 18 July 2005

Abstract

Objectives: To compare the early follow-up and perioperative morbidity of photoselective vaporization (PVP) and transurethral resection of the prostate (TURP) in patients (pts.) suffering from lower urinary tract symptoms (LUTS) secondary to benign prostatic hyperplasia (BPH).

Material and method: 101 pts. underwent PVP ($n = 64$) and TURP ($n = 37$) in a prospective, non-randomized bi-centre trial. Inclusion criteria were identical at both centres. Primary outcome parameters were maximum urinary flow rate (Q_{max}), post-void residual volume (V_{res}), International Prostate Symptom Score (IPSS). Secondary outcomes included intraoperative surgical parameters and perioperative and post-discharge morbidity.

Results: Baseline characteristics of both groups were similar. Operating time was slightly shorter in the TURP group ($p = 0.047$). During TURP significant more irrigation solution was used ($p < 0.001$). Decrease of serum haemoglobin ($p = 0.027$) and serum sodium ($p = 0.013$) was larger after TURP. Catheter drainage was removed significant earlier after PVP than after TURP ($p < 0.001$). Outcome of Q_{max}, and IPSS were similar in both groups within 6 months. The sort of perioperative complications was different in both groups, however overall cumulative perioperative morbidity was comparable (PVP 39.1% versus TURP 43.2.1%; ns).

Conclusion: PVP provides excellent intraoperative safety, instant tissue removal, and immediate relief from obstructive voiding symptoms, similar to TURP. Early outcomes 6-months after PVP and TURP are comparable.

Keywords: Photoselective vaporization of the prostate (PVP); Benign prostatic hyperplasia (BPH); Transurethral resection of the prostate (TURP); Laser treatment; Potassium-titanyl-phosphat (KTP)

1. Introduction

Surgical treatment of patients suffering from lower urinary tract symptoms (LUTS) secondary to benign prostate hyperplasia (BPH) remains the most efficient treatment options up to date. Within this context, transurethral electro resection of the prostate (TURP) has proven to be the standard option and is respected as an efficient tool for removal of obstructive prostatic tissue. In order to minimize perioperative morbidity of TURP, various minimally invasive alternatives were introduced to the clinical practice. However, with regard to immediate outcome and re-treatment rate, only the holium:yttrium–aluminum-garnet (Ho:YAG) laser and electro vaporization of the prostate seem to have an efficacy comparable to TURP.

* Corresponding author.
E-mail address: bachmanna@uhbs.ch (A. Bachmann).

0302-2838/$ – see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.eururo.2005.07.001

We report about early outcome and perioperative morbidity in the first prospective, non-randomized bi-centre comparing study of photoselective laser vaporization of the prostate (PVP) versus TURP in 101 patients with LUTS secondary to BPH.

2. Material and methods

In December 2003, we started with a prospective, non-randomized bi-centre study of PVP and TURP to compare perioperative morbidity and postoperative outcome. PVP is the standard treatment in patients with LUTS secondary to BPH since September 2002 in the University Hospital Basel. All patients from the Cantons Hospital Baden underwent TURP. This ongoing open study includes 101 consecutive patients; 64 patients underwent PVP and 37 patients underwent TURP.

All patients underwent a treatment trial with a selective α-blocker for at least 6 weeks prior to surgery, following internal guidelines for the treatment of BPH in both hospitals. Thus, patients with only mild LUTS were spared form surgery. Patients with definitive indications for surgery (e.g. recurrent urinary tract infections, chronic renal impairment or recurrent prostatic bleeding) were not considered for α-blocker therapy. Inclusion criteria for surgery comprised maximum urinary flow rate (Q_{max}) $\leq$ 15 ml/s or transvesically measured postvoid residual volume (V_{res}) $>$ 100 ml in conjunction with the International Prostate Symptom Score (IPSS) $>$ 7.

All patients underwent a general and urological standard evaluation prior to surgery, including digital rectal examination, urine analysis, transrectal ultrasound measurement of the prostate (TRUS), ultrasound evaluation of the kidney, blood sample analysis including determination of prostate-specific antigen (PSA), Q_{max}, V_{res}, and self assessment by International Symptom Score (IPSS), including IPSS quality of life score (Bother-score). TRUS guided biopsies were performed in patients with PSA $>$ 3 ng/dl, abnormal digital rectal examination, and/or suspicious and irregular echogenicity on TRUS.

Criteria for patient exclusion from the study were known neurogenic bladder disorder (e.g. detrusor instability or hyperreflexia), urethral strictures or a V_{res} $>$ 400 ml. Accordingly, patients with a history of acute or repeated urinary retention or with the necessity of an indwelling catheter were excluded.

Because of the non-randomized bi-centre study design different surgeons at different hospitals performed PVP and TURP. All PVP's were performed at the University Hospital Basel by two experienced surgeons (T.S., A.B.) and two novices (R.R., S.W.). TURP was performed at the Cantons' Hospital Baden by three surgeons, who all had experience with TURP of at least 200 procedures prior to the beginning of the trial.

2.1. Parameter

The following parameters for group analysis (PVP versus TURP) were scheduled for primary outcome: Q_{max}, V_{res}, IPSS and Bother score and. Parameters were assessed at time of discharge, 1, 3 and at least 6 months after surgery. Secondary outcome parameters including patients age, preoperative prostate volume and PSA value, operating time (OPT), intraoperative irrigation volume, intraoperative electrolyte and serum haemoglobine changes, recording of intra-and early postoperative complication rate until discharge were assessed perioperatively. Postoperatively, reduction of prostate volume and the PSA value were analyzed within the observation period.

2.2. Laser-tissue interaction

Photoselective vaporization of the prostate (PVP) was performed using a GreenLight PV laser generator (GreenLight PV™, Laserscope®, San Jose, CA). The potassium-titanyl-phosphate (KTP) laser emits visible green light at a wavelength of 532 nm, which is strongly absorbed by haemoglobin (chromophore) but almost not at all by water. Hence the green laser light gets strongly absorbed within a very superficial layer of tissue by virtue of the fact that blood vessels and haemoglobin contained therein serve as primary absorbers [1]. Heat generated by absorption of the KTP laser energy leads to formation of vapour bubbles inside the targeted tissue. Continued exposure of the targeted area to KTP laser energy leads to progressive vaporization of the newly exposed deeper layers of tissue, accompanied by release of more vapour bubbles and tissue fragments (Fig. 1). These events are the hallmarks of efficient removal of tissue [1].

2.3. Surgical technique

Vaporization was carried out with a 600 μm side firing laser fiber (ADDStat™) inserted into a special 26 or 22.5 French laser 30-degree cystoscope. The fiber emits a divergent beam with an opening angle of 15 degrees under 70 degrees to the side. Energy is applied using a non-contact technique. In order to stabilize the laser

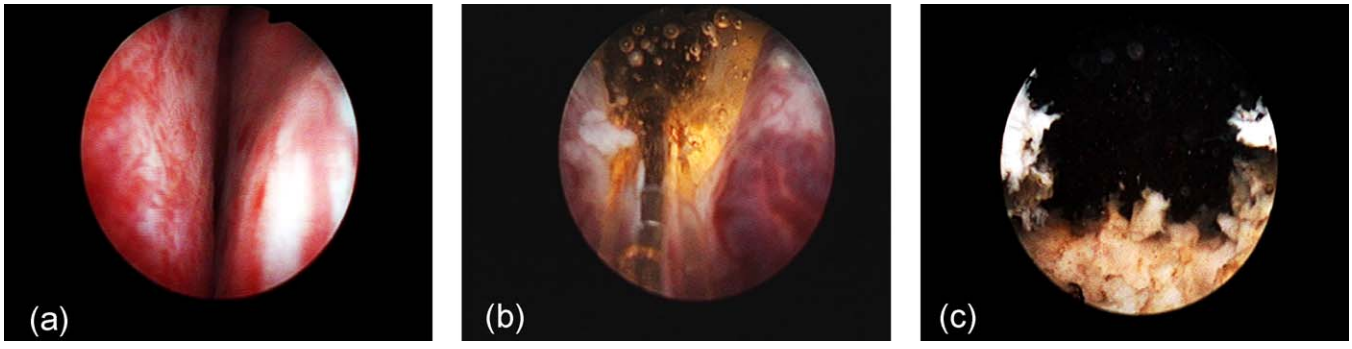

Fig. 1. Photoselective laser vaporization of the prostate (PVP) in a patient with a prostate volume of approximately 50 ml. (a): Preoperative intraoperative situs with obstructing prostatic lobes. (b): The laser fiber (ADDStat™) is introduced via a 22.5 French laser cystoscope. Once the laser starts, continuous bubble formation (as seen in the picture) reflects an optimized vaporization effect. Prostatic tissue is immediately removed by vaporization. (c): The end point of the tissue-ablative procedure is a clearly deobstructed TURP-like prostatic fossa that is lined with ''coral-like'' stromal residues (operating time 40 min).