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No Bladder Irrigation v/s Continuous Bladder Irrigation After HoLEP: Analysis Showing Which is Better

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ABSTRACT
In this study, we tried to check the feasibility of not giving bladder irrigation strategy after transurethral holmium laser enucleation of the prostate (HoLEP) for the treatment of benign prostatic hyperplasia (BPH). From January 2019 to January 2020, the clinical data of 40 patients who received no bladder irrigation after HoLEP (Group A) was studied. The control group contained the clinical data of 60 patients in the same therapy group (from January 2019 to January 2020) who received continuous bladder irrigation after HoLEP (Group B). The baseline was consistent after applying Individual matching method and the differences between groups were compared. The End points of the study were Pre-and Postoperative complications, international prostate symptom score (IPSS), quality oflife (QOL), Maximum urinary flow rate (Qmax) and Postvoid residual urine (PVR) of the two groups were compared, accompanied by a follow-up evaluation of surgical effects. Thirty two pairs of patients were successfully matched by Individual matching technique. There was no statistically significant difference in the intraoperative conditions and the incidence of early postoperative complications between the two groups ($p>0.05$). Before and one month after the surgery, significant differences were also found in the IPSS, QOL, Qmax, and PVR of both groups ($p<0.05$). Within one month after the surgery, no statistically significant difference was found in IPSS,QOL, Qmax, PVR, or the incidence of early postoperative complications between the two groups ($p>0.05$). For appropriately selected patients according to the exclusion criteria, the no bladder irrigation strategy after HoLEP for BPH is safe and effective.

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Key Words
No bladder irrigation strategy, Benign prostatic hyperplasia, holmium laser, enucleation of the prostate, Surgery

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INTRODUCTION

Benign prostatic hyperplasia (BPH) has long been recognized as a common disease affecting elderly individuals and their health in old age[1]. BPH development leads to blockage of the bladder outlet which may deteriorate bladder functioning, resulting in urine retention sometimes, repeated haematuria, bladder stones formation, recurrent urinary tract infections, hydronephrosis of the upper urinary tract and renal insufficiency. Transurethral surgery is the most commonly performed procedure for BPH surgery, including transurethral resection of the prostate (TURP) by monopolar and bipolar technique, by LASER technique such as holmium laser enucleation of the prostate (HoLEP), thulium laser enucleation of the prostate(ThuLEP) and green light laser vapourization of the prostate (photoselective vapourization of the prostate [PVP])[2]. The TURP technique has several drawbacks, e.g., incomplete excision of the prostate tissue, TUR syndrome (mainly in monopolar),excessive bleeding and limited prostate volume[3]. In contrast, the HoLEP technique has become one of the most effective alternatives to BPH surgery because of the shorter catheterization and hospital stay, effective haemostasis, and fewer complications[4-6]. Related research has shown that HoLEP is superior to conventional transurethral prostate enucleation techniques[5,7]. HoLEP is now thought to have the best chance of becoming the gold standard for the treatment of BPH[8].

Postoperative bleeding is the most significant complication independent of mode of surgery like open surgery, TURP or HoLEP procedure. The main strategy to overcome postoperative bleeding is continuous bladder irrigation to avoiding formation of clots that can block the urinary catheter. At the same time the urinary catheter can be pulled and the untreated blood vessel haemorrhage can be squeezed using the urine catheter balloon. With the development of minimally invasive surgery the blood loss associated with HoLEP surgery has been decreasing and the prostatic fossa wound may be bloodless after HoLEP surgery. Related studies have also shown that the time required after bladder irrigation is decreasing, and in some cases, daytime surgery has been implemented for BPH surgery[9-12]. Therefore, the time of continuous bladder irrigation postoperative has been decreasing and it may not be considered an essential step after HoLEP for BPH surgery.

In this study, a no-bladder irrigation strategy after HoLEP for BPH surgery was studied based on a database containing the clinical data of patients who received no bladder irrigation after HoLEP for BPH surgery (January 2019 to January 2020) in a Tertiary care hospital. This study provides a good insight of the no bladder irrigation strategy after HoLEP, which can influence its application in prostate-related minimally invasive surgery.

MATERIALS AND METHODS

Patients: From January 2019 to January 2020, 140 patients received HoLEP for BPH surgery. Based on the exclusion criteria, 40 patients who received no bladder irrigation after the surgery were chosen as the research group (Group A) and 60 patients received HoLEP and continuous bladder irrigation after the surgery were chosen after applying exclusion criteria as the control group (Group B). We performed Individual Matching for a total of 32 pairs that were successfully matched after reducing the effect of potential confounders such as age, disease duration, and prostate volume between groups. Indications for surgery were based on AUA guidelines. All patients gave written and informed consent to participate.

Exclusion criteria: For two groups of patients included the following:

- Patients with severe organ dysfunction, such as cardiovascular or cerebrovascular disease
- Patients with a history of malignant tumours on prostate biopsy before the surgery
- Patients who previously had received TURP or Transurethral Enucleation of the prostate
- Patients whose prostate volume was more than 100 mL

Equipment and techniques: The 96 W Ho laser generator, with a 550 µm fibre and a 26 Fr resectoscope sheath, was used during the HoLEP surgery. The energy settings were set as 2J, 40 Hz for cutting and 0.8 J, 40 Hz for coagulation.The majority of patients received en bloc HoLEP surgery. After surgery careful coagulation was performed at the prostatic fossa to stop the bleeding. A 20-Fr three-way catheter with 20 mL saline was used to block the bladder neck area. Postoperatively, no bladder irrigation was applied in Group A and continuous saline bladder irrigation was applied in Group B. All operations were performed by the same surgeon.

End point indicators: The preoperative baseline data, surgery time, haemoglobin decline, capsule perforation, catheterization time and hospital stay of the patients were compared between the two groups. Within one month after the surgery, urine retention, gross haematuria, haemorrhage, urinary tract infection and other complications of the patients between the two groups were monitored. One month and six months after the surgery, different parameters, including IPSS, QOL, Qmax and PVR, were compared between the two groups.

Statistical analysis: Before matching, for the data with a normal distribution, independent sample t tests were used, and for the data with an abnormal distribution, Mann Whitney U-tests were used. Chi-square tests were used to compare the categorical variables. Matching was done by Individual Matching Technique and 32 pairs were formed with similar preop data. After matching, normally distributed variable data was analyzed with paired sample t-test. For a non-normally distributed variable data, Wilcoxon Mann Whitney tests were used, and categorical variable data was analyzed with the McNemar test. $p<0.05$ was considered statistically significant. All of the experimental data are displayed as the average value ± standard deviation.

RESULTS

After matching for a total of 32 pairs further results were analyzed.

Preoperative baseline characteristics: such as age, disease duration, anticoagulants, alpha blockers, urogenital complications, prostate volume, PSA, IPSS, QoL, Qmax and PVR were not statistically significant between the two groups ($p>0.05$, Table 1). There was no significant difference in operative time, resected prostate weight or haemoglobin decrease between the two groups ($p>0.05$). There were statistically significant differences in main 4 End point Indicators post-surgery namely IPSS, QoL, Qmax and PVR between the two groups. One patient in Group A and two patients in Group B underwent prostate capsule puncture during surgery but no visible bleeding occurred, and no additional treatment needed to be provided. The differences in catheterization time and hospital stay between the two groups were not statistically significant ($p>0.05$).

Key for tables:

- Normally distributed variable data analyzed with paired-sample t test
- Non normally distributed variable data analyzed with Wilcoxon-Mann-Whitney test
- Categorical variable data analyzed with McNemar test

Within one month: After the surgery, there were no statistically significant differences in early postoperative complications, such as urine retention, gross haematuria, haemorrhage, urinary tract infection between the two groups ($p>0.05$, Table 2).

Before and one month after: The surgery, there were statistically significant differences in IPSS, QoL, Qmax, and PVR in the two groups ($p<0.05$, Table 3).

At one month and six months After the surgery, there were no statistically significant differences in IPSS, QoL, Qmax, or PVR between the two groups ($p>0.05$, Table 4).

DISCUSSIONS

This study compared intra operative conditions, early postoperative complications, and follow-up data in patients who received no bladder irrigation after HoLEP with continuous bladder irrigation. Two groups had similar findings in terms of intraoperative conditions and early postoperative complications.

Meanwhile, the discomfort symptoms of patients during continuous bladder irrigation can also be significantly alleviated. Finally, there were no statistically significant differences in follow-up data 1 month and 6 months after surgery. This indicates that the two groups have similar long-term treatment effects.

The duration of continuous bladder irrigation after HoLEP varies, with the shortest bladder irrigation time being only 2 hrs[13,14]. There were also reports of nobladder irrigation after surgery for the treatment of benign prostatic hyperplasia[15]. In our study, we propose that the strategy of no bladder irrigation after HoLEP is feasible, which simplifies the postoperative treatment steps. After endoscopic enucleation of theprostate, bladder irrigation is used to prevent blood clots from obstructing the urinary catheter but has little haemostatic effect.

The theoretical basis of no bladder irrigation after enucleation of the prostate are:

- There is a clear gap between the mature prostatic adenoma and the prostate capsule, and the crawling blood vessels of theprostate capsule are visible superficially, which facilitates precise haemostasis[16]
- There is no residual gland tissue following enucleation, which results in a smoother surgical wound and less bleeding
- A holmium laser can achieve point-to-point haemostasis
- The fossa iscontracted when the bladder is empty, which facilitates precise haemostasis
- Urine has a procoagulant effect and it comes into direct contact with the surgical wound in the prostatic fossa, promoting haemostasis[17]

This study discusses the strategy of no bladder irrigation after transurethral holmium laser prostate enucleation, which is an optimization of the transurethral holmium laser prostate enucleation surgical method. We compared continuous bladder irrigation after HoLEP with postoperative no bladder irrigation and the two groups of patients were

Table 1: Baseline Criteria of two groups after matching of 32 patients

Criteria	Group A	Group B	p-value
Age (year)[a]	65±7.3	68±5.8	0.2059
Disease duration (year)[b]	4.5±2.1	4.1±1.6	0.506
Alpha blockers c	17	19	0.8923
Anticoagulantsc	8	5	0.6578
ARI use (alone/combination)[c]	17	20	0.6987
Urological complications			
AUR[c]	9	10	0.621
Gross hematuriac	10	9	0.9070
Bladder stonesc	4	5	0.698
Prostate volume (mL)[b]	64.2±15.2	68.1±12.3	0.2441
IPSS b	23.9±4.5	22.1±4.9	0.6383
QoLb	4.5±0.9	5.1±0.7	0.1673
PSA (ng mL^{-1})[b]	2.8±1.9	2.5±2.2	0.0002
PVR (mL)[b]	129±90.8	127±93.6	0.3668
Qmax(mL sec^{-1})[b]	6.3±2.1	6.2±1.9	0.5807

Table 2 : Intraoperative conditions and early postoperative complications

	Group A	Group B	p-value
Operative time (min)[a]	68.3±10.3	62.5±14.3	0.07242
Resected prostate weight (mL)[b]	53.1±15.3	50.2±10.9	0.06353
Hb decrease (g dL)[a]	9.3±6.1	10.5±5.9	0.8539
Capsular perforations	1	2	1.000
Catheterization time(d)[b]	2.1±0.4	2.5±0.9	0.298
Hospital stay (d)[b]	3.9±0.3	4.6±0.7	0.193
Post op haemturia (%)[c]	5	8	0.6903
Haemorrhage (%)c	1	2	1.000
Urinary retention (%)[c]	2	5	1.000
UTI (%)[c]	2	6	0.7280

Table 3 : IPSS, QoL, Qmax, PVR in two groups preoperative and 1 month after surgery

Group A	Preop	Post op	p-value
IPSS[a]	23.9±4.5	8.9±3.4	<0.001
QoL[a]	4.5±0.9	1.7±0.8	<0.001
PVR (mL)[a]	129±90.8	9.6±4.9	<0.001
Q max (mL s^{-1})[a]	6.3±2.1	17.3±3.6	<0.001
Group B			
IPSS[a]	22.1±4.9	9.2 ±2.9	<0.001
QoL[a]	5.1 ±0.7	2.1±1.1	< 0.001
PVR (mL)[a]	127±93.6	9.3±2.8	<0.001
Q max (mL s^{-1})[a]	6.2±1.9	16.4±2.8	<0.001

Table 4 : Follow up Data 1 month and 6 months after surgery in two groups

1 month after surgery	Group A	Group B	p-value
IPSS[b]	8.9±3.4	9.2±2.9	0.3807
QoL[b]	1.7±0.8	2.1±1.1	0.6109
PVR (mL)[b]	9.6±4.9	9.3±2.8	0.256
Qmax (mL s^{-1})[b]	17.3±3.6	16.4±2.8	0.3673
6 months after surgery			
IPSS[b]	7.9±3.2	8.9±3.1	0.8608
QoL[b]	1.2±0.7	1.6±0.7	0.520
PVR (mL)[b]	5.8±2.4	8.7±2.1	0.4615
Qmax (mL s^{-1})[b]	19.1±2.9	18.2±2.1	0.7711

considered equal in terms of functional outcomes. Within one month following surgery, there was nostatistically significant difference in early postoperative complications between the two groups, such as urine retention, gross haematuria, haemorrhage, urinary tract infection. Before and one month after surgery, there were significant differences in IPSS, QoL, Qmax and PVR in both groups. This is consistent with prior research results[18,19]. At one month and six months following surgery, there was no statistically significant difference in IPSS, QoL, Qmax, or PVR between the two groups. This finding is also understandable because no bladder irrigation following HoLEP eliminates only one aspect of postoperative management.

Both groups of patients essentially had identical surgical procedures. With the development of minimally invasive technology and the progress of medical devices the strategy of no bladder irrigation after HoLEP will become a trend and this concept will also be accepted by more and more urologists. No bladder irrigation strategy combined with day-case HoLEP will further simplify treatment steps and reduce the catheterization time.

CONCLUSION

The no bladder irrigation strategy after HoLEP is an improvement on the conventional surgical procedures for the treatment of BPH, which is safe and effective for appropriately selected patients according to the exclusion criteria.

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