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Is an adjustment by transurethral surgery simultaneously needed during the suprapubic open prostatectomy?

Yu Seob Shin [a], Li Tao Zhang [a], Chen Zhao [b], Jae Hyung You [a], Jong Kwan Park [a,*]

[a] Department of Urology, Chonbuk National University Medical School, and Research Institute of Clinical Medicine of Chonbuk National University-Biomedical Research Institute and Clinical Trial Center of Medical Device of Chonbuk National University Hospital, Jeonju, Republic of Korea
[b] Department of Urology, Renji Hospital, Shanghai Jiao Tong University School of Medicine, and Shanghai Institute of Andrology, Shanghai, China

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ABSTRACT

Purpose*:* To compare suprapubic open prostatectomy (SOP) and a novel SOP with transurethral adjustment of residual adenoma and bleeding (TURARAB) for large sized prostates.
Methods*:* Between March 2010 and March 2014, 49 patients with symptomatic BPH (>100 g) were scheduled for SOP or SOP with TURARAB. The patients were subdivided into two groups. In Group I, each patient underwent SOP. In Group II, each patient underwent SOP with TURARAB. Additional transurethral resection of residual adenoma and bleeding control were done through the urethra after enucleation of the prostate adenoma by SOP. Prior to intervention, all patients were analyzed by preoperative complete blood count, blood chemistry, prostate specific antigen, International Prostate Symptom Scores, and transrectal ultrasound of the prostate and uroflowmetry. SOP was performed by a suprapubic transvesical approach via a midline incision. The bladder neck mucosa was circularly incised to expose the prostate adenoma, and the plane between the adenoma and surgical capsule was developed by finger dissection. In addition, in Group II TURARAB was performed using Urosol. Postoperative outcome data were compared in the 1st month and 3rd month.
Results*:* There were no statistically significant differences in baseline characteristics between the two groups. Group I required a longer operative time than Group II. Blood transfusion during the operation was unnecessary due to the short amount of time available to control arterial bleeding in the prostatic fossa leading to a marked decrease in perioperative bleeding in Group II. Postoperative voiding function improved significantly in both groups.
Conclusions*:* Even for large prostate glands, our novel procedure appears to be an effective and safe operation to reduce operation time, bleeding, and complications.

1. Introduction

Of all modalities for the treatment of bladder outlet obstruction (BOO) caused by benign prostatic hyperplasia (BPH), open prostatectomy (OP) provides the highest probability of symptomatic improvement and the lowest failure rate.[1] It is the true gold standard of BPH surgery with respect to outcome and durability. However, open surgery also has the highest perioperative morbidity. The 2003 American Urological Association guideline on the management of BPH reports a blood transfusion rate as high as 27%.[2]

The disadvantages of OP include the need for long operating times and hospitalization. There may also be an increased potential for perioperative hemorrhage.

To reduce these disadvantages of OP and trim the remnant tissue after OP, we designed a novel suprapubic open prostatectomy (SOP) with transurethral adjustment of residual adenoma and bleeding (TURARAB) for larger sized prostates.

2. Methods

2.1. Patients

Between March 2010 and April 2012, 29 patients with symptomatic BPH (>100 g) were scheduled for SOP, and 20 patients with symptomatic BPH (>100 g) were scheduled for SOP with TURARAB

* Corresponding author. Department of Urology, Chonbuk National University Hospital, 20, Geonji-ro, Deokjin-gu, Jeonju, Republic of Korea.
E-mail address: rain@chonbuk.ac.kr (J.K. Park).

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between June 2012 and March 2014. Exclusion criteria included previous transurethral surgery and conventional contraindications to OP or prostate cancer on biopsy. All patients gave their informed consent to the procedure. Prior to intervention, all patients were analyzed using preoperative complete blood count, blood chemistry, International Prostate Symptom Scores (IPSS), transrectal ultrasound of the prostate and maximum urinary flow rate (Qmax), postvoid residual urine (PVRU) volume, digital rectal examination, prostate specific antigen (PSA) measurement, and saturation (18 cores) TRUS-guided prostate biopsy if PSA was high (>4 ng/mL). Postoperative outcome data were compared in the 1st month and 3rd month. All complications were recorded.

The patients were randomly subdivided into two groups. In Group I, each patient underwent SOP. In Group II, each patient underwent SOP with TURARAB.

2.2. Surgical technique

The procedure was performed under general anesthesia with the patient in a low lithotomy position. A lower midline incision was made from the umbilicus to the pubic symphysis. Vertical cystotomy was performed using electrocautery. With the use of electrocautery, cystotomy was extended cephalad and caudally to within 1 cm of the prostate-vesical junction. A “figure-of-eight” suture using a 2-0 Vicryl suture (ETHICON, Edinburgh, UK) was placed and tied at the most caudal position of the cystostomy to prevent further extension of the cystostomy incision. The bladder neck and prostate gland were well visualized. After marking the prostate, electrocautery created a circular incision in the mucosa of the prostate-vesical junction distal to the trigone starting from the posterior portion of the bladder neck to anterior portion. The plane between the prostatic adenoma and prostatic capsule was developed by index finger dissection. Prostatic adenoma, either as one unit or separate lobes, was removed from the prostatic fossa.

In Group I, hemostatic techniques in the prostatic fossa were performed.[3] Briefly, discrete bleeding sites were controlled with electrocautery or 4-0 chromic suture (ETHICON, Edinburgh, UK) ligatures. In addition, a 0-chromic suture was used to place two “figure-of-eight” shaped sutures to advance the bladder mucosa into the prostatic fossa at the 5-o'clock and 7 o'clock positions at the prostate-vesical junction to ensure control of the main arterial supply to the prostate.

In Group II, four stitches at the 12 o'clock, 3 o'clock, 6 o'clock, and 9 o'clock positions by 2-0 Vicryl sutures (ETHICON, Edinburgh, UK) were used to mark the limitation between the bladder neck and prostatic fossa on TURRABC. To perform transurethral surgery for the residual adenoma and remnant fibrotic tissue (Fig. 1) and the severe bleeding points (Fig. 2), the cystostomy site was clamped with several Babcock clampers to prevent a leak of irrigation fluid from the cystostomy site. Any leakage of irrigation fluid was removed by suction tube. After transurethral surgery, the prostatic fossa and external sphincter were evaluated (Fig. 3). The cystotomy incision and skin were closed.

2.3. Statistical analysis

Baseline characteristics, perioperative data, Qmax, and PVRU of the two groups were compared by Mann–Whitney *U* test. A *P* value = 0.05 was considered significant. Operation time was measured from skin incision to skin closure.

3. Results

3.1. Baseline characteristics

There were no statistically significant differences in baseline characteristics between the two groups (Table 1).

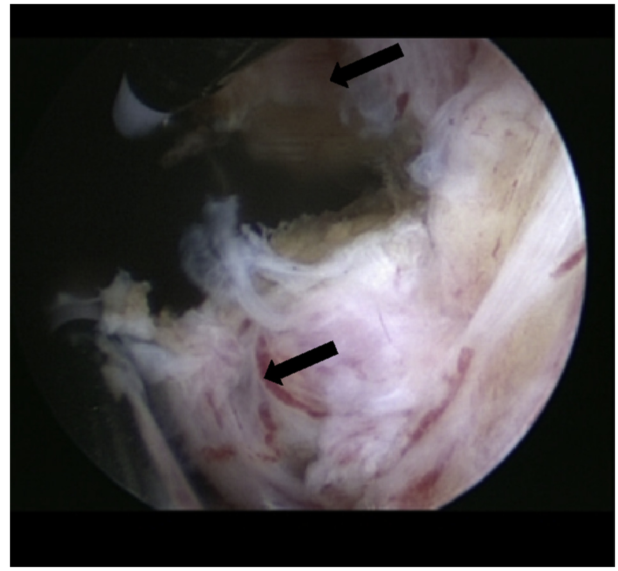

Fig. 1. Perioperative endoscopic view of remnant adenomas (solid arrows).

3.2. Perioperative results

There was a marked decrease in operation time and perioperative bleeding in Group II compared with Group I (Table 1). Blood transfusion during the operation was not needed in Group II due to the easy control of arterial bleeding sites under the transurethral procedure. In Group II, the mean time for TURARAB was 23.5 min.

3.3. Outcome of voiding functions

Postoperative voiding function was improved significantly in all groups (Table 2).

3.4. Complications

In Group I, blood transfusions were given to five patients due to severe bleeding. Three patients received recatheterisation due to clot retention. Wound dehiscence was seen in four patients. In

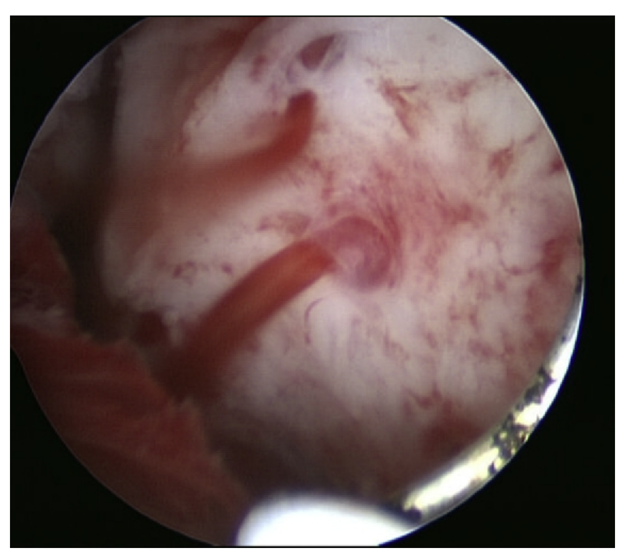

Fig. 2. Perioperative endoscopic view of arterial bleeding in the prostatic fossa after open suprapubic prostatectomy.

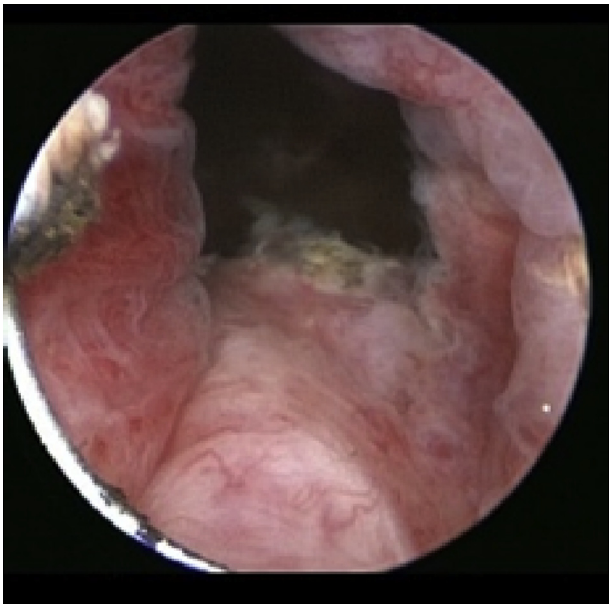

Fig. 3. Perioperative endoscopic view of apical prostatic urethra after removal and trim of remnant adenoma by transurethral resection and cauterization.

Group II, no patient required transfusion and recatheterization. Wound dehiscence was present in one patient.

4. Discussion

Even though the mortality of OP has decreased to a minimum,[3,4] mainly owing to the advent of better preoperative evaluation and anesthesia, with the therapeutic results obtained being excellent, OP has been displaced by transurethral resection of the prostate (TURP), mainly because of its invasiveness. However, despite considerable blood loss and a prolonged recovery, OP has been the traditional treatment of choice for extremely large prostates, over 100 g.[5] In TURP, a larger prostate requires more resection time and has been associated with increased blood loss. Enucleating a large prostate can be much faster than removing it transurethrally. Compared with TURP, OP offers the advantages of lower retreatment rate and a more complete removal of the prostatic adenoma under direct vision. However, basic OP requires ligations of both the prostatic branch of the internal common iliac artery at the prostatevesical junction and the intraprostatic capsular arterial braches. The

Table 1
Preoperative and perioperative characteristics of the groups.

	Group I ($n = 29$)[a)]	Group II ($n = 20$)[b)]	*P*
Age (y)	73.1 ± 5.2	72.1 ± 4.2	0.359
Total prostate volume (cc)	128.6 ± 17.4	125.1 ± 11.8	0.645
Preoperative IPSS	20.1 ± 5.0	19.2 ± 3.7	0.724
Preoperative PSA	14.9 ± 7.2	13.5 ± 6.7	0.154
Preoperative Qmax (mL/s)	7.5 ± 3.2	6.1 ± 2.2	0.635
Preoperative PVR volume	251 ± 90.9	245 ± 120.6	0.823
Resected tissue (mL)	85.2 ± 12.7	83.5 ± 23.5	0.072
Operative time (min)	123.1 ± 24.5	95.7 ± 14.9	0.015
Hospitalization (d)	12.1 ± 2.4	7.2 ± 1.2	0.032
Intraoperative transfusion rate (%)	12.5	0	0.020
Intraoperative loss of Hb (gm/dL)	3.3 ± 1.2	2.1 ± 0.9	0.043

IPSS, International Prostate Symptom Score; PSA, prostate specific antigen; PVR, postvoid residual urine; Qmax, maximum urinary flow rate.
a) Group I, suprapubic open prostatectomy.
b) Group II, suprapubic prostatectomy followed by transurethral adjustment of residual adenoma and bleeding.

Table 2
Improvement of voiding function of the groups.

	Preoperative	Postoperative		*P*
		(Mo 1)	(Mo 3)	
Group I[a)]				
Qmax	7.5 ± 3.5	23.1 ± 7.5	24.3 ± 3.7	<0.001
PVRU volume	251 ± 90.9	50.2 ± 25.6	20.4 ± 12.6	<0.001
IPSS	20.1 ± 5.0	14.3 ± 4.5	13.2 ± 3.4	0.037
Group II[b)]				
Qmax	6.1 ± 2.2	23.8 ± 12.7	25.3 ± 9.5	<0.001
PVRU volume	245 ± 120.6	32.6 ± 13.4	21.2 ± 12.3	<0.001
IPSS	19.2 ± 3.7	15.6 ± 5.2	11.5 ± 3.3	0.021

IPSS, International Prostate Symptom Score; PVRU, postvoid residual urine; Qmax, maximum urinary flow rate.
a) Group I, suprapubic open prostatectomy.
b) Group II, suprapubic prostatectomy followed by transurethral adjustment of residual adenoma and bleeding.

ligations of intraprostatic capsular branches were very difficult and time consuming procedures because massive bleeding interrupts the process of finding the bleeding points. This is the main cause of blood loss and sometimes necessitates a blood transfusion. In addition, when excessive bleeding persists after traction of the ballooned urethral catheter, a cystoscopic inspection and fulguration of the prostatic fossa and bladder neck, or open reexploration should be considered.

Since 1994, holmium laser enucleation of the prostate (HoLEP) has been available for large prostates, but it is not easy to learn, requires morcellation, requires a prolonged operation time, and requires an expensive laser machine.[6,7] Compared with HoLEP, SOP with TURARAB also has an advantage of a reduced operating time. Moody and Lingeman[8] reported their HoLEP experience. Mean preoperative prostate volume exceeded 100 g, and the operation time was 197 min. Morcellation consisted of approximately onethird of the total operating time (average 56/173 total operative minutes). Compared with our data, SOP with TURARAB has the advantage of a reduced operation time than HoLEP. Bipolar TURP has been recently introduced as a minimal invasive surgical method in the treatment of BPH. Coskuner et al.[9] reported their experience for large prostates (>100 g) with bipolar TURP. To the best of our knowledge, their study is known to be unprecedented for large prostates (>100 g) with bipolar TURP. Mean preoperative prostate volume exceeded 116 g, and the operation time was 102 min. Compared with our data, operation time had no big difference. However, perioperative blood transfusion rate was 8.6% in bipolar TURP. SOP with TURARAB has the advantage of reduced perioperative blood transfusion rate than bipolar TURP. SOP with TURARAB has an advantage of reduced operation time and bleeding for patients with large prostates. But, an incision scar on the lower abdomen is a disadvantage of our novel method compared with HoLEP or bipolar TURP.

With the threshold for transfusion being a hemoglobin value of 10 g/dL, a transfusion rate of 8.2% was reported in a large study from Italy.[10] In our study, in Group I, the transfusion rate was 12.5%. To reduce this kind of disadvantage of OP, we designed a novel SOP with TURARAB. After removal of the main adenoma, we converted the SOP to transurethral surgery. In this method, we were able to ascertain the exact sites of bleeding foci, remnant adenoma, and fibrotic tissue (Figs. 1 and 2). This reduced bleeding during the operation and perioperative hemorrhage, leading to a shortened operation time.

In the classic SOP, the prostatic fossa must be examined for discrete bleeding sites that can frequently be controlled with an electrocautery or 4-0 chromic suture ligatures. In addition, two "figure-of-eight" sutures of a 0-chromic are placed at the prostatovesical junction to prevent severe bleeding from the main arterial blood supplies after removing the prostate adenoma. SOP with TURARAB can save time in suturing bleeding sites. In our study, we appreciably reduced the time for bleeding control compared with SOP.

In addition, we were very surprised when we found many fibrotic tissues and remnant adenoma of the BPH at the enucleation site, especially the apical area of the prostatic fossa. TURARAB has advantages of being able to remove residual fibrotic tissue and remnant adenoma of BPH, to control severe bleeding and to create a good shape of the prostatic urethra (Fig. 3). In our study, improved voiding function was evident in both groups. But, long-term follow-up of these two groups may yield a different outcome.

To perform TURARAB, the cystostomy site was clamped with several Babcock clampers. The bladder was filled with Urosol, to provide a clear view of the prostatic urethra from the bladder neck. However, excessive pressure is exerted on the OP site of the prostatic urethra, which may cause transurethral resection syndrome. In our study, there was no case of transurethral resection syndrome because we used continuous irrigation during the operation.

In conclusion, even for large prostate glands, SOP with TURARAB appears to be an effective and safe operation to reduce operation time and bleeding for patients with large prostates who have to undergo OP rather than endoscopic surgery.

Conflict of interest

A grant was received from the Ministry of Health, Welfare, and Family Affairs, Korea. However, the Ministry of Health, Welfare, and Family Affairs, Korea only had a financial role in this research.

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