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Comparison of the Effectiveness and Safety of Transvesical Open Prostatectomy versus Transurethral Resection of the Prostate in Patients with Benign Prostatic Hyperplasia with a Prostate Weight of 40-65 Grams

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ABSTRACT

Purpose: The aim of this study was to evaluate the efficacy of transvesical open prostatectomy (OP) compared with transurethral resection of the prostate (TURP) in patients with benign prostate hyperplasia (BPH) with a prostate weight of 40-65 grams. The short-term and long-term complications of these two procedures were also assessed.

Materials and Methods: In this retrospective study, we included 160 consecutive patients with BPH who had undergone TURP (n=80) or OP surgery (n=80) from 2006 to 2017 in Tohid and Kowsar hospitals, Sanandaj, Iran. Inclusion criteria were positive history of BPH, definite indication for prostatectomy, and prostate weight between 40 to 65 grams. Patients were evaluated for duration of hospitalization, need for re-operation, short-term and long-term postoperative complications, urinary flow rate, peak flow rate (Q max) and international prostate symptom score (IPSS).

Results: The mean age ± Standard Deviation (SD) of patients was 62.4 ± 3.7 and 67.2 ± 4.6 years old in the TURP and OP groups, respectively. Four (5%) and seven (8.7%) patients required transfusion in the TURP group and OP groups, respectively. Dysuria was significantly more frequent in the TURP group from week two to 12 months after surgery as compared with the OP group ($P<.001$). Hemodynamic changes and decrease in serum sodium level were not reported in either group. However, the urinary retention and need for urinary catheterization in the first year was significantly different between the two groups with 10 cases (12.5%) in the TURP group and no cases in the OP group ($P<0.001$). The need for reoperation in the TURP group was reported (27 procedures on 19 patients) (33.7%) of patients. Furthermore, retrograde ejaculation (RE) was reported in 65 (81.2%) and 80 patients (100%) of the TURP and OP group, respectively.

Conclusion: Despite the fact that TURP is the standard method of treatment for BPH when the prostate weighs between 40-65 grams, the results of our study showed that OP is a more efficient and safe surgery for these patients and is associated with less complications. Furthermore, the need for re-operation seems to be higher in patients with TURP.

INTRODUCTION

Benign prostatic hyperplasia (BPH) is the most common benign tumor in men, leading to problems such as disturbance in the urinary flow. The best treatment modality for this disease depends on different factors such as severity of symptoms, size of the prostate and patient's general condition(1-3). These treatment modalities range from medical and pharmacological therapies to surgical procedures such as transurethral resection of the prostate (TURP), open prostatectomy (OP) or minimally invasive surgeries (1-3). TURP and OP and laser prostatectomy (HoLEP) is currently a standard treatment are three standard surgical procedures in patients with BPH (2, 4, 5).

For patients with BPH who have a prostate weight of less than 70-80 grams, TURP has been recommended as the standard method of treatment. For larger prostates or in the case of presence of large bladder stones, open prostatectomy has been suggested as the preferred method (6-8). However, there have been few studies directly comparing OP and TURP in a parallel study for prostate sizes of 40-65 grams (7, 9). Herein, we aim to compare the safety and efficiency of transvesical open prostatectomy versus TURP in patients with BPH and a prostate weight of 40-65 grams.

MATERIALS AND METHODS

Study design and participants

This was a retrospective study performed on 160 consecutive patients with BPH who had undergone TURP (n=80) or OP surgery (n=80) during 2006-2017 in Tohid and Kowsar hospitals, Sanandaj, Iran. Inclusion criteria were: confirmed presence of BPH, definite indication for prostatectomy, prostate weight between 40-65 grams, and consent to participate in the study. Indications for prostate surgery included recurrent urinary tract infection, persistant lower urinary

tract symptom despite medical treatment, increased creatinine and bilateral hydronephrosis that significant reduce following urinary catheterization, frequent urinary retention (need to evacuate and catheterize the patient after surgery for one year), and hematuria due to prostate enlargement despite receiving medical treatment. Criteria for being excluded from the study included: previous history of urinary tract surgery, prostate surgery or concurrent presence of bladder stones, patients with diabetes, patients with a history of discopathy and known cases of bladder neurogenesis.

Patients' data including age, prostate weight and volume, length of hospital stay, and need for re-operation was collected. The volume (cc) of the prostate was measured by ultrasound before surgery and the weight (gram) of the prostate was assessed post-surgery. Short-term post-operative complications such as fever, dysuria, requirement for blood transfusion, clot formation and need for catheter replacement within the first three days after surgery as well as long-term complications such as urinary retention, urinary incontinence, impotence, retrograde ejaculation (RE) and urinary catheterization within the first year after surgery were also investigated. Furthermore, patients' peak flow rate (Q max) and international prostate symptom score (IPSS) was assessed at different time points: before surgery until 12 months post-surgery.

Patients' medical history and physical examination (including digital rectal exam) was evaluated by the same urologist. Laboratory parameters including plasma creatinine (CR), blood urea nitrogen (BUN), complete blood count (CBC), serum sodium and potassium, urinary analysis (U/A), urinary culture (U/C), prostate-specific-antigen (PSA) were measured. In addition, renal, bladder and prostate transabdominal ultrasound were performed to determine prostate volume and size before surgery. On the day of surgery, cystoscopy was performed for all patients and the approximate size of the prostate was recorded. Foley catheter was removed in TURP group after lightening of urine color 3-5 days after surgery. In the OP group, Skin incision of 7-10 cm was

given, sutures was removed on the tenth day. No wound infection or dehiscence was seen in the suture line. The cystostomy was removed on day 2 or 3 after confirming the absence of clot and Foley catheter was removed on day 7-9 after surgery. In the TURP group, an average of 25 mg of pethidine was given (first day) to relieve pain, and in the OP group, 50 mg of pethidine was given to relieve the patients' pain (first day) and then oral acetaminophen 500 mg, 4 times a day for 7-10 days was administered similarly in both groups. Patients were followed up for at least one year **.** OP and TURP were performed by the same experienced urologist with more than 25 years of experience and history of performing more than 4000 TUR operations.

Ethical considerations

This study was approved by the ethics committee of Kurdistan University of Medical Sciences (IR.MUK.REC.1398.174).

Statistical analysis

Categorical variables are expressed as frequency (percentage) and continuous variables are reported as mean ± Standard Deviation (SD). T-test was used for comparison of continuous data and categorical was compared by using Chi-square test and Fisher exact test. All statistical analysis was performed by STATA software version 14. P-value <0.05 was considered as statistically significant.

RESULTS

The mean ±SD age of patients in the TURP and OP groups was 62.4 ±3.7 and 67.2 ±4.6 years old, respectively. The mean ±SD prostate weight in the TURP and OP groups was 46.6 ±5.7 and 45.3 ±4.5 grams, respectively and the mean prostate volume was 41.1 and 42.5 cc (respectively). The mean duration of hospitalization was 36.2 hours in the TURP and 73.1 hours in the OP group. There were no differences between the two groups in terms of postoperative complications

including: hemodynamic changes and decrease in serum sodium level was not reported in either group, fever, the need for transfusion was reported in four cases (5%) in the TURP group and seven cases (8.7%) who underwent open surgery. Dysuria was reported more frequently in the TURP group compared with the OP group from week two to 12 months post-surgery, showing a statistically significant difference between the two groups (Table 1). We observed six cases (7.5%) with clot retention and need for catheter replacement within the first three days after surgery in the TURP group while no cases developed this complication in the OP group.

Regarding long-term complications, the frequency of urinary retention and requirement for urinary catheterization within the first year was significantly different between the two groups with 10 cases (12.5%) in the TURP group and no cases in the OP group (P<.001). In the TURP group, 19 patients underwent reoperation in 27 procedures, including three patients with Meatal stenosis who underwent meatotomy. Nine patients were diagnosed with bulbar uretheral stenosis, for whom three patients underwent dilatation and internal uretherotomy once, and for six patients, for whom dilatation and internal uretherotomy were performed twice. Two patients had residual tissue in prostatic fossa who underwent Re-TUR in the fourth month. Five patients were diagnosed with bladder neck fibrosis. Two patients underwent TUIP, one patient underwent bladder neck dilatation once and two patients underwent bladder neck dilatation twice. Of note, no patients in the OP group required a second surgery. Urinary incontinence and impotence was not reported in any patients of both groups. RE was observed in 65 cases (81.2%) of the TURP group and 80 cases (100%) of the OP group. If the TURP group includes all patients, Q Max shows a significant difference with the open group in 1, 3, 6, 9 and 12 months (Table 1). However, if 19 patients in the TURP group who need reoperation are removed from this group, the rate of Q Max in the two groups is not significantly different (Table 2).

Based on the IPSS, a significant improvement in symptoms was seen after surgery in the OP group compared with the TURP group, (the TURP group includes all patients) (Table 1). However, if 19 patients in the TURP group who need reoperation are removed from this group, the rate of IPSS in the two groups is not significantly different (Table 2).

In order to relieve the pain at the incision site and the surgical site in the OP group, on the first day, pethidine injection of 25 mg more than the TURP group was required, and then oral acetaminophen 500 mg, 4 times a day for 7-10 days was administered similarly in both groups. At monthly follow-up of patients, no incision site pain was reported in patients. At monthly follow-up of patients, pain at the incision site was not reported in patients in the OP group.

DISCUSSION

TURP and OP are two accepted surgical procedures in patients with BPH (7). TURP is one of the most common methods, performed in 60 to 97% of cases with BPH (7, 10). Due to the high prevalence of benign prostatic hyperplasia and the importance of this issue, in this study, we aimed to investigate the efficacy and safety of these two surgical approaches in comparison with each other. The results of our study showed that the mean prostate weight and volume was not significantly different between the two groups who underwent TURP and OP. This finding was consistent with the results of a previous study conducted by Simforoosh et al. (7). In another study by Nnabugwu and colleagues, the prostate volume was significantly different between TURP and OP groups (11). In the present study, patients with similar prostate weight and volume were selected so that selection bias could be minimized.

In the present study, the duration of hospitalization in individuals with TURP and OP methods was 36.2 and 73.1 hours, respectively, which was comparable with the results of another study by Ou et al. (12). In a similar study by Kwon et al., the duration of hospitalization in patients who

underwent monopolar TURP, bipolar TURP and OP was 9.4, 6.3 and 12 days, respectively (1); however, in accordance with our study, the mean hospital stay in the OP group was higher than that of TURP group. However, in our opinion and in the opinion of our patients, 36 hours of longer hospitalization was not important for this age group under prostate surgery.

The results of the present study showed that the need for re-operation was significantly higher in the TURP group compared with patients who underwent open surgery that is consistent with the results of a study by Simforoosh et al. (7). Some studies have reported the rate of reoperation as less than 5% per year, depending on the duration of follow-up period and number study showed that the need for reoperation in the TURP group was higher than the open method and this difference was statistically significant. It was consistent with the results of a study by Simforoosh et al. (7). In some other studies, reoperation was reported to be less than 5% per year, which varied according to the patient's follow-up period and the number of recurrences (13, 14).

In this study, urinary incontinence and impotence was not reported in any patients of either groups at three months post-surgery but RE was higher in the OP group compared with the TURP group. Dysuria was a more frequent complaint in patients of the TURP group from week two to one-year post surgery; 27 cases (33.7%) of the TURP group versus one case (1.3%) in the OP group had dysuria at the first-year after surgery which was statistically significant. In line with this finding, in a study by Simforoosh et al.(7), a significant difference existed between the two groups, with 28% of cases suffering from dysuria in the OP group compared with 71% in the TURP group. Urinary incontinence was statistically significant, which is consistent with the results of the present study (7). In a study by Long et al., incontinence and urinary tract infection was more prevalent in patients with OP compared with transurethral plasmakinetic resection of the prostate (PKRP) while the need for catheterization method was more frequently reported in the PKRP group than the TVP

group. Based on the findings of this study, the main reason for temporary urinary incontinence may be related to local inflammation and edema, difficulties with the external sphincter mechanism, instability or decreased bladder adaptation or excessive stretching of the external sphincter (15). Urinary incontinence and other irritative symptoms have been reported in some other studies and in patients undergoing TURP surgery (16, 17). In general, irritative symptoms are a major problem after surgery of damaged tissues and these symptoms may become resistant to treatment (7). Recovery time and resolution of these symptoms depends on the type and duration of the operation and also patients' general condition and amount of compliance.

In our study, If the TURP group includes all patients, Q Max shows a significant difference with the open group in 1, 3, 6, 9 and 12 months. However, if 19 patients in the TURP group who need reoperation are removed from this group, the rate of Q Max in the two groups is not significantly different. In the study by Long and colleagues, it was shown that during the follow-up period, Q max improved in both of the study groups (PKRP and TVP) (15). Park argued that the reason for higher Q max in the OP method compared with TURP is that with complete removal of the adenoma, the proximal duct becomes wider and more symmetrical (18). Ou et al. demonstrated that at six and 12 months post-surgery, there was no significant difference between TURP and OP groups in terms of Q max rate (12). The results of these studies, in agreement with the results of our study.

In the present study, the need for transfusion in the OP group was slightly higher. In the study by Park, only 0.8% of patients in the TURP group required blood transfusions (18). In the study of Kwon et al., need for transfusion with monopolar TURP, bipolar TURP and OP was observed in 15.7%, zero and 33.3% of patients, respectively, showing a statistically significant difference (1). In the study of Kader et al., the need for transfusion in the TURP and Transurethral incision of the

prostate (TUIP) groups was 5% and 0%, respectively; however, this difference was not statistically significant (19).

In the present study, clot formation and catheter replacement within the first three days of surgery was more frequently observed in the TURP group in comparison with the OP group. Gupta et al reported this rate as 8% in patients who underwent TURP and 0% with open surgery (20). Simforoosh and colleagues found this rate to be 12% in the TURP group and 0% in the OP group (7). These reports are consistent with the results of our study.

Based on the IPSS, a significant improvement in symptoms was seen after surgery in the OP group compared with the TURP group, (the TURP group includes all patients). However, if 19 patients in the TURP group who need reoperation are removed from this group, the rate of IPSS in the two groups is not significantly different. Nnabugwu and colleagues showed no difference between TURP and OP at 12 months after surgery (11). In the study of Simforoosh et al., IPSS did not have a statistically significant difference between OP and TURP groups (7).

CONCLUSIONS

Although TURP is the standard method of treatment for BPH in patients with a prostate weight between 40-65 grams, the results of our study showed that OP is a safer and more effective method with less short-term and long-term complications compared with TURP. Furthermore, the need for re-operation seems to be significantly higher in patients with TURP. OP has an easy learning curve and does not require specialized equipment and apparatuses. Thus, we recommend open surgery as the preferred method for treatment of BPH in prostate weighing between 40-65 grams.

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CONFLICT ON INTEREST

The authors declare that there is no conflict of interest.

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Tables:

Table 1. Comparing operative and postoperative variables in OP and TURP patients.

Variable	TURP (N=80)	OP (N=80)	*P*- value
Age (year), Mean ± SD	62.4±3.7 (57-76)	67.2±4.6 (62-78)	<0.001
Body mass index (BMI)	23.7±3.2	24.1±3.7	.46
Prostate weight, Mean ± SD	46.6±5.7 (45-65)	45.3±4.8 (40-65)	.10
Prostate size, g, Mean ± SD	41.6±2.7 (30-65)	42.1±3.6 (40-65)	.32

Duration of Hospitalization (Hour)	36.2±2.8 (24-50)	73.1±2.6 (72-120)	<0.001
Cr	1.40±0.27 (1.2- 1.6)	1.38±0.33 (1.1-1.6)	.83
PSA	3.61±0.44 (3-4.2)	3.72±0.51 (3.1-4.3)	.14
Short Complications after surgery			
Postoperative fever, N (%)	52 (65)	47 (58.7)	.41
Blood transfusion	4 (5)	7 (8.7)	.25
Dysuria			
Week 2	27 (33.7)	3 (3.7)	<0.001
Week 4	26 (32.5)	4 (5)	<0.001
Week 8	24 (30)	3 (3.7)	<0.001
Month 3	26 (32.5)	5 (6.2)	<0.001
Month 4	22 (27.5)	3 (3.7)	<0.001
Month 5	21 (26.2)	2 (2.5)	<0.001
Month 6	22 (33.8)	2 (2.5)	<0.001
Month 12	27 (33.7)	1 (1.3)	<0.001
Clot retention and need for catheter replacement within the first three days after surgery	6 (7.5)	0 (0)	.01
hemodynamic changes and decrease in serum sodium level	0 (0)	0 (0)	-
Long-term complications after surgery			
Urinary retention and requirement for urinary catheterization (Year 1)	10 (12.5)	0 (0)	<0.01
Incontinence after 3 months	0 (0)	0 (0)	-
Impotence after 3 months	0 (0)	0 (0)	-
Retrograde ejaculation	65 (81.2)	80 (100)	<0.01
Re-operation (27 procedures on 19 patients)	27 (33.7)	0 (0)	<0.01
Peak flow rate (Q max), Mean ± SD (Range)			
Before	9.3±1.2 (8-11)	9.2±1.3 (8-11)	.61
After 1 month	14.1±1.6 (10-17)	14.3±1.5 (13-16)	.41
After 3 month	13.3±1.5 (11-15)	16.4±2.3 (15-18)	<0.001
After 6 month	13.3±2.2 (11-13)	17.2±2.4 (16-19)	<0.001
After 9 month	12.6±1.7 (11-13)	17.1±2.2 (16-19)	<0.001
After 12 month	13.4±2.2 (12-15)	17.3±1.6 (16-19)	<0.001
International prostate symptom score (IPSS)			
Before	28.4±3.2 (23-30)	29.2±3.1 (27-32)	.11
After 3 month	21.3±2.8 (19-23)	18.4±2.6 (16-20)	<0.001
After 6 month	21±3.1 (19-23)	17.5±2.4 (16-20)	<0.001
After 12 month	21.6±2.5 (18-23)	17.3±2.4 (16-20)	<0.001

Abbreviations: OP, open prostatectomy; TURP, transurethral resection of the prostate; SD, standard deviation; IPSS, International prostate symptom score

Table 2. Comparing Peak flow rate (Q max) and International prostate symptom score (IPSS) variables in OP and TURP group without Re-operation.

Variable	TURP (N=61)	OP (N=80)	*P*- value
Peak flow rate (Q max), Mean ± SD (Range)			
Before	9.1±1.3 (8-11)	9.2±1.3 (8-11)	0.61
After 1 month	14.2±1.5 (10-16)	14.3±1.5 (13-16)	0.99
After 3 month	16±1.6 (13-17)	16.4±2.3 (15-18)	0.25
After 6 month	16.7±2.2 (13-18)	17.2±2.4 (16-19)	0.48
After 9 month	16.7±1.9 (14-18)	17.1±2.2 (16-19)	0.23
After 12 month	17±2.4 (14-19)	17.3±1.6 (16-19)	0.14
International prostate symptom score (IPSS)			
Before	28.4±3.2 (23-30)	29.2±3.1 (27-32)	0.11
After 3 month	19.3±2.8 (17-22)	18.4±2.6 (16-20)	0.53
After 6 month	17.6±3.1 (15-19)	17.5±2.4 (16-20)	0.93
After 12 month	17.5±2.5 (15-19)	17.3±2.4 (16-20)	0.82

Abbreviations: OP, open prostatectomy; TURP, transurethral resection of the prostate; SD, standard deviation; IPSS, International prostate symptom score