

Surgical management of Benign Prostatic Hyperplasia: Transvesical prostatectomy versus Transurethral resection of prostate with a volume range of 70–100 gram

Dr. Adnan Mohammed Kanoos, Dr. Mohammed Elswalem
Misrata Medical Center (MMC), Libya
adnankanosk@gmail.com

Article information	Abstract
Key words Transvesical prostatectomy, monopolar transurethral resection Received: 10-9-2024 Accepted: 14-10-2024 Available: 28-01-2025	Objectives: This study aims to compare the short-term outcomes and complications of transvesical prostatectomy versus monopolar transurethral resection of the prostate between 70 and 100 grams. Methods and material: This is a retrospective descriptive study conducted from April 2017 to April 2021. A total of 59 patients were admitted and underwent transvesical prostatectomy (TVP) and transurethral resection of the prostate (TURP) at Misrata Medical Center (department of urology). Patients with prostatic volume between 70-100 g were included in this study, while patients with prostatic volume greater than 100 g or less than 70 g were excluded. Types of surgery (TVP and TURP), patient age, size of the prostate gland, duration of surgery (mins), blood transfusion, clot retention, length of catheterization (days), hospital stay (days), post-operative infection, incontinence, reoperation, bladder neck stenosis, and urethral stricture were analyzed. Results: 59 patients were studied. 29 cases had TVP, while 30 cases had TURP. The mean age for TVP was 73.8 years, while for TURP it was 78.5 years. The mean duration of catheterization for TVP vs. TURP was 9.1 vs. 3.3 days, respectively, and the mean hospital stay was 9.6 and 4.7 days for TVP and TURP, respectively, while the duration of surgery (mins) for TVP and TURP was 90.7 vs. 120.8 minutes, respectively. The blood transfusion rate for both groups was the same for each (6.9% for TVP and 6.7% for TURP). The clot retention was 6.9% in the TVP group and 13.8% in the TURP group. In the TURP group, the reoperation rate was 16.3% within six month , the urethral stricture rate was 3.3%, sexual abnormality 16,3% and bladed neck stenosis was 3.3%. Overall complications about TURP group happened within six month .Overall complication showed no statistical difference between the two groups. Conclusion :Transvesical prostatectomy is a safer option in larger prostates with fewer reoperation rates and urethral stricture and bladder neck stenosis and sexual abnormality in comparison with TURP. While TURP has a long hospital stay and a shorter post-operative catheterization time and post-operative incontinence in TURP groups. (Transvesical prostatectomy is safer and more effective in patients with prostate more than 70 g.)

I) Introduction

Benign prostatic hyperplasia (BPH) is a non-malignant enlargement of the prostate gland in elderly males. BPH is an enormously common condition in elderly males and may causes lower urinary tract symptoms(1, 2). These symptoms impair quality of life and can result in renal dysfunction. After the age of forty, the prevalence of benign prostatic hyperplasia (BPH) increased in men.

A) Clinical Presentation

- 1) Urinary frequency - The need to urinate frequently during the day or night (nocturia), usually voiding only small amounts of urine with each episode
- 2) Urinary urgency - The sudden, urgent need to urinate, owing to the sensation of imminent loss of urine without control
- 3) Hesitancy - Difficulty initiating the urinary stream; interrupted, weak stream
- 4) Incomplete bladder emptying - The feeling of persistent residual urine, regardless of the frequency of urination
- 5) Straining - The need strain or push (Valsalva maneuver) to initiate and maintain urination in order to more fully evacuate the bladder
- 6) Decreased force of stream - The subjective loss of force of the urinary stream over time
- 7) Dribbling - The loss of small amounts of urine due to a poor urinary stream

B) Medical management:

- 1) Medical management for symptom relief – Men with BPH can be treated with one or more classes of medications and, in general, should try medical treatment prior to considering surgical interventions. For most patients, monotherapy with an alpha-1 adrenergic antagonist is used as initial treatment. In patients who have concomitant erectile dysfunction, phosphodiesterase type 5 (PDE5) inhibitors are a reasonable alternative to alpha-1 adrenergic antagonists for initial medical therapy. While In patients with normal post-void residual urine volumes and irritative symptoms, anticholinergics or beta-3 agonists are a reasonable alternative to alpha-1 adrenergic antagonists for initial medical therapy.
- 2) Therapy to prevent progression – In men with demonstrated benign prostatic enlargement (BPE), 5-alpha reductase inhibitors (5ARIs) are used to reduce prostate volume, prevent BPH progression, and reduce the need for surgery. Treatment for 6 to 12 months is generally needed before prostate size is sufficiently reduced to improve symptoms. Finasteride and dutasteride appear to have similar efficacy and side effect profile.

For patients with low post-void residual urine volumes and irritative symptoms (eg, frequency, urgency) that persist after monotherapy with an alpha-1 adrenergic antagonist or anticholinergic agents, a combination of treatment with alpha-1 adrenergic antagonists and anticholinergic agents or beta-3 agonists should be used. We can also use a combination therapy with an alpha-adrenergic blocker and a steroid 5ARI in patients who have demonstrated prostate enlargement and moderate to severe symptoms of BPH.

C) Surgical management

In general, BPH should be treated medically first, and patients who have not responded to medical management, they should be considered for surgical therapy to relieve obstruction and improve symptoms and overall quality of life. Two tried-and-true surgical methods for BPH care are open prostatectomy and transurethral resection of the prostate (TURP)(9).

Only 3% of procedures for symptomatic BPH in the USA involved open prostatectomy, according to Bruskewitz R et al. although TURP is regarded as the reference standard surgical treatment for BPH. Open prostatectomy is still the cornerstone of surgical treatment in many impoverished countries, including Ethiopia(12). The oldest surgical treatment for BPH is an open prostatectomy, which entails the removal of the prostate adenoma through an open suprapubic, transvesical, or retropubic approach. TURP, which involves endoscopic removal of the prostate adenoma, was first recorded in 1932(9). It is now regarded as the gold standard treatment for BPH.

Recently, there has been an increase in the use of electrosurgical means in treating benign prostatic hyperplasia in our environment, especially transurethral resection of the prostate (TURP), a minimally invasive endourological procedure that employs a monopolar or bipolar current-based resection of the prostate(13, 14). Despite the growing trend in the use of electrosurgical means in the treatment of benign prostatic enlargement, the lack of equipment, power supply, and training has been a challenge in our environment(11, 15, 16). TURP is the gold standard treatment owing to its long-term efficacy for the prostate up to 70 g. and the treatment of choice amongst the majority of urologists.

D) Indications of surgical management

- (1) Lower urinary tract symptoms, the most common indication for surgical intervention is moderate-to-severe voiding symptoms attributed to BPH that are refractory to medical therapy.
- (2) Refractory urinary retention, BPH is a common cause of acute urinary retention (AUR) in older men. Catheterization is the initial treatment, but subsequent treatment varies. AUR triggered by medication, anesthesia, or acute bacterial prostatitis. An alpha blocker is commonly added to increase the chance of patients passing the voiding trial .
- (3) An elevated or increasing post-void residual urine volume (PVR). However, one should remember that there can be significant variability in PVR when assessed over time.
- (4) Recurrent urinary tract infection (UTI), Recurrent UTI attributed to BPH is considered a sign of progressed disease and a reasonable indication for surgical intervention .
- (5) Recurrent bladder stones, the findings of bladder calculi, bladder diverticula, and other signs of end-stage bladder decompensation are also possible indications for surgical intervention. While bladder calculi were a classical indication for surgical treatment of BPH in the past, the 2019 American Urological Association (AUA) guidelines recommended that any bladder calculi be removed and a trial of medical management be instituted before surgical intervention for BPH.
- (6) Recurrent gross hematuria – Recurrent and robust gross hematuria is an indication for treatment of the prostate once other causes (eg, infection, carcinoma, trauma) have been excluded.
- (7) Bilateral hydronephrosis with renal functional impairment – This presentation mandates relief of the bladder outlet obstruction in order to preserve the upper urinary tract and renal function.

E) Transurethral Resection of the Prostate (TURP)

Transurethral Resection of the Prostate (TURP) remains the benchmark by which all other surgical advancements are compared. As such, The Guidelines recommend offering patients TURP due to its continued efficacy and safety. In breaking down the role of TURP in the management of LUTS/BPH, The Guideline does not distinguish between the utilization of monopolar (mTURP) or bipolar (bTURP) technology, leaving the decision to the urologist. The bTURP platform has certainly become more refined and more widely available from multiple manufacturers in the endoscopic manufacturing sector. In five systematic reviews and meta-analyses of mTURP versus bTURP, there was no difference in efficacy; however, when comparing safety parameters, bTURP is superior. This includes shorter hospital stay, lower risk of blood transfusion, clot retention, and lower rates of TUR syndrome. A recent Cochrane review analyzing 59 randomized control trials of mTURP versus bTURP with 8924 participants, supported these conclusions(19, 20). With regard to sexual function and satisfaction, there is no clinically demonstrable difference between mTURP and bTURP. In the aforementioned Cochrane review, International Index of Erectile Dysfunction IIEF scores were similar between the two groups. In a more in-depth look a sexual function, El-Assmy et al. found no difference in erectile function, orgasmic function, sexual desire, intercourse satisfaction, or overall satisfaction. It is evident that bTURP is equivalent in terms of efficacy and far superior than mTURP in terms of safety. For the purpose of The Guideline, comparisons to mTURP were justified given that most comparisons were related to efficacy standards. This most appropriately relates to TUR syndrome, which is unique to mTURP. However, as MIST technology advances, and urologists lean more heavily on outpatient- and office-based procedures for the management of smaller gland sizes (< 80 g), TURP will likely become a procedure utilized for larger glands. Inherently, this will lead to longer resection times and place patients at increased risk of adverse events, further validating that a surgical transition to bTURP is justified.(21, 22)

F) Transvesical Prostatectomy

An alternative management option for BPH includes simple prostatectomy. Comparison to TURP demonstrates similar efficacy and safety profile as pointed out by The Guideline analysis of four Randomized Clinical Trials, though data suggests lower reoperative rate for those undergoing simple prostatectomy. Since the last rendition of The Guideline in 2010, a major development has been the evolution of technique for simple prostatectomy, with more widespread utilization of robotic assistance.

Overall, minimally invasive simple prostatectomy (laparoscopic and robotic technique) shows no difference in I-PSS, max flow rates, and post void residual volume with less blood loss, risk of transfusion, shorter hospital stay, and lower complication rate compared to open simple prostatectomy. Minimally invasive simple prostatectomy was associated with a longer operative time. Direct comparison between robotic and open simple prostatectomy afford similar efficacy with improved safety considerations showing that robotic simple prostatectomy has a shorter length of hospital stay and reduced blood loss, though a longer operative time. Comparison of minimally invasive approaches have not shown a difference between laparoscopic and robotic technique, as it pertains to efficacy or safety, suggesting that utilization of either approach should be based on surgeon preference or availability of equipment.

As far as sexual outcomes are concerned, none of the Randomized Clinical Trials from The Guideline reported sexual function outcomes for simple prostatectomy compared to TURP. One trial comparing laparoscopic simple prostatectomy to TURP describes 36 cases of retrograde ejaculation following the procedures. It is likely that sexual outcomes of open prostatectomy are similar to that of enucleation and TURP with resultant ejaculatory dysfunction. Moreover, there is a renewed effort to alter simple prostatectomy techniques that might preserve ejaculatory function.

G) Choice of surgical operation

Most surgical procedures for BPH are performed via the urethra using a specialized cystoscope. The exceptions are simple prostatectomy and prostatic artery embolization (experimental technique). The prostatic tissue can be removed, destroyed, or compressed using a variety of energy sources, including electrocautery (diathermy), lasers, convective steam, capsular anchored compression, high-pressure saline, and microwave. The choice of available procedures should be based on the size and shape of the prostate gland, the patient's bleeding risk, presentation (concurrent stones, symptom severity), and his attitude toward potential sexual side effects. Equally important is the treating urologic surgeon's experience and preference. All patients should be provided with the risk/benefit profile of all treatment options to allow them to make informed decisions regarding their treatment plans. When certain treatment modalities are not available, clinicians should engage in a shared decision-making approach to reach a treatment choice, which may necessitate a referral to another clinician for the chosen treatment. Additionally, all patients should be informed of possible treatment failure and the need for retreatment (medical, minimally invasive, or surgical), the rate of which generally correlates with the duration and completeness of follow-up .

- 1) Prostate size — The size and shape (ie, middle lobe present) of the prostate gland limits the applicability of some procedures. As examples, minimally invasive surgical treatments (MISTs), such as water vapor thermal therapy (WVTT) and prostatic urethral lift (PUL), can only be applied to prostates between 30 and 80 grams; larger prostates are better treated with simple prostatectomy or laser enucleation. The 2021 American Urological Association (AUA) guidelines provide a reasonable algorithm to select surgical therapy based on the volume and shape of the prostate. Since digital rectal examination is unreliable in estimating prostate size and serum prostate-specific antigen (PSA) only provides a rough estimate of the prostate size, current guidelines recommend using preoperative prostate imaging to accurately assess the size and shape of the prostate and direct intervention .
- 2) Bleeding risk — For patients who are at a high risk of bleeding, such as those taking anticoagulation or antiplatelet medications, holmium laser enucleation of the prostate (HoLEP), thulium laser enucleation of the prostate (ThuLEP), and photoselective vaporization of the prostate (PVP) are preferred because they are associated with lower risk of bleeding/transfusion and can even be performed without interrupting the anticoagulation/antiplatelet therapy in some patients .
- 3) Sexual side effects — surgical treatment of BPH has been known to cause ejaculatory dysfunction and worsen erectile function in some patients. Thus, eligible patients who desire to preserve erectile and ejaculatory functions and do not mind the potential need for retreatment may be offered PUL or WVTT as data indicate greater preservation of sexual function with those two procedures. Regardless of the chosen procedure, however, all patients should be counselled about the potential for sexual side effects.

H) Complications of Transurethral Resection of Prostate (TURP)

Following TURP, complications may include bleeding, ejaculatory issues and urine issues. Hemorrhage, urinary extravasation, and related urinoma are postoperative complications that can occur after suprapubic and retropubic prostatectomy. When prophylactic antibiotics are used, infectious processes including cystitis and epididymal orchitis may also develop, but infrequently.(23)

Stress urine incontinence and complete urinary incontinence are uncommon following these procedures since there is little possibility of damaging the external urinary sphincter. Following suprapubic prostatectomy, 2%–3% of patients have been found to also suffer concurrent erectile dysfunction and bladder neck contracture(24). Postoperative urge incontinence may last for weeks or months, depending on the severity of the preoperative urge incontinence. Retrograde

ejaculation is a frequent side effect of surgery that has been documented in up to 80%–90% of patients

- 1) Bladder tamponade Recurrent or persistent bleeding sometimes results in clot formations and a bladder tamponade that require evacuation or even reintervention (1.3–5%). Arterial bleeders can usually be identified by intermittent change of colour in the irrigation outflow from clear to red (cloudy red spots), whereas venous bleeders result in a dark red continuous irrigation fluid .
- 2) Infection The infection rate is usually low, however, in the French multicentric study the incidence of post-TURP infection was 21.6%, including a 2.3% rate of septic shock.
- 3) Urinary retention - (3–9%) is mainly attributed to primary detrusor failure rather than to incomplete resection. Unless TRUS shows significant tissue (ventile effects), TURP should be postponed until the fossa heals. RU may persist above 100 cc for a significant amount of time without presenting a problem to the patient, particularly in cases of previous detrusor decompensation.
- 4) Incontinence Early incontinence may occur in up to 30–40% of patients; however, late iatrogenic stress incontinence occurs in less than 0.5% of patients.
- 5) Urethral stricture the rate of urethral stricture varies from 2.2% to 9.8% in the literature; there is no relationship to time periods. There are two main reasons related to location.
- 6) Bladder neck stenosis the incidence varies from 0.3% to 9.2%, usually after smaller glands (<30g) are treated. Therefore, the indication for TURP in cases of smaller glands should be taken very seriously according to the criteria mentioned earlier. A prophylactic bladder neck incision at the end of the procedure may reduce the incidence. Treatment includes electrical, or preferably, laser incision of the bladder neck .
- 7) Retrograde ejaculation might be avoided if the tissue around the verumontanum is spared during resection.
- 8) Erectile dysfunction Theoretically, HF-generated current close to the capsule may damage the neurovascular bundles. The rate of impotence varies from 3.4 to 32% in the literature [2,3]. However, there are also reports of improved erections after TURP.[52]
- 9) Recurrent BPH The retreatment rate of TURP is lower than the rates of other alternatives such as TUMT and TUNA (3–14.5% after five years). Reasons for Re-TURP include insufficient resection and the natural course of the disease.

I) Complications of Transvesical Prostatectomy (TVP)

Postoperative complications include hemorrhage, urinary extravasation, and associated urinoma. Infectious processes, including cystitis and epididymo-orchitis, may also occur, but only rarely when prophylactic antibiotics are administered.

Because the risk of injury to the external urinary sphincter is minimal with these procedures, stress urinary incontinence and total urinary incontinence are rare.

Coincident erectile dysfunction and bladder neck contracture have been reported postoperatively in approximately 2%–3% of patients following suprapubic prostatectomy. Depending on the degree of preoperative urge incontinence, postoperative urge incontinence may be present for weeks or months. Retrograde ejaculation has been reported in up to 80%–90% of patients after surgery and is a common phenomenon after these procedures(25).

Finally, as with any substantial pelvic surgery, there is also a risk of nonurological complications such as deep vein thrombosis, pulmonary embolism, myocardial infarction, and cerebral vascular accidents. The incidence of these complications, however, is low and reflects the co morbidities of the patient population being treated. This study aims to compare the preoperative, short-term outcomes, and complications of open prostatectomy and transurethral resection of the prostate.

II) Methods and Materials

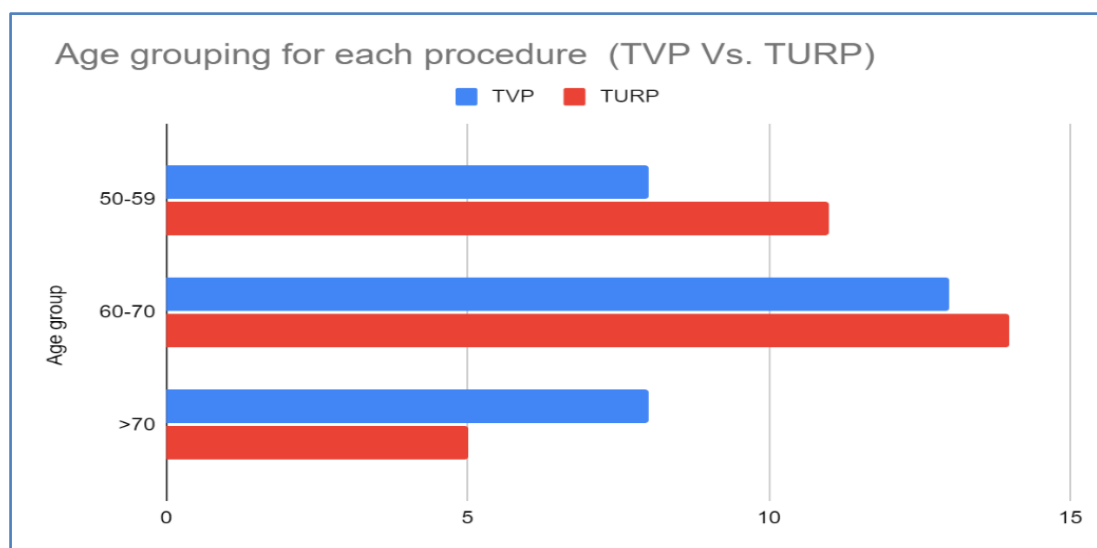
- A) Study design:** A retrospective descriptive study, conducted in the department of urology at Misrata Medical Center.

B) Study population: Patients with benign prostatic hyperplasia (BPH) who underwent prostatectomy (TVP or TURP) for the prostate gland between 70-100gms from April 2017 to April 2021

III) Data collection: The medical records of 59 patients were obtained from the patient registry archives of Misurata Medical Center. The records of the patients who were followed up for six month after prostatectomy were retrieved and recorded in a proforma. Patients with incomplete records or those lost to follow-up were excluded. Patient evaluation included history, physical examination, and abdominal ultrasonography to assess the kidneys, ureters, and urinary bladder and determine the prostate size and other changes in the urinary tract. The patient's age, size of the prostate gland (grams), duration of surgery (mins), blood transfusion, clot formation, length of catheterization (silicon catheter) in days, hospital stay (days), postoperative infection, post-operative incontinence, reoperation, bladder neck stenosis, and urethral stricture were analyzed.

IV) Results

A total of 59 patients who had prostatectomy were studied. 29 patients underwent transvesical prostatectomy (TVP), while 30 patients had transurethral resection of the prostate (TURP). 2 patients were found to have prostate cancer after histopathology and were sent directly to the oncology center. The mean age of patients who underwent TVP and TURP was 73.8 (SD7.2) years and 78.5 (SD8.0) years, respectively. (Graph 1) shows the age grouping for the patients. The mean prostatic size (grams) for transvesical prostatectomy was 65.6 (SD20.0) ($p = 0.019$), while for transurethral resection of the prostate, it was 59.7 (SD19.7) ($P = 0.239$).



Graph 1: Age grouping for each group.

In patients who had transvesical prostatectomy, blood transfusion was required in two patients (6.9%), equal to the patients in the TURP group (6.7%), and there was no post-operative incontinence in both TVP and TURP.

Table 1: TVP Vs. TURP Short term outcomes

Variables	TVP (mean_+SD)	TURP(mean+_SD)	P- value
Length of catheterization(days)	9.1(3.7)	3.3(1.0)	0.001
Hospital stays(days)	9.6(4.1)	4.7(2.2)	0.001
Duration of surgery(minute)	90.7(15.3)	120.8(14.0)	0.001

The post-operative irrigation time and duration of admission were comparable between the two groups. In the TURP group, the reoperation rate was in two patient (16.3%), bladder neck stenosis was in one patient (3.3%), and urethral stricture was also seen in one patient (3.3%), sexual abnormality seen in two patient (16.3%) whereas none were recorded in the TVP groups. The overall complication rate for open prostatectomy was 13.8%, while for TURP, it was 30% ($P = 0.462$)

V) Discussion

Benign prostatic hyperplasia is a very common urinary tract condition seen in elderly males over 50 years of age. Transurethral resection of the prostate and transvesical prostatectomy (TVP) are two accepted surgical procedures for patients with BPH. Transvesical prostatectomy is still considered the only surgical option for completely relieving prostatic obstruction caused by prostatic enlargement (26, 27). Though many newer interventions are available and practiced, the management of large prostates associated with other pathologies requiring open intervention, such as multiple bladder stones and transvesical prostatectomy, is the treatment of choice (28). Transurethral resection of the prostate is also the most commonly used management option for relieving the obstruction, with an almost 60% to 97% prevalence of prostatic surgeries.

At present, newer methods such as laser vaporization technology and holmium laser enucleation of the prostate seem to be more promising with lesser morbidity and equivalent success as TVP or TURP (20, 29, 30). But the main drawback of laser technology is its higher cost. Transurethral resection of the prostate is the treatment of choice of the majority of urologists for prostate sizes less than 70 gm (26); however, there was notable complications above 11.1% as observed in a multicentre study that included 10,654 men. The average age in our study was found to be 73.8 and 78.5 years in the TVP and TURP groups, respectively.

Benign prostatic hyperplasia obstructs the flow of urine, causing symptoms of acute or chronic retention and LUTS. Even in our study, 50 cases complained of urinary retention, while 9 patients had symptoms of LUTS before surgery. The most common complication post-TURP, in general, was an infection, urethral stricture, bladder neck stenosis, painful or difficult urination, retrograde ejaculation, and reoperation, but in transvesical prostatectomy, the immediate complication was intra-operative bleeding followed by wound infection, urinary tract infection, clot retention, epididymal-orchitis, and incontinence. In this study, the overall complication rate for TVP was 13.8%, while for TURP, it was 30% ($P=0.462$). Immediate postoperative complications were observed in two patients in the TVP group (clot retention in two patients was 6.9%) and also in four patients in the TURP group (clot retention in four patients was 13.8%). The blood transfusion requirement during surgery serves as a surrogate for intraoperative blood loss. Transvesical prostatectomy is perceived to be associated with significant blood losses and allogeneic blood transfusion (16). In the TURP group, the reoperation rate was 16.3% within six month, while none was recorded in the TVP group.. A large-scale, contemporary, nationwide analysis confirmed the higher reoperation rate after TURP compared to open prostatectomy (16). This is not unexpected, as the higher reoperation rate in TURP could be attributed to an average resected prostatic tissue weight of 25.8g, which is 54% of gland volume (31). Urethral stricture occurred in 3.3% of the TURP group, while none occurred in the transvesical prostatectomy group (32). The rate of urethral stricture varies from 2.2% to 9.8% in the literature for TURP (17), which is similar to the finding in this study. Other studies have noted the occurrence of urethral stricture in both groups of patients, though injuries to the urethra were considerably less frequent with transvesical prostatectomy. Instrumentation, urethral injury, and inadequate lubrication may account for the higher incidence of urethral stricture in TURP.

Our study shows no post-operative incontinence in both groups. Other studies have noted post-operative incontinence while performing TVP (18, 33). Damage to the external sphincter is the most frequent cause of post-operative incontinence following TVP. Invariably, endoscopic procedures are

associated with a short hospital stay. The median hospital stay in this study was shorter for patients who had TURP (4.7 days) than for patients who had TVP (9.6 days), with $p = 0.001$. It is a known possibility that extended hospital stay is associated with complications: nosocomial infection, deep vein thrombosis, adverse drug reaction, and need for social care, as well as the economic implication of prolonged hospital stay(34). The mean time of catheterization for TVP (9.1 days) compared to TURP (3.3 days) was longer in this study ($p = 0.001$), and the mean duration of surgery for OP (90.7 minutes) was lower than TURP (120.8 minutes). Although TVP seems more invasive due to the low midline incision, on the other hand, the following advantages should also be considered: it can simultaneously deal with bladder stone or bladder diverticulum; it's much safer in patients with other co-morbid cardiopulmonary conditions; it's less complicated in intrinsically narrow urethra; it has a lesser incidence of stricture urethra; it can be performed for glands larger than 70 g; it can be performed in patients who cannot attain lithotomy position; there is no TURP syndrome and complete enucleation, therefore fewer chances of reoperation.

VI) Conclusion

- 1) Open prostatectomy is a safer option in larger prostates with fewer reoperation rates and urethral stricture and bladder neck stenosis and sexual abnormality and lower duration of surgery in comparison with TURP.
- 2) TURP has a shorter hospital stay and a shorter post-operative catheterization time.
- 3) There is no post-operative incontinence in both groups.
- 4) The first option of choice for management of prostate size more than 70gram is open prostatectomy.

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