New Modification of Transurethral Incision of the Prostate in Surgical Treatment of Bladder Outlet Obstruction: Prospective Study

Boris Ružić, Davor Trnski, Ognjen Kraus, Igor Tomašković, Tomislav Sorić, Goran Štimac, Alek Popović, Zaim Čustović

Department of Urology, Sisters of Mercy University Hospital, Zagreb, Croatia

Aim. To analyze long-term effects of “short and shallow” incision of the prostate, a new modification of transurethral incision of the prostate (TUIP), as a method of resolving bladder outlet obstruction and preserving anterograde ejaculation and potency.

Method. Fifty patients with symptoms of bladder outlet obstruction caused by a small benign prostate tumor of ≤30 g estimated weight were included in a nonrandomized, prospective study and underwent transurethral incision of the prostate. In the patients with normal sexual activity (n=28), “short and shallow” incisions were made, limited to the prostatic urethra and reaching to the fibrous capsule. In sexually inactive men (n=22), “longer and deeper” incisions were made, extending from below the urethral orifice upward to the verumontanum and in depth to the perivesical and periprostatic fat. All incisions were made at “5 and 7 o’clock.” Preoperative and postoperative evaluations performed 1, 3, 6, 12, 18, 24, 30, 36, 40, 48, 54, 60, 66, and 72 months after surgery were based on the International Prostate Symptom Scores (I-PSS), uroflowmetry, patients’ overall assessment of surgery outcome, and a sexual function questionnaire.

Results. Median follow-up was 42 months (6-72 months). There was a significant improvement in urinary peak flow rates and I-PSS decreased significantly during the follow-up period in both groups (p<0.05). Surgery outcome was rated satisfactory by all patients, with no difference between the groups. All 28 patients sexually active before the surgery retained their sexual activity after surgery; only one developed retrograde ejaculation. Two patients, one from each group, underwent further urologic treatment (transurethral resection of the prostate) 36 and 42 months after transurethral incision of the prostate, respectively.

Conclusion. Transurethral “short and shallow” incision at “5 and 7 o’clock” is an effective method for long-term relief of bladder outlet obstruction in patients with small, benign prostate tumor. It has equally good long-term outcome as the classic “long and deep” transurethral incision but with fewer complications. None of the patients operated by this new method had lost potency and only a single one developed retrograde ejaculation.

Key words: prostate; prostatic hyperplasia; transurethral resection of prostate

Benign prostate hyperplasia is a chronic, progressive disease related to age. Autopsy studies revealed that the percentage of benign prostate hyperplasia increases from 20% in men aged 41-50 to 50% in men aged 51-60, and to over 90% in men aged over 80 (1-3). Although not all men with this condition have symptoms, 25% of men aged 55 and 50% aged 75 report obstructive voiding symptoms (4). Patients with severe symptoms of prostatism or complications of benign prostate hyperplasia require surgical treatment (5-7). The gold standard for the treatment of benign prostate hyperplasia is transurethral resection of the prostate. However, despite its supremacy, it leaves 3-35% preoperatively sexually active men impotent, 50-95% develop retrograde ejaculation after the surgery, 1% become incontinent, and 20-25% are not satisfied with the effect of operation (6,8,9). On the other hand, transurethral incision of the prostate seems appropriate surgical technique for treatment of patients with severe symptoms of prostatism and small prostates (10). It has become a good alternative to transurethral resection of the prostate, only with a lower rate of complications in well-selected patients. In a study, 82% of patients were satisfied with the effect of transurethral incision of the prostate after 4 years of follow-up (12), and in another study 80% felt the same way 6 years from the treatment (25). Transurethral incision of the prostate became the method of choice in patients with benign prostate hyperplasia, especially in younger, sexually active ones, with the prostate weighing ≤30 g. But even after transurethral incision of the prostate, stud-
ies reported up to 6% incidence of impotency and 7-35% incidence of retrograde ejaculation (10-28). Most studies with longer follow-up reported about traditional "deep and long incisions," where the incision extended from distal to urethral orifice outward to verumontanum and deep into periprostatic and perivesical fat (18,19,21,23,25-28).

In our study, we applied a new method, "short and shallow" incisions, first suggested by Orandi (17) in 1990 to diminish the incidence of retrograde ejaculation and erectile dysfunction. At the same time, we wanted to assess if the new variant of transurethral prostate incision was as good in resolving urinary obstructive problems as the traditional one. We analyzed longer term effects of this method with respect to total obstructive and irritative symptoms expressed as International Prostate Symptom Score (I-PSS), maximum urine flow rate (Qmax), patients' satisfaction, postoperative complications, and need for re-operation.

**Patients and Methods**

**Study Population**

From 1994 to 1998, several hundreds of patients with symptoms of bladder outlet obstruction caused by small prostates of estimated weight of ≤30 g were admitted to the Department of Urology, Sisters of Mercy University Hospital, Zagreb, as candidates for surgical treatment. Out of those patients, we randomly selected 50 for transurethral incision of the prostate, and divided them into two groups according to their sexual activity ("active" and "not active"). The groups underwent different types of transurethral incision of the prostate. The median age of the patients was 67 years (range 48-84 years) and median postoperative follow-up in the 1994-2000 period was 42 months (range 6-72 months). The median age of sexually active patients was 60 years (range 48-73 years), and median age of sexually inactive patients was 71 years (range 65-84 years). Out of 50 patients who underwent transurethral incision of the prostate, 4 patients were lost to follow-up for unknown reasons (all 4 were followed up less than 2 years). During the follow-up period, 2 patients died from unrelated diseases, and 2 underwent additional surgical procedure on the prostate. They were excluded from the study.

**Inclusion and Exclusion Criteria**

Patients with symptoms of bladder outlet obstruction were included in the study if they had 1) small prostates found on digital rectal examination; 2) prostate specific antigen (PSA) < 4 ng/mL; 3) prostate mass ≤30 g (based on digital rectal examination, ultrasound, and cystoscopy); 4) maximum uroflow (Qmax) ≤15 mL/s; 5) I-PSS ≤20; and 5) postvoid residual urine volume < 300 mL.

Exclusion criteria were the following: 1) abnormal clinical or laboratory findings; 2) prostate weight >30 g, and prostatic urethra longer than 3 cm (verified on cystoscopy); 3) hematouria or urinary tract infection; 4) complete urinary retention; 5) urethral stricture; and 6) previous prostate operation, prostate cancer, neurologic or psychiatric disease, or urinary catheter due to acute urinary retention.

**Preoperative and Postoperative Assessment**

We planned preoperative and postoperative assessments of the following parameters: 1) symptom intensity changes based on I-PSS; 2) maximum urine flow rate (Qmax); 3) patients' overall assessment of surgery outcome; and 4) sexual function.

Informed consent was obtained from each patient participating in the study.

I-PSS was used for the assessment of symptom intensity of benign prostate hyperplasia. Patients were asked to answer 7 questions regarding voiding frequency, hesitancy, straining, sensation of incomplete bladder emptying, interrupted stream, nocturia, and weak stream. The severity of the symptoms was quantified on a 0-5 scale. The total score ranged from 0 (no symptoms) to 35 (severe symptoms).

Maximum urine flow rate was measured by uroflowmeter (Type 2118.13 Richard Wolf GmbH D-7134, Knittlingen, Germany). All patients included in the study had preoperative maximum urine flow rate ≤15 mL/s after voiding at least 200 mL of urine.

Patients were also asked to assess the effect of transurethral incision of the prostate by rating the degree of improvement on a 0-100% scale (0% = no improvement, and 100% = the most desirable outcome).

Sexual function interviews were conducted with the emphasis on potency and ejaculatory ability before and after transurethral incision of the prostate.

**Treatment Interventions**

Knowing that traditional transurethral incision of the prostate could bring up to 6% impotency (22) and up to 35% of retrograde ejaculation (25), we made "short and shallow" incisions of prostates in all preoperatively sexually active patients (n = 28), as a new sparing variant of transurethral incision of the prostate limited to the prostatic urethra and extending up to the fibrous capsule. Preoperatively sexually inactive (n = 22) patients underwent traditional "long and deep" incisions extending from below the urethral orifice down to verumontanum and deep to perivesical and periprostatic fat.

After the insertion of a resectoscope through the urethra into the urinary bladder, both ureteral orifices and verumontanum were visualized. Incisions were performed at "5 and 7 o'clock" loci with a Colling's knife.

Long and deep incision was first made at 7 o'clock, beginning 1 cm below the ureteral orifice, and extending down the bladder's neck, up to the site few millimeters proximal and lateral to the verumontanum of the prostate, and to the perivesical and periprostatic fat in depth. The same procedure was repeated at 5 o'clock.

Short and shallow incisions were also performed at 5 and 7 o'clock, but they were begun few millimeters below the bladder's neck and extended upward few millimeters proximal and lateral of the verumontanum, going in depth to the prostatic capsule but leaving it intact.

**Statistics**

The results were presented as median and range or mean±standard deviation. Frequency tables were used for qualitative data descriptions. Mann-Whitney test was used for comparison of two groups (sexually active and inactive men) because most variables did not follow normal distribution. Quantitative analysis was made with chi-square test, and data were analyzed with Friedman's test. For all statistical analyses, p<0.05 was taken as significant.

**Results**

I-PSS significantly decreased after operation in both groups of patients (Fig.1, p<0.05 for both groups). In the first month of follow-up, I-PSS decreased from mean 24.4±3.3 to mean 9.3±3.4 in sexually active patients, and from mean 25.5±4.3 to mean 7.1±3.6 in sexually inactive patients. Total I-PSS remained low during the whole follow-up period (Fig. 1).

Mean maximum urine flow rate improved from 7.8±3.2 mL/s to 17.7±6.4 mL/s in the group of sexually active men and from 6.4±2.8 to 16.8±5.4 mL/s in the group of sexually inactive men. At 6, 12, and 18 month of follow-up, mean and median maximum urine flow rate was significantly better (p = 0.016, 0.026, and 0.035 respectively) in the group of sexually inactive than sexually active patients (Fig. 2).

The mean degree of satisfaction with surgery results in the group of sexually inactive patients was
At 1 month of follow-up and 94.6% after 3 months of follow-up. For sexually active patients, the mean degree of satisfaction was 62.5% in the first month, and 88.9% in the third month of follow-up (Fig. 3).

Figure 1. International Prostate Symptom Scores (I-PSS, mean±SD) preoperatively and at each follow-up interval for the sexually active (squares) and sexually inactive patients (triangles). Significant differences in total scores between the groups were seen 1 and 12 months postoperatively. Asterisk indicates p<0.05. Compared to baseline, the total scores were lower at all follow-up visits in both groups.

Figure 2. Mean peak flow rates (mean±SD) preoperatively and at each follow-up interval for the sexually active (squares) and sexually inactive patients (triangles). Significant differences in peak flow rates between the groups were seen 6, 12, and 18 months postoperatively. Asterisks indicate p<0.05.

Figure 3. Overall subjective assessment of surgical outcome and corresponding standard deviation of mean at each follow-up interval in two subgroups. Squares – sexually active patients; triangles – sexually inactive patients. Significant differences were observed 1 and 3 months of follow-up. Asterisks indicate p<0.05.

74.1±22.2% after 1 month of follow-up and 94.6±8.6% after 3 months of follow-up. For sexually active patients, the mean degree of satisfaction was 62.5±16.3% in the first month, and 88.9±10.3% in the third month of follow-up (Fig. 3).

All 28 preoperatively sexually active patients retained potency and 27 of them retained anterograde ejaculation.

All patients in the group of sexually active men were operated on under spinal anesthesia. The median time of hospitalization was 3 days (range 2-3), the median length of surgical procedure was 14 min (range 10-15), and the urinary catheter was removed after median 2 days (range 1-2). Early complications included uroinfection in one patient, hematuria in 2 patients, and both complications in one patient. None of the patients in this group needed blood transfusion.

In the group of sexually inactive men, 4 high-risk patients were operated on under local anesthesia. The median time of hospitalization was 4 days (range 3-5), the median length of surgical procedure was 20 min (range 15-45), and urinary catheter was removed after median 2 days (range 1-4). Early complications included transfusion in one patient, urinary tract infection in 3 patients, and hematuria in one patient.

None of the operated patients developed transurethral resection syndrome. Significantly shorter length of hospitalization, length of surgery procedure, and postoperative catheterization were found in sexually active patients who underwent “short and shallow” incisions (p<0.05). There was no significant difference in early complications between the groups.

Late complications, such as urethral stricture, incontinence, and contracture of bladder’s neck were not observed.

One sexually active patient underwent additional transurethral resection of the prostate 36 months after the first surgery because of complete urine retention. One sexually inactive patient underwent additional transurethral resection of the prostate after 42 months of follow-up because of gross hematuria from prostatic urethra.

Discussion

We showed that new “short and shallow” incision of small prostates (<30 g) brought 75% improvement in the total symptom score in comparison with initial value. Urodynamic parameter, maximum urinary flow (Qmax), was significantly better after surgery and remained stable during the 42-month follow-up period. Even after 42 months, patients assessed their condition 70% better than before surgery. All the patients treated with new method remained potent and only one developed retrograde ejaculation.

This study had some limitations and biases. First, there was a significant difference in age between the two groups (active and inactive patients) caused by the criteria for patient allocation. However, we think that age had no crucial impact since we found no difference between the groups when we compared them preoperatively with respect to the parameters of obstructive uropathy. Patients from both groups were assigned to undergo surgery not because of their age but because of their obstructive disease. Obstructive uropathy is more common in elderly men, but since it
has to be treated, the patient’s age is irrelevant. The assessment of the severity of obstructive disease and need for operation was based on parameters such as I-PSS and maximum urinary flow rate rather than the age of the patient.

The second limitation of the study was the classification of patients according to their sexual activity into preoperatively sexually active or inactive. Such classification did not allow us to compare two different surgical methods with respect to the impact on sexual activity (antegrade ejaculation and potency). The reason for this decision was strictly ethical. Studies have shown that retrograde ejaculation can be expected in up to 35% of the patients after transurethral incision of the prostate (25), with up to 6% remaining impotent (22). This was the reason why we could not assign any of sexually active men to undergo the procedure that could harm their potency or antegrade ejaculation. Future research is needed for these biases to be resolved.

The value of our study lies in the long follow-up (42 months). Furthermore, the study showed that the new variant of transurethral incision of the prostate is equally good in resolving bladder outlet obstruction as traditional one, and better in preserving antegrade ejaculation and potency. We analyzed parameters such as I-PSS and prostate specific antigen (PSA), which were not used routinely in other similar studies at the time (e.g., some studies used Madsen-Iversen questionnaire instead of I-PSS) (17,19). The “PSA era” allowed us to monitor eventual appearance of prostate cancer since transurethral incision of the prostate does not provide tissue for histological examination. In our study, we determined prostate specific antigen (PSA) in all patients. All of them had PSA concentration less than 4.0 ng/mL (normal range 0-4 ng/mL) and negative digital rectal examination. During the follow-up of 42 months, prostate specific antigen value did not exceed the limit of 4.0 ng/mL in any of the patients. Two of our patients who underwent transurethral resection after transurethral incision of the prostate did not have histological signs of cancer.

In conclusion, we recommend “short and shallow” transurethral incisions of the prostate for treatment of bladder outlet obstruction caused by prostates weighting ≤30 g since this method showed equally good long-term results as traditional one, but with fewer complications.

References
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Correspondence to:
Boris Ružić
Department of Urology
Sisters of Mercy University Hospital
Vinogradska 29
10000 Zagreb, Croatia
boris.ruzic@zg.tel.hr