ORIGINAL ARTICLE

Comparison of early and late results of open and laparoscopic retropubic prostatectomy in surgical treatment of benign prostatic hyperplasia

Valentyn R. Taheiev, Volodymyr O. Shaprynskyi, Victor Horovy, Roman Moraru-Burlesku, Oleh Kapshuk, Ruslan Tserkovnyuk

VINNYTSIA NATIONAL MEDICAL UNIVERSITY NAMED AFTER M. I. PIROGOV, VINNYTSIA, UKRAINE

ABSTRACT

Aim: To compare and evaluate the early and late results of open and laparoscopic retropubic prostatectomy in the surgical treatment of large benign prostatic hyperplasia (more than 80 ml).

Materials and Methods: There were 50 one-stage laparoscopic extraperitoneal retropubic prostatectomies and 120 one-stage open retropubic prostatectomies performed in patients with benign prostatic hyperplasia in the urology department of the Vinnytsia Regional Hospital named after M. I. Pirogov in the period from 2021 to 2023. Indications for surgery in patients were: acute (including repeated) retention of urine; pronounced symptoms of the disease due to the lack of effect from conservative therapy; repeated hematuria, which is caused by BPH; bladder stones; recurrent infections of the urinary tract (cystitis, pyelonephritis) due to BPH. Patients with and suspected prostate cancer were excluded from the study. All patients were surveyed to determine IPSS indices and quality of life (QOL) of the International Prostate Symptoms Questionnaire, digital rectal examination, laboratory tests.

Results: The average time of laparoscopic prostatectomy - 120.3 ÷ 11.7 minutes, open - 81.1 ≤ 17.4; average intraoperative blood loss - 118.7 ÷ 33.6 ml and 520.5 ÷ 67.4 ml, postoperative bed-day 6.1 ÷ 1.1 and 9.8 $ 2.9, respectively. Transfusion of blood components - in 9 (7.5%) patients after open retropubic prostatectomy, never after laparoscopic. Urological complications after laparoscopic prostatectomy - in 2% of patients, open - 19.2%, complications according to Clavien - Dindo - 4% and 33.3%, respectively. Laparoscopic and open retropubic nrostatectomies allow eduall effective restoration of the art of urination after surgerv late results of treatment and postoperative complications were less (2.5% versus 8%) after laparoscopic retropubic prostatectomy.

Conclusions: Laparoscopic and open retropubic prostatectomy are effective operations for the treatment of patients with benign prostatic hyperplasia of large size (more than 80 ml) with satisfactory early and late results, as well as restoration of urination. In the hands of an experienced laparoscopic surgeon, laparoscopic retropubic prostatectomy can achieve better treatment results, than open retropubic prostatectomy. This makes it possible to recommend laparoscopic retropubic prostatectomy in the practice of urologists of urological clinics of Ukraine where laparoscopic equipment are present.

KEY WORDS: benign prostatic hyperplasia, open and laparoscopic retropubic prostatectomy, early and late results

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INTRODUCTION

Benign prostatic hyperplasia (BPH) is one of the most common diseases in men after 60 years old, half of them have symptoms of frequent and difficult urination about 30-50% of such patients seek a surgical help [1, 2]. According to the recommendations of the European Association of Urologists (EAU, 2023) [3] for large BPH (more than 80 ml), open prostatectomy of first choice and can be performed with transvesical or retropubic (transcapsular) approach. Open prostatectomies are traumatic interventions for patients and accompanied a significant percentage of intra- and postoperative bleeding from the prostate bed and need blood transfusions and repeated operations; significant pain syndrome in the postoperative wound; a large number of infectious complications with the possibility of suppuration of the postoperative wound; a long postoperative bed-day and a long rehabilitation period [1, 2, 4-7].

To reduce and avoid the above-mentioned complications of open prostatectomies, laparoscopic prostatectomy and later laparoscopic robot-assisted prostatectomy were introduced into the practice of urologists [1, 2]. Due to the significant cost of equipment for performing laparoscopic robot-assisted prostatectomy and the cost of consumables for its performance, laparoscopic prostatectomy is a more common surgical intervention for large BPH [8, 9]. Laparoscopic prostatectomy for BPH is performed via transperitoneal or extraperitoneal access. Most urologists (80-90%) prefer laparoscopic extraperitoneal prostatectomy to avoid urine entering into abdominal cavity, abdominal organ damage, and adhesion disease [2, 10, 11]. Laparoscopic prostatecto-

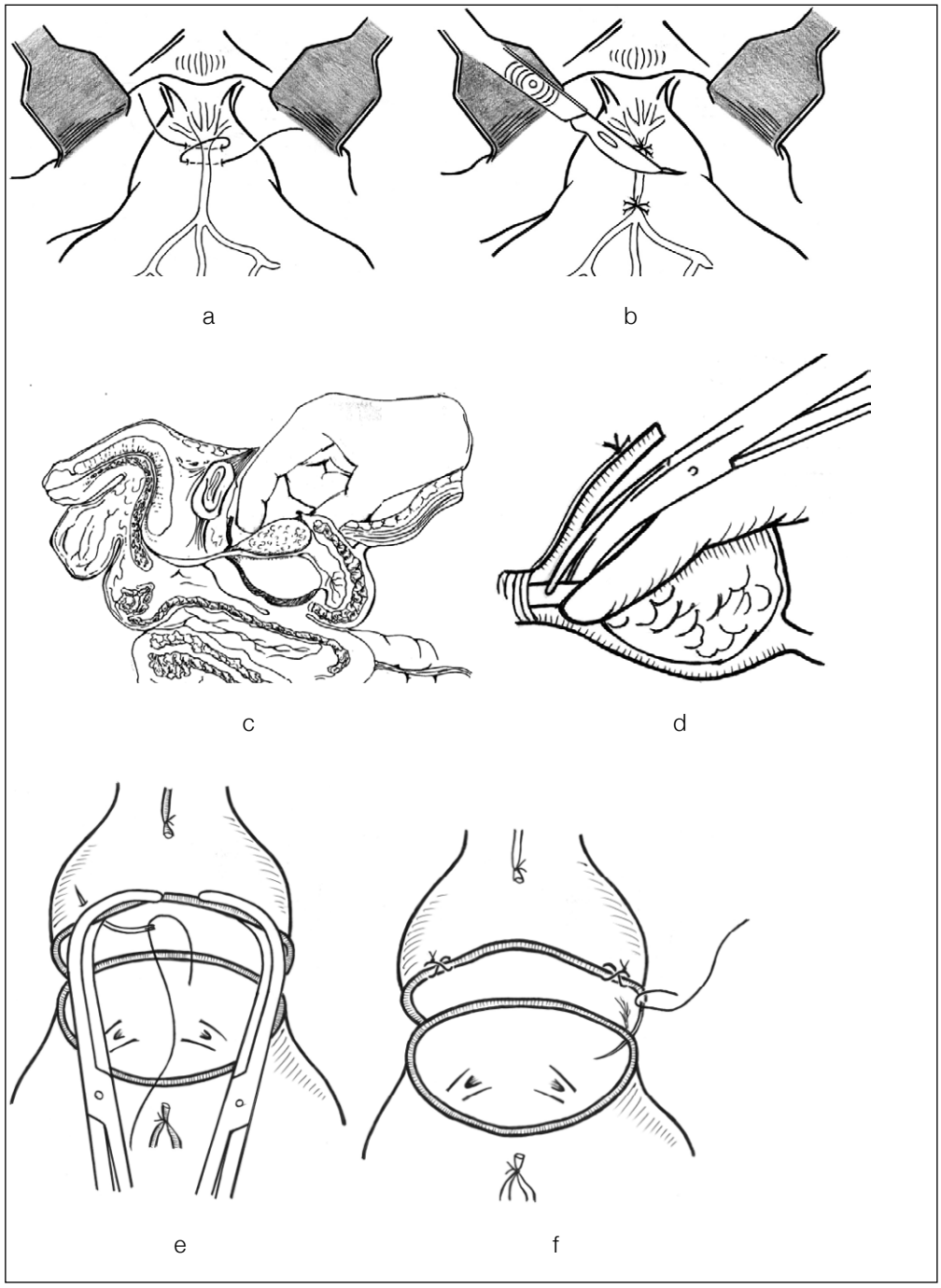

Fig. 1 (a-i). The technique of one-stage open retropubic prostatectomy with trigonization of the lower semicircle of the bladder neck
Picture taken by the authors

mies, like open prostatectomies, are performed through a transvesical or retropubic (transcapsular) approach. We prefer retropubic access as less traumatic, since there is no trauma to the bladder wall and its drainage and urination is restored faster and the postoperative bed-day is reduced [1, 12, 13]. In Ukraine, there are no data on the comparison of the results of open and laparoscopic prostatectomy in the surgical treatment of benign prostatic hyperplasia. We were the first in Ukraine to describe the experience of performing first 30, and then 50 one-stage laparoscopic extraperitoneal retropubic (transcapsular) prostatectomies in patients with BPH [12, 13].

AIM

To compare and evaluate the early and late results of open and laparoscopic extraperitoneal retropubic prostatectomy in the surgical treatment of large benign prostatic hyperplasia (more than 80 ml).

MATERIALS AND METHODS

There were 50 one-stage laparoscopic extraperitoneal retropubic prostatectomies and 120 one-stage open retropubic prostatectomies performed in patients with benign prostatic hyperplasia in the urology department of the Vinnytsia Regional Hospital named after M. I.

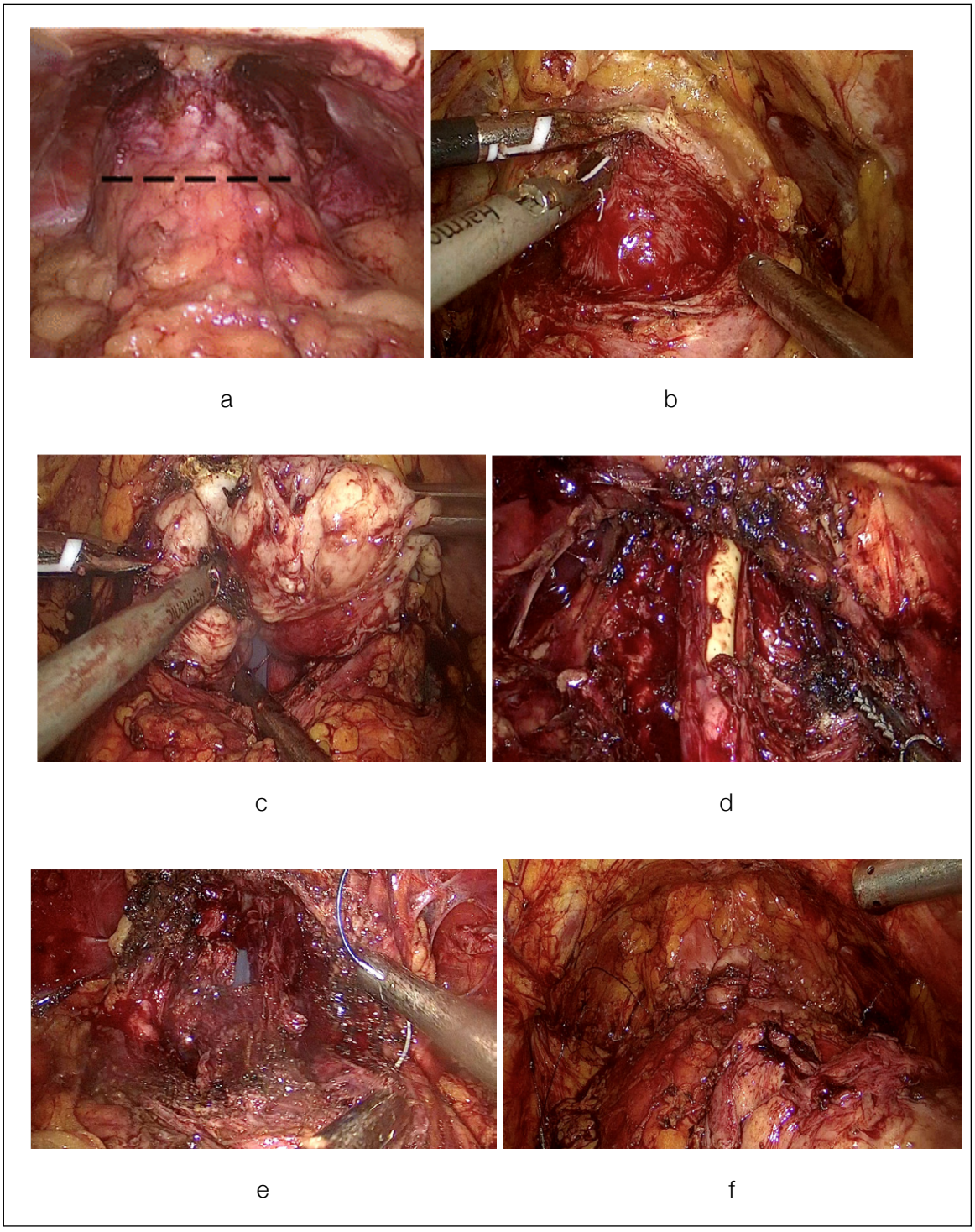

Fig. 2 (a-h). Technique of one-stage laparoscopic retropubic prostatectomy (in 10 (20%) patients it was possible to preserve the prostatic part of the urethra)
Picture taken by the authors

Pirogov in the period from 2021 to 2023. Indications for surgery in patients were: acute (including repeated) retention of urine; pronounced symptoms of the disease due to the lack of effect from conservative therapy; repeated hematuria, which is caused by BPH; bladder stones; recurrent infections of the urinary tract (cystitis, pyelonephritis) due to BPH. Patients with and suspected prostate cancer were excluded from the study. All patients were surveyed to determine IPSS indices and quality of life (QOL) of the International Prostate Symptoms Questionnaire, digital rectal examination, laboratory tests (general blood and urine analysis, urine culture, blood urea and blood creatinine, determination of the level of prostate-specific antigen

Table 1. Results of examination and treatment of patients who underwent simultaneous laparoscopic and open retropubic prostatectomy

Indexes	Laparoscopic retropubic prostatectomy (n=50)	Open retropubic prostatectomy (n=120)
Average age of patients	68.2 ± 2.4	68.0 ± 7.2
Average body mass index (kg/m2)	28.5 ± 1.5	28.8 ± 3.5
Average prostate volume (cm3)	111.5 ± 17.4	94.4 ± 42.3*
Average PSA (prostate specific antigen)	4.9 ± 1.2	4.1 ± 1.3
The average index of the ASA scale	1.8 ± 0.2	1.8 ± 0.3
Patients with a urethral catheter	17 (34%)	44 (36.7%)
Average IPSS index before surgery in patients with preserved urination	25.3 ± 3.3	25.4 ± 2.1
Average IPSS index after surgery	5.3 ± 0.6	5.8 ± 0.9
Average QOL index before surgery	5.1 ± 0.7	5.0 ± 0.6
Average QOL index after surgery	2.0 ± 0.5	2.1 ± 0.6
The maximum flow rate before surgery (Qmax), ml/s	7.4 ± 1.2	7.3 ± 0.8
The maximum flow rate after surgery (Qmax), ml/s	27.4 ± 1.5	26.1 ± 1.8
Bladder stone(s).	2 (2%)	13 (10.8%)*
Average operation duration (min.)	120.3 ± 11.7	81.1 ± 17.4*
Average intraoperative blood loss (ml)	118.7 ± 33.6	520.5 ± 67.4*
The number of administered narcotic painkillers after surgery (ampoules)	1.2 ± 0.1	4.2 ± 0.2*
Duration of bladder irrigation after surgery (hours)	28.7 ± 3.6	74.7 ± 13.6*
Average postoperative bed day	6.1 ± 1.1	9.8 ± 2.9*

Note: * - $p < 0.05$

Source: compiled by the authors of this study

Table 2. Urological complications in patients after laparoscopic and open retropubic prostatectomy

Complications	Number of cases	
	Laparoscopic retropubic prostatectomy (n=50)	Open retropubic prostatectomy (n=120)
Bleeding after surgery, which required transfusion of blood components	-	9 (7.5 %)*
Discharge of urine through the suprapubic wound after removal of the urethral catheter	-	1 (0.8 %)
Funiculitis, epididymorchitis	-	1 (0.8 %)
Acute or exacerbation of chronic pyelonephritis	-	1 (0.8 %)
Hyperthermia after removal of urethral drainage (due to prostatic venous reflux)	1 (2%)	7 (5.8%)
Stress urine incontinence	-	2 (1.7%)
Acute retention of urine	-	1 (0.8%)
Paravesical hematoma	-	1 (0.8%)
In total	1 (2%)	23 (19.2%)*

Note: * - $p < 0.05$

Source: compiled by the authors of this study

in blood serum - PSA), uroflowmetry in patients with preserved urination, ultrasound examination of the kidneys and bladder with the determination of residual urine, ultrasound transrectal examination of the prostate to determine the volume of the prostate, if necessary, MRI of the prostate and cystoscopy (to rule out cancer of prostate and bladder tumors). In addition, an examination of the cardiopulmonary system was performed (ultrasound examination of the heart, electrocardiography with the consultation of a cardiologist) and ultrasound examination of the veins of the lower extremities to rule out thrombus formation. Preoperative assessment of the physical condition of patients was performed according to the classification system of the American Society of Anesthesiologists (ASA) [1, 2]. Body mass index was determined for all patients.

Table 3. Non-urological complications in patients after laparoscopic and open retropubic prostatectomy

Early non-urological complications	Patients after one-stage prostatectomy	
	Laparoscopic retropubic prostatectomy (n=50)	Open retropubic prostatectomy (n=120)
Thromboembolism of small branches of the pulmonary artery	-	2 (1.7%)
Hypertensive crisis	1 (2%)	2 (1.7%)
Acute coronary syndrome	-	1 (0.8%)
Acute psychosis	-	1 (0.8%)
Stomach dyskinesia with pain syndrome	-	1 (0.8%)
Exacerbation of gouty arthritis of the knee joint	-	1 (0.8%)
In total	1 (2%)	8 (6.7%)*

Note: * - $p < 0.05$

Source: compiled by the authors of this study

Table 4. Clavien-Dindo classification of surgical complications after laparoscopic and open retropubic prostatectomy

Degree of complication	Complications (number of patients in absolute values and percentages) in patients after laparoscopic retropubic prostatectomy (n=50)	Complications (number of patients in absolute values and percentages) in patients after open retropubic prostatectomy (n=120)	Treatment of complications
I	Hyperthermia after removal of urethral drainage(1 - 2%)	Hyperthermia after removal of urethral drainage(7 - 5.8%)	Re-inserting of the Foley catheter, antibacterial, antipyretic, anti-inflammatory therapy
	-	Urine excretion through the suprapubic wound (1 - 0.8%)	Repeated incerting of the Foley catheter, antibacterial therapy
	-	Acute retention of urine (1 - 0.8%)	Repeated installation of the Foley catheter, antibacterial therapy
	-	Paravesical hematoma (1 - 0.8%)	Dressings using local antiseptic solutions
	-	Stress urinary incontinence "d" (2 - 1.7%)	Kegel exercises, duloxetine
	Hypertensive crisis (1 - 2%)	Hypertensive crisis (2 - 1.7%)	Hypotensive therapy
	-	Stomach dyskinesia with pain syndrome (1 - 0.8%)	Fibrogastroduodenoscopy, spasmolytic, analgesic therapy
	-	Acute or exacerbation of chronic pyelonephritis (1 – 0.8%)	Antibacterial, anti-inflammatory, antipyretic, detoxification therapy
	-	Acute psychosis (1-1.71%)	Antipsychotic drugs
	-	Exacerbation of gouty arthritis of the knee joint (1-1.7%)	Anti-inflammatory, antipyretic, antibacterial therapy
II	-	Bleeding from the bed of the prostate (9 - 7.5%)	Hemostatic therapy, transfusion of blood components
	-	Postoperative anemia (4 - 3.3%)	Transfusion of blood components
IIIa	-	-	-
IIIв	-	-	-
IVa	-	Postoperative hypotension (6 – 5%)	Treatment in the intensive care department
	-	Acute coronary syndrome (1 - 0.8%)	Treatment in the intensive care department
	-	Thromboembolism of small branches of the pulmonary artery (2 - 1.7%)	Treatment in the intensive care department
IVb	-	-	-
V	-	-	-
In total	2 (4%)	40 (33.3%)*	

Note: * - $p < 0.05$

Source: compiled by the authors of this study

Table 5. Determination of the average maximum flow rate (Qmax, ml/s) in patients after laparoscopic and open retropubic prostatectomies

Type of intervention, uroflowmetry index	Upon discharge from the hospital	1 month after surgery	3 months after surgery
Laparoscopic retropubic prostatectomy (Qmax, ml/s)	(n=40) 27.4 ± 1.3	(n=30) 28.3 ± 1.4	(n=20) 27.1 ± 1.5
Open retropubic prostatectomy (Qmax, ml/s)	(n=100) 26.1 ± 1.7	(n=70) 27.6 ± 1.5	(n=50) 27.0 ± 1.6

Source: compiled by the authors of this study

Table 6. Complications after laparoscopic and open retropubic prostatectomies

Complications	Number of complications	
	Laparoscopic retropubic prostatectomy abs. (%) (n=40)	Open retropubic prostatectomy abs. (%) (n=100)
Bladder neck stricture	-	1 (1%)
Urethral stricture	-	1 (1%)
Acute epididymorchitis	1 (2,5%)	3 (3%)
Bladder stone	-	1 (1%)
Exacerbation of chronic pyelonephritis	-	1 (1%)
Stress urine incontinence	-	1 (1%)
In total	1 (2,5%)	8 (8%) *

Note: * - $p < 0.05$

Source: compiled by the authors of this study

Uroflowmetry before surgery (with preserved urination) and after surgery (at discharge, after 1 and 3 months) with determination of the maximum flow rate (Qmax, ml/s) was performed on the domestic uroflowmeter "Potik - K" (Dnipro) [14] .

The technique of one-stage open retropubic prostatectomy is presented on Fig. 1, and the technique of laparoscopic extraperitoneal retropubic prostatectomy - Fig. 2. Laparoscopic extraperitoneal retropubic prostatectomy was performed under intubation anesthesia, open retropubic - spinal anesthesia. Transverse or longitudinal skin incisions were used for open prostatectomy. The capsule of the prostate in both interventions was dissected with a transverse incision. Intraoperative blood loss was determined by the weight method [1, 2]. Assessment of intra- and postoperative complications after surgery was performed according to Clavien-Dindo classification [15]. Open retropubic prostatectomies were performed by 5 urologists with the highest category and surgical experience of at least 20 years. Laparoscopic retropubic prostatectomies were performed by one surgeon (Moraru-Burlesku R.P.).

Statistical processing of the obtained data was carried out using methods of variational statistics. The significance of the difference was determined using Student's t-test and Mann-Whitney's U-test. The integrated system STATISTICA (USA) was used for statistical calculations.

ETHICS

This work complies with the principles of the Declaration of Helsinki.

RESULTS

The results of examination and treatment of patients who underwent one-stage laparoscopic and open retropubic prostatectomy are presented in Table 1. According to Table 1, the mean age of the patients, body mass index, ASA score, IPSS score, QoL, Qmax before and after surgery, as well as the number of patients with urinary retention and an indwelling urethral catheter in both groups, were statistically similar.

The mean duration of laparoscopic prostatectomy in our patients (120.3 ± 11.7 minutes) corresponded to data reported in the literature. McCullough T.S. [6] performed 96 retropubic prostatectomies with a mean operative time of 95.1 ± 6.0 minutes. Suceken F.Y. [7] reported a mean operative time of 152.1 ± 42.6 minutes in 35 patients undergoing laparoscopic retropubic prostatectomy. Autorino R. et al. [10], after performing 843 procedures, reported a mean time of 95 minutes.

A comparison of laparoscopic versus open prostatectomy in BPH shows an advantage of laparoscopic intervention over the open approach. The latter authors reported an average blood loss of 280 ml during laparoscopic prostatectomy; McCullough reported 350

ml, and Suceken — 80 ml [6, 7]. In our patients, this parameter was 118.7 ± 33.6 ml.

Urological complications in patients after laparoscopic and open retropubic prostatectomy are presented in Table 2. According to Table 2, the rate of blood transfusions after open prostatectomy was 7.5%, while no transfusions were performed after laparoscopic prostatectomy. After laparoscopic prostatectomy, the overall complication rate was 2%, compared with 9.2% after open surgery. There were no cases of intraoperative bleeding, repeated operations due to bleeding from the prostate bed, and no deaths in both groups of patients. Urethritis and suppuration of the postoperative wound were also absent in both groups of patients.

Non-urological complications in patients after laparoscopic and open retropubic prostatectomy are presented in Table 3. Cases of hospital-acquired pneumonia were not observed in both groups of patients.

Classification of surgical complications after laparoscopic and open retropubic prostatectomy according to Clavien-Dindo is presented in Table 4. According to Table 4, the number of in-hospital complications classified according to Clavien–Dindo was higher in the group that underwent open prostatectomy (33.3% vs. 4%).

The mean operative time was longer in the group that underwent laparoscopic extraperitoneal prostatectomy, whereas intraoperative blood loss was greater after open prostatectomy.

According to Table 5, both open and extraperitoneal prostatectomy were equally effective in restoring normal urination after the procedure.

According to Table 6, in the long-term postoperative period, the number of complications was higher after open prostatectomy (8%) compared with 2.5% after robotic surgery.

DISCUSSION

The percentage of complications after open retropubic prostatectomy in our patients corresponded to and did not exceed the percentage of complications in various urological clinics, according to the literature [4-6, 10, 16, 17].

The postoperative bed-day after laparoscopic retropubic prostatectomy was 6.1 ± 1.1 days, open retropubic prostatectomy - 9.8 ± 2.9. Thus, laparoscopic retropubic prostatectomy, when compared with open retropubic prostatectomy, is characterised by many significant advantages: absence of bleeding from the prostate bed and hemotransfusions, less use of narcotic drugs in the postoperative period, a short period of bladder irrigation after surgery and a short postoperative bed-day, fewer urological and non-urological complications despite the longer duration of the operation. This is due to minimal invasiveness of the operation, excellent visualization of the operative field with step-by-step hemostasis, preservation (partial) of the prostatic urethra and preservation of an intact bladder neck.

To determine and compare the restoration of urination after laparoscopic and open retropubic prostatectomies, we conducted urodynamic studies of patients on the domestic uroflowmeter "Potik - K" (Dnipro) with the determination of the maximum flow rate (Qmax, ml/s) on the day of discharge from the department, through 1 and 3 months (table 5). Not all patients in the hospital were able to perform uroflowmetry due to various factors, as well as in the late period.

According to Table 5, the average maximum flow rate after both types of interventions was statistically the same, slightly increasing 1 month after surgery. Thus, laparoscopic and open retropubic prostatectomies make it possible to equally effectively restore the urination in patients after surgery.

Observations (repeated examination and inpatient treatment, telephone survey) of the patients were carried out during the first 2 years after the operations in order to identify late complications of both surgical interventions. Complications of laparoscopic and open retropubic prostatectomies are presented in Table 6. Not all patients could be re-examined and interviewed due to various factors.

One patient underwent TUR of the bladder neck after open retropubic prostatectomy due to bladder neck stricture. Acute epididymoorchitis occurred in patients of both groups who did not undergo bilateral scrotal vasoresections. Antibacterial, anti-inflammatory and anti-edema therapy was carried out. The condition of the patients improved and we never had to operate them. A small bladder stone (up to 1 cm) occurred in one patient after open retropubic prostatectomy, it was successfully crushed using transurethral contact ultrasound cystolithotripsy. A patient with exacerbation of chronic pyelonephritis after open prostatectomy underwent repeated inpatient treatment using antibacterial, anti-inflammatory and detoxification therapy. Stress urinary incontinence, which occurred in 1 patient after open retropubic prostatectomy, significantly decreased after a course of conservative therapy. He was recommended to continue Kegel pelvic floor muscle training, duloxetine and sibutin, use male urological pads and urinary devices. Thus, when analysing the late results of treatment of patients with benign prostatic hyperplasia, fewer postoperative complications were noted after laparoscopic retropubic prostatectomy.

CONCLUSIONS

Laparoscopic and open retropubic prostatectomy are effective operations for the treatment of patients with

benign prostatic hyperplasia of large size (more than 80 ml) with satisfactory early and late results, as well as restoration of urination. In the hands of an experienced laparoscopic surgeon, laparoscopic retropubic prostatectomy can achieve better treatment results with fewer complications than open retropubic prostatectomy. This makes it possible to recommend laparoscopic retropubic prostatectomy in the practice of urologists of urological clinics of Ukraine where laparoscopic equipment are present.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

CORRESPONDING AUTHOR
Valentyn R. Taheiev
Vinnytsia National Medical University
named after M. I. Pirogov
56 Pirogova St, 21018 Vinnytsia, Ukraine
e-mail: valentyn.taheiev@vnmu.edu.ua

ORCID AND CONTRIBUTIONSHIP
Valentyn R. Taheiev: 0000-0001-9144-6128 B D
Volodymyr O. Shaprynskyi: 0000-0002-3890-6217 E F
Victor Horovy: 0000-0003-4911-5151 A B C D
Roman Moraru-Burlesku : 0000-0002-6364-0959 B D
Oleh Kapshuk: 0000-0003-3236-9606 B D
Ruslan Tserkovnyuk: 0009-0005-7015-2696 B D

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