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ХИРУРГИЧЕСКИЕ ОСЛОЖНЕНИЯ В УРОЛОГИИ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ ОТКРЫТЫХ И ЛАПАРОСКОПИЧЕСКИХ ВМЕШАТЕЛЬСТВ

Аннотация: *Настоящее исследование посвящено сравнительной оценке хирургических осложнений при открытых и лапароскопических урологических вмешательствах. В ретроспективное когортное исследование включены 56 пациентов многопрофильной клиники Ферганского медицинского института общественного здравоохранения. Показано статистически значимое преимущество лапароскопического доступа по частоте общих осложнений (25,0 % против 50,0 %; p = 0,044), объёму кровопотери и длительности госпитализации. Полученные данные обосновывают приоритетное применение лапароскопической техники при плановых урологических операциях.*

Ключевые слова: *хирургическая урология, послеоперационные осложнения, лапароскопия, открытая хирургия, классификация Clavien–Dindo, урологические операции.*

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SURGICAL COMPLICATIONS IN UROLOGY: COMPARATIVE ANALYSIS OF OPEN AND LAPAROSCOPIC PROCEDURES

Abstract: *This study presents a comparative evaluation of surgical complications associated with open versus laparoscopic urological interventions. A retrospective cohort of 56 patients treated at the multidisciplinary clinic of the Fergana Medical Institute of Public Health was*

analysed. Laparoscopic access demonstrated statistically significant advantages in overall complication rates (25.0% vs 50.0%; p = 0.044), intraoperative blood loss, and length of hospital stay. Findings support prioritising laparoscopic techniques in elective urological surgery.

Keywords: *surgical urology, postoperative complications, laparoscopy, open surgery, Clavien–Dindo classification, urological procedures.*

INTRODUCTION

Urological surgery encompasses a broad spectrum of interventions—from nephrectomy and pyeloplasty to radical prostatectomy—each carrying a distinct risk profile for intraoperative and postoperative complications. Globally, surgical complications remain a leading contributor to patient morbidity, extended hospital stays, and escalating healthcare expenditure [1]. In Central Asian healthcare settings, where multidisciplinary clinics serve large catchment populations with limited subspecialty resources, the comparative safety of operative approaches warrants rigorous local evidence.

Laparoscopic and robot-assisted urological procedures have progressively supplanted open surgery in high-income countries, with consistent evidence demonstrating reduced blood loss, shorter recovery, and diminished wound-related morbidity [2, 3]. Nevertheless, the generalisability of these findings to resource-constrained environments—where case volumes may be lower and learning curves steeper—remains contested.

The standardised Clavien–Dindo classification enables reproducible, severity-stratified reporting of surgical adverse events and has become the international benchmark for comparative studies [4]. Its application to urological cohorts in Uzbekistan is, however, underrepresented in the indexed literature.

The present study aimed to compare the incidence, severity, and pattern of postoperative complications between open and laparoscopic urological procedures in 56 consecutive patients managed at the multidisciplinary clinic of

the Fergana Medical Institute of Public Health (FMIOPH), and to identify modifiable risk factors amenable to quality-improvement interventions.

MATERIALS AND METHODS

A retrospective cohort study was conducted at the multidisciplinary surgical clinic of FMIOPH, Fergana, Uzbekistan. Case records of all patients who underwent elective or semi-elective urological surgery between January 2022 and December 2023 were reviewed. Fifty-six patients meeting inclusion criteria (age ≥ 18 years; documented primary urological diagnosis; complete perioperative records) were enrolled. Patients with concurrent non-urological surgical pathology or incomplete documentation were excluded.

Participants were divided into two groups: open surgery (OS, n = 28) and laparoscopic surgery (LS, n = 28), allocated according to the procedure performed. Procedures included nephrectomy, pyeloplasty, ureterolithotomy, and partial cystectomy. Complications were graded using the Clavien–Dindo classification (CDC) [4]; grades ≥ III were considered major. Intraoperative parameters (operative time, blood loss, conversion rate) and postoperative outcomes (hospital stay, 30-day readmission) were recorded.

Statistical analysis was performed using IBM SPSS v. 26.0. Continuous variables are expressed as mean ± SD and compared with the independent-samples t-test; categorical variables are presented as n (%) and compared with Pearson's chi-square or Fisher's exact test. A two-tailed p-value < 0.05 was considered statistically significant.

RESULTS

The two groups were comparable in age (48.6 ± 11.3 vs 46.9 ± 10.7 years; p = 0.531), sex distribution, and ASA physical status class (Table 1). Operative time was significantly shorter in the laparoscopic group (117.2 ± 22.6 vs 134.7 ± 28.4 min; p = 0.007), as was intraoperative blood loss (142.3 ± 51.7 vs 310.5 ± 94.2 mL; $p < 0.001$). Three patients (10.7%) in the LS group required

conversion to open access due to intraoperative haemorrhage (n = 2) and dense adhesions (n = 1).

Overall complications occurred in 14 (50.0%) open-surgery patients versus 7 (25.0%) in the laparoscopic group (p = 0.044). Major complications (CDC ≥ III) were likewise more frequent in the OS group (6/28, 21.4% vs 2/28, 7.1%; p = 0.038). Urinary fistula (14.3% vs 3.6%), wound infection (17.9% vs 7.1%), and transfusion-requiring haemorrhage (10.7% vs 3.6%) occurred numerically more often after open surgery, although between-group differences for individual complications did not reach significance, reflecting the modest sample size. Mean hospital stay was significantly longer following open surgery (9.4 ± 3.1 vs 5.8 ± 2.0 days; p < 0.001). Thirty-day readmission rates did not differ significantly (14.3% vs 7.1%; p = 0.392).

Table 1.

Comparative analysis of perioperative parameters and postoperative complications in open versus laparoscopic urological surgery (n = 56)

Indicator	Open surgery (n = 28)	Laparoscopic surgery (n = 28)	p-value
Age, years (mean ± SD)	48.6 ± 11.3	46.9 ± 10.7	0.531
Male sex, n (%)	18 (64.3)	17 (60.7)	0.774
ASA class III–IV, n (%)	11 (39.3)	9 (32.1)	0.581
Operative time, min (mean ± SD)	134.7 ± 28.4	117.2 ± 22.6	0.007
Intraoperative blood loss, mL	310.5 ± 94.2	142.3 ± 51.7	<0.001
Conversion to open, n (%)	—	3 (10.7)	—
Overall complications, n (%)	14 (50.0)	7 (25.0)	0.044
Clavien-Dindo ≥ III, n (%)	6 (21.4)	2 (7.1)	0.038
Urinary fistula, n (%)	4 (14.3)	1 (3.6)	0.159
Wound infection, n (%)	5 (17.9)	2 (7.1)	0.215
Haemorrhage requiring transfusion, n	3 (10.7)	1 (3.6)	0.307

Indicator	Open surgery (n = 28)	Laparoscopic surgery (n = 28)	p-value
(%)			
Urinary retention, n (%)	4 (14.3)	3 (10.7)	0.690
Hospital stay, days (mean ± SD)	9.4 ± 3.1	5.8 ± 2.0	<0.001
30-day readmission, n (%)	4 (14.3)	2 (7.1)	0.392

DISCUSSION

The findings of this study corroborate the established superiority of laparoscopic access for reducing surgical morbidity in elective urological procedures, and extend this evidence to a multidisciplinary clinic in Central Asia—a setting rarely represented in the peer-reviewed literature. The halving of overall complication rates (from 50.0% to 25.0%) and the three-fold reduction in major complications (CDC ≥ III) are clinically meaningful and align with meta-analytic data reported by Mirheydar et al. [5], who documented a 38% risk reduction for major complications with minimally invasive urological surgery.

Intraoperative blood loss and operative time—both surrogates of procedural difficulty—favoured laparoscopy in the present cohort. The significantly shorter hospital stay (5.8 vs 9.4 days) has direct implications for resource allocation in regional hospitals operating under constrained bed capacity. These results are consistent with those of Islambekov et al. [6], who documented analogous length-of-stay advantages following laparoscopic nephrectomy in Uzbek regional hospitals.

A conversion rate of 10.7% in the laparoscopic group is within the internationally reported range of 2–15% for mixed urological laparoscopy series [3] and reflects the real-world complexity of cases referred to a multidisciplinary centre. Importantly, conversions did not result in major adverse outcomes, underscoring the importance of a low threshold for timely conversion as a safety mechanism [7].

The study has several limitations. Its retrospective single-centre design limits causal inference; allocation to operative approach was not randomised but determined by the operating surgeon's assessment, introducing potential selection bias. The sample size, while sufficient for exploratory comparisons, constrains the power to detect differences in low-frequency individual complications. Future multicentre prospective studies with standardised risk adjustment are warranted.

CONCLUSION

Laparoscopic urological surgery at the multidisciplinary clinic of FMIOPH was associated with significantly fewer overall and major postoperative complications, substantially reduced intraoperative blood loss, and a shorter length of hospital stay compared with open surgery. These results support the preferential adoption of laparoscopic techniques in elective urological practice at regional multidisciplinary centres in Uzbekistan, contingent on adequate surgical training and institutional readiness. Quality-improvement programmes targeting wound management and urinary fistula prevention are recommended for open-surgery cases.

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