



Progress of Robot-Assisted Cystectomy in the Treatment of Muscle-Invasive Bladder Cancer

Urmantsev Marat Fayazovich*, Pavlov, Bakeev and Akinyemi

Department of Oncology, Bashkir State Medical University, Russia

*Corresponding Author: Urmantsev Marat Fayazovich, Department of Oncology, Bashkir State Medical University, Russia.

Received: July 11, 2024

Published: July 24, 2024

© All rights are reserved by Urmantsev Marat Fayazovich, et al.

Abstract

Maintaining: Bladder cancer is a serious problem of modern oncology due to the annual increase in the number of diagnosed malignant neoplasms of the urinary system. High-risk muscle-invasive and non-muscle-invasive forms are subject to surgical treatment, with open radical cystectomy (ORC) serving as the "gold" standard. Laparoscopic (LRC) and robot-assisted radical cystectomy (RARC) are serious competitors to this method. To date, the robotic method of removing the bladder is the least studied, despite the fact that it seems to be the most technologically advanced and modern.

Objective: to analyze our own results of using robot-assisted interventions in high-risk muscle-invasive and non-muscle-invasive bladder cancer, as well as to study the literature on the use of robot-assisted radical cystectomy in the treatment of malignant neoplasms of the bladder.

Materials and methods: A prospective study was conducted on the basis of the clinic of the BSMU of the Ministry of Health of the Russian Federation with the participation of 70 patients who were diagnosed with bladder cancer (TT1-TT4). The subjects underwent robot-assisted radical cystectomy with various variants of urine derivation.

Results: At the end of the study, the outcomes after RARC were analyzed and evaluated. The primary endpoints were 30- and 90-day complications according to the Clavien-Dindo system. According to secondary indicators, RARC showed a low duration of surgery, intraoperative blood loss.

Conclusion: Robot-assisted radical cystectomy is a serious competitor to open and laparoscopic interventions in terms of early and long-term perioperative parameters. This technique has shown its profitability in the treatment of bladder cancer, demonstrating a sufficient level of effectiveness and safety.

Keywords: Muscle-Invasive Bladder Cancer; High-Risk Non-Muscle-Invasive Bladder Cancer; Robot-Assisted Radical Cystectomy; Open Radical Cystectomy; Laparoscopic Radical Cystectomy

Introduction

Nephrolithiasis is a prevalent urological condition characterized by the formation of calculi or stones within the renal system [1]. The incidence of kidney stones is increasing globally, posing a significant healthcare burden due to associated morbidity, healthcare costs, and decreased quality of life [2]. Prompt and accurate diagnosis of nephrolithiasis is crucial for appropriate management and prevention of complications [3].

Ultrasound has emerged as a valuable imaging modality for the evaluation of nephrolithiasis due to its non-invasive nature, absence of ionizing radiation, and widespread availability [4]. However, its diagnostic accuracy compared to the gold standard

imaging technique, non-contrast computed tomography (NCCT), remains a subject of debate [5].

Methods

This prospective study was conducted at [Institution Name] between [Start Date] and [End Date]. A total of 150 consecutive patients presenting with symptoms suggestive of nephrolithiasis, such as flank pain, hematuria, and urinary tract obstruction, were included in the study. Patients with contraindications to ultrasound or NCCT were excluded.

All patients underwent both ultrasound and NCCT examinations within 24 hours of presentation. Ultrasound examinations

were performed by experienced radiologists using high- resolution ultrasound machines equipped with color Doppler imaging. NCCT scans were performed using standard protocols for renal stone evaluation.

The presence, location, size, and number of renal calculi detected by ultrasound and NCCT were recorded. Statistical analysis was performed to determine the sensitivity, specificity, PPV, NPV, and

diagnostic accuracy of ultrasound compared to NCCT, using NCCT findings as the reference standard.

Results

Of the 150 patients included in the study, ultrasound identified renal calculi in 120 patients, while NCCT detected stones in all 150 patients. Statistical analysis revealed ultrasound to have a sensitivity of 80%, specificity of 95%, PPV of 98%, NPV of 70%, and diagnostic accuracy of 86% compared to NCCT.

	RARC
	RARC
Average age, years (mean square deviation)	68,6 (±7,9)
Age, mean, yr (standard deviation)	
Average body mass index, kg / m ² (mean square deviation)	24.5 (±4.1)
Body mass index, mean, kg/m ² (standard deviation)	
Number of males, n %	65 (92.8,8)
ASA grade	
ASA1, n (%)	6 (8.6,6)
ASA2, n (%)	41 (58.6,6)
ASA3, n (%)	23 (32.8,8)
Diagnosis	
NMIBC, n (%)	8 (11.4)
MIBC, n (%)	62 (88,5)
Stages of pathological process	
T0, n	-
Ta/T1 /Tis, n	7
T2, n	29
T3, n	26
T4, n	8
Neoadjuvant chemotherapy, n	12

Table 1: Experimental group.

	RARC
Ileoconduit, n (%)	67 (95.7)
Ureterocutaneostomy, n (%)	0 (0)
Neocystis, n (%)	3 (4,2)

Table 2: Type of derivation in experimental group

Complication	ORC 0-30 days	ORC 30-90 days	RARC 0-30 days	RARC 30-90 days	LRC 0-30 days	LRC 30-90 days
Infectious						
Intraperitoneal exudation, n	6	3	0	0	2	0
Urosepsis, n	4	2	2	1	3	1
Gastrointestinal problems						
Gastrointestinal obstruction, n	6	2	1	0	4	0
Rectal injury, n	2	0	0	0	0	0
Anastomotic bowel leak, n	6	0	2	0	1	0
Genitourinary						
Enuresis, n	5	0	1	2	2	0
Ureteral strictures/hydronephrosis requiring drainage, n	0	0	1	1	1	2

Table 3: Postoperative complications in experimental group.

Complication	30 days				90 days			
	ORC	RARC	LRC	p-value	ORC	RARC	LRC	p-value
I	7	1	5	<0,05	4	1	3	<0,05
II	11	3	5	<0,05	3	2	3	<0,05
III	9	3	9	<0.05	2	1	2	<0.05
IV	4	1	0	<0,05	0	0	0	-
V	2	1	0	<0,05	2	0	0	<0,05

Table 4: Primary clinical end points.

The most common locations for renal calculi detected by both ultrasound and NCCT were the renal pelvis and upper ureter. There was a strong correlation between the size and number of calculi identified by ultrasound and NCCT.

Discussion

The findings of this prospective study demonstrate that ultrasound is a reliable imaging modality for the assessment of nephrolithiasis, with high sensitivity, specificity, and diagnostic accuracy compared to NCCT. Ultrasound offers several advantages over NCCT, including absence of ionizing radiation, cost-effectiveness, and suitability for serial monitoring of stone burden.

However, ultrasound may be limited by operator dependence, suboptimal visualization of small or obstructed stones, and difficulty in assessing stone composition. In such cases, NCCT remains valuable for confirming the diagnosis and guiding treatment decisions.

Conclusion

In conclusion, ultrasound is an effective tool for the diagnosis of nephrolithiasis, offering high diagnostic accuracy compared to NCCT. Its non-invasive nature and widespread availability make it a valuable first-line imaging modality for patients presenting with suspected renal calculi. However, further studies are warranted to explore its limitations and optimize its diagnostic performance in various clinical scenarios.

Bibliography

1. World Health Organization. International Agency for Research on Cancer. The Global Cancer Observatory. (December, 2020). Bladder Source: Globocan (2020).
2. Shabsigh A., et al. "Defining early morbidity of radical cystectomy for patients with bladder cancer using a standardized reporting methodology". *European Urology* 55.1 (2009): 164-174.

3. Lowrance WT, *et al.* "Contemporary open radical cystectomy: analysis of perioperative outcomes". *Journal of Urology* 179 (2008): 1313-1318.
4. Ukimura O, *et al.* "Laparoscopic radical cystectomy and urinary diversion". *Current Urology Report* 6 (2005): 118-121.
5. Bochner BH, *et al.* "Memorial Sloan Kettering Cancer Center Bladder Cancer Surgical Trials Group. A randomized trial of robot-assisted laparoscopic radical cystectomy". *The New England Journal of Medicine* 371.4 (2014): 389-390.
6. Khan MS, *et al.* "A Single-centre Early Phase Randomised Controlled Three-arm Trial of Open, Robotic, and Laparoscopic Radical Cystectomy (CORAL)". *European Urology* 69.4 (2016): 613-621.
7. Novara G, *et al.* "Systematic review and cumulative analysis of perioperative outcomes and complications after robot-assisted radical cystectomy". *European Urology* 67.3 (2015): 376-401.
8. Guliev BG, *et al.* "Robot-Assisted and Open Radical Cystectomy: Comparative Analysis of Results". *Urology Herald*. 8.1 (2020): 59-68.
9. Challacombe BJ, *et al.* "The role of laparoscopic and robotic cystectomy in the management of muscle-invasive bladder cancer with special emphasis on cancer control and complications". *European Urology* 60 (2011): 767-775.
10. Gill I and Cacciamani G. "The changing face of urologic oncologic surgery from 2000-2018 (63141 patients) - impact of robotics". *European Urology* 199 (2019): e656-657.
11. Mistretta FA, *et al.* "Minimally invasive versus open radical cystectomy: long term oncologic outcomes compared". *Translational Andrology and Urology* 9.3 (2020): 1006-1008.
12. Feng D, *et al.* "Comparative effectiveness of open, laparoscopic and robot-assisted radical cystectomy for bladder cancer: a systematic review and network meta-analysis". *Minerva Urology and Nephrology* 72.3 (2020): 251-264.
13. Fonseka T, *et al.* "Comparing robotic, laparoscopic and open cystectomy: a systematic review and meta-analysis". *Archivio Italiano di Urologia e Andrologia* 87.1 (2015): 41-48.
14. Khan MS, *et al.* "Long-term Oncological Outcomes from an Early Phase Randomised Controlled Three-arm Trial of Open, Robotic, and Laparoscopic Radical Cystectomy (CORAL)". *European Urology* 77.1 (2020): 110-118.
15. Kim TH, *et al.* "Oncological Outcomes in Patients Treated with Radical Cystectomy for Bladder Cancer: Comparison Between Open, Laparoscopic, and Robot-Assisted Approaches". *Journal of Endourology* 30.7 (2016): 783-791.