



First Successful Experience of Organ-Preserving Endoscopic Surgical Treatment for Upper Urinary Tract Urothelial Carcinoma

Andrej D Kaprin¹, Dmitrij S Merinov¹, Dmitrij A Roshchin¹, Aleksandr A Kachmazov¹, Stanislav A Serebrianyi¹, Dmitrij V Perepechin¹, Shamil S Gurbanov¹, Dmitry S Blinov^{2*}, Pavel S Pilchuk³ and Ekaterina V Blinova⁴

¹Department of Onco-Urology, National Medical Research Centre Radiology, The Ministry of Health of the Russian Federation, Russia

²Department of Research and Development, Care Mentor AI Russia, 10, 2nd Tverskoy-Yamskoy Lane, Moscow, 125047, Russia

³Department of Urology, RUDN University, Russia

⁴Department of Operative Surgery and Clinical Anatomy, Sechenov University, Russia

Abstract

Objectives: To implement novel approach to endoscopic organ-preserving surgery of patients with urothelial cancer of the upper urinary tract and access the outcomes of such treatment.

Methods: A seventy-two-year-old male and five females aged from 53 to 68 with T1 low grade urothelial carcinoma of the renal pelvis and/or ureter, with no need for hemodialysis, and life expectancy more than 5 years were assigned to endoscopic surgery. Transcutaneous or retrograde holmium laser-assisted removal of the renal pelvis tumor was applied as surgical techniques. Postoperative follow-up period was at least 3 months and included ureteroscopy or transcutaneous pyeloscopy to check urodynamic disturbances, absence of the tumor relapse and progression, possible complications and hemodialysis needs.

Results: The operation time was 30 min to 80 min and depended on tumor localization. In all cases, blood loss did not go beyond 200 ml. Acute Pyelonephritis as a complication of early postoperative period developed in one patient after transcutaneous removal of pelvis tumor. Over the observation time (3 to 24 months) after surgery we registered no needs for hemodialysis; no signs of tumor recurrence were detected.

Conclusion: Organ-preserving endoscopic treatment of patients with UTUC may be considered as promising and alternative for conservative tactics due to providing local control on the tumor progression.

Keywords: Urothelial carcinoma; Organ-preserving surgery; Upper urinary tract; Renal pelvis; Ureter

Introduction

Transition cell cancer of the upper urinary tract accounts for about 5% of all urothelial tumors [1]. Monofocal localization of the tumor is more common. The simultaneous bilateral position of the lesion is extremely rare, and according to a large Swedish study led by Holmang et al. covers less than 1.6% of all cases [2]. Radical nephroureterectomy with bladder resection is the gold standard for the treatment of transition cell cancer of upper urinary tract. The analysis of 1,462 patients (992 males and 470 females) treatment results shows no positive progress in clinical outcomes during last three decades, despite the advances in both medical science and technology [3]. Hall with co-authors have conducted multi-factor analysis of the treatment results for 30-year period and noted that Upper Urinary Tract Urothelial Carcinoma (UTUC) relapse frequency depends on the tumor stage and the type of surgical treatment [4]. Moreover, the tumor relapse rate is significantly high in case of organ-preserving surgical approach [4]. Implementation of robotic nephroureterectomy has not also allowed improving sufficiently the treatment results [5]. Nephroureterectomy in case of urothelial cancer of the only or single-functional kidney inevitably leads to program lifetime hemodialysis, which itself increases mortality rate from the non-oncological causes.

OPEN ACCESS

*Correspondence:

Dmitry S Blinov, Department of Research and Development, Care Mentor AI, 10, 2nd Tverskoy-Yamskoy Lane, Moscow, 125047, Russia, Tel: +7-927-640-86-15; E-mail: d.blinov@cmai.team

Received Date: 20 Dec 2019

Accepted Date: 24 Jan 2020

Published Date: 30 Jan 2020

Citation:

Kaprin AD, Merinov DS, Roshchin DA, Kachmazov AA, Serebrianyi SA, Perepechin DV, et al. First Successful Experience of Organ-Preserving Endoscopic Surgical Treatment for Upper Urinary Tract Urothelial Carcinoma. Clin Oncol. 2020; 5: 1680.

Copyright © 2020 Dmitry S Blinov. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

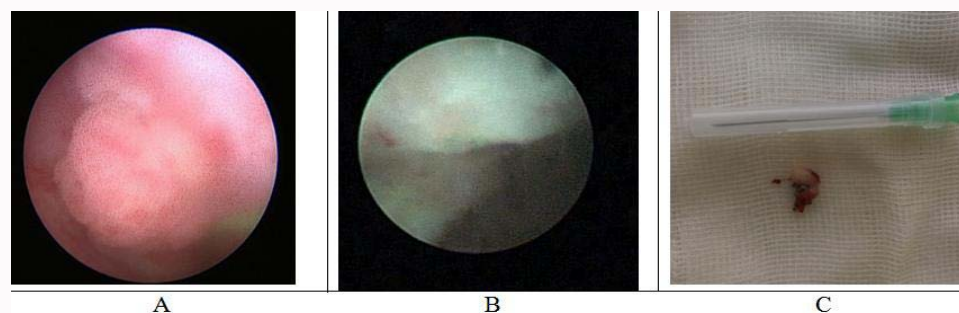


Figure 1: Tumor of renal pelvis. Seventy two-year-old male, the only kidney. A) The tumor visualized through ureteroscope. B) Postoperative scar, three months after surgery. C) Removed full-size tumor.

Progressive pace in endoscopic technology, including improved optics, availability of flexible endoscopes, new delivery systems for ablative energy (laser installations) allows surgeons manipulate in all sites of upper urinary tract [6,7]. On the other hand, extrapolation of large endoscopic experience of nephrolithiasis treatment provides an opportunity to advance endoscopic interventions in UTUC. Thus, the aim of the study was to implement novel approach to endoscopic organ-preserving surgery of patients with urothelial cancer of the upper urinary tract and access the outcomes of such organ-preserving treatment.

Materials and Methods

Ethics

Six patients diagnosed with UTUC at Onco-urology Department of National Medical Research Centre Radiology (Moscow) between January 14, 2019 and October 31, 2019 were enrolled to the study. The study protocol was reviewed and approved by Ethic Commission of National Medical Research Centre Radiology, Bio-ethic Committee of Sechenov University and Ethic Committee of RUDN at joint meeting on November 22, 2018 (report No 12). Informed consent was received from each patient before surgery.

Patients

Gender characteristics, kidney anatomic particularity, tumors' localization, stage and grade are summarized in (Table 1). A seventy-two-year-old male and five females aged from 53 to 68 with T1 low grade tumor were assigned to endoscopic surgery. All of them met following inclusion criteria: low-grade urothelial carcinoma of ureter or the renal pelvis T1N0M0 according to [7]; no need for hemodialysis; life expectancy more than 5 years. Patients with multifocal high-grade UTUC unremovable by endoscopic surgery, with life expectancy less than 5 years and need for lifetime hemodialysis were excluded from the study.

Surgical technique

a) Transcutaneous endoscopic removal of the renal pelvis tumor. Patients were anesthetized by 0.015 mg/kg fentanyl (Fentanyl, "Moscow Endocrine Plant", Russia), 3 mg/kg propofol (Propofol Kabi-200 mg, Fresenius Kabi Deutschland GmbH, Germany), both intravenously, and endotracheal sevoflurane (Sevofluranum MAC 2-3, flow 1 liter/min, Baxter Healthcare Corp, USA). We used 0.3 mg/kg rocuronium bromide (Rocuronium Kabi 50 mg, Fresenius Kabi Deutschland GmbH, Germany) intravenously for muscle relaxation. A patient was initially placed in lithotomy position on the back on X-ray transparent operating table (MOT 6000, Medifa-hesse GmbH & Co. KG, Germany). Then ureteropyeloscopy (as a rule, rigid tool

8.5/11 Fr) was performed. The tumor lesion volume was visually evaluated (Figure 1A) and the most optimal accesses was find out. Ureter was catheterized with Shariere's catheter 6 under X-ray control up to the renal pelvis level. The patient was turned to a position "on stomach". The pointing of kidney pelvis was performed under the combined ultrasound (Ultrasound Scanner Flex Focus 1202, Bk Medical, Denmark) and X-ray (Veradius, Philips Medical Systems Nederland B.V., The Netherlands) guidance. The operative access direction and location were selected by such a way as to ensure the greatest probability for main tumor mass removal under appropriate safe condition. During implementation of minimally invasive transcutaneous access miniaturized nephroscope (MIP-27830 KA, Karl Storz, Germany) with working channel 6 Charier combined with external tube 15 to 16 Charier was used. Kidney urinary collection system was inspected, and the tool was brought to the tumor. The laser light guide (Auriga XL 50W, Boston Scientific Corp., USA) with 365 nm wave length was passed through working channel of the miniaturized nephroscope directly to the tumor under endoscopic control. The tumor was removed by single unit (Figure 1B,1C) with 1200 mJ to 1800 mJ wave energy and 10 Hz to 12 Hz frequency in ablation mode. Then the tumor was captured and extracted by extractor *via* the lumen of the external tube. The operation was completed by endoscopic examination of the pelvicalyceal system. A string-conductor was drawn through the working channel into the cavity of the urinary collecting system, along which, in turn, the nephrostomic charier drain 14 was installed.

b) Retrograde intrarenal surgery of cancer localizing in the pelvis of kidney. Cystoscopy and ureteroscopy were performed, by a rigid tool on the side of the removing tumor location. The tumor was spotted and the possibility of its removal by a rigid instrument (Karl Storz/Richard Wolf, Germany) or fibroscope (Flex-Xc11278VK, Karl Storz, Germany) was determined. After that, teflon-coated casing 12-14 was installed (depending on the size of ureteroscope used) into the upper urinary tract. In case of adequate endoscopic exposure of the tumor, the laser light (365 nm if rigid ureteroscope was used and 230 nm at fibroscopy) was guided *via* working ureteroscope channel. A biopsy of the lesion was initially performed. Further, with the help of a golmium laser (Auriga XL 50W, Boston Scientific Corp., USA), the tumor was ablated using 1800 mJ laser energy and 12 Hz frequency for 365 nm light guide or 1000 mJ laser energy power with 10 Hz frequency for 230 nm light guide. Manipulating by rigid extractor 5 Ch, all tumor fragments were maximally extracted from the available calyces and the renal pelvis when the intervention was performed by rigid ureteroscope. If fibroscopy was used, tumor removal was carried out by means of flexible extractors- "baskets." At the end

Table 1: Gender and clinical characteristics of patients who underwent endoscopic surgery.

Patient, Gender, Age	Tumor			Surgical Approach	Characteristics
	Site	Stage	Grade		
P., male, 72	Renal pelvis	T1N0M0	Low-grade	Transcutaneous	Solitaire kidney
S., Female, 64	Bilateral tumors of renal pelvis	T1N0M0	Low-grade	Transcutaneous	Two-stage operation
R., Female, 68	Renal pelvis	T1N0M0	Low-grade	Transcutaneous	Solitaire kidney
L., Female, 68	Renal pelvis	T1N0M0	Low-grade	Transurethral	Three-stage operation
	Bilateral tumors of ureter				
N., Female, 54	Ureter	T1N0M0	Low-grade	Transurethral	
U., Female, 53	Ureter	T1N0M0	Low-grade	Transurethral	Solitaire kidney

Table 2: Duration of organ-preserving endoscopic surgery and postoperative outcomes in patients with UTUC.

Patient, Sex, Age	Duration of the Surgery, Min.	Period from the Surgery, months	Hemodialysis	Complications	Blood Loss	Kidney Drainage
P., Male, 72	80	12	No	Acute pyelonephritis	minimal	UCB
S., Female, 64	50	6	No	No	minimal	UCD
R., Female, 68	50	3	No	No	minimal	UCB
L., Female, 68	40	12	No	No	minimal	J-J stent
N., Female, 54	40	24	No	No	minimal	J-J stent
U., Female, 53	30	3	No	No	minimal	J-J stent

of the surgery, the ureteroscope was removed; internal ureter stent (SOT-626+G open/open Ureteral Stent Set Double-J, Mar Flow AG, Switzerland) was installed.

Patients follow-up

At least three-month postoperative follow-up period included ureteroscopy or transcutaneous pyeloscopy to check-up urodynamic disturbances, absence of the tumor relapse and progression, possible complications and hemodialysis needs.

Results

We present our first experience of UTUC organ-preserving surgical treatment. The operation time was 30 min to 80 min and depended on tumor localization. Duration of pelvis cancer surgery was longer than ureteral tumor removal (Table 1). In all cases, blood loss did not go beyond 200 ml. Acute Pyelonephritis as a complication of early postoperative period developed in one patient after transcutaneous removal of the renal pelvis tumor. In the course of observation time after surgery we registered no needs for hemodialysis. With transcutaneous access, the urinary tract was drained by nephrostomy drainage; in the case of transurethral access, a J-J stent was used.

The observation time was 3 to 24 months, during which the patients underwent endoscopic examination of the upper urinary tract by transurethral or transcutaneous (in case of nephrostomy) access. Over the entire observation period, no signs of tumor recurrence were detected (Figure 1B).

Discussion

Although the radical nephroureterectomy remains the accepted standard of surgical management of patients with UTUC, many of them seek organ-preserving treatment. Conservative tactics of UTUC treatment can be considered both in bond cases (high stage of kidney failure or solitaire functioning kidney) and in optional ones (with preserved function of contralateral kidney and low degree of the malignancy). At the same time, patients should necessarily be

informed of the demand for strict monitoring of the disease due to the increased risks of relapse and progression of cancer. UTUC of the solitaire kidney is rather unusual occurrence, and cohort of patients with such conditions may suffer some degree of renal failure. Pre-operative renal function is an important criterion for choosing the treatment tactics for UTUC in patients with a solitaire kidney (perform radical or organ-preserving surgery). It is clear now that nephroureterectomy does not give the complete control over the tumor process. The lifetime hemodialysis as inevitable medical assistance for patients with renal failure is a factor that reduces overall survival through death from the non-oncological causes.

Conclusion

Thus, organ-preserving endoscopic treatment of patients with UTUC may be considered as promising and life-prolonging alternative for conservative tactics. Moreover, the organo surface-protecting surgery can provide local control on the tumor progression.

Funding

The study was supported by National Medical Research Centre Radiology of the Ministry of Health of the Russian Federation internal grant.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA: A Cancer J Clinicians. 2019;69(1):7-34.
2. Jahnson S, Aliabad AH, Holmäng S, Jancke G, Liedberg F, Ljungberg B, et al. Swedish National Registry of Urinary Bladder Cancer: No difference in relative survival over time despite more aggressive treatment. Scand J Urol. 2016;50(1):14-20.
3. Adibi M, Youssef R, Shariat SF, Lotan Y, Wood CG, Sagalowsky AI, et al. Oncological outcomes after radical nephroureterectomy for upper tract urothelial carcinoma: Comparison over the three decades. Int J Urol. 2012;19(12):1060-6.
4. Hall MC, Womack S, Sagalowsky AI, Carmody T, Erickstad MD, Roehrborn CG. Prognostic factors, recurrence, and survival in transitional

- cell carcinoma of the upper urinary tract: A 30-year experience in 252 patients. *Urology*. 1998;52(4):594-601.
5. Vecchia A, Antonelli A, Francavilla S, Simeone C, Guruli G, Zargar H, et al. Robotic versus other nephroureterectomy techniques: A systematic review and meta-analysis of over 87,000 cases. *World J Urol*. 2019.
 6. Azizi M, Cheriyan SK, Peyton CC, Foerster B, Shariat SF, Spiess PE. Optimal Management of Upper Tract Urothelial Carcinoma: An Unmet Need. *Curr Treat Options Oncol*. 2019;20(5):40.
 7. Khalil MI, Alliston JT, Bauer-Erickson JJ, Davis R, Bissada NK, Kamel MH. Organ-sparing procedures in GU cancer: part 3-organ-sparing procedures in urothelial cancer of upper tract, bladder and urethra. *Int Urol Nephrol*. 2019;51(11):1903-11.
 8. Lopez-Beltran A. Tumors of the Urinary System. In: World Health Organization Classification of Tumors: Pathology and Genetics of Tumors of the Urinary System and Male Genital Organs. Eble JN, Sauter G, Epstein JI, Sesterhenn IA, editors. 2004. IARC Press: Lyon, France.