Original Article

# Robot-assisted radical nephroureterectomy for upper urinary tract tumor: initial experience with the use of novel surgical robot system, hinotori

**Daisuke Motoyama[1,2]^, Yuto Matsushita[1], Hiromitsu Watanabe[1], Keita Tamura[1], Atsushi Otsuka[1], Masato Fujisawa[3], Hideaki Miyake[1]**

[1]Department of Urology, Hamamatsu University School of Medicine, Hamamatsu, Japan; [2]Department of Developed Studies for Advanced Robotic Surgery, Hamamatsu University School of Medicine, Hamamatsu, Japan; [3]Division of Urology, Kobe University Graduate School of Medicine, Kobe, Japan

*Contributions:* (I) Conception and design: D Motoyama, H Miyake; (II) Administrative support: M Fujisawa; (III) Provision of study materials or patients: D Motoyama, Y Matsushita, H Watanabe, K Tamura, A Otsuka; (IV) Collection and assembly of data: D Motoyama; (V) Data analysis and interpretation: D Motoyama, H Miyake; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

*Correspondence to:* Hideaki Miyake, MD, PhD. Department of Urology, Hamamatsu University School of Medicine, 1-20-1 Handayama, Higashi-Ku, Hamamatsu 431-3192, Japan. Email: hmiyake@hama-med.ac.jp.

**Background:** The hinotori surgical robot system is a promising robotic platform that has been recently introduced into routine clinical practice. The aim of this study was to report our initial experience of robot-assisted radical nephroureterectomy (RANU) using hinotori.

**Methods:** This study included a total of eight patients with upper urinary tract tumor (UUTT) who underwent RANU using hinotori via the transperitoneal approach. In this series, nephrectomy was initially performed at the kidney direction stage followed by distal ureterectomy and bladder cuff excision at the bladder direction stage without repositioning of patient or port. Lymphadenectomy was performed at either stage.

**Results:** Median age, body mass index, and tumor diameter were 76 years, 21.7 kg/m$^2$, and 13 mm, respectively. Of eight patients, three were diagnosed with renal pelvic tumors and five with lower ureteral tumors. They underwent lymphadenectomy targeting the renal hilum plus para-aorta and the pelvis, respectively. All procedures in this series were completed without conversion to open surgery. Median operative time, time using the robotic system, estimated blood loss, and length of hospital stay were 230 minutes, 138 minutes, 23 mL, and 8 days, respectively. No major perioperative complication occurred. Pathological examinations of the tumors revealed seven urothelial carcinomas and one papilloma, the median number of resected lymph nodes was 13, and one patient was positive for both cancer margin and lymph node metastases.

**Conclusions:** Despite being a small case series, this is the first study characterizing RANU using the hinotori surgical robot system. RANU was efficaciously and safely performed, resulting in the achievement of favorable perioperative findings.

**Keywords:** Hinotori; perioperative outcomes; robot-assisted radical nephroureterectomy (RANU)

Submitted May 18, 2023. Accepted for publication Nov 09, 2023. Published online Dec 21, 2023.
doi: 10.21037/tcr-23-853
**View this article at:** https://dx.doi.org/10.21037/tcr-23-853

^ ORCID: 0000-0002-5315-3874.

## Introduction

The recent introduction of robotic surgery into routine clinical practice has revolutionized minimally invasive surgery (MIS). It has become possible to markedly expand the indications of MIS in highly complex cases using a surgical robot system. The robotic system is characterized by various useful features, including articulated arms with multiple degrees of freedom, scale motion function to relieve physiological tremors, and 3-dimensional clear image on magnified visual field (1). In the field of urology MIS, robotic surgery has gained particularly rapid and wide acceptance as a promising alternative to laparoscopic surgery in the majority of major surgeries, including radical prostatectomy, partial nephrectomy, and radical cystectomy, and it has generally provided equivalent or even superior outcomes to other surgical approaches (2,3).

To date, the da Vinci surgical system (Intuitive Surgical Inc., Sunnyvale, CA, USA) has represented the leading platform for robotic surgery across the world; however, the recent adoption of this system has been slowed due to economical considerations. Accordingly, since the expiration of some relevant patents related to da Vinci in 2019, novel competitors with unique technical refinements have entered the surgical robot system market (4-8). Among them, the hinotori surgical robot system, launched by Medicaroid Corporation (Kobe, Japan) and co-funded by Sysmex Corporation and Kawasaki Heavy Industries (Kobe, Japan), has been introduced into Japanese real-world clinical practice. This surgical robot has several unique and attractive characteristics that differentiate it from existing systems (8). Promising perioperative outcomes using hinotori have already been reported in a series of robot-assisted radical prostatectomies (RARP) and robot-assisted partial nephrectomies (RAPN) (8,9). However, there has not been any study focusing on robot-assisted radical nephroureterectomy (RANU) using hinotori. The present study describes our initial experience with RANU using hinotori without patient or port repositioning in order to characterize the feasibility of this platform for performing RANU for patients with upper urinary tract tumor (UUTT). We present this article in accordance with the STROBE reporting checklist (available at https://tcr.amegroups.com/article/view/10.21037/tcr-23-853/rc).

### Highlight box

**Key findings**

- Robot-assisted radical nephroureterectomy (RANU) using the novel surgical robot system, hinotori, could provide favorable perioperative outcomes in patients with upper urinary tract tumor (UUTT).

**What is known and what is new?**

- RANU with the use of an existing platform (da Vinci) has been reported to enable the completion of the procedure in UUTT patients without patient or port repositioning.
- It was possible to complete RANU using hinotori using the same procedure as da Vinci. Perioperative outcomes in this series were similar to those in previous studies using da Vinci.

**What is the implication, and what should change now?**

- Considering the unique features of hinotori, such as more flexible movement of robotic arms in eight axes and software calibration of the trocar position without docking the arm, its use may have advantages due to the smooth maneuverability between the kidney and bladder regions during RANU.

## Methods

### Patients

This study included a total of eight constitutive patients with UUTT who received RANU using hinotori between July 2022 and March 2023 at our institution. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by institutional review board of Hamamatsu University School of Medicine (No. 21-090) and individual consent for this retrospective analysis was waived.

### Evaluation

All data of the included patients with respect to clinicopathological and perioperative findings were obtained from their medical records at our hospital. The indication for RANU in this series was clinically non-metastatic UUTT. All patients preoperatively underwent appropriate examinations including computed tomography (CT) of the abdomen and chest, cystoscopy, and urinary cytology. In patients with radiological findings suspicious for UUTC but negative on urinary cytology, diagnostic ureteroscopy was additionally performed. The severity of perioperative complications was evaluated according to the Clavien-Dindo system (10), and major complications were defined as those corresponding to Clavien-Dindo ≥3.

### Surgical procedure

RANU was conducted by three robotic surgeons, who

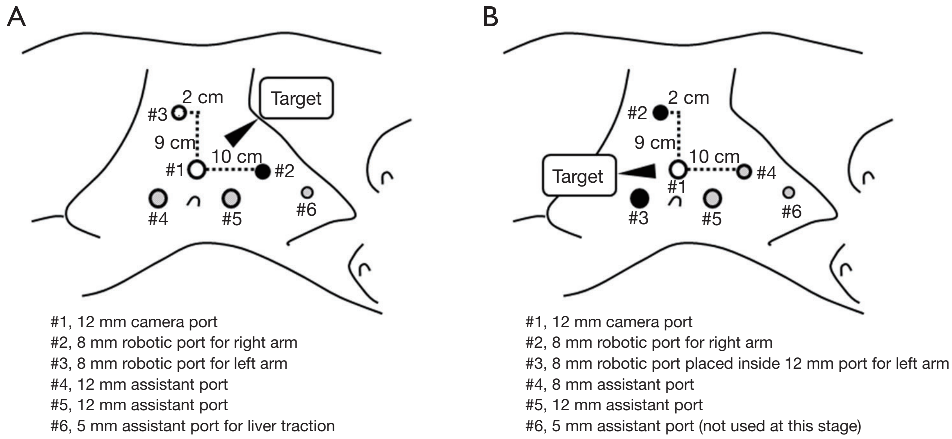


**Figure 1** Trocar placement in cases undergoing robot-assisted right radical nephroureterectomy using hinotori. (A) Trocar placement at the kidney direction stage. (B) Trocar placement at the bladder direction stage.

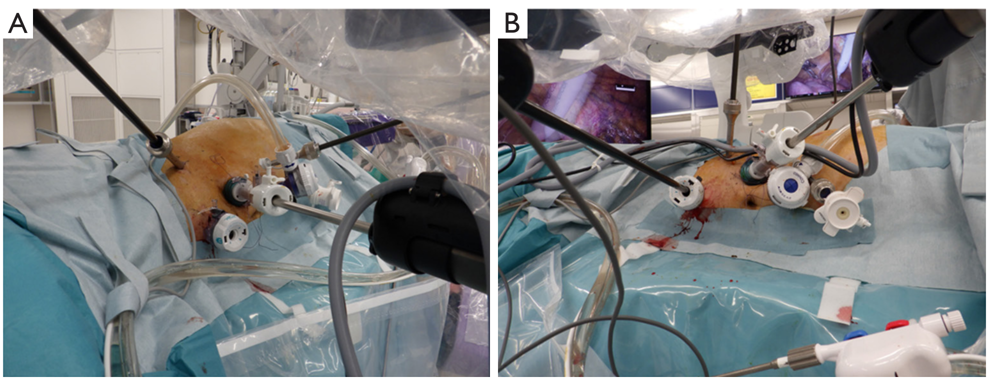


**Figure 2** Intraoperative pictures in a case undergoing robot-assisted right radical nephroureterectomy using hinotori. The patient cart is docked to the patient at the kidney direction stage (A) and the bladder direction stage (B).

had been certified as proctors for robot-assisted surgery by the Japanese Society of Endourology and Robotics and performed at least >200 robotic surgeries as an operator prior to the involvement in RANU. All procedures were performed for patients in a modified flank position with the diseased side up through the trans-peritoneal approach. As presented in *Figure 1*, three trocars for the use of robotic arms and two or three trocars, including AirSeal iFS (CONMED Japan KK, Tokyo, Japan), for use by assistant surgeons were placed. The following instruments were used during RANU: monopolar curved scissors, bipolar fenestrated forceps, and needle holder. A vessel-sealing device was not used in this series. Lymph node dissection (LND) was conducted in all patients, and as its extent was determined based on the location of UUTT as previously described (11).

At the kidney direction stage wherein hinotori targeted the renal hilum (*Figures 1A,2A*), nephrectomy was performed in all patients as previously described (12,13), followed by the mobilization of ureter to the level of the bifurcation of common iliac vessels. LND targeting the renal hilum plus para-aorta was then added in patients with UUTT of the renal pelvis. Upon completion of the procedure at the kidney direction stage, all robotic arms were released, and reconfigured for the bladder direction stage wherein hinotori targeted the vesicoureteral junction (*Figures 1B,2B*) by maintaining the position of patient and port. After peeling off the ureter up to the bladder, the ureter was dissected from the bladder until the recognition of the tented bladder mucosa, and distal ureterectomy and bladder cuff excision were performed by cold cut using monopolar curved scissors, and cystotomy was closed by the

 

**Table 1** Preoperative characteristics of patients who underwent robot-assisted nephroureterectomy using hinotori surgical robot system

| No. | Age (years) | Sex | BMI (kg/m$^2$) | ECOG-PS | DM | HT | Preoperative CKD | Abdominal surgery | Tumor location | Tumor side | Tumor size (mm) | TNM classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 70 | Male | 26 | 0 | No | Yes | No | Yes | Renal pelvis | Left | 11 | cT1N0M0 |
| 2 | 78 | Male | 23.1 | 0 | Yes | Yes | Yes | Yes | Lower ureter | Right | 9 | cT1N0M0 |
| 3 | 79 | Male | 21.8 | 0 | No | Yes | Yes | No | Renal pelvis | Left | 55 | cT3N0M0 |
| 4 | 82 | Male | 22.2 | 0 | No | Yes | Yes | No | Renal pelvis | Left | 51 | cT3N0M0 |
| 5 | 81 | Male | 21.5 | 1 | No | Yes | Yes | No | Lower ureter | Left | 16 | cT1N0M0 |
| 6 | 51 | Male | 19.4 | 0 | No | No | No | No | Lower ureter | Left | 12 | cT1N0M0 |
| 7 | 69 | Male | 20 | 0 | No | Yes | Yes | No | Lower ureter | Right | 13 | cT1N0M0 |
| 8 | 74 | Male | 20.9 | 0 | Yes | No | No | No | Lower ureter | Left | 6 | cT1N0M0 |
| Overall[a] | 76 | – | 21.7 | – | – | – | | – | – | – | 13 | – |

[a], values are presented as median. BMI, body mass index; ECOG-PS, Eastern Cooperative Oncology Group Performance Status; DM, diabetes mellitus; HT, hypertension; CKD, chronic kidney disease; TNM, tumor, node, metastasis.

running barbed suture with 3-0 V-Loc (Medtronic, Tokyo, Japan). LND was then performed targeting the ipsilateral pelvis, including resection of the ipsilateral common iliac, external iliac, obturator and internal iliac nodes, in patients with UUTT of the lower ureter. The en bloc specimen was retrieved via an approximately 5 cm incision by lengthening the paraumbilical camera port.

## Results

This study included a total of eight UUTT patients undergoing RANU using hinotori surgical robot system. Baseline clinical characteristics of these patients are presented in *Table 1*. The median age, body mass index, and tumor diameter were 76 years, 21.7 kg/m$^2$, and 13 mm, respectively. Three patients were diagnosed with renal pelvic tumor and five with lower ureteral tumor.

All of the eight patients received RANU using hinotori via the transperitoneal approach (*Table 2*). LND targeting the renal hilum plus para-aorta and the pelvis was performed in three renal pelvic and five lower ureteral tumors. All procedures in this series were completed as planned without conversion to open surgery. Median operative time, time using the robotic system, and estimated blood loss were 230 minutes, 138 minutes, and 23 mL, respectively. All patients did not experience major perioperative complication. The median length of hospital stay was 8 days. Final pathological examinations of the resected specimens showed that seven were urothelial carcinoma and one was papilloma, the median number of the dissected lymph nodes was 13, and one patient was diagnosed as having positive findings on cancer margin and nodal involvement.

## Discussion

In recent years, competition to develop new robotic platforms has intensified. Some have already been released and introduced into clinical practice (4-8). Of these, hinotori, launched by Medicaroid Corporation in 2019 as the first made-in-Japan surgical robot system, has several advantageous features that differentiate it from the existing system, da Vinci, as follows: (I) robotic arms that consist of eight axes enable more flexible movement and prevent them interfering with each other (*Figure 3*). (II) Software-based calibration of the trocar position without docking an arm with a trocar provides a sufficient space in a clean field and protects collisions among arms outside the body. (III) A 3D viewer mounted in the surgeon's cockpit makes it possible to relieve the fatigue of surgeons by flexible positioning (8). As the initial human surgery with the use of hinotori, RARP was successfully performed in 2020. Since then, the proportion of robotic surgeries performed using hinotori in Japan is gradually increasing, and favorable perioperative outcomes using hinotori were reported in two series of patients undergoing RARP and RAPN (8,9). Thus, the use of hinotori may also be suitable for RANU, which requires highly complex procedures (14-20); however, there are no previous studies of RANU using hinotori.

Radical nephroureterectomy with bladder cuff excision

**Table 2** Perioperative outcomes of patients who underwent robot-assisted nephroureterectomy using hinotori surgical robot system

| No. | Surgical approach | Area of lymph node dissection | Operative time (minutes) | Time using robotic system (minutes) | Estimated | | Open conversion | Postoperative major complication[b] | Resected tumor weight (g) | Length of hospital stay (day) | Histology | pT stage | Number of positive/ resected lymph nodes | Positive cancer margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Blood loss (mL) | Blood translation | | | | | | | | |
| 1 | Transperitoneal | Renal hilum/ paraaorta | 220 | 118 | 35 | No | No | No | 608 | 6 | Urothelial carcinoma | pT1 | 0/31 | No |
| 2 | Transperitoneal | Pelvis | 270 | 206 | 12 | No | No | No | 402 | 6 | Urothelial carcinoma | pT3 | 2/14 | Yes |
| 3 | Transperitoneal | Renal hilum/ paraaorta | 210 | 131 | 50 | No | No | No | 520 | 9 | Urothelial carcinoma | pT3 | 0/24 | No |
| 4 | Transperitoneal | Renal hilum/ paraaorta | 230 | 137 | 50 | No | No | No | 326 | 12 | Urothelial carcinoma | pT1 | 0/12 | No |
| 5 | Transperitoneal | Pelvis | 230 | 138 | 5 | No | No | No | 366 | 6 | Urothelial carcinoma | pT1 | 0/18 | No |
| 6 | Transperitoneal | Pelvis | 239 | 143 | 34 | No | No | No | 180 | 8 | Urothelial papilloma | – | 0/7 | – |
| 7 | Transperitoneal | Pelvis | 250 | 163 | 1 | No | No | No | 288 | 8 | Urothelial carcinoma | pT1 | 0/5 | No |
| 8 | Transperitoneal | Pelvis | 212 | 124 | 8 | No | No | No | 394 | 8 | Urothelial carcinoma | pTis | 0/12 | No |
| Overall[a] | – | – | 230 | 138 | 23 | – | – | – | 380 | 8 | – | – | – | – |

[a], values are presented as median; [b], corresponding to Clavien-Dindo grade ≥3.

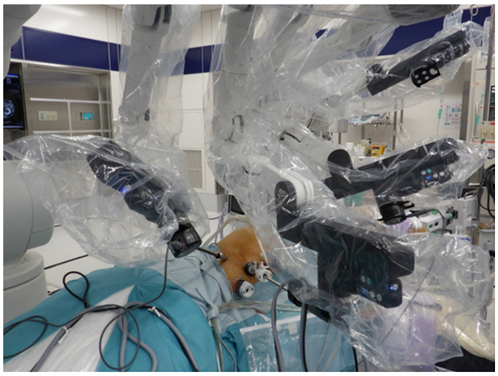

**Figure 3** The picture of robotic arms of hinotori consisting of eight axes that enable more flexible movement and prevent them from interfering with each other. Software-based calibration of the trocar position without docking an arm with a trocar provides a sufficient space in a clean field and protects collisions among arms outside the body.

is regarded as the standard treatment for patients with UUTT. This procedure can be conducted by either an open or minimally invasive approach, including using a surgical robot system (14). Since the first report in 2006 (15) and subsequent studies introducing technical refinements (16-20), RANU has been increasingly adopted in real-world clinical practice. As a result, several studies have reported the advantages of RANU over other surgical approaches (21-23). Veccia *et al.* performed a systematic review and meta-analysis and reported that RANU could offer benefits as a minimally invasive approach without impairing oncological outcomes compared to open and laparoscopic nephroureterectomies (21). However, accumulating findings with respect to RANU are still limited to studies performed with da Vinci (15-23). The present study summarizes the perioperative findings of the first series of eight patients undergoing RANU using hinotori.

At our institution, RANU was performed in four UUTT patients using da Vinci prior to insurance coverage in April 2022, and thereafter eight UUTC patients underwent RANU using hinotori until March 2023. In the series of eight patients with the use of hinotori, RANU, including bladder cuff excision and LND, was completed in all patients without conversion to open surgery. Furthermore, by properly reconfiguring robotic arms from the kidney to bladder direction stage, it became possible to precisely operate in the upper abdomen and deep in the pelvis; thus, all procedures were accomplished without the requirement of patient or port repositioning. Favorable perioperative outcomes were achieved including operative time, time using the robotic system, estimated blood loss, and incidence of major perioperative complications. Collectively, these findings suggest that RANU using hinotori is a useful alternative to conventional open and laparoscopic approaches.

It is of interest to compare perioperative outcomes in this series with those in patients undergoing RANU using da Vinci. The perioperative findings of the four patients who received RANU using da Vinci were as follows: operative time =211 minutes; time using the robotic system = 132 minutes; estimated blood loss =35 mL; major complications =0%; and length of hospital stay =10 days. There were no significant differences in the perioperative outcomes between the hinotori and da Vinci groups. Furthermore, the present outcomes using hinotori were equivalent or even superior to those in previous studies focusing on RANU using da Vinci (16-27). Morizane *et al.* reported the following perioperative outcomes in the report of first series of nine cases undergoing RANU using da Vinci in Japan: operative time =323 minutes; time using the robotic system =209 minutes; estimated blood loss =55 mL; major complications =0%; and length of hospital stay =12 days (16). Veccia *et al.* conducted a multicenter study that included 185 patients receiving RANU using da Vinci, and reported that operative time, estimated blood loss, incidence of major postoperative complications, and length of hospital stay were 216 minutes, 100 mL, 24.4%, and 3.5 days, respectively; however, LND was performed in only 45.9% of the included patients (24).

This study has several limitations. Firstly, it was a small retrospective case series containing only eight patients undergoing RANU using hinotori. Our findings will need to be confirmed by a future prospective assessment with more patients. In addition, prognostic outcomes based on long-term follow-up should also be evaluated for more comprehensive assessment of RANU using hinotori. Secondly, it may be difficult to compare the present findings with those in other studies due to the significant diversity of surgical techniques used, particularly studies that involved management of distal ureter. Thirdly, length of hospital stay in Japan is usually longer than that in Western countries regardless of procedure. This may be explained by the difference of social insurance systems rather than as a result of surgical stress; therefore, attention should be paid when interpreting findings related to this point. Fourthly, although RANU could be completed without re-docking with the use of da Vinci Xi (19), in the present study, it was necessary to undock hinotori when moving from the kidney to bladder direction stage to determine the trocar position once again by software-based calibration. This difference may affect perioperative outcomes of RANU using hinotori.

## Conclusions

This is the first report to describe the perioperative outcomes of RANU using the novel surgical robot system, hinotori. In this series containing eight UUTT patients, RANU, including bladder cuff excision and LND, could be safely completed as planned without repositioning of patient or port, resulting in the achievement of favorable perioperative outcomes. Further prospective studies with a larger sample size are necessary.

## Acknowledgments

*Funding:* None.

## Footnote

*Provenance and Peer Review:* This article was commissioned by the Guest Editor (Takuya Koie) for the series "Current Status of Robotic Surgery for Genitourinary Diseases in Japan" published in *Translational Cancer Research*. The article has undergone external peer review.

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at https://tcr.amegroups.org/article/view/10.21037/tcr-23-853/rc

*Data Sharing Statement:* Available at https://tcr.amegroups.com/article/view/10.21037/tcr-23-853/dss

*Peer Review File:* Available at https://tcr.amegroups.com/article/view/10.21037/tcr-23-853/prf

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at https://tcr.amegroups.com/article/view/10.21037/tcr-23-853/coif). The series "Current Status of Robotic Surgery for Genitourinary Diseases in Japan" was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by institutional review board of Hamamatsu University School of Medicine (No. 21-090) and individual consent for this retrospective analysis was waived.



## References

1. Diana M, Marescaux J. Robotic surgery. Br J Surg 2015;102:e15-28.
2. Falagario U, Veccia A, Weprin S, et al. Robotic-assisted surgery for the treatment of urologic cancers: recent advances. Expert Rev Med Devices 2020;17:579-90.
3. Honda M, Morizane S, Hikita K, et al. Current status of robotic surgery in urology. Asian J Endosc Surg 2017;10:372-81.
4. Almujalhem A, Rha KH. Surgical robotic systems: What we have now? A urological perspective. BJUI Compass 2020;1:152-9.
5. Farinha R, Puliatti S, Mazzone E, et al. Potential Contenders for the Leadership in Robotic Surgery. J Endourol 2022;36:317-26.
6. Rao PP. Robotic surgery: new robots and finally some real competition! World J Urol 2018;36:537-41.
7. Bravi CA, Paciotti M, Sarchi L, et al. Robot-assisted Radical Prostatectomy with the Novel Hugo Robotic System: Initial Experience and Optimal Surgical Set-up at a Tertiary Referral Robotic Center. Eur Urol 2022;82:233-7.
8. Hinata N, Yamaguchi R, Kusuhara Y, et al. Hinotori Surgical Robot System, a novel robot-assisted surgical platform: Preclinical and clinical evaluation. Int J Urol 2022;29:1213-20.
9. Miyake H, Motoyama D, Matsushita Y, et al. Initial Experience of Robot-Assisted Partial Nephrectomy Using Hinotori Surgical Robot System: Single Institutional

Prospective Assessment of Perioperative Outcomes in 30 Cases. J Endourol 2023;37:531-4.
10. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-13.
11. Kondo T, Hashimoto Y, Kobayashi H, et al. Template-based lymphadenectomy in urothelial carcinoma of the upper urinary tract: impact on patient survival. Int J Urol 2010;17:848-54.
12. Miyake H, Motoyama D, Kawakami A, et al. Initial experience of robot-assisted radical nephrectomy in Japan: Single institutional study of 12 cases. Asian J Endosc Surg 2022;15:162-7.
13. Caputo PA, Ko O, Patel R, et al. Robotic-assisted laparoscopic nephrectomy. J Surg Oncol 2015;112:723-7.
14. Joseph JP, O'Malley P, Su LM. Robot-Assisted Radical Nephroureterectomy. J Endourol 2021;35:S122-31.
15. Rose K, Khan S, Godbole H, et al; GUY'S and St. Thomas' Robotics Group. Robotic assisted retroperitoneoscopic nephroureterectomy -- first experience and the hybrid port technique. Int J Clin Pract 2006;60:12-4.
16. Morizane S, Yumioka T, Iwamoto H, et al. Initial Experience of Robot-Assisted Laparoscopic Nephroureterectomy in Japan: A Useful Technique Using a Vessel Sealing Device for Securing a Good Surgical Field and Efficient Sealing. Asian J Endosc Surg 2022;15:458-62.
17. Pugh J, Parekattil S, Willis D, et al. Perioperative outcomes of robot-assisted nephroureterectomy for upper urinary tract urothelial carcinoma: a multi-institutional series. BJU Int 2013;112:E295-300.
18. Argun OB, Mourmouris P, Tufek I, et al. Radical Nephroureterectomy Without Patient or Port Repositioning Using the Da Vinci Xi Robotic System: Initial Experience. Urology 2016;92:136-9.
19. Patel MN, Aboumohamed A, Hemal A. Does transition from the da Vinci Si to Xi robotic platform impact single-docking technique for robot-assisted laparoscopic nephroureterectomy? BJU Int 2015;116:990-4.
20. Campi R, Cotte J, Sessa F, et al. Robotic radical nephroureterectomy and segmental ureterectomy for upper tract urothelial carcinoma: a multi-institutional experience. World J Urol 2019;37:2303-11.
21. Veccia A, Antonelli A, Francavilla S, et al. Robotic versus other nephroureterectomy techniques: a systematic review and meta-analysis of over 87,000 cases. World J Urol 2020;38:845-52.
22. Ji R, He Z, Fang S, et al. Robot-assisted vs. laparoscopic nephroureterectomy for upper urinary tract urothelial carcinoma: a systematic review and meta-analysis based on comparative studies. Front Oncol 2022;12:964256.
23. O'Sullivan NJ, Naughton A, Temperley HC, et al. Robotic-assisted versus laparoscopic nephroureterectomy; a systematic review and meta-analysis. BJUI Compass 2023;4:246-55.
24. Veccia A, Carbonara U, Djaladat H, et al. Robotic vs Laparoscopic Nephroureterectomy for Upper Tract Urothelial Carcinoma: A Multicenter Propensity-Score Matched Pair "tetrafecta" Analysis (ROBUUST Collaborative Group). J Endourol 2022;36:752-9.
25. Aboumohamed AA, Krane LS, Hemal AK. Oncologic Outcomes Following Robot-Assisted Laparoscopic Nephroureterectomy with Bladder Cuff Excision for Upper Tract Urothelial Carcinoma. J Urol 2015;194:1561-6.
26. De Groote R, Decaestecker K, Larcher A, et al. Robot-assisted nephroureterectomy for upper tract urothelial carcinoma: results from three high-volume robotic surgery institutions. J Robot Surg 2020;14:211-9.
27. Kenigsberg AP, Smith W, Meng X, et al. Robotic Nephroureterectomy vs Laparoscopic Nephroureterectomy: Increased Utilization, Rates of Lymphadenectomy, Decreased Morbidity Robotically. J Endourol 2021;35:312-8.

**Cite this article as:** Motoyama D, Matsushita Y, Watanabe H, Tamura K, Otsuka A, Fujisawa M, Miyake H. Robot-assisted radical nephroureterectomy for upper urinary tract tumor: initial experience with the use of novel surgical robot system, hinotori. Transl Cancer Res 2023;12(12):3522-3529. doi: 10.21037/tcr-23-853

 