Simultaneous laparoscopic nephroureterectomy and robot-assisted radical cystectomy: Lessons learned from our initial experience

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Abstract

Background: In patients with high-risk bladder cancer and concomitant upper urinary tract malignancies, simultaneous cystectomy and nephroureterectomy is the principle oncological procedure of choice. Nevertheless, there are still not many reports of simultaneous robot-assisted radical cystectomy (RARC) and nephroureterectomy. Therefore, the aim of this study was to evaluate outcomes and complications of simultaneous RARC and laparoscopic nephroureterectomy in our institution.

Materials and methods: This case series evaluated our initial clinical results of 3 patients who underwent simultaneous laparoscopic unilateral nephroureterectomy and RARC with the da Vinci Xi system between 2019 and 2020 at our hospital. Demographic data, preoperative parameters, and postoperative parameters were retrospectively analyzed.

Results: All 3 patients were men whose median age was 75 years (range 73–89 years). The median total operative time was 435 minutes (range 429–484 minutes), median estimated blood loss was 377 mL (range 125–410 mL), and median hospital stay was 26 days (range 21–36 days). In all 3 cases, each trocar was used in 7 ports. The postoperative complications were stratified according to the Clavien-Dindo Classification system, and a grade 3B complication developed in 1 patient: trocar site herniation of the small bowel.

Conclusions: We reported our initial experience of simultaneous laparoscopic nephroureterectomy and RARC. A large-scale prospective, randomized, controlled trial will be required to prove the feasibility and safety of simultaneous laparoscopic nephroureterectomy and RARC.

Keywords: Bladder cancer; Laparoscopic surgery; Nephroureterectomy; Radical cystectomy; Urothelial carcinoma

1. Introduction

Urothelial carcinoma (UC) can involve the urinary bladder as well as ureters and the renal pelvis, however, simultaneous lower and upper UC is less frequent, affecting 0.3%–2.3% of patients.[1]

Radical nephroureterectomy with bladder cuff excision is the standard procedure for upper urinary tract (UUT) malignancies: also, in patients with high risk bladder cancer and concomitant UUT tumors, simultaneous cystectomy and nephroureterectomy is the principle oncological procedure of choice.[2]

A case report of simultaneous laparoscopic radical cystectomy and nephroureterectomy was initially written by Deng et al.[3] Afterward, a few series of simultaneous laparoscopic radical cystectomy and nephroureterectomy were published.

In recent years, robot-assisted radical cystectomy (RARC) has been proposed as a minimally invasive alternative with improved morbidity and acceptable oncological outcomes for high risk bladder cancer. Nevertheless, there are still not many reports of simultaneous RARC and nephroureterectomy for cases with high risk bladder cancer and concomitant UUT tumors.[4,5]

The aim of this report was to describe our experience of our first 3 patients with synchronous UUT tumor and invasive bladder cancer treated with simultaneous laparoscopic nephroureterectomy and RARC at our department.

2. Materials and methods

We describe our initial clinical results of 3 patients who underwent simultaneous laparoscopic unilateral nephroureterectomy and RARC with the da Vinci Xi system between 2019 and 2020 at our hospital.

Preoperative parameters of the 3 patients such as age, gender, status of disease in the bladder, and status of disease in the UUT were recorded. Intraoperative parameters such as port placement, side of surgery, console time, estimated blood loss, and status of lymphadenectomy were also evaluated. Postoperatively, all details regarding the length of stay, complications by the Clavien-Dindo grade, and histopathology report were assessed.

Surgery was performed after obtaining informed consent from all 3 patients. Ethical approval of this study was obtained from the National Cancer Center Institutional Review Board.

The present study examined the safety and initial effectiveness of simultaneous laparoscopic nephroureterectomy and RARC.

2.1. Laparoscopic nephroureterectomy

All the surgeries were performed with transperitoneal access. All these procedures were performed by the same surgical team in our institution.
Initially, the patient was placed in a standard 60° flank position with the operative side up and transperitoneal laparoscopic nephroureterectomy was prepared. The initial 12-mm trocar (Applied Medical Kii Balloon Blunt Tip System 12 × 100 mm) was placed by the open (Hasson’s) technique at the level of the umbilicus lateral to the ipsilateral rectus muscle, which served as a camera port. The remaining three trocars as working port were placed under direct vision; one 5-mm port (ENDOPATH XCEL®, Johnson & Johnson) and two 12-mm ports (ENDOPATH XCEL®, Johnson & Johnson) were placed 6–8 cm from the camera port respectively. In all cases, a flexible laparoscopic camera was used for the nephroureterectomy. Trocar placement is shown in Figure 1.

After the hilar vessels were divided, the dissection of the kidney continued posteriorly and superiorly to the upper pole with the adrenal gland being preserved in all cases. Subsequently, we continued dissection from the ureter downward to the level of the iliac vessel.

2.2. Robot-assisted radical cystectomy

Next, the patient was placed in the lithotomy-Trendelenburg position so as to move the small bowel out of the pelvis, and the surgical field was re-prepared and re-draped.

The 4 ports which were used for laparoscopic nephroureterectomy were retained, and then another three 8-mm robotic ports were placed under direct vision at the level of the umbilicus in a transverse line across the abdomen. The 8-mm robotic port was placed via a 12-mm port which was used as a camera port for nephroureterectomy procedure. The remaining two 3-mm ports and one 12-mm port were reused as assistant ports. Trocar placement for RARC is shown in Figure 2.

The da Vinci camera was placed via the port attached to the third robotic arm. We began with mono-polar curved scissors (Intuitive Surgical Inc.) in the left hand (arm 2), fenestrated bipolar forceps (Intuitive Surgical Inc.) in the right hand (arm 4), and a ProGrasp™ forceps (Intuitive Surgical Inc.) in the first arm. This was because the console surgeon was left-handed person. The majority of the operation was performed with the 0° lens; also, the 30° lens was used at part of the extended pelvic lymph node dissection.

The entire specimen, including the kidney, ureter, urinary bladder, prostate was freed and removed through the skin incision around the umbilicus, and then the ureterocutaneostomy was performed. Finally, 3 silicone drains (Jackson-Pratt) were placed (Fig. 3).
3. Results

The demographic characteristics and pathological features of the bladder and upper tract tumors are shown in Table 1.

All patients in this report were men. Patients’ median age was 75 years (range 73–89 years) and median body mass index was 21.7kg/m² (range 21.1–22.4kg/m²). All 3 patients were classified as having a score of 0 or 1 on the Eastern Cooperative Oncology Group scale of Performance Status.

None of the 3 patients had carcinoma in situ. Sites of the upper tract tumor were renal in 1 patient and ureteral in 2 patients. Left-side nephroureterectomy was performed in 1 patient and right-side nephroureterectomy was performed in 2 patients. The clinical characteristics, perioperative information, and postoperative information are shown in Tables 2 and 3.

Neither conversion to open surgery nor total blood transfusion was necessary in all 3 cases. The total median operative time was 435 minutes (range 429–484 minutes), median operative time for laparoscopic nephroureterectomy was 119 minutes (range 110–135 minutes), median total console time for RARC was 202 minutes (range 196–233 minutes), median estimated blood loss was 377mL (range 125–410mL), and median interval to resuming oral intake was 2 days (range 2–3 days). Each trocar was used in 7 ports.

The postoperative complications were stratified according to the Clavien-Dindo Classification system: a Grade 3b complication developed in 1 patient (trocar site herniation of the small bowel). This patient presented some episodes of epigastric burning pain, as well as nausea and vomiting on the fourth postoperative day.

On physical examination, he presented a palpable mass under the right 12-mm port; which had been used as a camera port for laparoscopic nephroureterectomy (Fig. 4). Computed tomography of the abdomen was suggestive of incisional hernia at the port site (Fig. 5).

We performed manual reduction of the hernia and it was successful. Suture of rectus fascia and the peritoneum was performed under general anesthesia at the seventh postoperative day to prevent repeated hernia. The skin incision at the right 12-mm port was opened and enlarged (30 mm). The viability of the small bowel under the port was confirmed (color and peristalsis) after some minutes of observation. The muscular layer and the peritoneum were sutured. The total operative time was 21 minutes.

After suture of the muscular layer and the peritoneum, the patient presented a satisfactory postoperative course: clear liquids were offered in the first postoperative day, and the patient was discharged home on the 13th postoperative day.

All 3 patients have not received neoadjuvant nor adjuvant chemotherapy. Median follow-up was 8 months (range 4–8 months), and all 3 patients remained disease free at the last follow-up.

4. Discussion

Synchronous or metachronous presentation of UC in the upper and lower urinary tract has been reported at varying rates throughout the literature: Olbring et al. reported 11 cases (1.7%) of subsequent UC of the renal pelvis or ureter in 657 patients with bladder cancer, Rodriguez et al. reported a 2.6% incidence of upper tract urothelial cancer of 1529 patients with primary superficial bladder tumors, and Miyake et al. reported an incidence of 13.2% of simultaneous bladder and UUT tumors in a total of 106 cases.

| Case | Sex | Age (yr) | BMI (kg/m²) | Pathological stage of the bladder | Sites of the UUT tumor | ECOG PS |
|------|-----|---------|-------------|---------------------------------|------------------------|---------|
| 1    | Male| 75      | 22.4        | UC, HG, pT1 or more             | Right renal pelvic     | 0       |
| 2    | Male| 89      | 21.7        | UC, HG, pT2                     | Left ureter            | 1       |
| 3    | Male| 73      | 21.1        | UC, HG, pT1 with concomitant CIS| Right ureter           | 1       |

BMI = body mass index; CIS = carcinoma in situ; ECOG PS = Eastern Cooperative Oncology Group scale of Performance Status; HG = high grade; UC = urothelial carcinoma; UUT = upper urinary tract.
In patients with high-risk bladder cancer and concomitant UUT tumors, simultaneous cystectomy and nephroureterectomy is the principle oncological procedure of choice.[2] The techniques of simultaneous laparoscopic/robotic nephroureterectomy and cystectomy have been reported in the literature. Berglund et al.[9] reported the feasibility of laparoscopic radical cystectomy with bilateral nephroureterectomy: they inserted 9 ports during the entire procedure. Barros et al.[10] reported the surgical technique of simultaneous laparoscopic nephroureterectomy and cystectomy: they required at least 8 ports (5 ports for one-sided nephroureterectomy with 3 ports for the pelvic component) during the procedure. Ou et al.[11] reported the feasibility and safety of simultaneous robot-assisted nephroureterectomy and cystectomy: they required only 5 ports (4 trocars for nephroureterectomy with the addition of 1 port for cystectomy and lymph node dissection). Peter et al.[5] in Germany reported 3 cases of RARC and laparoscopic nephroureterectomy: they required 6 ports in all procedures.

In this paper, we have described the surgical steps of a small series of simultaneous RARC and laparoscopic nephrectomy in the case of a specific indication. Although many studies report the feasibility and safety of simultaneous laparoscopic/robotic nephroureterectomy and cystectomy, in our report, a Grade 3b complication (according to Clavien-Dindo Classification) developed in one (33%) patient. This patient was diagnosed with trocar site herniation of the small bowel, and underwent suturing of the muscular layer and the peritoneum under general anesthesia at the 7th postoperative day.

In general, the larger the wound created by the trocar, the higher the risk of trocar site herniation: the incidence of postoperative trocar site hernia is estimated to be around 0.23% for 10 mm trocars and rising to 3.1% for 12 mm trocars.[12] The management of trocar site herniation includes access to the hernia by extending the trocar-site incision or...
laparoscopy, and then reduction of the hernia and further surgeries based on the bowel viability.\[13\] In order to reduce the risk of trocar site herniation, it is recommended to close the fascial defect if the trocar size is larger than 10 mm.\[14,15\]

In our case, we closed the fascia of the 12 mm port after surgery; however, the placement of the 5 mm robotic port via the 12 mm port (which was used as a camera port for the procedure of laparoscopic nephroureterectomy) may have caused the fascial dehiscence and that resulted in insufficient suture of the fascia.

Also, we did not suture peritoneal defects at the time of fascial closure, and this can also be considered as one of the causes of trocar site herniation.\[15,16\]

5. Conclusion

In conclusion, we reported our initial experience of simultaneous laparoscopic nephroureterectomy and RARC. The main limitation of our study was the small sample size (n = 3), and the relatively short follow-up time (8 months).

A large-scale prospective, randomized, controlled trial will be required to prove the feasibility and safety of simultaneous laparoscopic/robotic nephroureterectomy and cystectomy.

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Statement of ethics

Ethical approval to report this case was obtained from the National Cancer Center Institutional Review Board. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Surgery was performed after obtaining informed consent from all 3 patients.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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Author contributions

Shugo Yajima wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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