

Robot-assisted laparoscopic retroperitoneal lymph node dissection for stage IIIb mixed germ cell testicular cancer after chemotherapy

Sang Hyub Lee, Dong Soo Kim, Sung-Goo Chang, Seung Hyun Jeon

Department of Urology, Kyung Hee University School of Medicine, Seoul, Korea

Laparoscopic retroperitoneal lymph node dissection, especially when performed with the da Vinci Surgical System (Intuitive Surgical), has shown excellent cosmetic results with similar oncologic outcomes to those of open surgery. In this study, we present a case of robot-assisted retroperitoneal lymph node dissection performed in an 18-year-old man who was diagnosed with a stage IIIb mixed germ cell tumor and who was initially treated with radical orchiectomy, followed by chemotherapy. This case shows that robot-assisted retroperitoneal lymph node dissection is technically feasible, safe, and cosmetically favorable, even when performed on patients with high-stage disease or after chemotherapy.

Keywords: Lymph node excision; Robotic surgical procedures; Testicular neoplasms

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INTRODUCTION

With recent improvements in laparoscopic techniques, many urologic surgeries can now be performed by using laparoscopy. Moreover, the introduction of robotic systems has simplified minimally invasive surgery. Therefore, many urologic procedures, such as radical prostatectomy, partial nephrectomy, radical cystectomy, and pyeloplasty, have been performed with robotic systems.

Laparoscopic retroperitoneal lymph node dissection (L-RPLND) has been shown to have acceptable morbidity, rapid recovery, and good cosmetic outcomes [1]. Since Davol et al. [2] reported the first case of robot-assisted laparoscopic retroperitoneal lymph node dissection (R-RPLND) in 2006, there have been many reports of R-RPLND for stage I

nonseminomatous germ cell tumors (NSGCTs) [3,4]. However, there has been only one report of R-RPLND applied to post-chemotherapy patients [5].

Here, we report a case of stage IIIb NSGCT treated with R-RPLND after chemotherapy. This is the first description of R-RPLND in Korea.

CASE REPORT

A 17-year-old boy visited Kyung Hee University Medical Center because of a painless, enlarging left scrotal mass. Scrotal ultrasonography revealed an approximately 6.6-cm-sized left testis with a partially cystic portion. Abdominopelvic and chest computed tomography (CT) showed enlarged, conglomerated left paraaortic lymph

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Corresponding Author: Seung Hyun Jeon

Department of Urology, Kyung Hee University Medical Center, Kyung Hee University School of Medicine,
23 Kyunghedae-ro, Dongdaemun-gu, Seoul 130-872, Korea
TEL: +82-2-958-8537, FAX: +82-2-959-6048, E-mail: juro@khu.ac.kr

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nodes and right retrocrural lymph nodes (Fig. 1A). The patient underwent left radical orchiectomy. The pathologic report demonstrated a mixed germ cell tumor (immature teratoma 65%, embryonal carcinoma 15%, yolk sac tumor 10%, seminoma 5%, and choriocarcinoma 5%). Tumor markers after orchiectomy were significantly elevated: alpha-fetoprotein, 169.5 ng/mL; beta-human chorionic gonadotrophin, 23,245.16 mIU/mL; and lactate dehydrogenase, 644 U/L. After thorough counseling about treatment for multiple enlarged lymph nodes, the patient decided to receive chemotherapy with bleomycin, etoposide, and cisplatin. Three cycles of chemotherapy were administered, and the levels of all tumor markers decreased; however, the follow-up abdominopelvic CT scan showed increased lymph node size (Fig. 1B). Therefore, we decided to perform R-RPLND for resection of the remnant mass after chemotherapy.

The patient was positioned in a right lateral decubitus position with the left side up and the bed flexed. After

pneumoperitoneum was established by use of a Veress needle, a 12-mm camera port was placed at the umbilicus and five more trocars were used in the abdomen: three for robotic arms and two for the assistant (Fig. 2A). The robot was docked at the patient's left side, and the assistant was positioned on the patient's right side (Fig. 2B).

A left-modified template dissection was planned. The procedure was started with an incision at the line of Tolddt. After the colon dropped medially, ligation of the gonadal vein was performed, and the spermatic vessel was dissected. The left ureter was easily identified and was isolated with a nelaton catheter. To prevent ureteral injury during dissection of lymph nodes, the ureter was retracted by the third arm of the robot. Paraaortic lymph nodes were dissected from the level of the common iliac artery to the root of the left renal artery along the lateral margin of the aorta (Fig. 3A, B). Dissection of lymph nodes was a difficult and time-consuming process because of severe adhesion

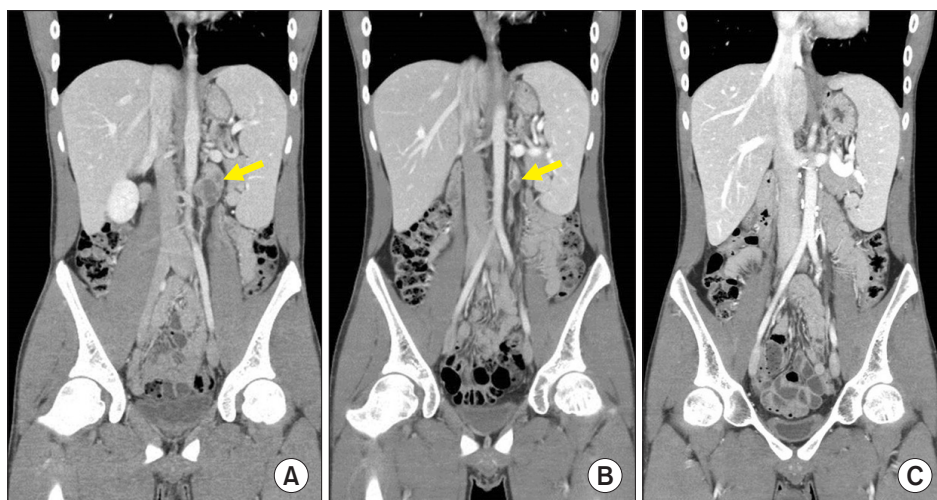


Fig. 1. Computed tomography images. (A) Before chemotherapy: a para-aortic lymph node is indicated by the yellow arrow. (B) After chemotherapy: the size of the lymph node was decreased after three cycles of bleomycin-etoposide-cisplatin chemotherapy; however, a remnant mass (yellow arrow) was detected. (C) At 18 months after retroperitoneal lymph node dissection, no lymph nodes were detected during follow-up.

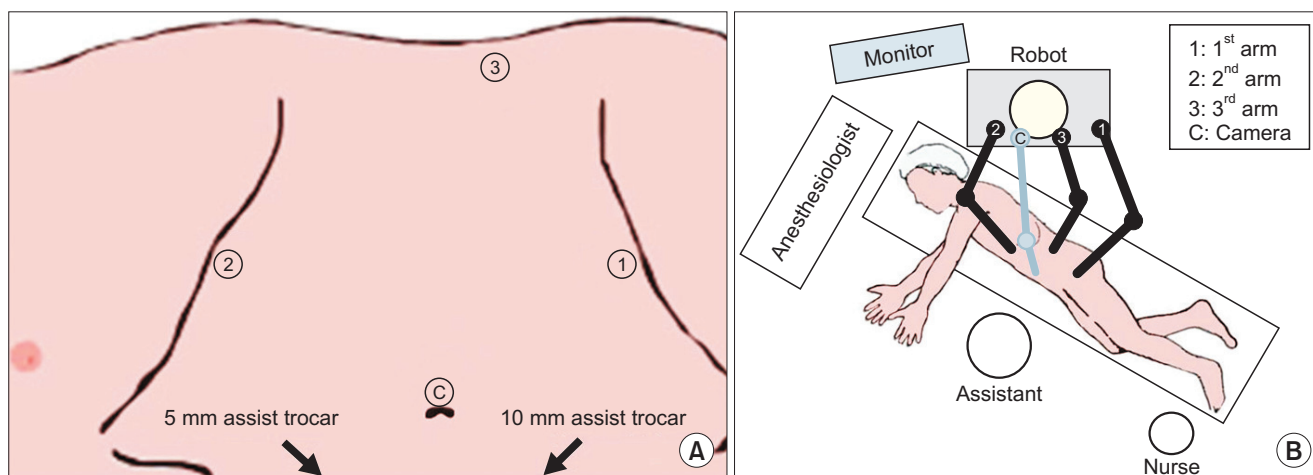


Fig. 2. (A) Port placement (C, camera port; 1, first robotic arm; 2, second robotic arm; 3, third robotic arm). (B) Robot dock, assistant, and nurse positioning.

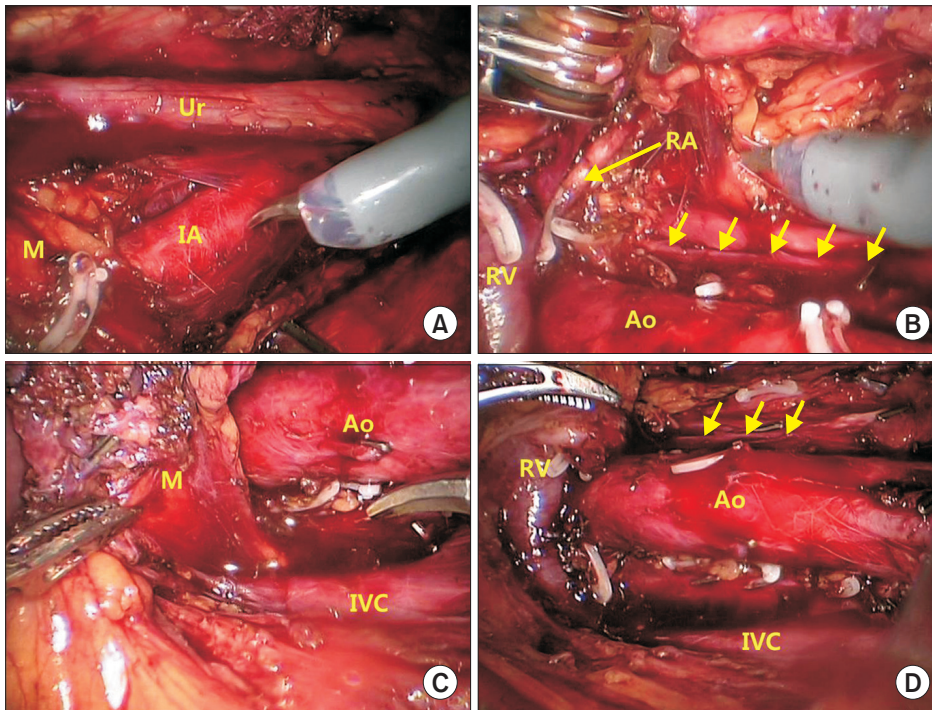


Fig. 3. Images from robot-assisted laparoscopic retroperitoneal lymph node dissection. First, the retroperitoneal space was exposed. (A) Lymph nodes were dissected from the level of the common iliac artery. (B) Dissection was continued to the hilar area. All of the paraaortic lymph nodes were removed. (C) Interaortocaval lymph nodes, which were not found on the previous computed tomography, were detected and removed. (D) After the removal of whole lymph nodes, skeletonized great vessels were detected. Yellow arrows on panels B and D indicate the sympathetic nerve chain along the lateral border of the aorta. Ur, ureter; M, mass; IA, common iliac artery; RA, renal artery; RV, renal vein; Ao, aorta; IVC, inferior vena cava. Scan this QR code to see the accompanying video, or visit www.kjuurology.org or <http://youtu.be/CLiPJHAQyCc>.

between the lymph nodes and great vessels as a result of chemotherapy. Postganglionic sympathetic fibers were detected and preserved to maintain ejaculatory function. Multiple aorto-caval lymph nodes were also observed (Fig. 3C) and were all dissected carefully by using Hem-o-lok clips and small metal clips. The skeletonized aorta and inferior vena cava were observed (Fig. 3D). All of the resected lymph nodes were placed in an EndoCatch bag. A drain tube and a Foley catheter were inserted, and the surgery was completed.

The total operative time, including console time, was 420 minutes. There were no postoperative complications. The Foley catheter was removed on the first postoperative day, and the patient was discharged on the fourth postoperative day. Pathology revealed a count of 20 lymph nodes, 2 of which showed a metastatic immature teratoma. The patient received two cycles of chemotherapy with etoposide and cisplatin. At the time of this writing, his laboratory tests were within normal limits, and there was no evidence of metastasis on radiologic examination (Fig. 1C). Furthermore, the patient had not complained of a decreased amount of semen or a dry ejaculation.

DISCUSSION

Chemotherapy with a cisplatin-based regimen is the initial approach for the treatment of clinical stage IIC or III NSGCTs. However, RPLND is indicated when teratomatous components are found in the testicular mass, in-

complete remission is confirmed, or retroperitoneal masses remain without increased tumor markers after primary chemotherapy [6]. Postchemotherapy RPLND provides both staging and therapeutic benefits. However, the procedure of conventional open RPLND is difficult, and a previous study has reported considerable morbidity that results in a long recovery time and a large incision [7].

With the development of minimally invasive techniques, many efforts have been made to perform urologic surgeries with laparoscopy, including RPLND. Since 1992, when the first case of L-RPLND for the treatment of a clinical stage I germ cell tumor of the testis was reported, multiple series of L-RPLND have been reported. Such studies concluded that, although the procedure is difficult and the learning curve must be overcome, L-RPLND is feasible even for postchemotherapy NSGCT patients with residual masses [1,7]. Nonetheless, L-RPLND seems to have the critical limitation of being an extremely difficult procedure. High conversion rates have been reported in other studies, and minor perioperative complications such as lymphoceles, chylous ascites, vascular lesions, and bowel lesions have also been described [8,9].

The first report of R-RPLND for clinical stage I NSGCT was published in 2006 [2]. Since then, there have been a few studies of R-RPLND for the treatment of clinical stage I testicular tumors. Using a robotic system, physicians can more easily and safely perform RPLND compared with L-RPLND. Indeed, the da Vinci surgical system

(Intuitive Surgical, Sunnyvale, CA, USA) facilitates three-dimensional and expanded visualization so that much more delicate procedures can be performed, especially during the detachment of lymph nodes near the great vessels or for nerve preservation [10]. For these reasons, all previous reports on R-RPLND have concluded that R-RPLND is not only safe and beneficial with regard to cosmetics, but also results in a similar oncologic outcome compared with open or L-RPLND [4,10]. However, many studies were limited to cases of clinical stage I NSGCTs, and there has been only one report of R-RPLND in postchemotherapy NSGCT patients or in those with clinical stage II or higher disease [5]. In that previous study, although patients treated with postchemotherapy R-RPLND showed a higher rate of complications and open conversion with longer operative times than did patients without preoperative chemotherapy, the lymph node yield, estimated blood loss, and postoperative hospital stay were similar. The investigators reported similar lymph node positivity compared with many open RPLND series. Additionally, the authors described less estimated blood loss and a shorter length of hospital stay compared with a large cohort of open RPLND cases.

In this report, we present a case of R-RPLND performed for postchemotherapy treatment of an NSGCT patient with initial clinical stage IIIb disease. To our knowledge, there have been no reports of R-RPLND in Korea. We found that R-RPLND allowed for meticulous and clear dissection with excellent vision. All masses, even though they adhered to the great vessels as a result of previous chemotherapy, were eliminated successfully. However, dissection of lymph nodes from adjacent organs including great vessels was a time-consuming procedure and we had to concentrate so as not to injure great vessels. When the mass was severely adhering to adjacent organs, we used small clips and then cut with scissors. We always kept in mind not to dissect the lymph nodes by force. In addition, during the operation, we prepared to open in case of emergency such as injury to the aorta. Another advantage of R-RPLND was that owing to the improved field of vision and delicate motion of the robot arms, the postganglionic sympathetic chains were easily preserved. We believe that R-RPLND has many advantages, such as treatment of difficult cases that would be impossible with an open or laparoscopic technique. However, our findings cannot be generalized to all urologists because this is a preliminary report, and all of the procedures were performed by a single surgeon with extensive experience in oncologic radical surgeries and robotic surgeries. Additional long-term studies with numerous cases are needed to establish R-RPLND as a reasonable treatment option.

In conclusion, we have described the first case of postchemotherapy NSGCT with initial stage IIIb disease that was successfully treated by R-RPLND. The robot system facilitated delicate and secure dissection of lymph nodes and remnant masses. Therefore, R-RPLND offers an excellent oncologic and functional outcome with great cosmetic benefit.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

SUPPLEMENTARY MATERIALS

An accompanying video can be found in the 'urology in motion' section of the journal homepage (www.kjuurology.org). The supplementary data can also be accessed by scanning a QR code located on the Fig. 3 of this article, or be available on YouTube (<http://youtu.be/CLiPJHAQyCc>).

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