

Extraperitoneal Laparoscopic Radical Prostatectomy with Handheld Articulating Laparoscopic Instruments Driven By Robotic Technology

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Abstract

Robotic assisted radical prostatectomy (RARP) is a popular current minimally invasive surgical treatment option for organ confined prostate cancer (PCa). We recently very well know its benefits in terms of fully articulating robotic arms and three-dimension (3D) vision. However, cost of the RARP is the main limitation. Laparoscopic radical prostatectomy (LRP) has been still in usage for its minimally invasive features, but it is a very complex procedure, has negative effects on surgeons' ergonomics, and has limited vision on 2D. At his point, LRP with articulating devices and 3D vision is logical. We here reported an extraperitoneal LRP case with with articulating laparoscopic instruments (Kymerax®, Terumo, Hatagaya, Tokyo, Japan) with 3D visualizing system (Viking Systems, La Jolla; CA). According to our best, this is the first extraperitoneal LRP via using this set, in published literature.

Keywords: Laparoscopy; prostate cancer; robotics; surgical equipment.

Radical prostatectomy (RP) is backbone of the surgical treatment for organ confined prostate cancer (PCa) [1]. The fascinating development in endourology provided improvements in minimally invasive surgical modalities. Laparoscopic and robotic RP are the standard of care in advanced clinics worldwide. The very well-known advantages of robotic assisted radical prostatectomy (RARP) in terms of fully articulating devices, three-dimension (3D) optical magnification, and being less invasive have been published [2]. However, cost of RARP is still major problem. On the other hand, laparoscopic radical prostatectomy (LRP) stands out with reduced cost, but long learning curve, limited ergonomics, being complexity of the procedure, with two-dimensional (2D) optic system are the essential problems in LRP [3]. In view of these, LRP with articulating devices and 3D visualizing system is logical and may be an

alternative to RARP for overcoming problems in LRP. We here reported an extraperitoneal LRP case with articulating laparoscopic instruments (Kymerax®, Terumo, Hatagaya, Tokyo, Japan) with 3D visualizing system (Viking Systems, La Jolla; CA). According to our best, this is the first case of LRP with this set.

Case Report

A 51-years-old man admitted with lower urinary tract symptoms to urology outpatient clinic. After detailed physical and laboratory examinations, the prostate specific antigen was 8ng/dl. Then ultrasound guided prostate biopsy (prostate volume was 70cc in ultrasound) was performed in 12 cores and pathology reported PCa with Gleason score 3+3=6 in 2 cores from left side of prostate. The patient has no previous medical and/or history. The patient was diag-

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nosed as cT1c PCa and underwent extraperitoneal LRP with operation set mentioned above after signing the informed consent form.

Surgical Technique

The patient was taken to tredelenburg position with 10-20 degrees under general anesthesia. The extraperitoneal approach was used and the traditional trocar placement was applied [2]. Then, retzius was dissected with articulating instruments (Kymerax, Terumo; Japan) (Fig. 1a, b) under 3D HD Visualization System (Viking Systems, La Jolla; CA, USA). The bladder neck was dissected in manner of bladder neck sparing surgical technique (Fig. 2a) [4]. Then, periprostatic fascia was dissected via using bilateral nerve sparing technique (Fig. 2b). Bilateral vas deferentia was transected and then dorsal venous complex was sutured and cut. At the end of procedure urethra was dissected and cut (Fig. 2c). A new urethral catheter was inserted and urethro-vesical anastomosis was completed with V-Loc™ 180 absorbable Wound Closure Device (Covidien, Minneapolis, MN) (Fig. 2d). Watertight of the anastomosis was checked by filling

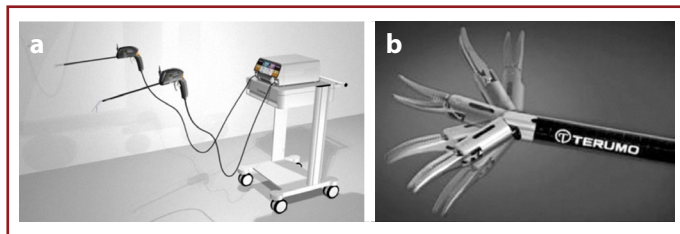


Figure 1. (a, b) The Kymerax system. A. The KYMERAX System is comprised of a console, handles, and interchangeable instruments. B. The articulation and rotation features of instrument's tip.

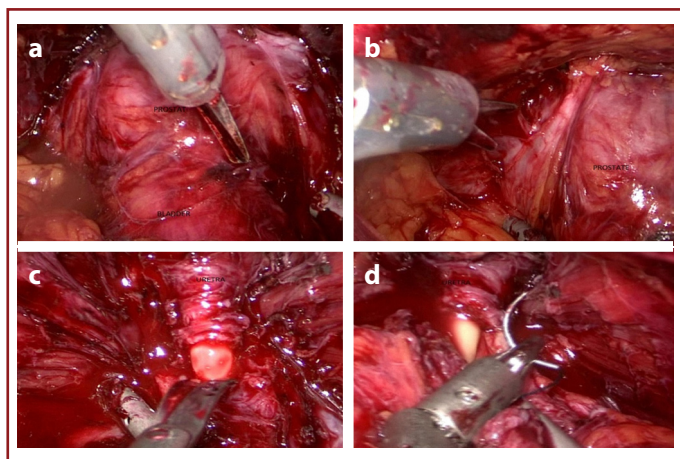


Figure 2. (a-d) Extraperitoneal laparoscopic radical prostatectomy was successfully performed with Kymerax articulating devices under three-dimension vision. (a) Dissection of bladder Neck, (b) Opening endopelvic fascia, (c) Dissection of prostate's apex and cutting urethra, (d) Urethrovesical anastomosis.

150 ml saline. The rectum was also checked by blowing 50 cc air from rectal catheter for injuries. Finally, the operation specimen was taken in to endobag TM (Covidien, Minneapolis, MN) and drainage catheter was inserted in operation field. Neither preoperative and perioperative, nor postoperative complication was occurred. Estimated blood loss was 50 cc and operation time was 130 min. The drainage tube was removed on the 2nd day and urethral catheter was removed 7th day of surgery.

Discussion

The long learning curve, traditional non articulating devices, 2D visualizing system and also complexity of the RP procedure are the overriding difficulties in LRP. The RARP of course can overcome these. However, cost of the procedure is the main limitation for RARP. Thus, LRP with 3D visualizing system with articulating devices is reasonable. However, there is no published report on LRP with this set. Kymerax (Kymerax, Terumo, Japan) has been recently introduced in our community. Its system consisted of a console, handles, and interchangeable instruments. Up to two handles can be connected to the console, which provides power to the motors located within the handle component of the system. These motors are activated by the user through the manipulation of the buttons and controls of the handle interface, and allows for rotation and yawing motions of the instruments' tips. The motors for the instruments rotation and yawing speed can be adjusted from 1 to 5 (slow to fast) within the console. The four available instruments attach to the handle component, are 8.8 mm in diameter and include a Monopolar scissors, Maryland dissector, needle driver, and monopolar L-hook. These articulating facilities of Kymerax provided us to dissect and cut tissues easier than traditional laparoscopic devices. Hackethal et al reported similar operation set in laparoscopic hysterectomy. Furthermore, they stated that Kymerax system is more ergonomic than traditional laparoscopic set with traditional devices [5]. However, this is the first case of extraperitoneal LRP with Kymerax, we experienced parallel findings to them. In addition, LRP is one of the most difficult surgical modality in urologic laparoscopic procedures. This report can be proof of Kymerax's the usefulness in difficult urological surgical modalities. We know that the Kymerax system with 2 articulating laparoscopic devices cannot take place of 4 armed robots. However, it can be just an alternative and this system is seemed like more comfortable than traditional laparoscopic devices. We are sure that there is needed more studies on comparing ergonomics of Kymerax with traditional devices in laparoscopic proce-

dures, in future researches.

On the other hand, we previously reported benefits of 3D visualizing system in LRP [6]. In the present report we used same 3D setting with Kymerax. This operation set can provide surgeons more anatomical details. Additionally, to perform suture was easier than traditional operation set with 2D. We could experience this notably during urethra-vesical anastomosis. Hruba et al. [7] reported that Kymerax system showed remarkable advantages over standard instruments in standard dry lab settings and could be adapted quickly and easily. In the present case, our surgeon (S.A.) and assistants easily adapted Kymerax system, however, our surgeon has been experienced with Kymerax in other urologic laparoscopic procedures.

Conclusion

This is the first extraperitoneal LRP case with Kymerax using 3D visualizing system. According to our initial experience, this operation set is very useful and can be easily adapted. Thus, usefulness and easy adaptation to Kymerax in laparoscopic urologic difficult procedures can be feasible. However, there is needed more studies on this issue.

Informed Consent: Approval was obtained from the patients.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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