Doi: 10.4274/jus.2016.02.018
J Urol Surg 2016;2:58-61

Robot-assisted Radical Prostatectomy: How I Do It

Nasıl Yapıyorum: Robot Yardımlı Radikal Prostatektomi

Cemil Uygur[1], Fethullah Gevher[2]

[1]*Anadolu Health Center, Clinic of Urology, Kocaeli, Turkey*
[2]*Medical Park Gaziosmanpaşa Hospital, Clinic of Urology, İstanbul, Turkey*

ABSTRACT

In this article, we describe surgical technique for robot assisted radical prostatectomy using the four-arm da Vinci robotic surgical system (SI, Intuitive Surgical, Sunnyvale, CA, USA). We have continually refined our technique to improve patient outcomes.

Keywords

Prostate cancer, radical prostatectomy, robot assisted laparoscopic surgery, sugical technigue

ÖZET

Bu makalede, dört kollu da Vinci robotik cerrahi sistemi (SI, Intuitive Surgical, Sunnyvale, CA, USA) kullanarak robot yardımlı radikal prostatektomi tekniğimizi tanımlıyoruz. Daha iyi sonuçlar elde edebilmek için cerrahi tekniği tekniğimizi sürekli geliştirme çabası içindeyiz.

Anahtar Kelimeler

Prostat kanseri, radikal prostatektomi, robot yardımlı laparoskopik cerrahi, cerrahi teknik

Patient Positioning

A silicone pad is put over the operating table. The patient is placed over this pad in supine position. Once the patient is under general anesthesia, the arms are tucked in with foam rolls in the palms of the hands and shoulder braces are placed in order to prevent patient slipping. The patient's legs are placed in padded boot stirrups in a low lithotomy position. The distance between the legs must be enough to allow the robot docking. A 20Fr Foley catheter is installed to drain the bladder. Ultimately, abdominal, genital and perineal areas are scrubbed followed by sterile draping. After these preparations and port placement have been completed, the patient is put in the Trendelenburg position in which the patient is inclined at 30 degrees and robot is docked (Figure 1).

Port Placement

A standard 5-port placement is done. Of these, 4 are used for the robotic arms (three 8-mm metallic robotic trocars which are bonded to number 1, 2 and 3 robotic arms and a 12-mm trocar for the robotic camera). There is also a 12-mm trocar for the assistant usage. A 12-mm incision, 1-2 cm above the umbilicus is done. Pneumoperitoneum is established using

Figure 1. Trendelenburg position

Figure 2. Port placement; A) Insertion of the Veress needle, B) Port placement

Correspondence
Cemil Uygur MD, Anadolu Health Center, Clinic of Urology, Kocaeli, Turkey
E-mail: cemil.uygur@gmail.com **Received:** 28.04.2016 **Accepted:** 28.04.2016
Journal of Urological Surgery, published by Galenos Publishing.

a Veress needle through this incision. The insufflation is started at 1-2 L/min for a total of 3-5 L. An intraperitoneal pressure of 16 mmHg is then achieved. Then, the Veress needle is retrieved and a 12-mm trocar is placed. Later, primary inspection of the intraperitoneal cavity is performed to ensure that no injuries to the bowels or adjacent organs have occurred and to verify the presence of adhesions. Other trocars are then placed under laparoscopic guidance on a slightly curved parabolic line. Two 8-mm robotic trocars are placed 1-2 cm below on each side of the camera port and 4-5 finger breadths lateral to the camera port. On the right side of the patient, a third 8-mm robotic trocar is placed lateral to and 1-2 cm below and 4-5 finger breadths from the other 8-mm robotic trocar. On the left side of the patient, the 12-mm assistant port is placed again 1-2 cm below and 4-5 finger breadths lateral to the 8-mm robotic port (Figure 2).

Surgical Technique

Step 1

Mobilization of the Colon: The colon and other parts of the bowels that are stitched to the pelvic wall are mobilized (Figure 3).

Step 2

Mobilization of the Bladder: Bilateral medial umbilical ligaments are cauterized and divided. The fourth arm prograsp is used to provide traction. The bladder is then liberated off the anterior surface of the abdominal wall. Dissection is made towards the avascular plane until reaching the pubic bone (Figure 4).

Step 3

Endopelvic Fascia Dissection: After removing the layer of fat over the prostate and endopelvic fascia, better visualization of the puboprostatic ligaments, the dorsal venous complex and the junction between the bladder and the prostate is allowed. Endopelvic fascia is incised with the monopolar scissors towards to the prostate apex. The levator ani muscle fibers are removed by blunt dissection from the prostate (Figure 5).

Step 4

Apical Dissection: Bilateral levator ani muscle fibers are removed from both sides of the prostate apex using blunt dissection. Thereafter, pubo-prostatic ligaments are cut (Figure 6).

Step 5

Dorsal Vein Complex Ligation: The suture (using a 36-mm needle, 0 monocryl) is passed beneath the dorsal vein complex (DVC) and anterior to the urethra. A total of two suture ligations are put in place (one distal and another more proximal) (Figure 7). At this step, the DVC is not yet cut.

Step 6

Bladder Neck Transection: The bladder is hold and stretched backwards using the fourth arm prograsp. After identification of the proper plane of dissection, the bladder neck is divided horizontally using monopolar cauterization until the urethral catheter is seen. The Foley catheter is then deflated. While external counter traction is exerted on the penile meatus via the Foley catheter by the bedside assistant, the prostate is suspended anteriorly towards the abdominal wall by grasping the internal tip of the catheter and lifting it upwards (Figure 8). By this way, the posterior bladder wall is addressed. The detrusor fibers and mucosa are taken down using monopolar cauterization.

Step 7

Posterior Dissection, Exposure of the Seminal Vesicles and the Denonvillier's

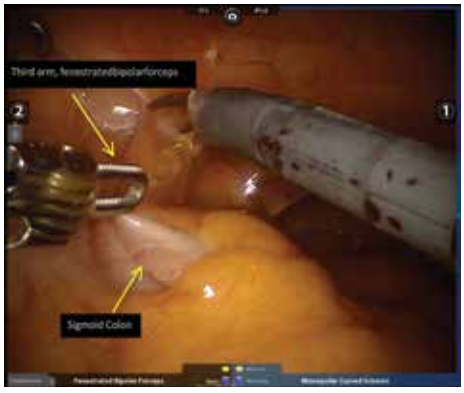
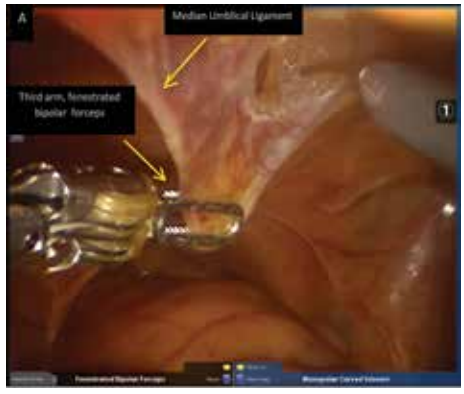


Figure 3. Mobilization of the colon



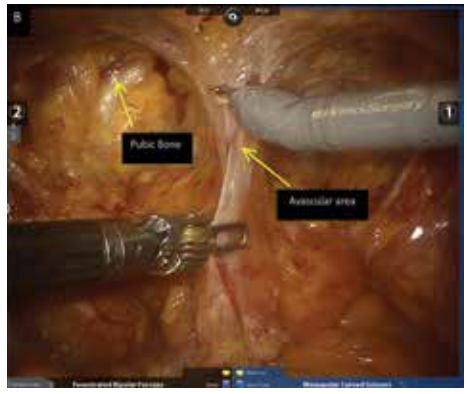


Figure 4. Mobilization of the bladder, A) Cauterization of the umbilical ligament, B) Dissection of the avascular plane

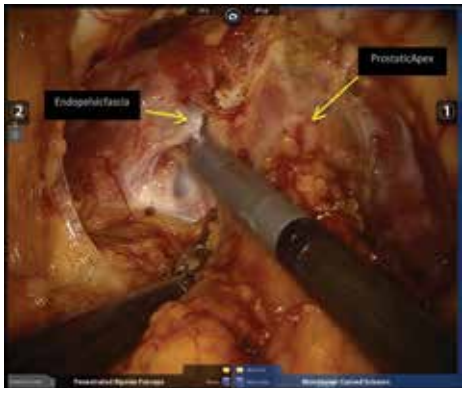


Figure 5. Incision of the endopelvic fascia

Figure 6. Apical dissection

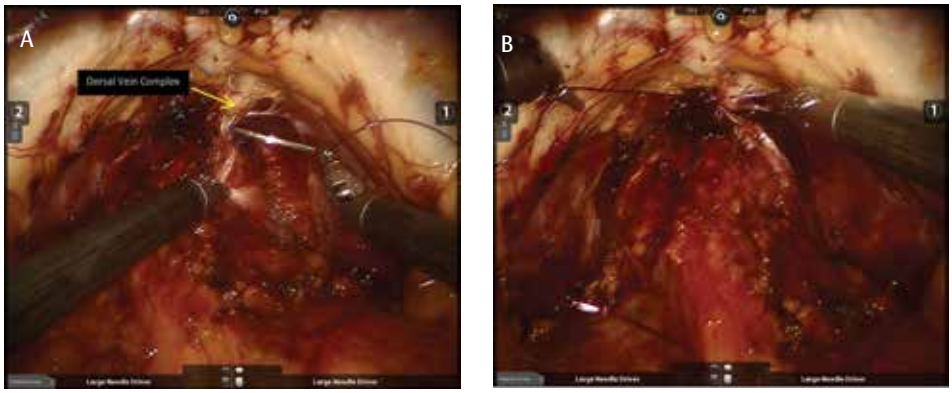


Figure 7. Dorsal vein complex ligation (A, B)

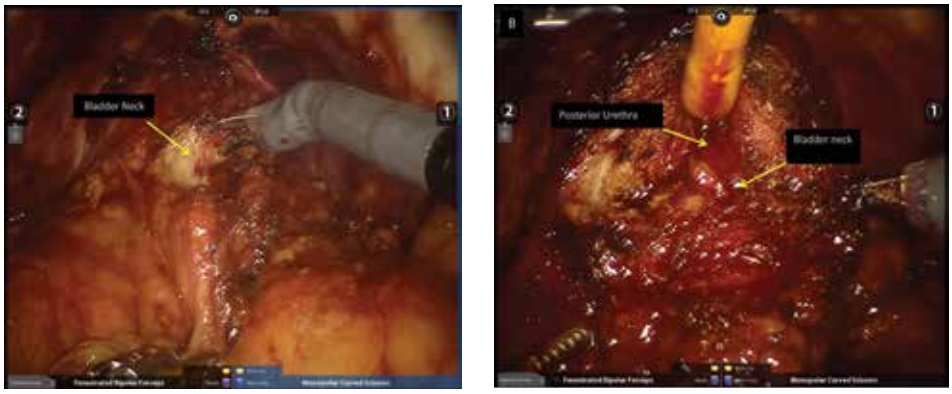


Figure 8. Bladder neck transection; A) Dividing the bladder neck horizontally, B) Prostate is suspended towards the abdominal wall

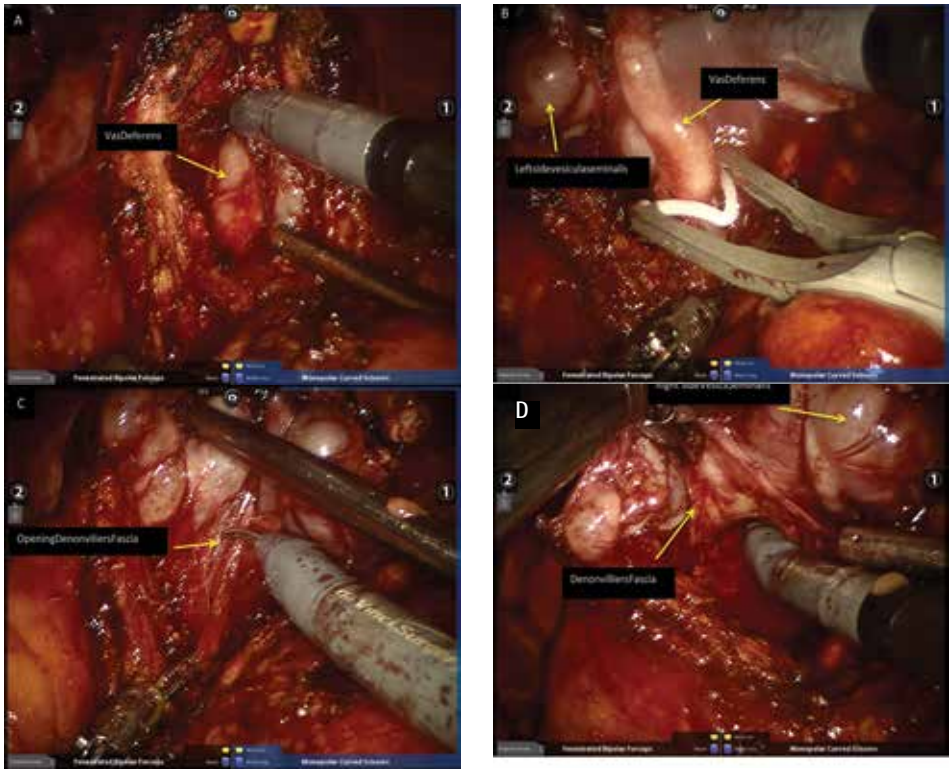


Figure 9. Posterior dissection, exposure of the seminal vesicles and the Denonvillier's fascia; A) The vas deferens and the accompanying vessels are exposed, B) The vas deferens are clipped and then divided, C) Seminal vesicle dissection is done, D) Deep posterior dissection is continued

Fascia: Bipolar graspers are used to dissect through and divide fibrovascular tissue to the desired plane. Through the dissection of the retroprostatic tissue, the vas deferens and the accompanying vessels are exposed. A monopolar scissor is used to free adjoining vessels. The vas deferens are then divided bilaterally. Afterwards, in order to dissect the seminal vesicles, the assistant provides upper traction of the vas deferens and downward traction with the suction tip. Blunt dissection of the fibrovascular tissue overlying the surface of the seminal vesicle is done. After mobilization of the seminal vesicle, it is grasped by the bipolar instrument and elevated. Rigorous blunt dissection is continued to allow complete dissection of the seminal vesicle. Deep posterior dissection is then continued to the level of Denonvillier's fascia (Figure 9).

Step 8

Neurovascular Bundle Preservation: It is mandatory to use an athermal dissection technique in the proximity of the nerve bundles also to limit the amount of stretch. Lateral pedicles are dissected afterwards, clipped by the assistant using a medium 10-mm Weck Hem-o-lok clip (Figure 10). Once the clips are placed, sharp scissor cutting between them liberates the tissue. After releasing the prostate from its vascular pedicles and completing the posterior plane dissection by dissecting through the Denonvillier's fascia to the prostate apex, small stroking movements using the back end of the monopolar scissor are made to liberate the tissues. The avascular plane is followed laterally along the prostatic capsule and antegrade dissection can be carried out along this plane from the base to the apex of the prostate.

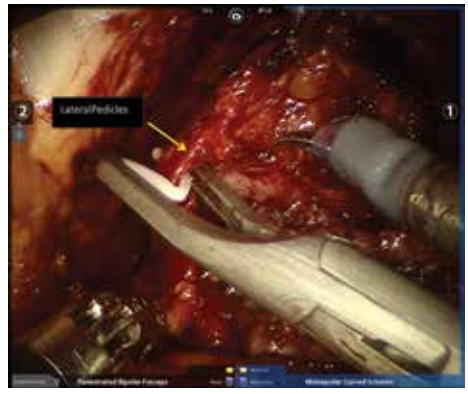


Figure 10. Neurovascular bundle preservation

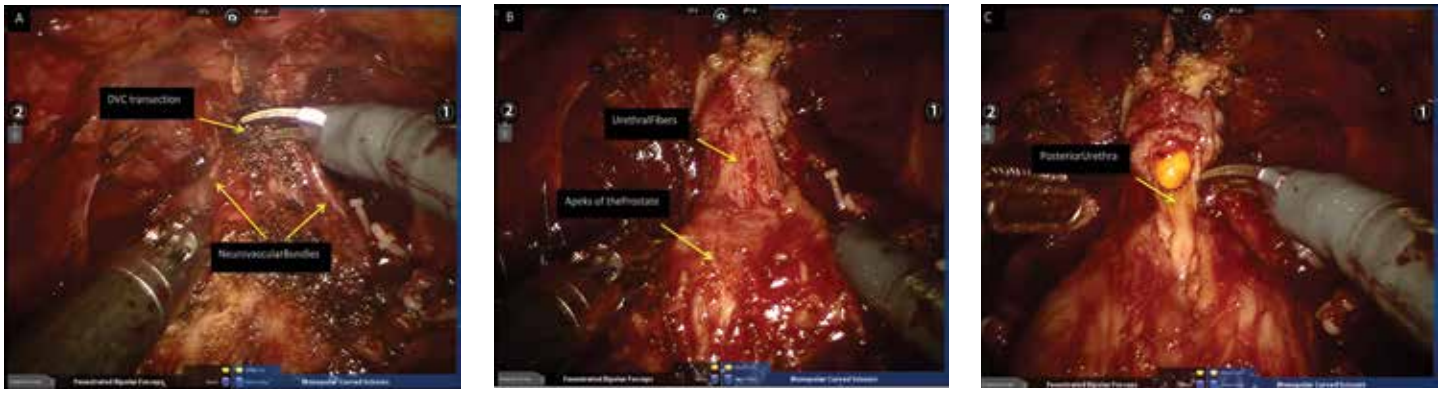


Figure 11. Transection of the dorsal vein complex and urethral division; A) Transection of the dorsal vein complex, B) Urethra, C) Division of the urethra

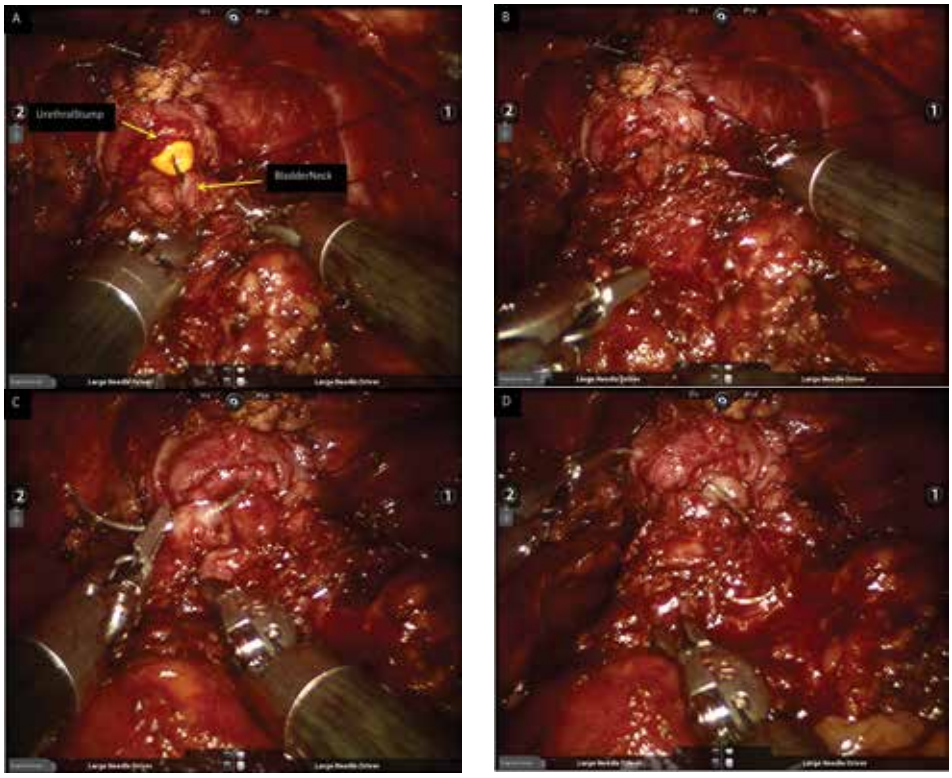


Figure 12. Continuous vesico-urethral anastomosis, A) The 'outside-in' (bladder), B) 'Inside-out (urethra) bites along the right side of the vesicourethral anastomosis, C) The 'outside-in' (bladder), D) 'Inside-out (urethra) bites along the left side of the vesicourethral anastomosis

Step 9

Transection of the Dorsal Vein Complex and Urethral Division: Starting beneath the DVC, monopolar scissors are used to divide the tissue. After transection of the DVC, the urethra is then skeletonized to delineate the boundary of the end of the prostate and the released neurovascular bundles. The anterior urethra is cut until visualization of the Foley catheter is possible. The Foley catheter is withdrawn to expose its tip. The remaining posterior wall is then cut sharply until the prostate is liberated (Figure 11). The prostate is placed in an endo-catch bag.

Step 10

Continuous Vesico-Urethral Anastomosis: The anastomosis is done using two different colored 2/0 monocryl sutures. The two sutures are bonded together. Both suture needles are anchored at the 6 o'clock position of the bladder. Detrusor muscve and bladder mucosa are grasped and passed through with the needle. While the assistant introduces the Foley catheter, the needles are positioned toward the urethra. This time, both sutures are passed through the posterior side of the urethra at the same 6 o'clock position. The sutures are then pulled backwards with repetitive, short pulls until the bladder neck mucosa is adjacent to the urethral stump with no gap. The 'outside-in' bites along the bladder and the 'inside-out' urethral bites are continued in a running fashion from 6 to 12 o'clock on the both sides, independently assuring adequate tension (Figure 12). The two sutures are then ligated together; the knot is placed above the bladder and not over the vesico-urethral anastomosis (VUA). The integrity of the VUA is verified with 180 cc saline instilled in the bladder. The needles are snapped out and removed from the body by the assistant.

Step 11

Case Completion and Postoperative Considerations: No drain is put if it is not mandatory. The specimen within the endo-catch bag is extracted through extension of the assistant trocar site. The fascial defect is then closed by 2/0 Vicryl sutures. The skin defects are closed with a subcuticular absorbable suture (4/0 monocry). Closure of the fascial defects for the 5 mm and 12 mm trocar sites are not needed. Regular diet is offered the evening of the surgery and patients are mobilized out of bed within hours of surgery. The Foley catheter is placed to a leg-bag upon discharge. Removal of the Foley catheter is planned on postoperative day 7.