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Original Article

Robotic perineal radical prostatectomy and robotic pelvic lymph node dissection via a perineal approach: The Tugcu Bakirkoy Technique

Robotik perineal radikal prostatektomi ve perineal yaklaşımla robotik pelvik lenf nodu disseksiyonu: Tugcu Bakırköy Tekniği

Volkan Tuğcu[1], Oktay Akça[2], Abdulmuttalip Şimşek[1], İsmail Yiğitbaşı[1], Mustafa Gürkan Yenice[1], Selçuk Şahin[1], Ali İhsan Taşcı[1]

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ABSTRACT

Objective: To describe The Tugcu Bakirkoy robotic perineal radical prostatectomy and pelvic lymph node dissection technique, and present the results of seven patients.

Material and methods: We performed seven robotic perineal radical prostatectomy and pelvic lymph node dissection operation using Da Vinci Xi HD Surgical System (Intuitive Surgical, Inc., Sunnyvale, California, USA) on single Gel-port platform. The operation is completed in 4 stages: stage 1 open perineal dissection and gel port placement, stage 2 robotic perineal radical prostatectomy, stage 3 robotic pelvic lymph node dissection, stage 4 vesico-urethral anastomosis. In addition to describing the operation technique step by step, we aimed to present the perioperative and postoperative findings of the seven patients who underwent The Tugcu Bakirkoy Technique.

Results: All operations were successfully completed without any complications in fully the robotic procedure by a single surgeon. Demographic data of the patients were as follows: Mean age (62.1±8 years), mean body mass index (28.2±0.7 kg/m^2), mean prostate specific antigen value (10.7±3 ng/mL), and mean prostate volume (64.2±15.3 cc). Mean operative time (184.1±20.2 mins), blood loss (64.2±15.3 cc), hospitalization time (2.1±0.6 days), and time to withdrawal of the urethral catheter (7.8±0.8 days) were also estimated. According to the pathology results, lymph node metastasis was detected in 3 patients while the surgical margin was positive in one.

Conclusion: We demonstrated for the first time that a new The Tugcu Bakirkoy robotic perineal radical prostatectomy technique which was previously tested in a cadaveric model, can be safely applied for the first time in vivo, and presented our results. On the basis of this, for problems that can not be overcome by traditional methods, this method is a good alternative as a way out. In this regard, it is necessary to carry out advanced studies so that this method can be applied to daily practice.

Keywords: Dissection; lymph; node; perineal; prostatectomy; robotic.

ÖZ

Amaç: Tuğcu Bakırköy Tekniği olarak adlandırdığımız robotik perineal radikal prostatektomi ve pelvik lenf nodu disseksiyonu tekniğini tanımlamak ve 7 hastada uyguladığımız bu tekniğin sonuçlarını sunmaktır.

Gereç ve yöntemler: Kliniğimizde Da Vinci Xi HD Surgical System (Intuitive Surgical, Inc., Sunnyvale, California, ABD) single Gel-port platform kullanılarak 7 hastaya robotik perineal radikal prostatektomi ve pelvik lenf nodu disseksiyonu operasyonu gerçekleştirildi. Operasyon 4 aşamada yapılmaktadır. Birinci aşama açık perineal disseksiyon ve Gel-port yerleştirilmesi, ikinci aşama robotik sistemin docking yapılıp robotik perineal radikal prostatektomi yapılması, üçüncü aşama robotik pelvik lenf nodu disseksiyonu yapılması ve dördüncü aşama veziko-üretral anastomozun yapılmasıdır. Bakırköy Tekniği'nin uygulandığı 7 hastanın peroperatif ve postoperatif bulgularını sunmayı amaçladık.

Bulgular: Bu tekniğin uygulandığı 7 hastada tüm operasyonlar tek cerrah tarafından herhangi bir komplikasyon gerçekleşmeden tamamen robotik prosedür ile yapıldı. Preoperatif, peroperatif ve postoperatif verilere baktığımızda 62,1±8 yaş, 28,2±0,7 kg/m^2, 10,7±3 ng/mL, 41±11,1 cc, 184,1±20,2 dakika, 64,2±15,3 cc, 2,1±0,6 gün, 7,8±0,8 gün sırasıyla ortalama yaş, ortalama vücut kitle indeksi, ortalama PSA değeri, prostat volümü, operasyon süresi, ortalama kan kaybı, ortalama hospitalizasyon, ortalama üretral kateter çekilme süresidir. Postoperatif patoloji sonuçlarına göre 3 hastada lenf nodu metastazı saptanırken bir hastada cerrahi sınır pozitif olarak geldi.

Sonuç: Robotik sistemle daha önceden kadavra modelinde uygulanan bir tekiniğin kliniğimizde ilk defa canlıda güvenle uygulanabileceğini ortaya koyduk, canlıda ilk kez uygulanan bu tekniği Tuğcu Bakırköy

[1]Department of Urology, University of Health Sciences, İstanbul Bakırköy Dr. Sadi Konuk Training and Research Hospital, İstanbul, Turkey

[2]Department of Urology, University of Health Sciences, Kartal Dr. Lütfi Kırdar Training and Research Hospital, İstanbul, Turkey

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Correspondence: Volkan Tuğcu
E-mail: volkantugcu@yahoo.com

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Tekniği olarak adlandırdık. Bu yöntem klasik yöntemlerle üstesinden gelinemeyecek durumlarda önemli bir alternatif teknik olacaktır. Bu yöntemin günlük pratiğe yaygın olarak girmesi için çok fazla sayıda hastaya bu tekniğin uygulanması ve ileri düzey çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Disseksiyon; lenf; nodu; perineal; prostatektomi; robotik.

Introduction

Walsh defined anatomic radical prostatectomy (RP) which was once accepted as standard therapy. However radical prostatectomy has not been widely used in daily practice.[1] because of its high morbidity and mortality rates. Nowadays many different methods such as open, laparoscopic and robotic RPs have been applied with their various modifications. These various methods have been diversified and focused on these new techniques to reduce morbidity and mortality; so still unknown number of new techniques have been introduced and put into practice. Kaouk et al.[2,3] described the technique of robot- assisted radical perineal prostatectomy (r-RPP) model on cadavers and reported the results of first four patients. Tugcu et al.[4] initially applied this technique to 15 patients and reported that this technique could be applied safely by presenting their results. Based on the results of the patients in the series, it was found that this method provides great advantages in patients with high body mass index, which was a major handicap for prior abdominal surgeries. Although r-RPP was performed through a narrow field of vision, it can be safely applied to patients with large prostate and middle lobe hyperplasias. When compared with commonly applied other techniques in practice, this technique raises the question of whether it can be applied in cases with locally advanced cancers or pelvic lymph node metastases with a wide range of indications such as other techniques. From this point of view, it is conceivable that this is an obstacle that restricts application of this technique despite its many advantages. In the light of the reported information in the literature, Ramirez et al.[5] performed r-RPP in 3 male cadaver models and performed pelvic lymph node dissection in 2 of them. According to their report, no organ, vessel or nerve injuries were encountered. No prostatic capsulotomies were identified on the prostatic specimens. All cases were performed with no need for conversion to conventional multiport robotic technique or open surgery. All cases were performed with excellent visualization without clashing of instruments. Pathological assessment of lymph node count was not performed, representing a limitation of this study. In our group, before starting to dissect pelvic lymph node, we worked out on human cadaveric models. Patients in our series were staged prior to surgery and indication of pelvic lymph node dissection was estimated according to the Partin normogram and we performed r-RPP and pelvic lymph node dissection in 7 patients. We have given the name of The Tugcu Bakırkoy technique to the application of this technique *in vivo*.

Material and methods

The study was approved by the local ethics committee and written informed consent was taken from all patients. Since November 2016, we have performed 47 r-RPPs in Bakırköy Dr. Sadi Konuk Training and Research Hospital. In addition to 7 of these patients, we performed a pelvic lymph node dissection. After excluding the locally advanced disease with multiparametric magnetic resonance imaging, we performed bilateral robotic pelvic lymph node dissection with Da Vinci Xi HD Surgical System (Intuitive Surgical, Inc., Sunnyvale, Calif., USA) on single Gel-port platform in the patient with a risk of pelvic lymph node metastasis according to the Partin normogram. We aimed to describe this technique applied *in vivo* named The Tugcu Bakirkoy Technique and to share the peroperative, and postoperative findings of these seven patients, and management of this technique according to pathology results.

Surgical technique

Step1: Initial perineal dissection and single port placement
The patient is laid in the exaggerated lithotomy and 15^0 Trendelenburg position. A urethral catheter is placed and the bladder is emptied. A sterile glove is placed in the rectum and the sides of the glove are stitched to the perineal skin. Thus, we aim to avoid rectal damage by using digital rectal examination during perineal dissections. A 6 cm semilunar incision is made between both tuberculum isciiadicum. The perineal dissection is terminated when the dissection margin reaches to the membraneous urethra and the apex of the prostate is seen. Subcutaneous tissue laying under the incision borders is dissected deeply over the superficial perineal fascia to place the GelPOINT® (Applied Medical, Rancho Santa Margarita, CA, USA).

Step II: Robotic perineal radical prostatectomy
Once the robotic system is docked (Figure 1), dissection is started from prostate apex and extended to the lateral sides of the prostate and then deepened inferiorly to reveal the Denonvilliers' fascia covering the seminal vesicle compartment. Once the Denonvilliers' fascia is incised bilateral vas deferences are revealed, dissected and and cut. Seminal vesicles are completely dissected and freed. Then the membranous urethra is dissected and cut. The lateral prostatic pedicles are dissected and hemostatic control is achieved using Hem-o-Lock® Clips. After completing the lateral dissections of prostate bilaterally, the bladder neck is identified and incised with monopolar scissors. Once the bladder neck dissection is completed, the robot is undocked and the prostate is removed from the surgical field. Then the robotic system is redocked for bilateral robotic pelvic lymph node dissection.

Step III: Bilateral robotic pelvic lymph node dissection
After RP is completed and the prostate removed, pelvic lymph node dissection is performed before vesicourethral anastomosis. Initially, when the bladder is medialized, the levator ani muscles are lateralized to the contralateral side and the dissection is extended towards the cranial side of the perivesical area. After

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Figure 1. The docking of the three robotic arms

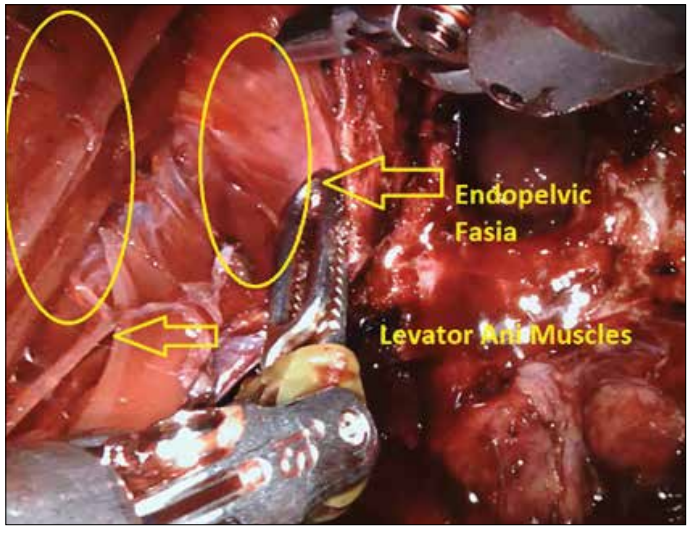

Figure 2. Dissection of endopelvic fascia

passing this stage, endopelvic fascia is revealed (Figure 2). After endopelvic fascia is gently dissected and medialized, the obturator fossa is exposed and dissection is expanded to this region. When the dissection is continued in this area, the obturator nerve is first visualized at the bottom and most lateral side. When we dissect towards more upwardly and medially, obturator venous ring may be visible. Obturator artery can be seen if dissection is extended to the lateral side of the obturator venous ring and into fatty planes (Figure 3). When the dissection is performed superiorly, the external iliac vein and the external iliac artery are dissected. The dissection is terminated when the ureteral crossing over the external iliac artery is reached. Thus, obturator lymph nodes and iliac lymph node groups are included in the dissection area (Figure 4). After completion of dissection of pelvic anatomical landmarks, pelvic lymph node excision is continued. Obturator lymph nodes are released and traced, and excision is performed by placement of the Hem-o-loc® clip for safety purposes (Figure 5). Iliac lymph nodes are released and traced, and excision is performed by placement Hem-o-loc® clip for safety purposes (Figure 6).

Step IV: Vesico-urethral anastomosis

After completing pelvic lymph node dissection, The two 4/0 V-Loc™ (Covidien, Mansfield, MA, USA) sutures are used in a running fashion starting from the Retzius side to rectal side of the bladder neck. The first suture is started at 12 o'clock on the bladder neck from outside to inside and then continued to the urethra from inside to outside in a clockwise fashion down to 6 o'clock. A second barbed suture is used in the same setting but in reverse clockwise fashion. Once the anastomosis is completed a 22 Ch urethral catheter is replaced. The bladder is filled with 200 cc saline to test the anastomosis for leakage. After observing the anastomosis is water tight, robotic system is undocked and a Jackson Pratt drain is placed before completion of The Tugcu Bakirkoy Robotic Perineal Radical Prostatectomy Technique.

Results

All operations were successfully completed without any complications wholly as a robotic procedure using Da Vinci Xi HD Surgical System (Intuitive Surgical, Inc., Sunnyvale, Calif., USA) on single Gel-port platform by a single surgeon. Preoperatively, mean age (62.1±8 years), mean body mass index (28.2±0.7 kg/m^2), mean prostate specific antigen (PSA) value (10.7±3 ng/mL), and mean prostate volume (41±11.1 cc) were calculated as indicated in parentheses. Three patients had history of major abdominal surgery. All patients have Charlson Comorbidity Index ≤2 points. The clinical stages of the patients were determined as of 4 patients was T2c (n=4), T1c (n=1), T2a (n=1), and T2b (n=1). The Partin normogram risk factor interval was calculated as 4.9 to 14 for patients. Mean operative time (184.1±20.2 mins), blood loss (64.2±15.3 cc), hospitalization time (2.1±0.6 days), and time to withdrawal of the urethral catheter (7.8±0.8 days) were also estimated. According to the pathology results, lymph node metastasis was detected in 3 patients while the surgical margin was positive in one patient. According to the results of the final histopathological examination , the pathology was downgraded in 1, and upgraded in 2 cases. Three patients who had lymph node metastasis were treated using hormonal therapy and surgical border was positive in one of

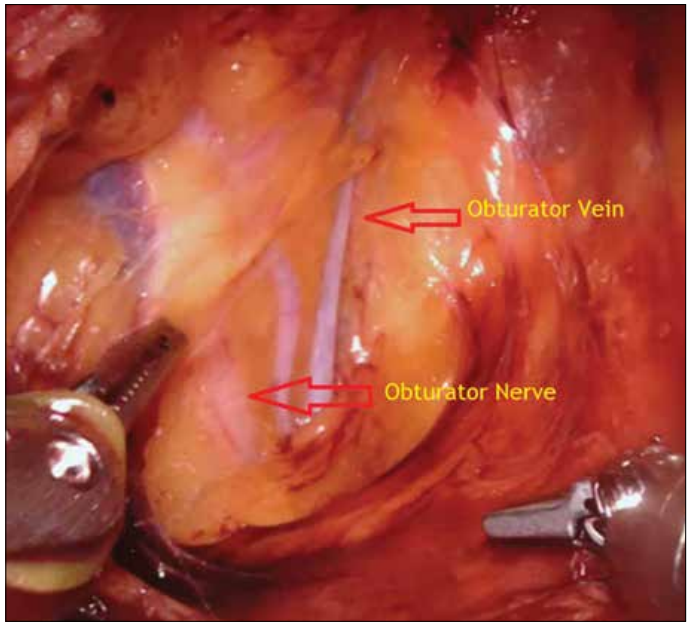

Figure 3. Dissection of obturator nerve and vein

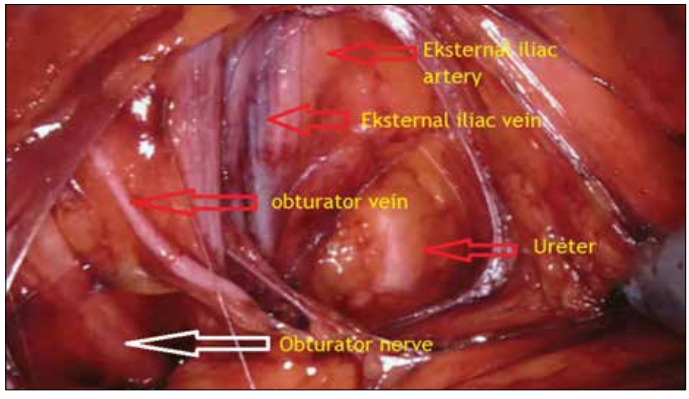

Figure 4. Dissection of İliac vessel up to cross ureter

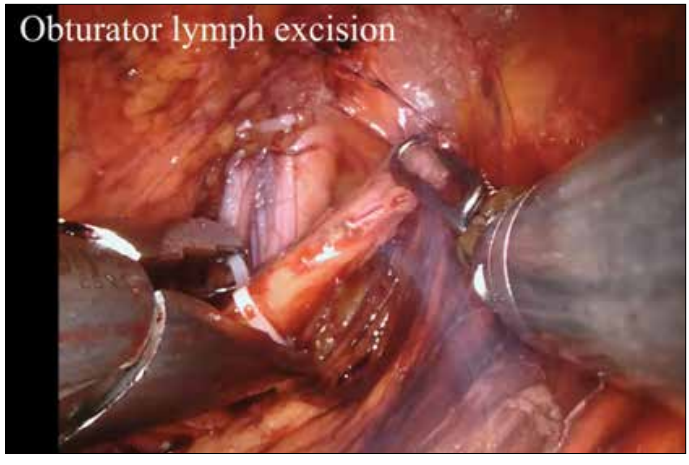

Figure 5. Obturator lymph node excision

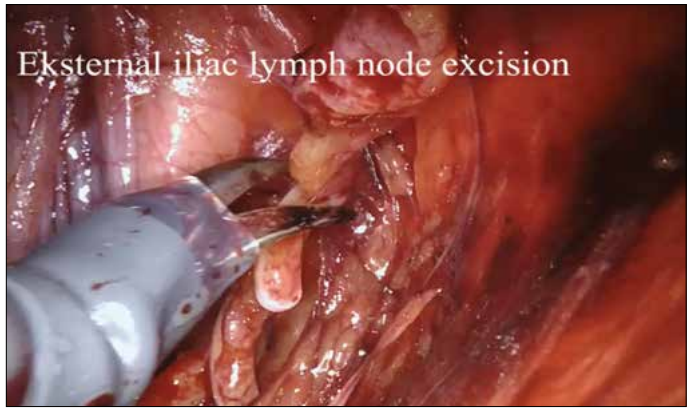

Figure 6. Iliac lymph node excision

these three patients. If PSA recurrence is detected in this patient, radiotherapy will be planned. There is no PSA recurrence for any patients. Table 1 summarised preoperative, peroperative and post-operative data of the patients.

Discussion

Today, with the development of technology, even surgery with high morbidity and mortality can be performed with minimally invasive techniques. Cosmetic results as well as the oncologic and functional results of major surgeries have become increasingly important for patients. The Tugcu Bakirkoy technique can make it possible to perform such a major surgery with minimal morbidity, and highly improved cosmetic results. According to the European Urological Guidelines, the lymph node biopsy sample in prostate cancer is essential for staging while it has no significant contribution to overall survival.[6] Unnecessary lymph node sampling can be avoided if the patient is preoperatively, and appropriately classified . If lymph node biopsy is indicated according to various nomograms, absolutely lymph node dissection should be performed so that the patient can be correctly evaluated and multimodal treatment can be performed in case of need.[7] The Tugcu Bakırkoy technique allows for dissection of the pelvic lymph node with less morbidity than other techniques and with superior cosmetic, and equivalent oncological results relative to other methods. This technique does not affect the intestines and there is no need to intervene intraabdominal adhesions developed due to previous surgery. Therefore the patient can return to the daily life earlies. In order to apply this method, extensive experience in robotic open, and laparoscopic surgery is required. Patient's pathology, comorbidity factors and surgical history should be evaluated appropriately and the most appropriate method should be applied for the patient. The Tugcu Bakırkoy technique is a new technique and we have demonstrated in this procedure that pelvic lymph node dissection can be performed safely *in vivo*. Thanks to the development of technology and performing greater number of operations with this technique, this technique will be gradually used in daily practice.

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Table 1. Preoperatve, peroperative and postoperative data

	Age	BMI	PS	CCI	PSA	PV	PrP	MMR	CST	PN	OT	BL	HT	PP	LM	CM
1st Case	60	29	Yes	2	13	25	3+4	Pirads IV	T2a	5.1	195	40	2	3+4	Negative	Negative
2nd Case	58	27	No	1	7.9	40	4+3	Pirads III	T1c	4.9	185	50	1	3+4	Negative	Negative
3rd Case	47	28	No	1	7.7	37	4+3	Pirads IV	T2b	14.5	200	60	2	4+3	Positive	Negative
4th Case	71	29	No	2	14.2	30	3+3	Pirads IV	T2c	5.2	170	70	2	3+3	Negative	Positive
5th Case	67	28	No	2	15.1	50	3+3	Pirads IV	T2c	5.1	180	70	2	3+3	Negative	Negative
6th Case	62	29	Yes	1	7.2	55	4+3	Pirads V	T2c	14	190	85	3	4+4	Positive	Negative
7th Case	70	28	Yes	2	10	50	3+4	Pirads III	T2c	6	200	75	3	4+3	Positive	Negative

BMI: body mass indeks (kg/m^2); PS: previous surgery; CCI: Charlson Comorbidity Index; PV: prostat volume (cc); PSA: prostate spesific antigen (ng/mL); PrP: preoperative pathology (Gleason score system); MMR: multiparametric magnetic resonance imaging; CST: clinical stage; PN: partin normogram (%); OT: operation time (minute); BL: blood loss (cc); HT: hopitalization (day); PP: postoperative pathology (Gleason score system); LM: lymph node metastasis; CM: surcical margin

In conclusion, we demonstrated for the first time that novel *in vivo* The Tugcu Bakirkoy Robotic Perineal Radical Prostatectomy Technique which was previously tested in a cadaveric model, can be safely applied, and presented our results. Accordingly for problems that can not be overcome by traditional methods, this method is a good alternative as a way out. In this regard, it is necessary to carry out advanced studies and this method can be applied to daily practice and publications are awaited as new results are obtained.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Health Science Universty Bakırköy Dr. Sadi Konuk Training and Research Hospital (2017/42).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - V.T., A.İ.T., İ.Y., A.Ş.; Design - A.Ş., İ.Y., M.G.Y., V.T.; Supervision - A.Ş., İ.Y., O.A., S.Ş., A.İ.T.; Resources - İ.Y., A.Ş., M.G.Y., V.T.; Materials - A.Ş., V.T., O.A., A.İ.T.; Data Collection and/or Processing - İ.Y., A.Ş., M.G.Y., V.T.; Analysis and/or Interpretation - A.Ş., V.T., S.Ş., İ.Y., O.A., M.G.Y.; Literature Search - V.T., İ.Y., A.Ş., O.A., M.G.Y.; Writing Manuscript - V.T., İ.Y., A.Ş., O.A., M.G.Y.; Critical Review - V.T., İ.Y., A.Ş., M.G.Y., S.Ş., A.İ.T.

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Hakem Değerlendirmesi: Dış bağımsız.

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