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Original Article

Comparative outcomes of antegrade open radical prostatectomy with electrosurgical devices versus retrograde technique without devices

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Abstract

Aim: In this study we compared outcome of antegrade and retrograde radical prostatectomy with new homeostasis devices.

Material and Methods: Present study includes retrograde view of prospective recorded data between January 2006 and January 2016 in two different centers.The antegrade technique was applied to 67 cases with the Thunderbeat and the retrograde technique was performed as described by Reiner and Walsh before include with early division of the urethra.Demographic data,operative data (tPSA, ISUP, DM, etc.) and post-operative data (transfusion, hospitalization, surgical margin positivity, stenosis, etc.) were evaluated.

Results: There was no difference in terms of demographic status.Incontinence resolved in 29patients in the antegrade group(%43) and resolved in 32patients in the retrograde group(%64) (p=0.012). Erectile dysfunction was observed in 28 patients in the first group(41%) and in 18 patients in the second group(36%) (p=0,359).There was a statistical difference in terms of surgical margin positivity in favor of the antegrade group for these results(p=0.003). Transfusion was required by 11 patients (16%) with the antegrade technique and in 9 patients (18%) with the retrograde technique (p=0.055).There was no difference in terms of anastomosis stenosis and operation duration (p=0.357 and p=0.108).

Conclusion: In our study,the antegrade method was shown to be an easier method with less hemorrhage,more reliable preservation of the neurovascular bundle and adding Thunderbeat to the procedure was found to add to the ease of surgery.

Keywords: Radical prostatectomy; surgical equipment; antegrade; retrograde

INTRODUCTION

Radical prostatectomy (RP) is the gold standard surgical method for organ-confined prostate cancer (1). Robotic-assisted laparoscopic radical prostatectomy (RALP) is very popular for RP. However, robotic device and equipment are very expensive. Laparoscopic RP (LRP) needs special surgical equipment and has a long learning curve. Thus, open RP is still the contemporary alternative to RALP and LRP. Besides, open RP is repeatable, easy to learn and to teach. Additionally, open RP surgical techniques can be transferred easily (2).

Erectile dysfunction (ED) and urinary incontinence are still annoyingafter RP, even with RALP, LRP, and open RP.Additionally, as prostate cancer diagnosis is mainly made after screening tests, there is an increase in the young population (3). This has triggered studies about avoiding these negative effects of surgery. Surgical techniques and developed surgical devices are the backbone of these improvements (4).

Since the introduction of the anatomic nerve-sparing (NS) technique during radical prostatectomy (RP) , techniques to preserve the neurovascular bundles (NVBs) have become essential part of modern approaches of RP(5). Approaches for the preservation of NVBs can be performed from the prostate base to the apex (antegrade) or from the apex to the base (retrograde).In addition, antegrade and retrograde RP techniques were debated whether ascending or descending surgical approach affected the ease of applying surgery or not (3,6,7).

We now know the pelvic anatomy better. Thus, nerve-

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sparing RP and providing long urethral stump can be performed in the right way (8).In this manner, new electrosurgical homeostasis devices can help surgeons to perform RP with NVBs properly. Moreover, the new homeostasis devices are widely used in chancing surgical operations (9). According to our best knowledge there is no published paper for comparing these devices during RP according to antegrade or retrograde surgical technique, in literature.

In this study we compared outcome of antegrade and retrograde RP with new homeostasis devices.

MATERIAL and METHODS

Present study includes retrograde view of prospective recorded data between January 2006 and January 2016 in two different centers asTepecik Education and Research Hospital and Katip Celebi University Faculty of Medicine.

Patient selection

Signed consent forms were obtained from PCa patients underwent RP. Demographic data included age, body mass index, erectile function score, urinary continence status, prostate specific antigen level (ng/dl), Gleason score in prostate biopsy, clinical stage. Operative data contained operative time, estimated blood loss, applied surgical technique, used homeostasis device.Early postoperative data comprised hospital stay, complication (evaluated according to modified Clavien classification), urinary catheter remove time, pathology stage. Late post-operative data included continence status, erectile functions, biochemical recurrence.

Surgical technique

The Thunderbeat (TB-0520IC Model Olympus, 5.5 mm – 20 cm) is one of these new devices. Olympus's Thunderbeat is a versatile blood vessel-sealing and tissue-cutting device that combines advanced bipolar and ultrasonic energies into a single multi-functional hand instrument. Surgeons can simultaneously seal and cut vessels up to 5 mm in size with minimal thermal spread. Thunderbeat boasts impressive cutting speed, reliable vessel sealing and high grasping forces at the tip (Figure 1).

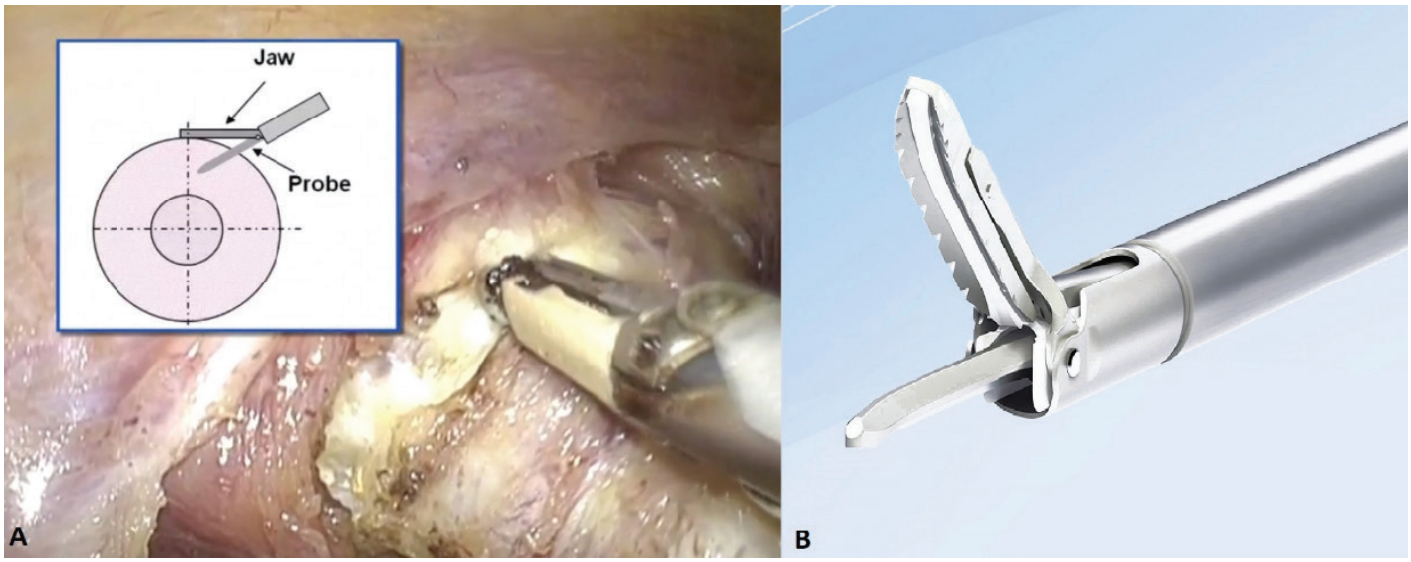

Figure 1. Thunderbeat tissue management system.A.The sealing end is 2 cm long and 3 mm denier to 2 mm wide and has a very polite structure.B.Close-up view of the sealing end.

Briefly, the antegrade technique separates the endopelvic fascia with cold incision, with puboprostatic ligaments cut with the Thunderbeat (tissue management system, Olympus Surgical Handpiece Inline Grip System 5.0 mm-20.0 cm TB-0520IC) and tied with DVC 1/0 vicryl sutures. Between the bladder neck-prostate is dissected with the Thunderbeat from 5 to 7 o'clock (Figure 2A). While dissecting the vesiculaseminalis with a right-angle forceps, bleeding is checked with hemo-clips (Figure 2B). After seminal vesicle dissection, the posterior prostatic fascia is separated from the Denonvillier fascia basal of the prostate with a right-angle forceps (Figure 2C). Blunt dissection is extended toward the lateral. After carefully dissecting the prostate pedicle, the Thunderbeat is gripped and stroked upward to seal and cut the lateral pelvic fascia and levator from the basal prostate toward the apex. The prostate apex is cut from the urethra with a scissors and is completely separated by passing a right-angle forceps under the urethra. To ease the apical dissection, the basal prostate is held with an Allis forceps and pulled toward the cranial. This maneuver eases dissection and is helpful in optimizing hemorrhage control (67 cases).

The retrograde technique was performed as described by Reiner and Walsh before (50 cases). The former technique includes with early division of the urethra andposterolateral dissection of the prostate, followed byincision of the

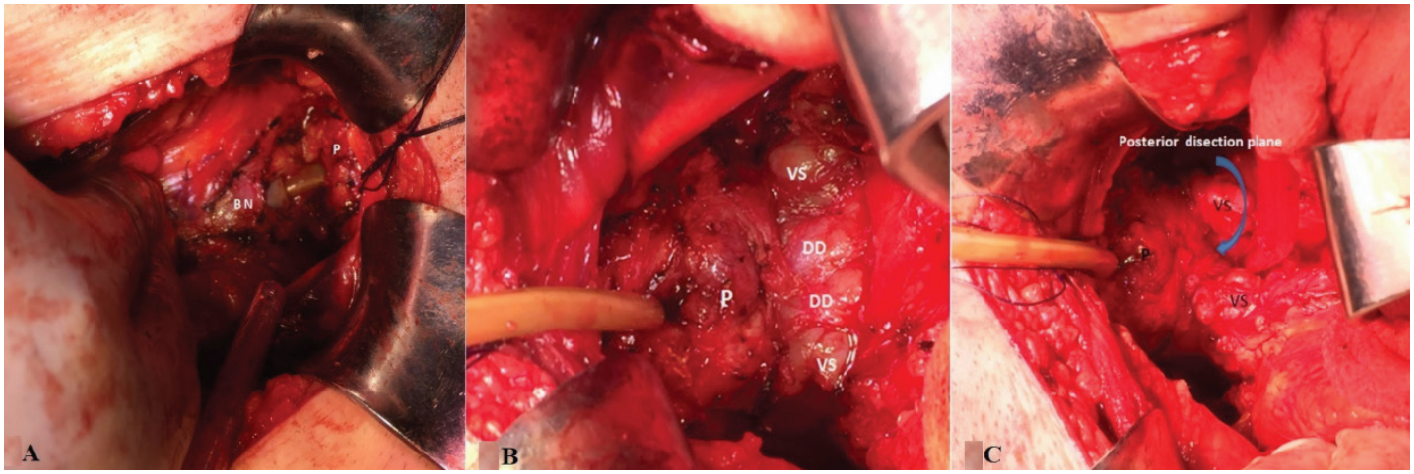

Figure 2. 2A: The bladder is dissected with Thunderbeat until the style is seen between the bladder and the prostate.2B:The basal prostate removed by bladder. 2C: The curved arrow shows the entry between the right angle clamp and the posterior prostatic capsule and the Denonvillier fascia.

bladder neck and dissection of the seminal vesicles and vas deferens(10).The blood transfusion was made when hematocrit value was below 28 during post-op care. Patients with continence and erectile dysfunction (ED) status determined in the preop period were removed from postop assessments, with the remaining patients interviewed at 3 monthly check-ups and recorded noting the situation before the operation. The 15-question International Index of Erectile Function (IIEF-15) was used to assess sexual functions. Scores of 25 and lower were recorded as ED. Accompanied by this form; the postop 6-month ED assessment was statistically compared. For incontinence, including stress incontinence, patients with urine leakage of 2 pads/day or more, apart from peroperatively, were accepted as "incontinence". In terms of incontinence, the patients' postop 12-month check-up results were compared.

ISUP Classification

Today, pathology reports are required to include a grade classification, from 1 to 5, in addition to the Gleason score assignment for PCa(11). Such classifications are made based on the guidelines for prostate cancer, which are graded in accordance with the scale identified at a consensus conference organized in 2014 by the International Society of Urological Pathology (ISUP). Upon the recommendations of the 2014 consensus conference, the 2005 ISUP classification has been changed.

Statistical Methods

All analyses were performed using IBM SPSS v22 (IBM SPSS Inc., Armonk, NY, USA) with statistical significance assessed at the 5% level.Descriptive statistics are given as mean, standard deviation, frequency, and percent. The Mann-Whitney U and Chi-Square tests were used. Significant p was $p<0.05$.

RESULTS

Mean follow-up duration for the antegrade method was 36 months (6-84) and for the retrograde method was 12 months (6-26). In total the radical retropubic prostatectomy operations of 117 patients, with 67 antegradetechnique using the Thunderbeat and 50 retrograde techniques were included. Data are presented in Table 1 and Table 2. In the preop period, there was no difference in terms of age, tPSA, ISUP score and DM. Additionally, patients with incontinence and ED determined in the preoperation period were removed from the postop assessments in terms of incontinence and ED.

Table 1. Preoperative Patient Datas

		Antegrade	Retrograde	p value
Number of patients (n)		67	50	
Age (years±sd)		63.7±6.2	63.5±6.3	0.875
tPSA (mean±sd)		9.8±9.2	10.1±6.4	8.848
ISUP*	1	44 (%66)	35 (%70)	
	2 and 3	19 (%28)	12 (%24)	0.567
	4 and 5	4 (%6)	3 (%6)	
DM**		17 (%25)	9 (%18)	0.436
Erectile				
Dysfunction		17 (%25)	24 (%48)	N.A.***
Incontinence		0	4 (%8)	N.A.***

* International Society of Urological Pathology
**Diabetus Mellitus,
***Normoactive

Incontinence resolved in 29 patients in the antegrade group in a maximum of 9 months (4-9 months) and resolved in 32 patients in the retrograde group in a maximum of 12 months (4-12 months) and in 5 patients leakage requiring mean 2 pads daily continued (p=0.012). ED was observed in 28 patients in the antegrade group (41%) and in 18 patients in the retrograde group (36%). The results were similar in the two groups (p=0.359).

Table 2. Peroperative / Posoperative Datas

		Antegrade	Retrograde	p value
Operative Time (min)		110±38	120±41	0,108
Transfusion (unit) (n)		11 (1-2)	9 (1-5)	0,055
Hospitalisation (day)		8 (5-13)	6 (4-13)	< 0,001
ISUP*	1	32	21	
	2 and 3	27	23	0,077
	4 and 5	8	6	
Surgical Margin Positivity		12 (%18)	21 (%42)	0,003
Biochemical Recurrence		19 (%28)	7 (%14)	0,072
Anastomosis Stenosis		9 (%13)	4 (%8)	0,357
Incontinence		29** (%43)	32** (%64)	0,012
Erectile Dysfunction		28** (%41)	18** (%36)	0,359
Mean follow-up duration (month)		36 (6-84)	12 (6-26)	< 0,001

* International Society of Urological Pathology
** Postop new additions

Surgical margin positivity was observed in 12 patients in the antegrade group and 21 patients in the retrograde group. There was a statistical difference in favor of the antegrade group for these results (p=0.003).

Transfusion was required by 11 patients (16%) with the antegrade technique and in 9 patients (18%) with the retrograde technique (p=0.055). Though this difference was not significant, transfusion requirements in the antegrade group were limited to 1-2 units, while in the retrograde group requirements were in the 1-5 unit interval. Additionally, there was no difference between the two groups in terms of anastomosis stenosis and operation duration.

DISCUSSION

In the present study, antegrade RP can be performed more easily than retrograde RP. Though not statistically different, the shorter operation duration with the antegrade method supports this result. Additionally, new electrosurgical devices can help surgeons to perform nerve-sparing surgical techniques. Because of more hemostasis with these devices, more anatomic dissections can be performed, and a long urethral stump can be obtained. In view of all this, fewer functional complications may come in to question.

Due to early control of the prostate pedicle and early tying and late cutting of the DVC, antegrade RP laparoscopic surgery is chosen more often (6,7,12). These two steps reduce hemorrhage to a minimum and provide a cleaner working environment which is important to preserve view, dissection and cavernous nerves. The same advantages are valid for open surgery. During surgery,the DVC hemorrhage risk is in the last stage of antegrade surgery, contrary to retrograde RP. The most important hemorrhage points are checked by early control of the lateral prostate pedicles and late cutting of the DVC and hemorrhage is minimized or the time of hemorrhage is met in the final stages of the operation. This increases the surgeon's dominance of the operation and increases the speed of learning. Though our study did not observe a significant difference between the two methods in terms of blood transfusion, the transfusion requirements in the group with antegrade method applied remained at 1-2 units, while they were in the interval 1-5 units for the retrograde method group. These results are similar to the literature (13). Additionally, surgical margin positivity was not in favor of retrograde RP. This situation may be a result of dominance of the surgical field. Additionally, the Thunderbeat device used for the antegrade method ensures dissection of fine and regular margins (length of the sealing tip 16 mm and width 2 mm) which may have contributed to this result.

The antegrade method is more reliable and more easily performed due to NVB dissection and preservation, field dominance, less hemorrhage in the surgical field, and additionally does not require cautery for uncontrolled bleeding due to hemoclip close to the NVB. To avoid heat trauma, the Thunderbeat is stroked above the lateral pedicles with sealing performed away from the NVB. This eases the procedure and is better at preserving continence than the retrograde method with erectile function preservation remaining the same.

During the antegrade approach, dissection continues from the bladder neck towards the apex. The working angle of the tools is more optimal as dissection is along the natural process of the NVB in the prostate, contrary to the opposite dissection in the retrograde technique. With the antegrade approach, the NVB is freed along the natural process toward the apex so the more difficult apical dissection is left to last and is more mobile as the prostate has been freed from the bladder neck. In this way, vision is most appropriate during the important steps of NVB dissection. In our study the incontinence rate was in favor of the antegrade method, which may be related to preserving the integrity of the NVB. In the literature, the incontinence rate after RP reaches rates of 69% (14). These

results are similar to the 64% incontinence rate observed in the retrograde method in our study. Additionally, it is important to know how DVC control will be provided during the retrograde technique. In this aspect, the learning curve is slower compared to the antegrade approach. The use of Thunderbeat increases the antegrade method due to the ease of use in this learning curve.

Meta-analysis studies have reported ED rates of up to 58% after RP (15). In our study these rates were 41% after the antegrade method and 36% after the retrograde method, within acceptable intervals. Additionally, our study observed similar results in terms of anastomosis stenosis between the two groups. These results comply with other studies in the literature (16-18). For apex dissection with the antegrade method we do not use the Thunderbeat but cut with a scissor, as in the retrograde method. This situation may explain the similar anastomosis stenosis results.

The strong aspects of our study include the similar patient distribution with no differences between the two groups in the preop period in terms of age, PSA, Gleason score and DM. Additionally, patients with preop incontinence and ED identified were not included in the postop period incontinence and ED assessment. Negative aspects ofour study include the retrospective nature, inclusion of results from two centers and obtaining transfusion requirements from anesthesia records. Additionally, though in favor of the antegrade method for ease of application, the longer hospitalization duration is an unexpected result. However, this situation may be due to different procedures for admission and discharge in the different centers. And also, from the prospect of cost containment, Thunderbeat retains the cost-effective benefit, in that it equips the surgeon with one instrument, without the aid of any other devices, capable of any tissue dissection and sealing efficiently. TB did not only make the dissection rapid but also offered additional benefits of reliable sealing without jeopardizing the safety and oncological clearance.

Though there are limits to our study, when the results are generally assessed, in our study we observed that inclusion of Thunderbeat in the procedure for the antegrademethod may make it an easier method with less hemorrhage, more reliable preservation of the neurovascular bundle with easier learning curve and application.

CONCLUSION

In our study, the antegrade method was shown to be an easier method with less hemorrhage, more reliable preservation of the neurovascular bundle and adding Thunderbeat to the procedure was found to add to the ease of surgery.

Competing interests: The authors declare that they have no competing interest.

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