

## Radical Retropubic Prostatectomy – A Review of the Current Literature and a Study of 250 Cases at Marmara University

### Radikal Retropubik Prostatektomi – Güncel Literatür Derlemesi ve Son 250 Vaka İle Marmara Tecrübesi

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#### ABSTRACT

**Objective:** To review the current literature of open radical retropubic prostatectomy and report the results of the last 250 open radical retropubic prostatectomies performed in our University clinic.

**Patients and Methods:** A literature review was performed using the PubMed database with combinations of the following keywords radical prostatectomy, open retropubic, prostate cancer, complications and comorbidity. Charts of the most recent 250 consecutive patients who had undergone radical retropubic prostatectomy at the Urology Department of Marmara University School of Medicine were reviewed.

**Results:** In 69.2% of the cases the tumor was confined within the prostate gland, whereas 30.8% of the cases had tumors with either positive surgical margins, capsular penetration, invasion of seminal vesicles or a combination of these features. Nerve-sparing radical retropubic prostatectomy patients were found to be more successful in achieving continence and erectile function in the post-operative period. Cancer progressions were experienced in 12.4% of the cases following radical retropubic prostatectomy at a mean follow-up of 53.8 months with a mean time to progression of 20.7 months.

**Conclusion:** The three goals of radical prostatectomy; cancer control, preservation of urinary control and preservation of sexual function were achieved with the long-time experience of open radical prostatectomy.

**Keywords:** Radical prostatectomy, Open retropubic, Prostate cancer, Complications, Comorbidity

#### ÖZET

**Amaç:** Açık radikal retropubik prostatektomi hakkındaki güncel literatürün derlenmesi ve üniversite kliniğimizde yapılan son 250 açık radikal retropubik prostatektomi vakalarının sonuçlarının bildirilmesi.

**Materyal ve Metot:** Radikal prostatektomi, açık retropubik, prostat kanseri, komplikasyonlar ve komorbidite anahtar kelimeleri seçildi ve Pubmed veritabanı kullanılarak literatür taraması yapıldı. Marmara Üniversitesi Tıp Fakültesi Üroloji Anabilim Dalı'nda yapılan son 250 açık radikal retropubik prostatektomi vakasının dosyaları tarandı.

**Bulgular:** Hastaların % 69, 2'sinde tümör prostat bezi ile sınırlı kalırken, % 30.8'inde pozitif cerrahi sınır, kapsül invazyonu, seminal vezikül invazyonu ya da bunların kombinasyonu saptandı. Sinir koruyucu radikal retropubik prostatektomi hastalarının ameliyat sonrası dönemde idrar kontinansını ve erektil işlevi geri kazanmalarının daha başarılı olduğu saptandı. Radikal retropubik prostatektomi sonrası vakaların % 12, 4'ünde ortalama 53,8 aylık takip ve ortalama 20,7 ay progresyon süresi ile kanser progresyonu saptandı.

**Sonuç:** Radikal prostatektominin üç hedefi olan; kanser kontrolü, idrar kontrolünün korunması ve cinsel işlevin korunması hedeflerine, açık radikal retropubik prostatektominin uzun dönem tecrübesi ile ulaşılmıştır.

**Anahtar Kelimeler:** Radikal prostatektomi, Açık retropubik, Prostat kanseri, Komplikasyonlar, Komorbidite

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## **INTRODUCTION**

Prostate cancer (PCa) is the most frequently diagnosed cancer and second leading cause of cancer-related deaths in the male population in the United States<sup>1</sup>. In Europe, PCa is the most common solid neoplasm, with an incidence rate of 214 cases per 1000 men, outnumbering lung and colorectal cancer<sup>2</sup>.

With the increasing use of prostate-specific antigen (PSA) testing, men are being diagnosed with earlier stage PCa and at a younger age, and they become candidates for curative therapy. Radical prostatectomy offers the best long-term cancer control for clinically localized disease.

Radical prostatectomy was first applied at the beginning of the 20th century by Young<sup>3</sup> using a perineal approach, while Memmelaar and Millin were the first to perform retropubic radical prostatectomy<sup>4</sup>. Walsh and Donker described the anatomy of the dorsal venous complex and the neurovascular bundles<sup>5</sup>. Their description of the open "nerve-sparing" radical prostatectomy has become the gold standard surgical treatment for PCa for the past 30 years.

Technically, radical retropubic prostatectomy is one of the most difficult operations in the field of urology. The three goals of the surgeon, in order of importance, are cancer control, preservation of urinary control, and preservation of sexual function<sup>6</sup>. There is no age threshold for radical prostatectomy and a patient should not be denied this procedure on the grounds of age alone<sup>7</sup>. Several large series with a long-term follow-up have confirmed that this approach results in excellent cancer control and functional results in terms of preservation of erectile function and urinary continence<sup>8-10</sup>.

In this study, we review the current literature of open radical retropubic prostatectomy and report the results of the last 250 open radical retropubic prostatectomies performed in our university clinic.

## **PATIENTS and METHODS**

### **Subjects**

This study comprises the most recent 250 consecutive patients who had undergone radical retropubic prostatectomy for clinically localized (stage T2c or lower) carcinoma of the prostate at the Urology Department of Marmara University School of Medicine. All office and hospital charts were reviewed.

### **Staging**

Preoperative evaluation of all patients included a digital rectal examination by an urologist, a serum PSA determination and radioisotope bone scanning with confirmatory imaging studies when necessary. Many men also underwent abdominal and pelvic computerized tomography or magnetic resonance imaging.

All tumors were clinically staged according to the TNM classification:

T1 - Clinically inapparent tumour not palpable or visible by imaging

- stage T1a -cancer incidentally found at transurethral prostatic resection or open adenectomy involving less than 5% of resected tissue
- stage T1b - cancer incidentally found at transurethral prostatic resection or open adenectomy involving greater than 5% of resected tissue
- stage T1c - cancer identified by needle biopsy because of elevated PSA in the presence of normal digital rectal examination

T2 - Tumour confined within the prostate

- stage T2a - tumor involving one half of a lobe of the prostate or less
- stage T2b - tumor involving more than half of one lobe but not both lobes of the prostate
- stage T2c - tumor involving both lobes of the prostate

### **Surgical Technique**

One surgeon (LT) performed radical retropubic prostatectomy with a previously reported technique, which was based on the anatomical approach for radical prostatectomy described by Walsh<sup>6</sup>. Briefly, radical prostatectomy involves the removal of the entire prostate gland between the urethra and the bladder, and resection of both seminal vesicles along with sufficient surrounding tissue to obtain a negative margin. Often, this procedure is accompanied by a bilateral pelvic lymph node dissection. Achieving negative surgical margins was the primary concern, followed by preservation of continence and erectile function with the nerve-sparing approach. We developed a new urethrovesical anastomotic suture technique and have been utilizing it since 2004<sup>11</sup>.

### **Measures of Incontinence and Erectile Dysfunction**

Postoperative urinary continence was assessed with the International Continence Society Male Short Form (ICS-SF) and was defined as complete continence (no pads), minimal incontinence (1 precautionary pad per day) or moderate to severe incontinence (2 or more pads per day)<sup>12</sup>.

The National Institute of Health (NIH) Consensus Panel has defined erectile dysfunction (ED) as the inability to achieve and/or maintain penile erection sufficient for satisfactory sexual performance. We used the International Index of Erectile Function (IIEF-5) as the diagnostic tool for erectile function pre- and postoperatively<sup>13</sup>.

Both questionnaires were completed before and at varying periods after surgery.

### **Follow-Up Evaluation**

Postoperative follow-up evaluation included serum PSA measurements every 3 months in the first year, every 6 months until the 5th year and yearly thereafter. Yearly digital rectal examination and urinary sonography were performed. Cancer progression was defined as detectable serum PSA (greater than 0.2 ng/ml), as documented by repeated PSA measurements, local recurrence or distant metastases.

## **RESULTS**

### **Mean age and preoperative PSA levels**

The mean age of this cohort of patients was 63 years (range 44 to 75). The mean preoperative PSA level was  $9.38 \pm 1.14$  ng/ml (range 1.01 to 34.5). Of the patients 11.2 % had normal PSA levels (less than 4 ng/ml) and the majority had levels in the 4 to 10 ng/ml range.

### **Preoperative tumor stage and Gleason grade**

All tumors were clinically confined to the prostate gland. A total of 152 cases (60.8 %) were stage T1c, which was the most prevalent clinical stage. Thirty-four (13.6 %) were clinical stage T2a, 21 (8.4 %) were clinical stage T2b and 36 (14.4 %) were clinical stage T2c. There were 2 patients with stage 1a and 5 patients with stage 1b disease.

Preoperative Gleason scores 2 to 4 were seen in 25 patients (10 %). A total of 151 patients (60.4 %) had moderately well-differentiated tumors with Gleason scores of 5 and 6. Gleason score of 7 was seen in 54 patients (21.6 %), distributed as (3+4) in 44 and (4+3) in 10 patients, respectively. Gleason score 8 to 10 ranges were seen in 20 (8 %) patients.

### **Operative measures**

Mean operative time was  $139 \pm 13$  minutes (min: 100 min - max: 190 min) and mean blood loss was  $880 \pm 116$  ml (min: 300 ml - max: 2200 ml).

### **Pathological findings**

Of 250 cases, 173 (69.2%) demonstrated tumors confined within the prostate gland (T2a, 2b and 2c) and 77 prostates (30.8%) had tumors with either positive surgical margins, capsular penetration, invasion of seminal vesicles or a combination of these features. Positive margins and established capsular penetration were seen in 46 cases (18.4%). Of these cases 20 (8 %) had focal capsular penetration with negative margins and 12 (4.8 %) had positive surgical margins only. A total of 32 cases (12.8 %) demonstrated seminal vesicle invasion (pT3b) and only 8 patients (3.2%) had pelvic lymph node metastases on final pathological examination.

### **Incontinence and erectile dysfunction**

Nerve-sparing RP patients were found to be more successful in achieving continence. Mean incontinence scores at the 3rd and 12th months in the nerve-sparing group was found to be 3.08 and 1.97; whereas the same scores of non-nerve-sparing group were 4.27 and 3, respectively

( $p=0.042$ ). With our new urethrovesical anastomosis technique, our continence (defined as no or single protective pad) rate was 98 % at 12 months after the operation, where continence rate was 86 % with the conventional technique.

Preoperatively, only 22.9 % of the patients had no erectile dysfunction. The mean postoperative IIEF-5 scores of the nerve-sparing RP patients pre-operatively and at the 1st, 3rd and 12th months were found to be  $17.66 \pm 5.61$ ,  $2.06 \pm 1.73$ ,  $4.1 \pm 2.8$  and  $6 \pm 4.45$ , respectively. The mean postoperative IIEF-5 scores of the non-nerve-sparing RP patients pre-operatively and at 1, 3 and 12 months were found to be  $17.28 \pm 5.3$ ,  $2.04 \pm 1.9$ ,  $3.24 \pm 2.19$  and  $3.45 \pm 2.54$ , respectively. In the nerve sparing group 11.9% of the patients had an IIEF score of 12 or higher in the post-operative period whereas this result was not achieved in any of the patients in the non-nerve sparing group.

### **Complications**

There were no deaths related to surgery. A total of 8 patients (3.2 %) developed anastomotic strictures which were treated successfully by a single internal urethrotomy session without any recurrence. A total of 3 patients (1.2 %) developed lymphoceles, which were treated with percutaneous catheter drainage.

### **Follow-up and oncological outcome**

Of 250 men, 31 (12.4 %) experienced cancer progression following RP at a mean follow-up of  $53.8 \pm 7.3$  months (range 5 to 112). Mean time to progression was  $20.7 \pm 2.1$  months (range 1 to 92). Of 31 men with cancer progression 14 (45.2 %) had received adjuvant radiotherapy and all patients subsequently received hormonal therapy. Only 2 patients died of non-urological causes, one due to a cerebrovascular accident and the other due to metastatic colon carcinoma.

## **DISCUSSION**

The incidence of PCa has increased dramatically with the widespread use of serum PSA as a screening tool for prostate cancer and as a result, more men are diagnosed with curable disease at a younger age. Today, men also live longer and a man 65 to 70 years old has a 50 % chance of living for another 15 years in the western countries<sup>6</sup>. As a result, an increasing number of radical prostatectomies are being performed and favorable outcomes are reported in the literature.

Radical prostatectomy is the only form of treatment for localized PCa that has been shown in a randomized controlled trial to reduce progression to metastases and death from the disease<sup>14</sup>. It is also the ideal treatment for patients who can be cured and who will live long enough to benefit from it. Based on high patient satisfaction rates, open radical retropubic prostatectomy is an excellent treatment for prostate cancer<sup>15</sup>.

A large quantity of long-term data has confirmed the efficacy of open radical prostatectomy. In a large open prostatectomy series with a median follow-up of 5.3 years, the Johns

Hopkins group reported an actuarial 10-year cancer-specific survival rate of 94%<sup>16</sup>. In a more recent re-analysis including 621 men who were followed for more than 10 years, they reported 15-year progression-free and cancer-specific survival rates of 66% and 90%, respectively<sup>10</sup>. Hull et al. reported the 10-year progression-free and cancer-specific survival rates in 1000 consecutive patients as 75% and 97.6%, respectively<sup>17</sup>. In a recent report of 3,478 consecutive men treated by open radical prostatectomy with a mean follow-up of 65 months, 631 (18 %) men had biochemical progression<sup>8</sup>. Similarly, 12.4 % of our patients experienced cancer progression following RP at a mean follow-up of 53.8 months.

The classification and reporting of urinary continence after radical retropubic prostatectomy vary significantly, making valid urinary control comparisons between studies difficult. Published incidence rates vary between 4 % and 50 % for slight stress incontinence and between 0 and 15.4 % for severe stress incontinence<sup>7</sup>. There are many factors affecting continence rates after radical prostatectomy, such as avoidance of injury to the external urinary sphincter, preserving the neurovascular bundles and the type of uretrovesical anastomosis technique<sup>9</sup>. In our patient cohort, nerve-sparing RP patients were found to be more successful in achieving continence. Mean incontinence scores at 12th month were  $1.97 \pm 3$  for nerve sparing group and  $3 \pm 3.9$  for non-nerve sparing group. We developed a new uretrovesical anastomotic suture technique and have been utilizing it since 2004<sup>11</sup>. With this new technique, our continence (defined as no or single protective pad) rate increased to 98 % at 12 months after the operation, where the continence rate was 86 % with the conventional technique.

Erectile dysfunction after radical retropubic prostatectomy is a significant morbidity of the operation. With the description of the open “nerve-sparing” radical prostatectomy and decreasing patients’ age, nerve-sparing RP can be performed safely in most men. However, published incidence rates of the erectile dysfunction vary greatly and have been reported to be between 29 and 100<sup>7</sup>. Many factors may affect these rates, where the patient’s age, pre-operative erectile function and the nerve-sparing status of the patient are the most important. In the largest and most recent open radical prostatectomy series, erectile function was preserved in 76% of preoperatively potent men who underwent bilateral nerve-sparing surgery with at least 18 months of follow-up<sup>9</sup>. In our series, mean patient’s age was 63 years and only 22.9 % of the patients had no erectile dysfunction pre-operatively. At 12th month postoperatively, patients who had undergone nerve-sparing RP reported better erectile status compared to non-nerve sparing RP patients based on the IIEF-5 scores ( $6 \pm 4.45$  versus  $3.45 \pm 2.54$ ).

A review of the post-operative complications of RP have been reported in the EAU Guidelines for prostate cancer in 2010 (Table 1)<sup>7</sup>. The rates of peri- and post-operative complications are reported to be significantly correlated with the surgeon’s experience and also with the clinic’s experience of the procedure. Our complication rates are comparable with the reported literature; where 3.2 % of the patients developed bladder neck obstruction and 1.2 % of the patients developed lymphoceles, which were treated successfully by secondary interventions.

**Table I:** Complications of radical prostatectomy

| Complication             | Incidence  |
|--------------------------|------------|
| Peri-operative death     | 0 - 2.1    |
| Major bleeding           | 1.0 - 11.5 |
| Rectal injury            | 0 - 5.4    |
| Deep venous thrombosis   | 0 - 8.3    |
| Pulmonary embolism       | 0.8 - 7.7  |
| Lymphocele               | 1.0 - 3.0  |
| Urine leak, fistula      | 0.3 - 15.4 |
| Bladder neck obstruction | 0.5 - 14.6 |
| Urethral obstruction     | 0 - 0.7    |

## CONCLUSION

Improved knowledge of prostate cancer in the general population and insistent screening has led to a remarkable rise in the detection and early treatment of prostate cancer. Consequently, an increased number of open radical prostatectomies are being performed as a major treatment option for organ-confined disease. The three goals of radical prostatectomy; cancer control, preservation of urinary control and preservation of sexual function have been achieved with the long-time experience of open radical prostatectomy.

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