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Source / Izvornik: **Collegium antropologicum, 2009, 33, 529 - 532**

Journal article, Published version

Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

Permanent link / Trajna poveznica: <https://um.nsk.hr/um:nbn:hr:105:564382>

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Download date / Datum preuzimanja: **2024-12-10**



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# Sex or Surgery – Erectile Dysfunction after Radical Treatment of Localized Prostate Cancer

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## ABSTRACT

*The maintenance of satisfactory quality of life is major concern in majority of patients who elect treatment for localized prostate cancer. We conducted a cross-sectional study to determine sexual function after radical prostatectomy (RP) and external beam radiotherapy (EBRT). Study population consisted of series of 57 patients with early-stage adenocarcinoma of the prostate, treated in our institution in the period from January 2003 till December 2003. Thirty three patients underwent radical retropubic prostatectomy and 24 patients were treated by primary radical radiotherapy. Patients have been given the full international index of erectile function (IIEF) questionnaire two to four and six months after the treatment. Post treatment sexual function in patients treated by EBRT is significantly better than in patients treated by RP (48.5% vs. 21.57%,  $p < 0,0001$ ). Subgroup analysis reveals that satisfaction with erectile function, maintaining of sexual intercourse and possibility of ejaculation is better in patients treated by EBRT than in patients treated by RP (44.67% vs. 11.57%,  $p < 0,0001$ ) as well as general satisfaction with quality of sexual life (48.5% in EBRT group vs. 21.57% in RP group,  $p < 0,0001$ ). On the other hand, sexual desire remains the same in both groups of patients (63.75% in EBRT group vs. 60.61% in RP group,  $p = 0.71$ ). Six months after surgical or radiotherapy treatment erectile function is almost as twice as worse in patients treated by surgery than in patients treated by radiotherapy.*

**Key words:** *erectile dysfunction, radical prostatectomy, radiotherapy, prostate cancer*

## Introduction

Prostate cancer is one of the principal medical problems facing male population in Western countries. Development of the prostate specific antigen (PSA) screening enabled detection of more patients with early-stage localized prostate cancer. Standard treatment options for localized prostate cancer include surgery, radiotherapy and active monitoring. All those treatment modalities, including watchful waiting, are associated with side effects. The most common side effects of curative treatment are urinary and fecal incontinence and erectile dysfunction. Due to early detection, more frequent treatment of localized disease and long post treatment survival, quality of life is becoming increasingly important. The maintenance of satisfactory quality of life is major concern in 45% of patients who elect treatment for localized prostate cancer<sup>1</sup> and sexual dysfunction has been reported to

be independent factor of poorer health-related quality of life at 2 years after primary treatment.<sup>2</sup>

Because there are only few direct comparisons of treatment options for early stage prostate cancer there are no sufficient data about comparative efficacy and side effects. We conducted a cross-sectional study to determine sexual function after radical prostatectomy (RP) and external beam radiotherapy (EBRT).

## Material and Methods

### *Patient characteristics*

Study population consisted of series of 57 patients with early-stage adenocarcinoma of the prostate, treated in our institution in the period from January 2003 till

December 2003, either by radical surgery or primary radiotherapy. All patients were male, white, median age was 67 years (range from 65 to 70 years), and had histological diagnosis confirmed by prostate biopsy in all cases. Computerized tomography of the abdomen and pelvis was performed in each patient to exclude patients with lymphatic dissemination. Patients with distant metastases were not eligible. Choice of treatment depended of patient characteristics, primarily cardiovascular comorbidity.

### Surgery

Thirty three patients underwent radical retropubic prostatectomy (complete resection of prostate, prostatic urethra, seminal vesicles and regional lymph nodes).

### Radiotherapy

Twenty four patients were treated by primary radical radiotherapy. Minimum tumor dose of 70 Gy / 35 fractions / 7 weeks was prescribed to the isocenter of a computer-generated plan encompassing the prostate gland only with a 1.5-cm 95% isodose margin, and radiotherapy delivered using eight-field external beam megavoltage (6–23 MV) photon technique. Radiotherapy planning was based on 2D computed tomography data in all patients.

### Protocol

Patients treated either by surgery or radiotherapy, have been given the full international index of erectile function (IIEF) questionnaire two to four months after the treatment. Consistency of the answers has been tested at consequent control six months after the treatment, and only one answer on every question has been taken into analysis for each patient. The questionnaire consists of three parts: set of questions regarding erectile function, maintaining of sexual intercourse and ejaculation, set of questions regarding patient's sexual desire, and set of questions aimed to patient's satisfaction with quality of sexual life in general.

Our hypothesis was that patients treated by primary radiotherapy have better quality of sexual life after the treatment. Therefore, subjects in both groups should experience similar sexual desire, while impairment of sexual function should be greater in surgically treated group.

### Statistics

Differences in erectile function between the two groups of patients were analyzed by chi-square test, and consequently subgroup analysis was also performed in the same way. P-values reported are from one-sided test.

### Results

IIEF score >10 defined potency. After radical prostatectomy potency declined (21,57% vs. 50,6% before treatment,  $p = 0,0001$ ), while after radiotherapy no statistically significant worsening has been found (48,5% vs. 50,6%,  $p = 0,77$ ). Post treatment sexual function in patients treated by EBRT is significantly better than in patients treated by RP (48,5% vs. 21,57%,  $p < 0,0001$ ). Subgroup analysis reveals that satisfaction with erectile function, maintaining of sexual intercourse and possibility of ejaculation is better in patients treated by EBRT than in patients treated by RP (44,67% vs. 11,57%,  $p < 0,0001$ ) as well as general satisfaction with quality of sexual life (48,5% in EBRT group vs. 21,57% in RP group,  $p < 0,0001$ ). On the other hand, sexual desire remains the same in both groups of patients (63,75% in EBRT group vs. 60,61% in RP group,  $p = 0,71$ ). All the results as well as IIEF score are shown in table 1.

### Discussion

Results of our cross-sectional study show that six months after surgical or radiotherapy treatment erectile function is almost as twice as worse in patients treated by surgery than in patients treated by radiotherapy. Since cause of erectile dysfunction is local (i.e. nerve damage or vascular damage) sexual desire is same and preserved in both groups of patients. Previous cross-sectional and longitudinal cohort studies also found that sexual function was more affected in prostatectomy patients than in radiotherapy patients, for review see<sup>3</sup>. These results were confirmed by our study.

It should be noted, however, that this is a cross-sectional study and as such has limitations regarding changes of erectile function over time. It is known from previous studies that erectile dysfunction after surgery is immediate but can be reversible in some patients over

**TABLE 1**  
ERECTILE DYSFUNCTION AFTER RADICAL PROSTATECTOMY OR RADICAL EBRT IN PATIENTS WITH EARLY STAGE PROSTATE CANCER, BASED ON THE FULL INTERNATIONAL INDEX OF ERECTILE FUNCTION (IIEF) SCORE

	RP %	EBRT %	
Number of patients	33	24	
Satisfaction with erectile function, ejaculation and sexual intercourse	11.57%	44.67%	$P < 0.00001$
Sexual desire	60.61%	63.75%	$P = 0.71128182$
Satisfaction with sexual QoL	28.89%	51.11%	$P = 0.00001239$
Total	21.57%	48.5%	$P < 0.00001$

RP = radical prostatectomy; EBRT = external beam radiotherapy; QoL = quality of life.

time, while after radiotherapy incidence of erectile dysfunction increases over time.<sup>4</sup> That is due to different underlying pathogenesis – erectile dysfunction after surgery is primarily due to neural damage and in minor extent due to vascular damage.<sup>5</sup> However, in the majority of patients the cause of post-radiotherapy erectile dysfunction is reduction of peak arterial systolic velocity in cavernosal arteries.<sup>6</sup> Therefore sildenafil, according to some reports, is more efficient in radiotherapy treated patients than surgically treated patients, as it is more efficient in surgically treated patients with at least one nerve bundle spared.<sup>7,8,9</sup>

Incidence and profile of side effects after treatment of localized prostate cancer are different in correlation with treatment modality used. Incidence of side effects is partly variable whether they are reported by the patient or by the physician as well. For example, incidence of urinary incontinence varies between 0.3 and 65.6%, and impotence between 11 and 87%.<sup>10</sup>

Factors correlated with better post-surgical erectile function are younger age, better erections before the surgical procedure, and preservation of neurovascular structures. If both neurovascular bundles are preserved, erectile function usually recovers within 4 to 6 months.<sup>11</sup> If one of the bundles is damaged during surgery recovery is usually as twice as long. In cases when disease control requires sacrificing both neurovascular bundles sural nerve

is usually transplanted with modest results. Most of surgically treated patients recover erectile function using newer vasodilative drugs like sildenafil, by intraurethral alprostadil implantation or intracavernous prostaglandin injections.<sup>12</sup>

In radiotherapy treated patients, prescribed radiation dose is the main determinant of side effects. Rectal toxicity is observed in 0.7% of patients with tumor dose of 75,6 Gy applied.<sup>13</sup> Urethral strictures are observed in 5.2% (range 1.1% to 8.4%) of patients treated by radiotherapy, and especially in patients who had transurethral resection of prostate cancer.<sup>14</sup> Incidence of erectile dysfunction after radiotherapy depends of quality of erections before irradiation, applied dose of radiation and time of evaluation. Since erectile dysfunction after radiotherapy is caused primarily by vascular damage its incidence increases over time.

Newer surgical techniques including sural nerve transplantation should decrease erectile dysfunction in surgically treated patients in the future, but newer radiotherapy planning and application techniques (3D planning, multileaf collimators) should not be neglected and probably will result in less radiotherapy-related complications as well.

In the absence of data from randomized comparative trials, data from studies such as this could offer valuable insights in quality of life of prostate cancer survivors.

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## SEKS ILI KIRURGIJA – EREKILNA DISFUNKCIJA NAKON RADIKALNOG LIJEČENJA LOKALIZIRANOG RAKA PROSTATE

### SAŽETAK

Očuvanje odgovarajuće kvalitete života je vrlo bitno bolesnicima koji se liječe od lokaliziranog raka prostate. Proveli smo studiju presjeka kako bi utvrdili seksualnu funkciju nakon radikalne prostatektomije (RP) i eksterne radioterapije (ER). U istraživanje je uključeno 57 bolesnika sa ranim karcinomom prostate koji su liječeni u našoj ustanovi od siječnja 2003. godine do prosinca 2003. godine. Trideset i tri bolesnika su liječena radikalnom retropubičnom prostatektomijom,

a 24 primarnom radikalnom radioterapijom. Bolesnici su ispunili međunarodni upitnik za indeks erektilne funkcije 2 do 4 mjeseca i 6 mjeseci nakon liječenja. Postterapijska seksualna funkcija je kod bolesnika koji su liječeni ER značajno bolja u odnosu na skupinu liječenu sa RP (48,5% vs. 21,57%,  $p < 0,0001$ ). Dodatne analize su pokazale da je kod bolesnika liječenih sa ER zadovoljstvo erektilnom funkcijom, sposobnost održavanja spolnog odnosa i mogućnost ejakulacije bolja u odnosu na one liječene RP (44,67% vs. 11,57%,  $p < 0,0001$ ), te također i opća kvaliteta spolnog života (48,5% u ER grupi vs. 21,57% u RP grupi,  $p < 0,0001$ ). Interes za seksualne odnose bio je naprotiv podjednak kod obje skupine bolesnika Eretilna funkcija je 6 mjeseci nakon kirurškog ili radioterapijskog liječenja ranog karcinoma prostate gotovo dva puta lošija kod bolesnika liječenih RP u odnosu na one liječenja ER.