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Erectile Dysfunction after Radical Prostatectomy: Prevalence, Medical Treatments, and Psychosocial Interventions

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Abstract

Purpose of review—This review will discuss erectile dysfunction (ED) in prostate cancer patients following radical prostatectomy (RP). It will focus on the prevalence and current treatments for ED as well as the emotional impact of ED and the current psychosocial interventions designed to help patients cope with this side effect.

Recent findings—While there is a large discrepancy in prevalence rates of ED after RP, several recent studies have cited rates as high as 85%. The concept of "penile rehabilitation" is now the standard of practice to treat ED following RP. However, many men avoid seeking help or utilizing ED treatments. This avoidance is related to the shame, frustration, and distress many men with ED and their partners experience. Recent psychosocial interventions have been developed to facilitate the use of treatments and help men cope with ED. These interventions have shown initial promise, however, continued intervention development is needed to reduce distress and improve long-term erectile function (EF) outcomes.

Summary—ED is a significant problem following prostate cancer surgery. While there are effective medical treatments, the development of psychosocial interventions should continue to evolve to maximize the assistance we can give to men and their partners.

Keywords

Erectile dysfunction; Prostate cancer; Avoidance; Erectile Function; Radical prostatectomy

Introduction

A wide range of erectile dysfunction (ED) rates following radical prostatectomy (RP) has been reported. In a meta analysis of ED rates following RP, Tal and colleagues (2010) reported rates that range from 14 to 90%, a range that is too broad to help inform prostate cancer treatment decision-making or quality postoperative counseling [1]. Such discrepancies in prevalence are primarily due to important methodological differences in these studies. For example, poor quality studies use physician assessment of erectile function (EF), define EF recovery as erections hard enough for penetration about "half the time", and

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Conflicts of interest

None

use favorable subgroup analysis [1, 2]. Mulhall (2009) similarly found the incidence of ED after RP was extremely discrepant, ranging from 12 to 96%, with higher rates in multicenter, multisurgeon series, compared to single center, single surgeon series [3]. Mulhall (2009) outlined recommendations for adequate reporting, ascertaining that the minimum requirements should include: comorbidity profile, patient selection process, data acquisition methods, questionnaires selection, baseline EF data, long-term EF data (>24 months), definition of adequate EF, proportions of men returning to normal, proportion of men returning to preoperative EF level, erectogenic medications use, and rehabilitation strategy [3].

The studies that have used sound methodologies have concluded RP has a severe impact on EF, and that ED rates are on the higher end of this spectrum. Schover et al. (2002) reported in 1,236 men, 4.3 years post early stage treatment, that 85% had problems with erections [4]. This percentage is supported by a number of current, high quality studies. Resnick and colleagues (2013) reported data from the Prostate Cancer Outcomes Study (PCOS), a population-based cohort study of men who were diagnosed with prostate cancer and were followed prospectively for 15 years since 1991 [5]. Of the 1,655 men assessed at baseline and 2, 5 and 15 years post-RP or radiation therapy, men undergoing prostatectomy were more likely to have ED at 2 years, and at 5 years, with 78 to 87% experiencing insufficient erections for intercourse [5]. Similarly, Johansson (2011) reported that of 173 men, 146 (84%) reported ED after RP [6]. Lastly, Nelson et al (2013) investigated the percentage of men who achieved “back to baseline” erections following RP. In a longitudinal study of 134 men with normal erections pre-surgery, only 16% were able to obtain the quality of their pre-surgery erections two years after treatment. For men over 60 years of age, this decreased to only 4% [7]. It is important to note that robotic surgical techniques have not improved the rate of EF recovery following RP. Robotic techniques were marketed suggesting that increased surgical precision would reduce side effects; however, a recent meta-analysis found that new robotic techniques have not improved ED after RP [8].

Medical Treatments for ED and Penile Rehabilitation following RP

There are currently a variety of treatments for ED. The first-line therapy for ED is using phosphodiesterase-5 inhibitors (PDE5Is) (e.g. sildenafil, tadalafil, and vardenafil). Unfortunately, only about 12 to 17% of men will respond to these pills in the first six months following surgery [9]. The mechanism for erections is the secretion of nitric oxide (NO) from the cavernous nerves that run bilaterally along the prostate. NO promotes smooth muscle relaxation in the penis, producing an erection. PDE-5 is a chemical that breaks down NO, and as their name implies, oral medications inhibit PDE-5, leaving more NO available to produce an erection. Despite nerve sparing surgical techniques [8, 10], oral medications are generally ineffective early after surgery because the cavernous nerves are injured intraoperatively and can take 24 months to heal [11]. Early in the healing process, there is reduced NO secretion which removes the mechanism of action for oral medications. As the nerves heal, they gradually start to secret NO and oral medications progressively become more effective.

Since the cavernous nerves responsible for erection may take 18 to 24 months to heal post RP, natural erections via sexual stimulation and nocturnal erections may be absent during this recovery period [8, 12]. In a normal state, erections serve the purpose of pulling oxygen rich blood into the penile tissue keeping this tissue healthy [12]. Men who fail to achieve natural erections post RP also fail to oxygenate their penile tissue, which can cause atrophy and permanent structural alterations [12, 13]. This may lead to venous leak which, once present, is irreversible and will cause ED [12].

This process has led to the development of "penile rehabilitation" to sustain penile tissue health following surgery. Penile rehabilitation programs instruct men to achieve medication assisted erections 2 to 3 times a week (with or without the use sexual activity) immediately following RP in the 18 to 24 month recovery period. The theory is that consistent erections will pull oxygen rich blood into the penile tissue, sustaining tissue health, and increasing the chance men will recover erections. Since PDE5Is are ineffective post RP, penile injections have become a cornerstone of many rehabilitation programs. Data suggest that 52–67% of men who use a penile rehabilitation strategy recover erections compared to 20% of men who do not utilize penile rehabilitation [9, 14]. Penile rehabilitation is now the most common treatment for men following surgery, as 89% of Sexual Medicine professionals are utilizing some type of penile rehabilitation [1]. Vacuum devices to assist with erections have also been used in penile rehabilitation programs; however there has been minimal research done on the effectiveness of vacuum devices for penile rehabilitation. If a man does not recover erections 24 months following RP, and penile injections or vacuum devices are not effective, penile implant surgery is an effective third-line therapy option [8].

Potential Future Treatments for ED following RP

Alternative compounds have been suggested as potentially new treatments for ED following RP [8]. These include triiodothyronine, rho kinase inhibitors, and stem cell therapy [15–17]. Another possibility that has been controversial is the use of testosterone treatment post-prostatectomy [8]. Animal studies have shown that there may be an acute phase with hypogonadism after cavernous nerve damage [18]. Kim and colleagues (2011) found that preoperative serum testosterone levels are positively correlated to post-prostatectomy erectile functioning [19]. Testosterone has also shown to regulate PDE-5 levels in rodents, and therefore may also improve response to PDE5Is in men with hypogonadism [20]. From these data, it has been speculated that a combination of testosterone and a PDE5I may aid in penile rehabilitation. Vignozzi et al. (2009) found that when tadalafil was combined with testosterone in rats after bilateral nerve resection, penile oxygenation was restored and fibrosis was prevented, but hypoxia, however, was not prevented.

In human studies, Spitzer et al. (2012) found that in men with low testosterone levels there was no benefit of combining testosterone and sildenafil, compared to sildenafil and a placebo [21]. In a comprehensive review, Buvat (2013) found that only young patients with testosterone deficiency experienced a consistent benefit from testosterone therapy. Recent small studies have suggested that testosterone therapy can be given to men following RP without increasing the risk of disease recurrence or disease progression [22–24]. While the

concept of testosterone in penile rehabilitation has potential, more clinical trials are needed to determine its efficacy in aiding in erectile function recovery [8].

Avoidance and Difficulty Sustaining ED Treatments

Although there are effective treatments for ED, many men avoid seeking medical help for this condition. In a study of men (non-cancer sample) who were found that have ED, 69% of men did not accept that they had ED and the median time to pursue treatment for ED was 2 years [25]. In men with prostate cancer (PC), a study found that only 50% of men who were interested in seeking treatment for ED actually took steps to find treatment [26]. Of men who seek help to treat their ED, compliance is poor. It is estimated that 50 to 80% of men discontinue their use of ED treatments within a year of starting them [4, 27–29]. This applies to men with and without PC. Considering the importance of penile rehabilitation following PC surgery, the difficulty starting and sustaining treatment could have a negative impact on men's ability to recovery erections following RP.

Emotional and Relationship Impact of ED

The most probable cause for the avoidance and lack on compliance with ED treatment is the emotional distress related to having ED [30]. Research has established that there is an association between ED and emotional distress [31–36]. The rate of depression in men with ED has been reported to be as high as 56%, and the relationship between ED and depression has been demonstrated in three large, well-designed, population based studies of aging men in the US, Finland, Brazil, Japan, and Malaysia [32, 33, 37]. While some authors have hypothesized that the life-saving nature of cancer treatments may mitigate the distress men experience related to ED, studies focusing on men following PC treatment have confirmed the relationship between ED, and distress and depression [6, 34, 38]. For example, Johansson and colleagues (2011) found that 37% report high distress due to a loss of erectile function following PC surgery [6]. Additionally, Nelson et al. (2010) found that men reported significant shame and embarrassment as well as a reduction in general life happiness related to their ED following surgery [36]. This distress seems to be related to the construct of male sexual or masculine identify. Men who have a high sexual self-schema pre-treatment are especially vulnerable to find the loss of sexual function distressing and show increased depressive symptoms when they experience ED [39]. Zaider et al. (2012) found that around one-third of men assert that they have a moderate to severe loss of masculinity after treatment for localized PC [40].

Even more problematic is that this psychological burden due to ED can lead to problems between the patients and their partners, and poor marital adjustment after RP [38, 41–44]. Loss of intimacy both sexual and non-sexual can occur and lead to relationship distress, conflict, and frustration [38, 45]. Couples often use avoidant strategies and put off seeking help for this marital distress [46]. This avoidance may seem useful at the time to circumvent dealing with the stressful problems of cancer and sexual dysfunction. However, as healthy spousal communication has been associated with greater marital adjustment in dealing with prostate cancer and ED, seeking help and developing healthy communication would be the optimal strategy [46, 47].

Psychosocial Interventions for ED following RP

Since the impact of ED goes beyond the physical and also affects psychological and relationship aspects, a few recent psychosocial interventions have taken a biopsychosocial approach to assisting men with sexual functioning after PC treatment. The results from these studies have generally proven to increase ED medical treatment use, while only minimally inducing long term EF or psychosocial improvements. Chambers and colleagues (2015) studied telephone based, couples interventions in Australia designed to improve couples' psychosexual adjustment after treatment for PC. They compared the efficacy of a couples-based, peer-delivered telephone support intervention versus a couples-based, nurse delivered telephone counseling intervention versus usual care [48]. The peer-delivered intervention utilized a peer support framework in which couples bolster support based on shared personal experiences, while the nurse-delivered counseling followed theoretical principles and techniques of cognitive-behavioral sex and couples therapy. Men who were scheduled for, or who had undergone surgery for PC, within the last 12 months of the study and their female partners were included. Significant effects in the intervention arms were found for patients on sexual function and sexual self-confidence. Significant differences among intervention arms for overall use of medical treatments for ED at 12-month follow-up were also reported. Patients in both the peer and nurse-driven interventions were over 3 times more likely to use medical treatments for ED than those in usual care.

Schover and colleagues (2012) developed and tested the Counseling about Regaining Erections and Sexual Satisfaction (CAREss) intervention, a psychosocial program designed to address sexual functioning following PC treatment [49]. In this study, the researchers compared a face-to-face intervention to an internet-based intervention. The internet-based intervention was created to be more convenient, minimize drop-out rates, and to play to the fact that many men already seek sexual content on the internet. Men with localized PC who were married or living with a partner for over a year and who had either definitive surgery or RT within seven years of starting the study were included. There were no differences in the study outcomes between the face-to-face and the internet-based groups, therefore, the two groups were combined for repeated measures analyses. Men who received the CAREss (face-to-face or internet-based) intervention had significant improvement in EF between baseline and the six-month follow-up as well as between baseline and the one-year follow-up. Approximately 16% had near-normal function at baseline, which increased to 39% at six months, then declined slightly to 35% at one year follow-up. Men in the intervention conditions also improved significantly on the subscales of orgasmic function, intercourse satisfaction, and overall sexual satisfaction from baseline to one year. Men who intensified their ED treatment had large, significant increases in EF scores across time.

Siddons, Wooten, and Costello (2013) conducted a randomized, wait-list control trial to evaluate a cognitive-behavioral therapy (CBT) group intervention to facilitate improved psycho-sexual adjustment to treatment side effects for PC survivors who had undergone RP [50]. A total of 60 men participated across nine cognitive behavioral groups, and completed a manualized 8-week cognitive-behavioral group intervention. All participants were 6 months to five years post-RP for localized PC. Standardized questionnaires pre-intervention and post-intervention were completed, which assessed quality of life, psychological distress,

PC anxiety, and sexual functioning. Significant pre-intervention to post-intervention improvement was found on sexual confidence, masculine self-esteem, and relationship functioning. There was no change on engagement in sexual activities, sexual Intimacy, or marital affection. After controlling for covariates, hierarchical regression analyses revealed participation in the group intervention significantly improved sexual confidence, sexual self-esteem, masculine self-esteem and satisfaction with orgasm.

Conclusion

While PC surgery can have a significant negative impact on erectile function, there are a number of medical treatments available to address ED. The state-of-art medical practice following PC surgery includes the concept of penile rehabilitation where penile tissue health is maintained by consistently using erectogenic treatments for approximately 18–24 months following surgery. However, patients have difficulty maintaining compliance with ED treatments and penile rehabilitation. This difficulty is related to the negative emotional and relationship impact ED can have on both the patient and the partner. Psychosocial interventions have taken a biopsychosocial approach and demonstrated initial efficacy in helping men maintain the use of ED treatments following RP. While these interventions have demonstrated promise, continued work needs to be done to advance a “combined” approach, where medical treatments and psychosocial interventions are used together to improve outcomes for these patients.

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Abbreviations

PC	Prostate cancer
ED	Erectile dysfunction
EF	Erectile function
RP	Radical prostatectomy
NO	nitric oxide
PDE5Is	phosphodiesterase-5 inhibitors

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Key points

1. Approximately 85% of men will report difficulties with erections following radical prostatectomy.
2. Penile rehabilitation should be the standard of practice for men with ED following radical prostatectomy.
3. Men with prostate cancer report significant emotional distress related to ED.
4. This emotional distress can lead to avoidance of utilizing ED treatments and penile rehabilitation.
5. Current psychosocial interventions have demonstrated initial promise in helping men utilize ED treatments; however continued work is needed to improve sexual functioning outcomes for men with prostate cancer.