

REVIEW

Erectile Dysfunction after Radical Prostatectomy

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Abstract

Management of recurrent UTI is a very topical subject due to the high prevalence of the disease, its influence on the quality of life and the resulting social burden, as well as the increasing ecological adverse effects of the prolonged and repetitive antimicrobial therapy prescribed over the time. Sustained efforts should be made for a better understanding of the risk factors and the pathophysiology of the UTI recurrence, a precise diagnosis and a circumspect attitude regarding the antibiotic prescription. All the alternative therapies must be considered and the best treatment option should be chosen, providing maximum efficiency and minimal risks for the individual and also for the community.

Key words: urinary tract infections, management, antimicrobial therapy.

Introduction

Prostate cancer (PCa) is one of the most frequent cancer that appears in men all around the world and especially in Western European Countries, becoming in the last decades more commonly diagnosed in younger men [1]. In present, the therapeutic approach correlated with bigger patient survival rate has been demonstrated to be radical prostatectomy (RP) [2]. Although in the last years a lot of advances have been made in the development of minimally invasive surgical techniques and new information of the surgical anatomy of the prostate, erectile dysfunction (ED) after RP is still a frequent complication, ranging widely between 6% and 68%, that concerns both physician and the patient [3]. Anyway,

the early time of diagnosis, evolution of new surgical approach and the use of robotic systems, the evolution of less invasive treatments such as brachytherapy, has increased patients expectancies about the survival rate and the life quality level after prostate cancer so postoperative ED should be right managed, giving importance to all factors that could influence the preservation of erectile function after surgery. In our opinion the important factors are preoperative evaluation of patient, operative techniques, implementing a ample plan for postoperative erectile dysfunction management.

Preoperative arrangements

The preoperative evaluation of the patient for radical prostatectomy is the first mandatory step in avoidance postoperative erectile dysfunction. The evaluation of the clinical and pathological characteristics of the disease is extremely important in the treatment decisions. Pursuant to European Association of Urology guidelines [4] nerve-sparing (NS) techniques are a secure surgical tactic in the majority of PCa patients [5], however NS techniques are contraindicated in patients with extracapsular extension (ECE), such as a biopsy Gleason score >7 and clinical stage T2c or T3 disease. Despite EAU clinical recommendations, a few clinical studies showed that in a cohort of patients with high-risk characteristics, bilateral NS was achievable in 70% of the cases [6]. Beside that around 50% of the reported cases recovered EF 2 years after surgery. Overall before performing a RP, comorbidities such as diabetes mellitus (DM), cardiovascular diseases, advanced patient age represent other important factors for erectile dysfunction in the general population [7, 8]; that will influence negatively postoperative EF recovery after radical prostatectomy. So, Rabbani et al presented the influence of age on the erectile function recovery after surgery, showing rates of recovery of 70%, 40%, and 30% for patients below 60 years, 60-65, and above 65 years of age [9]. Also, studies showed that vascular risk factors, including hypercholesterolemia, hypertension, DM, cigarette smoking and coronary diseases emerged as independent predictors of altered EF recovery 30 months after surgery [10]. Briganti et al. also created a risk stratification tool involving preoperative EF measured with the International Index of Erectile Function scores, the Charlson Comorbidity Index as a substitute for general health status and patient's age; they revealed that the risk of post-radical prostatectomy erectile dysfunction could be stratified into 3 groups

of risk: low risk for ED, intermediate risk for ED and high risk for ED [11]. The 3-year erectile function recovery rates were 85%, 59%, and 37% for patients in the low-, intermediate-, and high-risk categories. In conclusion preoperative erectile function status was found to be a major predictor of post-radical prostatectomy erectile function recovery [12]. It was demonstrated that up to 50% of patients with a few manifestation of ED before surgery they develop postoperative ED [13]. For these reasons, a critical and complete examination of EF is a fundamental part of the preoperative patient evaluation [14].

Intraoperative management

1. Physiopathology of postoperative erectile dysfunction

Penile erection is characterized as a neurovascular event regulated by hormonal status and psychological factors, where both vascular and neuronal constituents are vital in the physiological pathway [15]. Neurotransmitters in charge for the relaxation of the smooth muscle in the arteries delivering the erectile tissue during sexual stimulation are triggered by the cavernous nerve (CN) terminals that provide parasympathetic innervation to the corpus cavernosum; these terminals come from the pelvic plexus that is placed in the fibro-fatty stratum between the rectum and bladder [16]. So, post-radical prostatectomy erectile dysfunction has been described as arterogenic, venogenic, neurogenic or a combination there of usually related to injuries of CNs and the pelvic plexus like neuropraxia caused by traction, compression, and coagulation during the apical and lateral dissection of the prostate [12,13]. This kind of injury makes Wallerian degeneration of the nerves heading to the denervation of the corpus cavernosum and to the loss of nocturnal erectile function, determining also hypoxia and fibrosis of the penis that lead to ED [17]. It has been assumed that the first

mechanism in charge for postoperative arterogenic erectile dysfunction could be the section of the accessory pudendal arteries (APAs), arteries described at 75% of patients that may determine penile hypoxia individually of the CNs [18].

2. Surgical anatomy

In the last decades the surgical prostate anatomy has dramatically improved so this conducted to important changes in surgical techniques, having an important goal - achieving better postoperative functional results. So in the context of erectile function recovery, two central aspects must be considered: the anatomy of the NVBs and prostate vascular supply.

a) Neurovascular bundles

The nerve fibers arising from the pelvic plexus and innervating the corpus cavernosum are located postero-laterally to the seminal vesicles and get in touch with the margin of the bladder neck, running adjacent to their tips; making the dissection of the seminal vesicles during radical prostatectomy an important factor that reduce ED postoperative [43]. Near to the prostate, nerve bundles are distributed "spray-like" on the anterolateral and posterolateral surface of the gland [19]. Studies showed that these fibers going anteriorly in NVBs innervate the prostate and the levator ani muscle, while nerve bundles located posterolaterally stimulate the corpus cavernosum [16].

b) Prostate arterial source

The prostate vascularization can start from the gluteal-pudendal trunk in 30% of cases, from the obturator artery in 15 % of the cases and from the internal pudendal artery in 50% of cases. The principal bifurcations of the artery are represented by an anterior branch reaching the lateral side of the prostate to the prostate apex and a posterior bundle around the vas deferens and the seminal vesicles and reaching the prostate base. So it was demonstrated that preserving the anterior capsular prostate arteries which are responsible for ancillary

penile blood supply is usually associated with EF recovery [20].

3. Outcomes after radical prostatectomy: surgical techniques

In the last two decades has been made multiple studies about the incidence of erectile dysfunction post radical prostatectomy each of them presenting different results. The reported results have been mostly influence by the different measures and definition of erectile dysfunction used in each study, the patient selection criteria, the surgical technique and the different postoperative protocols used over time giving a variability of EF outcomes reports. Studies showed that after ORP at a minimum of 12 months of follow-up the recovery of erectile function is between 31% and 86 % [21]; similarly, after laparoscopic RP (LRP) have been reported to oscillate from 42% to 76% and after RARP EF recovery rates were between 30% to 70%, 50% to 80%, 50% to 90%, and 60% to 95% at 3, 6, 12, and 24 months after surgery [22]. In conclusion the last studies submitted that regarding of EF recovery the robotic approach in comparison to the laparoscopic technique or open surgery is superior. Still, the lack of randomized clinical trials, the different surgeon's experience and personal skill are factors that will impede anyone to choose for the momenta gold-standard technique for radical prostatectomy [23 - 35].

Postoperative management

The postoperative management of the erectile dysfunction is mainly based on penile rehabilitation using two important therapeutic tools: pharmaceutical treatment and penile prostheses.

1. Pharmaceutical treatment

Radical prostatectomy is mostly associated with period of inactivity of the nerves controlling erectile function, that can affect erectile tissue oxygenation and damage the corpora cavernosa, making any chance of EF recovery impossible [36]. The

deoxygenation and neuropraxia will raise the production of fibrogenic factors in charge for important changes in the erectile tissue, destroying smooth muscle cells, reducing the elasticity of the corpus cavernosum, and finally veno-occlusive dysfunction [37]. In this circumstances, the aim of all treatments are to preserve functional oxygenation of the tissue in the first phase. Montorsi et al., concluded that the early postoperative locally administration of alprostadil enhanced EF recovery rates [38]. Padma-Nathan et al. also published a study in which they gave sildenafil nightly or placebo for 36 weeks to the ORP patients and they concluded that patients recovered EF [39]. The patients obtained after a 8 week drug free period, improvements in nocturnal penile erections and better IIEF scores than the patients treated with placebo.

In conclusion the patients should be counselled postoperatively regarding the optimal rehabilitation treatment to increase the changes of re-gaining erectile function.

2. Penile prostheses

Penile prosthesis implantation is considered another treatment option for patients with ED, after radical prostatectomy [40]. The penile prostheses are recommended only after the failure of the pharmaceutical treatment [40]. The literature studies presented excellent reports about the satisfaction rates of patients and theirs partners [41], but on the other hand penile prostheses are underused in the management of erectile dysfunction after RP.

Conclusions

In conclusion we are living in the era of early diagnosis of PCa with outstanding oncological outcomes and new surgical methods, an era where the quality life and erectile function of the patient became very important aspect. In this context the doctors should be aware of applying correct strategies to increase post radical

prostatectomy erectile function recovery using comprehensive clinical management and establishing a personalized profile for each patient.

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