

QRS 1010 Pelvicenter

Repeated magnetic stimulation of peripheral muscles to eliminate functional disorders of the pelvic floor

Scientific documentation and medical information

Disorder of sexual function: Erectile dysfunction after prostatectomy



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Definition

Despite surgical methods that preserve nerve bundles, the most common complications of radical prostatectomy (RP) are incontinence and erectile dysfunction (ED). This is particularly problematic in Germany, where significantly more men have surgery, for example, than in the USA. While the quality of life of patients is essentially impacted by urinary incontinence in the first postoperative phase, later on, erectile dysfunction comes to the fore. According to the UAE directive [1], ED is defined as the persistent inability to achieve or maintain an erection sufficient for satisfactory sexual activity.

Epidemiology and incidence

Despite new surgical methods, impotence remains one of the most common long-term complications after retropubic radical prostatectomy [2],[3]. In the early stages immediately following the operation, erectile function is almost entirely stopped [4]. It is reported that this is the case in 14 to 90% of patients, but this range is very quickly relativized when we know that it is essentially based, according to a meta-analysis, on method errors [5]. A range of the same magnitude, between 12 and 96%, is also reported by another study, which explains that multicenter studies record higher numbers of cases than studies from isolated establishments [6]. According to a questionnaire mailed to 1236 men whose surgery (with early-stage carcinoma) was an average of 4.3 years ago and who already had ED at the time of diagnosis, the rate of impotence increased was 85% [7].

This is also supported by other high level studies of EbM. Thus, according to a long-term study, there was in 78 to 87% of prostatectomized patients a higher probability of not being able to have sexual intercourse 2 years, 5 years and 15 years after the operation [8]. In another longitudinal study, only 16% of men surveyed who had no erectile problems before their prostatectomy had regained a normal erection two years later, but only 4% for those who had reached 60 years [9]. Such results are of course also influenced by the preoperative condition of the patients, since on average 36% of all patients undergoing RA already suffered from more or less symptoms of ED before the operation [10].

According to a surgical method with preservation of nerve bundles, developed by Walsh [11] in 1988 but controversial in the literature, ED rates could still be reduced by 10 to 40% [12], however initially with a latency of 18 to 24 months [13],[14],[15],[16],[17]. This also applies to the loss of spontaneous nocturnal erections [18],[19],[20]. Robot-assisted radical prostatectomy, performed since 2004 in the USA on about 10% of patients with prostatic carcinoma, gives much better results in this area [21].

However, a recent meta-analysis contradicts them, showing that robot-assisted surgical procedures, which are in fact supposed to provide even more precision in the surgical outcome, have no influence on ED after RA [22] . While ED is already difficult to bear for patients who have undergone RA, there is also a postoperative reduction in the length and diameter of the penis [23],[24].

Physiology

Erectile dysfunction following radical prostatectomy is usually due to damage during the operation to the bundle of vascular nerves, the two main lateral parts of which extend along the latero-rectal part of the prostatic capsule [25] , or even to a lesion of part or all of the nerve branches of the pelvic splanchnic nerves (resulting from the pelvic plexus), which causes a rate of impotence of almost 100% [26] . The probable vascular cause, despite nerve-sparing prostatectomy, is postoperative trauma to the pudendal arteries, which results in reduced arterial inflow into the corpora cavernosa [27],[28] . The real role of vascular lesions is in any case a multifactorial problem that is still poorly understood [29]. On the whole, however, it would seem that the neurogenic cause is in the foreground [30].

Post-operative follow-up

Following the nerve and vascular lesions, “Wallerian degeneration” of the neurovascular structures is observed, with the primary consequence being the loss of the distal connections to the cavernous bodies (corpora cavernosa) as well as the neuro-regulatory processes associated with them. The absence of neuronal stimulation leads to progressive degeneration and atrophy of the smooth muscle cells of the corpora cavernosa. This results in veno-occlusive dysfunction and insufficiency of the corpora cavernosa, which result in a limitation or even loss of the erectile reflex during sexual stimulation [31],[32].

Subsequently, the arterial supply is reduced, which causes hypoxia of the tissues of the corpora cavernosa [33]. Tissue hypoxia and denervation ultimately lead to apoptosis of smooth muscle cells and multiplication of extracellular connective tissues [34]. According to a vicious circle, this has an effect on the blood supply to the penis, since, due to the disappearance of spontaneous erections, the cavernous bodies are no longer sufficiently oxygenated and fibrosis (increase in connective tissues) is amplified as a result of this hypoxia (independently of the above, hypoxia may also occur as a result of damage to the irrigating arteries).

From a histological point of view, this corresponds to fibrosis of the corpora cavernosa, which can lead to shortening, narrowing or deformation of the penis [35]. Veno-occlusive dysfunction is ultimately the cause of “caverno-venous leakage” since there is faster drainage of blood out of the corpora cavernosa [36].

In the context of a capacity for erectile function recovery that is sometimes slow, and which can take up to 40 months after the operation, the rate of sexual potency therefore depends primarily on the surgical technique with preservation of the nerves [37]. . However, we must not forget the decisive role that age can play (preoperative erectile capacity), comorbidities (diabetes mellitus, arterial hypertension, smoking), and of course the rehabilitation practiced [38].

Effect of QRS Pelvicenter rPMS

Due to the risk of fibrosis which affects both the filling of the corpora cavernosa and their drainage with cavernovenous leakage, prostatectomized patients must resort to their own "security system", namely their pelvic floor with the ischio-cavernosus muscle. (MIC) and, to a lesser extent, the bulbospongiosus muscle.

Indeed, the MIC enveloping 35 to 56% of the base of the corpora cavernosa, its contraction allows to exert an ideal compression on the venous drainage [39]. This is also supported by studies showing the effectiveness of pelvic floor training for mild to severe venous leakage [40],[41]. Unfortunately, with age, there is not only a decrease in the voluntary contraction capacity of the perineum, but also the influence of concomitant conditions such as diabetes, atherosclerosis or neuropathies on muscle weakening [42]. This means that these particular pelvic muscles are no longer involved in closing the draining veins.

Therefore, the use of an rPMS pursues two objectives:

1. To combat the threatening breakdown of smooth muscle tissue in the corpora cavernosa, rPMS training should be started fairly quickly, that is, no later than two weeks after catheter removal. The aim is to stimulate parasympathetic fibers from the hypogastric plexus / pelvic plexus so that they can promote not only nervous excitement, but also an increase in blood supply. Thus it is observed, at least in tests carried out on animals, that stimulation of the pudendal nerve (causing, among other things, the contraction of the ischio-cavernous muscle) increases the pressure in the area of the perineum and penis at suprasystolic values [43] and thus prevents apoptosis of smooth muscle cells. It should be noted, however, that suprasystolic pressures \ddot{y} 300 mmHG cannot be obtained in a flaccid penis, but only if it is tumescent.
2. In a second phase of treatment, i.e. approximately 3 months after the operation, during which a prior treatment with rPMS should in general have at least markedly improved the incontinence problems, it is advisable to prolong this treatment with rPMS for the purpose of treating stress incontinence. This treatment should focus especially on the ischiocavernosus muscle (MIC), because it is this which prevents venous drainage from the corpora cavernosa (see "rPMS in erectile dysfunction").
In this zone of action, the bulbospongiosus muscle (MBS) which envelops 33 to

50% of the base of the penis could also play a certain role. It has indeed been found, at least in animal trials, that its contraction will enhance penile erection [44].

Extent of treatment and duration

In terms of the extent of treatment, fibrosis prophylaxis is oriented on the patient-reported recurrence of nocturnal spontaneous erections, and until this result, treatment should be carried out 2-3 times a week, with 20 sessions in all. Consecutive training of the ischiocavernosus muscle and the bulbospongiosum muscle corresponds to the treatment of stress incontinence (SUI), the magnetic field applicator being positioned mainly under the perineum or in the area of the base of the penis, as in the prophylaxis of fibrosis. 12 to 16 sessions should be enough here. The precise treatment protocol, which requires modifications in the event of concomitant treatment with rPMS of an SUI, is provided in the various application recommendations concerning the Pelvicenter.

Prospects of success

There are as yet no valid or study-based data regarding the success of rPMS treatment of ED following prostatectomy. On the other hand, it is not possible to apply the conclusions concerning the active training of the pelvic floor to treat non-operative ED, since in this case there is no nerve injury or trauma.

Study status

No study on rPMS treatment of ED after prostatectomy has yet been published.

Summary

While incontinence induced by prostatectomy has good healing capabilities and is also found to be responsive to conservative therapy, approximately 84% of operated patients experience nerve damage due to the operation and persistence of impotence. . Apart from the rather unsatisfactory attempt to combat it using PDE5 inhibitors, there is no truly conclusive effective approach here.

However, if we consider that a "repair" or reinforcement of the veno-occlusive system cannot eliminate the disorders due to nerve damage but at least makes it possible to attenuate their impact, there would be good reasons to concentrate on a therapy treating the muscles of sexual performance (ischio cavernosum and bulbospongiosus muscles).

For this, however, it is necessary to prevent, as soon as possible after the operation, the possible fibrosis of the corpora cavernosa by strengthening the blood supply to the penis and therefore its capacity for tumescence, otherwise, a training of the venous occlusion doesn't make much sense.

Since rPMS can activate the perineal and penile blood supply as well as the ischiocavernosus and bulbospongiosus muscles, there are sufficient indications to consider it as a promising method of alternative or combined therapy with inhibitors of PDE5 in the treatment of ED after RA.

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