QRS 1010 Pelvicenter

Repetitive peripheral magnetic stimulation to correct functional pelvic floor disorders

Scientific documentation and medical information

Sexual dysfunction: erectile dysfunction after a prostatectomy

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definition

Despite nerve-sparing surgical methods, incontinence and erectile dysfunction (ED) are among the most common side effects of a radical prostatectomy (RP). This is a problem above all in Germany, because significantly more men are operated on here than, for example, in the USA. While the quality of life of patients in the early postoperative phase is mainly impaired by urinary incontinence, erectile dysfunction is the main concern later on. According to the EAU Guidelines [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 techniques, impotence is still the most common long-term complication after radical retropubic prostatectomy [2], [3]. Postoperatively, the erectile function comes to an almost complete standstill for the first time [4]. A rumored bandwidth of 14 to 90% is put into perspective very quickly if, according to a meta-analysis, it is primarily based on methodological errors [5]. Similar discrepancies between 12 and 96% can also be found in another study, according to which multi-centre studies result in higher case numbers than isolated institutions [6]. After a postal survey of 1,236 men whose intervention (early cancer stage) was on average 4.3 years ago and who already had ED at the time of diagnosis, the impotence rate was 85% [7].

This is also supported by other studies with high EbM levels. According to a long-term study, after 2, 5 and 15 years, 78 to 87% of the prostactomized had a higher probability of no longer being able to have sexual intercourse [8]. In another longitudinal study, only 16% of men surveyed who had had no erectile problems prior to prostatectomy were capable of a normal erection two years later, or only 4% by the time they reached 60 years of age [9]. Of course, such results are also influenced by the preoperative condition of the patients, after an average of 36% of all RP patients already suffer from ED symptoms to a greater or lesser degree preoperatively [10].

According to a nerve-sparing surgical method developed by Walsh [11] in 1988, but discussed inconsistently in the literature, the EP rates should be reduced to 10 to 40% [12] - but only 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]. The robot-assisted radical prostatectomy, which was already performed in around 10% of prostate cancer patients in the USA in 2004, performs much better here [21].

However, a current meta-analysis contradicts this, according to which robot-assisted surgical procedures, which should actually bring additional precision to the surgical result, have no influence on the ED after RP [22] . If EP is already difficult for RP patients to bear, it is made even more difficult by the fact that the penis length and girth shorten postoperatively [23] , [24] .

physiology

Erectile dysfunction after radical prostatectomy is usually the result of an injury to the neurovascular bundle caused during the operation, the main parts of which on both sides run on the rectolateral side of the prostate capsule [25] or parts or all nerve branches of the erigentes nerve (from the pelvic plexus), resulting in an impotence rate of almost 100% [26] . Despite nerve-sparing prostatectomy, an operation-related trauma to the pudendal arteries with a resulting reduced arterial inflow into the cavernous bodies is discussed as a vascular cause [27] , [28] . The exact role of vascular injury is definitely a multifactorial problem and is still largely unclear [29] . Overall, however, the neurogenic causation should be in the foreground [30] .

OP Consequences

In the course of nerve and vascular injuries, the so-called “Wallerian degeneration” of the neurovascular structures occurs with the consequence that distal connections to the corpora cavernosa (cavernous bodies) and the associated neuroregulatory processes are initially lost. The lack of neuronal stimulation leads to increasing degeneration and atrophy of the smooth muscle cells of the cavernous bodies. This leads to veno-occlusive dysfunction and insufficiency of the cavernous bodies, which results in a restriction or loss of erectile reflexes during sexual stimulation [31] , [32] .

As the disease progresses, arterial blood flow decreases, resulting in tissue hypoxia in the cavernous bodies [33] . Tissue hypoxia and denervation ultimately lead to smooth muscle cell apoptosis and proliferation of extracellular connective tissue [34] . In a vicious circle, this has an effect on the blood flow to the penis, since the lack of spontaneous erections means that the cavernous bodies are no longer sufficiently oxygenated, and fibrosis (“increase in connective tissue”) increases as a result of hypoxia (hypoxia can also be caused independently of this by an injury of the supplying arteries arise).

Histologically, this corresponds to fibrosis of the corpus cavernosum, which can shorten, slim and warp the penis [35] . The veno-occlusive dysfunction ultimately means a “venous leak” since the blood drains quickly from the cavernous bodies [36] .

In addition to the sometimes slow ability to regenerate erectile function, which can take up to 40 months postoperatively, the potency rate depends primarily on the nerve-sparing surgical technique [37] . But age (preoperative ability to have an erection), concomitant diseases (diabetes mellitus, arterial hypertension, smoking) and of course the rehabilitation that has been carried out can also be decisive [38] .

QRS Pelvicenter rPMS effect

Because of the impending fibrosis, which affects both the filling of the cavernous body and its drainage in the sense of a venous leak, prostatectomy patients rely on their actual "safety system" in the form of the pelvic floor or the M. ischiocavernosus (MIC) and (to a lesser extent) also the M. bulbospongiosus thrown back.

Because after the MIC envelops the base of the cavernous body by 35 to 56%, its contraction creates an ideal compression of the venous drainage [39] . This is also supported by studies that pelvic floor training is effective for mild to moderate venous leaks [40] , [41] . Unfortunately, with increasing age there is not only a decreasing ability of the pelvic floor to contract voluntarily, but accompanying diseases such as diabetes, atherosclerosis or neuropathies can also cause a weakening of the muscles [42] . This means that these special pelvic floor muscles no longer contribute to the closure of the draining veins.

There are two objectives for using an rPMS:

1. In order to prevent an impending degradation of smooth muscle tissue in the erectile tissue, rPMS training should be started fairly quickly, ie no later than two weeks after the catheter has been removed. The aim is to stimulate the parasympathetic fibers from the hypogastric plexus / pelvic plexus, which can cause both nerve irritation and an increase in blood flow. At least animal experiments have shown that stimulation of the pudendal nerve, in which the musculus ischiocavernosus contracts, causes the perineum and the penile area to rise to suprasystolic values [43] and thus prevents apoptosis of the smooth muscle cells. However, it remains to be said that suprasystolic pressures of ≥ 300 mmHG cannot be produced in a flaccid penis, but only in a tumescent penis.

2. In a second treatment phase, i.e. about 3 months postoperatively, after which the incontinence symptoms should have improved at least significantly through a previous rPMS treatment, it is recommended to continue this rPMS treatment aimed at stress incontinence. This should refer specifically to the ischiocavernosus (MIC) muscle because it prevents venous outflow from the cavernous bodies (see rPMS in erectile dysfunction). The M. bulbospongiosus (MBS), which encases 33 to 50% of the base of the penis, could also play a certain role for this effective area. At least in animal experiments, the penile erection increased when it contracted [44] .

Scope of treatment and duration of therapy

Fibrosis prophylaxis is based on the scope of treatment based on the patient's indication of a recurrence of nocturnal spontaneous erections and should be carried out 2 to 3 times a week with a total of 20 treatments until then. The subsequent training of the M. ischiocavernosus and M. bulbospongiosus corresponds to that of stress incontinence (SUI), whereby the magnetic field applicator - similar to fibrosis prophylaxis - should be positioned mainly below the perineum or in the area of the base of the penis. Here 12 to 16 treatments should be sufficient. The exact treatment

protocol, which requires changes in the case of a simultaneous rPMS treatment of an SUI, is specified in the respective recommendations for use of the Pelvicenter.

expectation of success

There are still no valid or study-based data on the success of rPMS treatment in ED after prostatectomy. These cannot be derived from active pelvic floor training for the treatment of non-surgical EDs, since they are not fundamentally based on nerve injuries or trauma.

study situation

No studies have yet been published on rPMS treatment of ED after prostatectomy.

summary

While prostatectomy-related incontinence has a good ability to recover and is also amenable to conservative therapy, approximately 84% of patients have surgically-related nerve damage and thus impotence. Apart from the rather unsatisfactory attempt to counteract this with PDE5 inhibitors, there is no really conclusive approach.

However, if one considers that a "repair" or strengthening of the veno-occlusive system does not remedy the neurogenic nerve damage, but its effects can be reduced, there is much to be said for therapeutically focusing on the "potency muscles" (M. ischiocavernosus / M. bulbospongiosus).

The prerequisite for this, however, is to prevent any erectile tissue fibrosis as early as possible after the operation by increasing the penile blood flow, since training the venous occlusion seems to make little sense without the appropriate ability to tumescent.

Since rPMS can train both the perineal-penile blood flow and the ischiocavernosus / bulbospongiosus muscle, there is enough evidence to see it as a promising treatment alternative or combination therapy with PDE5 inhibitors for ED after RP.

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