FUNKCIONALNA MAGNETSKA STIMULACIJA U SLUŽBI OPORAVKA: REHABILITACIJA ZDJELICE NAKON RADIKALNE PROSTATEKTOMIJE

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Radikalna prostatektomija (RP) predstavlja zlatni standard u liječenju lokaliziranog karcinoma prostate (engl. *prostate cancer* – PCa) u bolesnika dobrog općeg zdravlja i povoljnog očekivanog životnog vijeka.[1] Unatoč napretku kirurških tehnika, uključujući tehnike poštede neurovaskularnog snopa (NVS) i minimalno invazivne pristupe, postoperativne funkcionalne komplikacije i dalje su česte. Urinarna inkontinencija (UI) i erektilna disfunkcija (ED) najčešće su nuspojave nakon RP-a te predstavljaju ključne čimbenike koji utječu na kvalitetu života (engl. *quality of life* – QoL). Prijavljene stope ovih komplikacija znatno variraju zbog razlika u definicijama, vremenu procjene i metodama mjerenja ishoda, uključujući bolesnički prijavljene i liječnički procijenjene ishode.[2,3] Postoperativna urinarna kontinencija ovisi o usklađenoj funkciji mokraćnog mjehura, vrata mokraćnog mjehura, uretre te okolnih mišićnih i neuralnih struktura. Sam proces starenja, kao i prethodno postojeći poremećaji donjeg mokraćnog sustava, mogu narušiti ovu funkcionalnu cjelinu već prije samog operacijskog zahvata.[4] Nakon RP-a, ishodi kontinencije dodatno su uvjetovani anatomskim i kirurškim čimbenicima, uključujući duljinu uretre, integritet vanjskog sfinktera, očuvanje NVS-a te rekonstrukcijske kirurške tehnike. Brojna istraživanja potvrdila su važnu ulogu uretralne anatomije u oporavku kontinencije nakon RP-a. Liječenje postoperativne UI obuhvaća konzervativne, farmakološke i kirurške pristupe. Konzervativna terapija u pravilu predstavlja prvu liniju liječenja, pri čemu se najčešće primjenjuje trening mišića zdjeličnog dna (engl. *pelvic floor muscle training* – PFMT).[3] PFMT se može provoditi samostalno ili u kombinaciji s dodatnim modalitetima poput biofeedbacka, elektrostimulacije i funkcionalne magnetske stimulacije (FMS). Iako je PFMT široko zastupljen u postoperativnim rehabilitacijskim protokolima, dokazi o optimalnom vremenu primjene, intenzitetu i ukupnoj učinkovitosti i dalje su neujednačeni.[5] Posljednjih godina FMS se nameće kao obećavajuća neinvazivna metoda u liječenju UI-ja nakon RP-a. Dostupni podaci upućuju na to da FMS može ubrzati povrat kontinencije povećanjem maksimalnog tlaka zatvaranja uretre, supresijom hiperaktivnosti detruzora i poboljšanjem funkcionalnog kapaciteta mokraćnog mjehura.[6] ED predstavlja još jednu značajnu funkcionalnu komplikaciju nakon RP-a te je prvenstveno posljedica oštećenja kavernoznih živaca unutar NVS-a. Čak i uz primjenu tehnika poštede NVS-a, postoperativne promjene u tkivu mogu dovesti do odgođenog ili nepotpunog oporavka erektilne funkcije.[4] Učestalost i težina ED-a ovise o dobi bolesnika, početnoj erektilnoj funkciji,

komorbiditetima i kirurškom pristupu. Liječenje se temelji na konceptu rehabilitacije penisa s ciljem očuvanja strukture erektilnog tkiva i poticanja neuralnog oporavka. Najčešće korištene metode uključuju inhibitore fosfodiesteraze tipa 5, vakuumske erekcijske uređaje i intrakavernoznu terapiju.[7,8] Rana primjena rehabilitacijskih mjera povezuje se s boljim funkcionalnim ishodima, iako optimalni protokoli još nisu u potpunosti definirani. Unatoč poboljšanjima kirurških tehnika (razvoj robotske kirurgije) koje su smanjile relativnu učestalost funkcionalnih komplikacija, očekuje se da će broj bolesnika s UI-jem i ED-om nakon RP-a rasti paralelno s porastom broja izvedenih prostatektomija. Iako se kod većine bolesnika funkcija s vremenom oporavi, trajanje oporavka znatno varira. S obzirom na značajan utjecaj UI-ja i ED-a na kvalitetu života te opterećenje zdravstvenog sustava, od ključne je važnosti primjena učinkovitih i neinvazivnih rehabilitacijskih strategija. Multidisciplinarni, individualizirani i bolesniku usmjeren pristup nužan je za optimizaciju funkcionalnog oporavka i dugoročnog zadovoljstva bolesnika nakon radikalne prostatektomije.

Ključne riječi

urinarna inkontinencija, funkcionalna magnetska stimulacija

FUNCTIONAL MAGNETIC STIMULATION IN RECOVERY: PELVIC REHABILITATION AFTER RADICAL PROSTATECTOMY

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Radical prostatectomy (RP) remains the gold standard treatment for localized prostate cancer (PCa) in patients with good overall health and a longer life expectancy.[1] Despite advances in surgical techniques, including nerve-sparing and minimally invasive approaches, postoperative functional complications remain common. Urinary incontinence (UI) and erectile dysfunction (ED) are the most prevalent adverse outcomes following RP and represent major determinants of postoperative quality of life (QoL). The reported incidence of these complications varies widely due to heterogeneity in definitions, timing of assessment, and outcome measures, including patient-reported versus physician-reported outcomes.[2,3] Postoperative urinary continence depends on the coordinated interaction of the bladder, bladder neck, urethra, and surrounding musculoskeletal and neural structures. Aging and preexisting lower urinary tract dysfunction may impair this functional unit prior to surgery.[4] Following RP, continence outcomes are further influenced by anatomical and surgical factors, including urethral length, integrity of the external sphincter, preservation of the neurovascular bundles (NVBs), and reconstructive techniques. Several studies have demonstrated that urethral anatomy plays a critical role in continence recovery after RP. Management of post-RP UI includes conservative, pharmacological, and surgical approaches. Conservative therapy is generally recommended as the first-line treatment, with pelvic floor muscle training (PFMT) being the most commonly applied intervention.[3] PFMT may be used alone or combined with adjunctive modalities such as biofeedback, electrical stimulation, and functional magnetic stimulation (FMS). Although PFMT is widely incorporated into postoperative rehabilitation protocols, evidence regarding its optimal timing, intensity, and efficacy remains inconsistent.[5] In recent years, FMS has emerged as a promising

noninvasive option for the management of post-RP UI. Available data suggest that FMS may facilitate earlier recovery of continence by increasing maximal urethral closure pressure, suppressing detrusor overactivity, and improving functional bladder capacity.[6] Erectile dysfunction is another major functional complication following RP and is primarily caused by injury to the cavernous nerves within the NVBs. Even with nerve-sparing techniques, postoperative tissue changes may lead to delayed or incomplete recovery of erectile function.[4] The incidence and severity of post-RP ED are influenced by patient age, baseline erectile function, comorbidities, and surgical approach. Management strategies focus on penile rehabilitation aimed at preserving erectile tissue integrity and promoting neural recovery. Commonly employed modalities include phosphodiesterase type 5 inhibitors, vacuum erection devices, and intracavernosal therapies.[7,8] Early initiation of rehabilitation has been associated with improved functional outcomes, although optimal protocols remain a subject of ongoing research. Despite improvements in surgical techniques (development of robotic surgery) that have reduced the relative incidence of functional complications, the absolute number of patients affected by post-RP UI and ED is expected to increase with rising prostatectomy rates. Although most patients eventually recover function, the duration of recovery varies considerably. Given the significant impact of UI and ED on QoL and healthcare resources, the implementation of effective, noninvasive rehabilitation strategies is essential. A multidisciplinary, patient-centered approach is crucial to optimize functional recovery and long-term satisfaction following radical prostatectomy.

Keywords

urinary incontinence, functional magnetic stimulation

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