

EFFECT OF MICROCURRENT ELECTRICAL STIMULATION IN THE TREATMENT OF ERECTILE DYSFUNCTION AFTER RADICAL PROSTATECTOMY - PILOT STUDY



UNIVERSIDADE
ESTADUAL DE LONDRINA

Campana T1, Carboni C2, Sanvido L1, Silvio Henrique A1

1. Universidade Estadual de Londrina, 2. Universidade Inspirar

Hypothesis / aims of study

Erectile dysfunction (ED) after radical prostatectomy (PTR) is a specific form of ED, having a causal factor (surgical trauma), as well as previous multifactoriality.

Electrical stimulation is beneficial for treating smooth muscle dysfunctions and could be used in the treatment of ED, caused by the cavernous smooth muscle anomaly.

In studies on cavernous smooth muscle, there is knowledge that the growth of smooth muscle can be induced.

Microcurrent stimulation of striated muscles is an established method for muscle regeneration when applied through surface electrodes activating sensory and motor nerve fibers.

Bioelectrical stimulation (BES) can restore function as it modulates nervous system responses to stimuli, as by neuromodulation, or accelerate regeneration of injured peripheral or central nerves by regenerative electrical stimulation.

This trial aimed to study the effects of the use of BES in the recovery of erectile function in a group of ED patients. We hypothesize that micro-current and low-frequency levels of BES deliver a set of precise signals to target regenerative and reparative proteins and can be associated with significant improvement in all the endpoints used to assess ED with no reported adverse events.

Study design, materials and methods

Quasi-experimental study approved by the Research Ethics Committee of Universidade Inspirar, (N°3.076.79) and registered with Clinical Trials (N° NCT05118607).

Included were: Men who underwent open RP for localized prostate adenocarcinoma (clinical and pathological stage \leq T2, N0, M0), between 40 and 75 years of age with a diagnosis of post-RP ED (IIFE5 score less than 22) followed in the private urology physician, who agreed to participate in the study and who completed informed consent.

Each patient served as their control, using the validated questionnaires, International Index of Erectile Function -IIFE5 and Erection Hardness Score (EHS).

The assessment and intervention period :

- Out before the intervention period (pre-treatment)
- After the 8-week intervention period (post-treatment),
- 6 months after completing the treatment.

The intervention:

The intervention consisted of applying low-intensity transcutaneous penile electrical stimulation, below the motor threshold.

- Low frequency alternating between 10 Hz and 300 Hz.
- The sessions lasted 45 minutes and were carried out twice a week.
- The current was applied through two self-adhesive electrodes from the brand V Trodes (Anaheim, United States). One electrode was placed at the base of the penis, while the second was placed distal to the penis
- First and connected to a Mettler model 240 bioelectrical stimulator, which was programmed for five types of low-frequency current that were switched every 5-15 minutes.

Analyzes were performed using the SPSS 22.0 statistical program (SPSS, Chicago, Illinois). The analyzed data were presented in absolute and relative frequency, mean and standard deviation, or median and interquartile range 25-75%, according to the normality of the data, which was verified by the Shapiro-Wilk test. The Friedman test with Dunn's post-test was used for comparisons between evaluation periods.

Results and interpretation

Tabel 1 - Demographic and clinical data of the patients

Variable	n=10
Age (years)	61,2 ± 8,7*
Tabagism-yes/no (%)	0/10 (0/100%)
Alcool-use yes/no (%)	4/6 (40%/60%)
Diabetes -yes/no (%)	2/8 (20%/80%)
Medications- yes/no (%)	5/5 (50%/50%)

Tabel 3 - Demonstration of the comparison of scores from the IIEF-5 and EHS questionnaires in the four evaluation periods of the study.

	Baseline		PRE		POS		Follow up 6 M		P
	media	sd	media	sd	media	sd	media	sd	
IIEF-5	9,7	2,9	9,7	2,8	16,6 ^{AB}	4,9	16,9 ^{AB}	4,6	< 0,0001
EHS	1,6	0,5	1,6	0,5	2,6 ^{AB}	0,8	2,8 ^{AB}	0,7	< 0,0001

Data presented as mean and standard deviation ; IIEF-5= *International Index of Erectile Function*; EHS= *Erection Hardness Score*;
^{AB}= vs pre;

Studies have demonstrated the benefits of microcurrent for various health conditions and the healing process. However, to our knowledge, none have explored its use for treating erectile dysfunction in humans.

Superficial microcurrent stimulation resembles the currents generated in the body during healing, and intensifies tissue bioactivity at the cellular level, stimulating cellular physiology and growth (1).The stimulation of ion channels and cellular communication can regulate the electrical environment of cells and promote their activit.

Low-frequency electrical stimulation in an animal model:

- Increasing erectile function
- Protective effect on penile tissues and nerves

5-Phosphodiesterase Inhibitors (IPDE5):

- Relax smooth muscles, increase blood flow to the corpora cavernosa, and prevent fibrosis

Combining microcurrent therapy with IPDE5 can be a viable alternative for post-prostatectomy rehabilitation (3).

The use of microcurrent was effective for the treatment of patients with ED after open RP. Furthermore, its benefits proved to be long-lasting after a 6-month follow-up.

Conclusions

Microcurrent stimulation had a beneficial effect on ED post-open RP assessed by the IIFE-5 and EHS after the 8-week intervention period. Use as an isolated treatment or in combination with other treatments already used may be a promising proposal. Therefore, controlled and randomized studies must be carried out

References

1. Lee BY, Wendell K, Al-Waili N, Butler G. Ultra-low microcurrent therapy: A novel approach for treatment of chronic resistant wounds. *Adv Ther.* 2007;24(6):1202–9. 9. Schmidt-Malan SM, Brinkman CL, Karau MJ, Brown RA, Waletzki BE, Berglund LJ, et al. Effect of Direct Electrical Current on Bones Infected with *Staphylococcus epidermidis*. *JBMR Plus.* 2019;3(5):1–7.
2. Stief CG, Weller E, Noack T, Djamilian M, Meschi M, Truss M, et al. Functional electromyostimulation of the corpus cavernosum penis--preliminary results of a novel therapeutic option for erectile dysfunction. *World J Urol.* Janeiro de 1995;13(4):243–7.
3. Carboni C, Fornari A, Bragante KC, Averbeck MA, Vianna da Rosa P, Mea Plentz R Della. An initial study on the effect of functional electrical