New Frontiers of Extracorporeal Shock Wave Medicine in Urology from Bench to Clinical Studies

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Abstract

Introduction: A shock wave (SW) is a type of continuous transmitted sonic wave that carries energy and propagates through a medium, and achieves rapid energy transformations and alters the cell function. SWs have been applied for many fields of medical science in various treatment settings.

Material & Method: This article provides information on the basic characteristics and clinical evidence of application of low-energy shock waves (LESWs) in urology based on a literature review with a search strategy for articles related to urology, and LESW published in MEDLINE and PubMed.

Results: LESW enhance the expression of vascular endothelial growth factor (VEGF), endothelial nitric oxide synthase (eNOS), proliferating cell nuclear antigen (PCNA), chemoattractant factors, the recruitment of progenitor cells, and ameliorate mitochondrial dysfunction and inhibit inflammatory molecules. LESW therapy has been used in urology for treating chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS), interstitial cystitis/bladder pain syndrome (IC/BPS), overactive bladder, stress urinary incontinence, detrusor underactivity/underactive bladder, and erectile dysfunction through the mechanisms of anti-inflammation, neovascularization, and tissue regeneration. Additionally, LESW have been proven to temporarily increase tissue permeability and facilitate intravesical botulinum toxin delivery for treating overactive bladder. LESW assisted drug delivery was also suggested to have a synergistic effect in combination with cisplatin to improve the anti-cancer effect for treating urothelial cancer in an in vitro and in vivo study.

Conclusions: LESW is a promising method for the treatment of various diseases in urology. However, further investigation with a large scale of clinical studies and real world date is necessary to confirm the role of LESW in clinical use.

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