A New Physical Modality for Renal Stone Management: A Case Report

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ABSTRACT

This report described an innovative nonsurgical method for management of unsuccessful renal stone expulsion. Our patient was a 43-year-old physician with a history of two distinct episodes of renal stone entrapping in distal ureter and nonresponsive to shock wave lithotripsy, and oral medication recommended to treat by surgery. Fortunately, renal stones were expelled by whole body vibration technique without any surgical procedure.


Introduction

Renal stones are a common problem with substantial morbidities and economic costs. Shock wave lithotripsy (SWL) is one of the most common techniques that significantly reduce the morbidity of stone removal and it is the treatment of choice for most small renal calculi; however, it is not an ideal modality for the management of complex or large calculi. Whole body vibration (WBV) generates an oscillating movement on a plate and transmits vertical acceleration to muscle and bone. Skeletal muscles vibration causes muscle spindles response termed a “tonic vibration reflex.” The results of our study may be explained by causing intermittent contraction of ureters and urethra wall muscles and facilitation of stone fragments passage via usage of WBV after SWL.

Case Report

A 43-year-old male physician, experienced 10 mm renal stone 2 years ago, the stone was
in upper part of urethra; shock wave was prescribed. Unfortunately, a 6 mm stone was entrapped in distal ureter, a course of Tamsulosin, ibuprofen was not effective, considering the presence of hydronephrosis, surgical intervention was recommended. A course of WBV was tried. It was performed in different frequency from 25 to 50 Hz with 5 Hz interval (NetWBV, Iran) and different positions including standing, sitting, sitting with knee bending sitting and bending to each side for 45 minutes each episode was 90 seconds with short rests between sessions. Renal stone was expelled at the end of 45 minutes of WBV. One year later, another episode of renal stone was experienced. The stone was in distal urethral part with Grade 1 hydronephrosis. Another session of WBV for 45 minutes was tried. The stone was expelled about two hours after WBV figure 1.

Discussion
Renal stones are a common problem worldwide with substantial morbidities and economic costs. The lifetime risk for kidney stone disease currently exceeds 6-12% in the general population (1). Considerable progress has been made in the management of nephrolithiasis over the last 20 years, but approximately, 10-20% of all kidney stones still require surgical removal. SWL is one of the most common techniques that significantly reduce the morbidity of stone removal and it is the treatment of choice for most small renal calculi. However, SWL is not an ideal modality for the management of complex or large calculi. The guidelines suggest that for patients with a ureteral stone < 10 mm and well-controlled symptoms, a period of observation along with medical expulsive therapy is an option for initial treatment, and recommend α-1 blockers as the preferred agents for medical expulsion therapy (2). WBV is a relatively new exercise training mode that has shown to improve muscle strength and mass (3, 4), bone mineral density (5), and glycemic control (6). It generates an oscillating movement on a plate and transmits vertical acceleration to muscle and bone (7). Its mechanism of stimulating muscle spindles and alpha motor neurons initiates reflex muscle contractions (8). A single bout of whole body low-intensity vibration has been shown to increase systemic and regional (i.e., skin) blood flow (9-12). Application of vibration to skeletal muscles causes a response harmonized to frequencies of vibration in muscle spindles, termed a “tonic vibration reflex” (13, 14). Underlying mechanism involves the stimulation of the neuromuscular spindles by rapid and transient muscle stretching, which boosts the feedback of the myelinated Ia fibers. The effect of vibration on smooth muscles has been studied mainly in vascular system. To date, the effects of WBV on the peripheral vasculature perfusion remain inconclusive. Whether, mechanical WBV has mechanical effect or effects on ureter peristalsis may help to find the appropriate vibration frequency. Further research in this field may reveal potential effects of WBV in renal stone management.
Conflict of Interests
Authors have no conflict of interests.

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References