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Novel and Effective Therapeutic Regimen for Urinary Stones: A Noninvasive and Nonsurgical Procedure during the SARS-CoV-2 Pandemic (COVID-19) Outbreak

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Abstract

Nephrolithiasis is a highly prevalent disease worldwide with a high level of acute and chronic morbidity. First-line treatment is typically analgesia with non-steroid anti-inflammatory drugs until the stone passes, otherwise urological intervention may be necessary. Certain medications such as alpha blockers and non-steroidal anti-inflammatory drugs, corticosteroids, or anti-spasmodics are sometimes used to create passage of stones in order to avoid further urologic intervention or hospitalization. However, the study results have limited their use and meanwhile major adverse events defined as orthostatic hypotension, collapse, syncope, palpitations, or tachycardia have been reported. At the present global circumstances, the SARS-CoV-2 pandemic (COVID-19) has caused widespread disruption of routine surgical care and forced every surgeon to make triage decisions requiring greater ethical and community health consideration. It is necessary to balance the surgical risks and benefits and the medical risks of any perceived delay in treatment, and potential exposure of health care workers and/or patients to the deadly virus.

Hence, to reduce the incidence of renal lithiasis, an important number of etiologic factors can be adequately modified through diet. It is possible to treat kidney stones (nephrolithiasis and urolithiasis) successfully and out patiently, by avoiding the required surgery or invasive method of treatment.

Keywords: Renal lithiasis; The SARS-CoV-2; Oxidative stress; Antioxidants; Boron

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Introduction

Nephrolithiasis is a highly prevalent disease worldwide with rates ranging from 7-13% in North America, 5%-9% in Europe, and 1%-5% in Asia. Due to high rates of new and recurrent stones, management of stones is expensive and the disease has a high level of acute and chronic morbidity. There has been a rising incidence in stone disease throughout the world with a narrowing of the gender gap. Increased stone prevalence has been attributed to population growth and increases in obesity and diabetes [1]. One of the major problems with nephrolithiasis is the high rate of recurrence, which can effect up to 50% of patients over a 5-year period and the prevalence of stone disease has nearly doubled over the past 15 years, likely secondary to dietary and health trends. A significant economic burden is associated with kidney stones, with health care charges exceeding $10 billion annually [2]. Follow-up care after an ED visit for kidney stones may help reduce ED revisits and increase use of stone prevention strategies, but over half of patients seen acutely in the ED for kidney stones do not receive follow-up care [3]. Interestingly, the cost effectiveness of medical therapy varied from country depending on cost of treatment and cost of surgery. Patients with kidney stones have high levels of stress and anxiety, with a lifetime risk of 10% and increasing hospital admissions [4].

Presentation

To reduce the incidence of renal lithiasis, an important number of etiologic factors can be adequately modified through diet, since it must be considered that the urine composition is directly related to diet. In fact, the change of inappropriate habitual diet patterns should be the main measure to prevent kidney stones. Considering the nutrients, the biological, medical and environmental roles of trace elements have attracted considerable attention over the years in prevention of chronic or acute diseases, such as renal diseases [5]. Although, a complete picture

of the pathophysiological mechanisms involved is still unclear, but there is increasing evidence that reactive oxygen species (ROS) and development of oxidative stress (OS) are produced during idiopathic calcium oxalate (CaOx) nephrolithiasis [6].

As experimental and clinical studies have demonstrated, the most frequently studied natural antioxidants with free radical scavengers to provide superior renal protection are vitamins A and carotenoids, E, C, B6 and antioxidant trace elements, selenium and zinc [7-12] that can be easily and safely increased in tissues by supplementation. Medical treatment of stone-forming patients using pyridoxine is considered as an effective first-line therapy to decrease hyperoxaluria in patients who form stones [13] and zinc is believed to have inhibitory effect on calcium oxalate stone formation [14].

In a rat animal study, we reported a beneficial effect on treating and superior renal protection for preventing stone deposition in the rat kidney. The results provided a scientific rationale for preventive and treatment roles of antioxidant nutrient complex in human kidney stone disease. For this purpose, the standard diet enriched with Vitamin E, Vitamin A, Vitamin C, Vitamin B6, selenium, zinc and boron for each rat per day. Considering the nutrients, boron as an ultra-trace element is revealing to enhance the antioxidant defense mechanism and along vitamin status seems to have an impact on the stone removal [15]. Following the animal study, we investigated the lithiasis effect of the supplements on human subjects diagnosed with kidney stones (n>100) with the aim to evaluate the effect of boron and antioxidants supplementation on removal of kidney stones and recently, L- Arginine was added to the complex after showing to have an antioxidant and nephro-protective potential, as well [16].

Based on the personal research findings, the method is able to treat kidney stones (nephrolithiasis and urolithiasis) successfully and out patiently, by avoiding the required surgery or invasive method of treatment such as minimally invasive percutaneous nephrolithotomy (PCNL) and ureterorenoscopic lithotripsy (URSL), and even extracorporeal shock wave lithotripsy, particularly on Ca-Ox stones with minor pain, hematuria, and strong effect on preventing recurrences. The method simply uses the application of a nutritional supplement complexes and particularly is capable of dissolving the renal stones (up to 20 mm in diameters) **(Figure 1)** located in the calyces and pelvis (a 5-10 mm stone size reduction with the mean expulsion time of 20-30 days) (Fig 2) (Fig 3) and enhances passage of stone fragments spontaneously in ureter with minor pain episode and hematuria or converting the stone into sludge (for the stones up to 20 mm in diameters) within hours to days. Interestingly, in most cases, the stones are dissolved and disappeared in the calyces with no harm and patients are fully satisfied with feeling of highly pain alleviation and cease of hematuria. The method is applicable mainly for those patients (e.g. elderly and aging people) who cannot go under ESWL or surgery.

Figure 1: A sample of discarded stones from patients and decrease in the size.

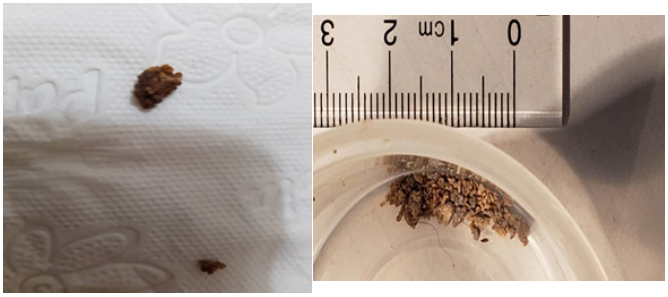

Figure 2: Measuring of the stones after they decreased in the size.

The results provided a scientific rational for treatment roles of antioxidant nutrient complex in human kidney stone disease.

There is increasing evidence that reactive oxygen species and development of oxidative stress are produced during idiopathic calcium oxalate nephrolithiasis. It is reported that oxidative stress, renal epithelial injury and inflammation are also engaged in idiopathic stone formation which is indicated by the urinary excretion of reactive oxygen species, products of lipid peroxidation, enzymes indicative of renal epithelial injury as well as many markers of chronic kidney disease and suggested that stone formation can lead to hypertension, diabetes, chronic kidneys disease and myocardial infarction [8].

Moreover, the administration of antioxidants has been used to protect against nephrotoxicity in human and experimental animals. In the kidney, these treatments are reported to diminish the increase in malondialdehyde (MDA) and the decrease in protective enzyme activity that are induced by chemical and pharmacological agents [17]. Also, evidence exists that boron may have antioxidants and anti-inflammatory properties [18-21]. Furthermore, in a recent study, one week boron supplementation resulted in a significant decrease in plasma TNF-α concentration (12.32 vs. 9.97 pg/ml) and a remarkable decrease (about 50%) in plasma concentration of hsCRP (1460 vs. 795 ng/ml) and IL-6 (1.55 vs. 0.87 pg/ml) in healthy male subjects, respectively [22].

Figure 3: Notice the passage of 10 mm stone fragments from 5 mm ureter.

The coronavirus disease 2019 (COVID-19) pandemic has had a global impact on all aspects of health care, including surgical procedures such as, the care of patients preoperatively, intraoperatively, and postoperatively [23].

The surge in patients affected by COVID-19 has led to extreme pressures and has had unprecedented effect on healthcare systems globally with severe impact on every specialist service within the hospital including urology. It has resulted in cancellations of the outpatient face-to-face clinics and many surgical procedures, requiring urologists to select only the most essential or critical procedures.

Unfortunately, kidney problems are another possible issue from COVID-19 in people who are critically ill. If there is someone who already has kidney disease, take preventative steps to help keep from getting infected, and plan to get the treatments as regularly scheduled. The treatment centers will work hard to keep people safe and to avoid clinic visit if appropriate and make decisions with management of less need for hospital retreatment.

Overall, the current study data indicated that administration of a combination of natural antioxidants, showed beneficial effects on non-invasive elimination of renal calculi successfully, as compared with alpha-blockers which are commonly used to improve stone passage through so-called medical expulsive therapy (MET), but their effectiveness remains controversial [24].

Conclusion

People living with chronic kidney disease need to take careful precautions during the COVID-19 pandemic. These individuals not only have decreased immune systems due to their kidney disease, but often have additional health conditions placing them at a higher risk of COVID-19 infection, like heart disease. Additionally, people with chronic kidney disease seem to have an increased risk of having severe COVID-19 infections.

It appears that the effect of the selected nutrients on prevention and disruption of the kidney stones may be, at least, in part due to their antioxidant and anti-inflammatory effects. Successful and comfortable medical expulsive therapy of kidney stones fragments that obstructs the ureter with a minor pain episode and bleeding indicates that this impact of boron plus antioxidants with no complications should be considered as an effective, safe, well tolerated and a first-line of treatment of kidney stones and ureteral stone clearance with a high efficacy rates and no analgesic use and deserves further study and clarification.

References

1. Sorokin I, Mamoulakis C, Miyazawa K, Rodgers A, Talati J, Lotan Y (2017) Epidemiology of stone disease across the world. World J Urol 35: 1301-1320.
2. Scales CD, Tasian GE, Schwaderer AL, Goldfarb DS, Star RA, Kirkali Z (2016) Urinary stone disease: advancing knowledge, patient care, and population health. Clin J Am Soc Nephrol 11: 1305-1312.
3. Luckenbaugh AN, Yan PL, Dauw CA, Ghani KR, Hollenbeck BK, Hollingsworth JM (2019) Follow up care after emergency department visits for kidney stones: A missed opportunity. Urol Pract 6: 24-28.
4. Whitehurst L, Jones P, Somani BK (2019) Mortality from kidney stone disease (KSD) as reported in the literature over the last two decades: A systematic review. World J Urol 37: 759-776.
5. Ferraro PM, Gambaro G, Curhan GC, Taylor EN (2018) Intake of trace metals and the risk of incident kidney stones. J Urol 199: 1534-1539.
6. Khan SR (2012) Is oxidative stress, a link between nephrolithiasis and obesity, hypertension, diabetes, chronic kidney disease, metabolic syndrome? Urol Res 40: 95-112.
7. Kumar SM, Selvam R (2003) Supplementation of vitamin E and selenium prevent hyperoxaluria in experimental urolithic rats. J Nutr Biochem 14: 306-313.
8. Thamilselvan S, Menon M (2005) Vitamin E therapy prevents hyperoxaluria-induced calcium oxalate crystal deposition in the kidney by improving renal tissue antioxidant status. BJU Int 96: 117-126.
9. Bardaoui M, Sakly R, Neffat F, Najjar MF, Hani AE (2010) Effect of vitamin A supplemented diet on calcium oxalate renal stone formation in rats. Exp Toxicol Patho 62: 573-576.
10. Holoch PA, Tracy CR (2011) Antioxidants and self-reported history of kidney stones: The national health and nutrition examination survey. J Endourol 25: 1903-1908.
11. Oyewole OI (2011) Chemopreventive role of vitamin C and E on potassium bromate induced renal oxidative damage in rat. J Med Med Sci 2: 1189-1192.
12. Ferraro PM, Taylor EN, Gambaro G, Curhan GC (2018) Vitamin B6 intake and the risk of incident kidney stones. Urolithiasis 46: 265-270.
13. Alvarado OO, Miyaoka R, Kriedberg C, Moeding A, Stessman M (2011) Pyridoxine and dietary counseling for the management of idiopathic hyperoxaluria in stone-forming patients. Urol 77: 1054-1058.
14. Atakan IH, Kaplan M, Seren G, Aktoz T, Gul H, Inci O (2007) Serum, urinary and stone zinc, iron, magnesium and copper levels in idiopathic calcium oxalate stone patients. Int Urol Nephrol 39: 351-356.
15. Naghii MR, Eskandari E, Mofid M, Jafari M, Asadi MH (2014) Antioxidant therapy prevents ethylene glycol-induced renal calcium oxalate crystal deposition in Wistar rats. Int Urol Nephrol 46: 1231-1238.
16. Kandhare AD, Patil MV, Bodhankar SL (2015) L-Arginine attenuates the ethylene glycol induced urolithiasis in uninephrectomized hypertensive rats: role of KIM-1, NGAL, and NOs. Ren Fail 37: 709-721.
17. Naziroglu M, Karaoglu A, Aksoy AO (2004) Selenium and high dose vitamin E administration protects cisplatin-induced oxidative damage to renal, liver and lens tissues in rats. Toxicology 195: 221-230.

18. Donoiu I, Militaru C, Obleaga O, Hunter JM, Neamtu J, Bita A et al. (2018) Effects of boron-containing compounds on cardiovascular disease risk factors - A review. J Trace Elem Med Biol 50: 47-56.

19. Khaliq H, Juming Z, Mei PK (2018) The physiological role of boron on health. Biol Trace Elem Res 186: 31-51.

20. Kurtoglu V, Kurtoglu F, Akalin PP (2018) The effects of various levels of boron supplementation on live weight, plasma lipid peroxidation, several biochemical and tissue antioxidant parameters of male mice. J Trace Elem Med Biol 49: 146-150.

21. Geyikoglu F, Koc K, Colak S, Erol HS, Cerig S, Yardimci BK, et al. (2019) Propolis and its combination with boric acid protect against ischemia/reperfusion-induced acute kidney injury by inhibiting oxidative stress, inflammation, dna damage, and apoptosis in rats. Biol Trace Elem Res 192: 214-221.

22. Naghii MR, Mofid M, Asgari AR, Hedayati M, Daneshpour MS (2011) Comparative effects of daily and weekly boron sup¬plementation on plasma steroid hormones and proinflammatory cytokines. J Trace Elem Med Biol 25: 54-58.

23. Steward JE, Kitley WR, Schmidt CM, Sundaram CP (2020) Urologic surgery and covid-19: how the pandemic is changing the way we operate. J Endourol 34(5): 541-549.

24. Campschroer T, Zhu X, Vernooij RW, Lock MT (2018) Alpha-blockers as medical expulsive therapy for ureteral stones. Cochrane Database Syst Rev 5: 4(4).