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Serum Vitamin D Status, Vitamin D3 Supplementation and Urine Calcium Levels Among 140 Calcium Kidney Stone Patients Barry S. Farber, M.D.*, Robert E. Kennedy, Jr., Ph. D., Springfield, MO

Introduction

Although there are current guidelines for the metabolic evaluation of patients with nephrolithiasis, there is no guideline for the management of coexisting vitamin D deficiency among these patients. The available research is not clear regarding the role of vitamin D in either causation of, or protection from, kidney stone formation. It is known that vitamin D has an essential role in calcium metabolism, and that vitamin D deficiency is common in the population. The purpose of this research is to help clarify the association, if any, between vitamin D status and urine calcium levels among patients with calcium kidney stones.

Methods

This study detected and treated vitamin D insufficiency in calcium kidney stone patients with concurrent metabolic urine studies before and after vitamin D supplementation. Between 2015 and 2017, 140 patients were evaluated in a community based urology practice following management of an acute episode of nephrolithiasis. Only patients with calcium composition stones were included. Initial metabolic evaluation measured stone composition, serum chemistry, 24 hour urine chemistry and baseline serum 25-hydroxy vitamin D (25-OHD). Patients who were found to be "not sufficient" for 25-OHD (<30 ng/ml) were advised to take 10,000 IU of over-the-counter vitamin D3 per day for two months, and then to return for retesting of 25-OHD and 24 hour urine calcium.

Results

Almost three-quarters of the 140 patients initially were not sufficient in 25-OHD (N=101 or 72%). No statistically significant association (at the 0.05 level) was found between 25-OHD status and urine calcium level. Two-thirds of the 101 insufficient patients had a follow-up 25-OHD test after two months of advised vitamin D3 intake (N=65 or 64%). Of these, most became sufficient (N=58 or 89%), and none exceeded the sufficient range of 30-100 ng/ml. Two-fifths of the 101 patients had both follow-up tests: 25-OHD and 24 urine calcium (N=40 or 40%). There was no statistically significant change (at the 0.05 level) over time (from pre-D3 supplement to post supplement) in the initial lack of association between 25-OHD status and urine calcium levels.

Conclusions

Correction of vitamin D insufficiency with over-the counter vitamin D3 in calcium kidney stone patients was promptly effective, and did not significantly affect urine calcium level. In other words, the observed positive change in 25-OHD status did not significantly improve, or harm urine calcium levels.

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2010107 (1110119 110	Calcium Oxalate I	Kidney Stone Patients	3
	Serum Vitamin D Status (25-OHD ng/ml)		
Urinary Calcium Level (mg/day)	Insufficient Or Deficient (0.0-29.9)	Sufficient (30.0-100.0)	Totals
Elevated (300 and higher)	16.8%	7.7%	14.3%
High (200-299)	26.7%	28.2%	27.1%
Low (199 and lower)	56.5%	64.1%	58.6%
Column %	100%	100%	100%
Totals N	(101)	(39)	(140)

Urinary Calcium Levels Before and After Vitamin D ₃ Supplementation among 40 Calcium Oxalate Kidney Stone Patients.					
		ntation of 10,000 IU n Average of 160 days			
Urinary Calcium Level (mg/day)	Before	After	Totals		
Elevated (300 and higher)	17.5%	25.0%	21.2%		
High (200-299)	35.0%	32.5%	33.8%		
Low (199 and lower)	47.5%	42.5%	45.0%		
Column %	100%	100%	100%		
Totals N	(40)	(40)	(80)		

Association Between Initial and Follow-up 24 Hour Calcium Urine Tests Among 40 Calcium Oxalate Kidney Stone Patients. Follow-up Initial Urinary Calcium Level (mg/day) Calcium Level (mg/day) Elevated High Low (300 and higher) (200-299) (199 and lower) Elevated 72% 28% 5% 25% (300 and higher) High 14% 36% 37% 32%

TABLE 3

Elevated (300 and higher)

High (200-299)

Low (199 and lower)

Column % 100% 100% 100% 100%

Totals N (7) (14) (19) (40)

Significance: p-value = 0.014; significant at the p< .05 level.