Efficacy of Directed Dietary and Medical Therapies for Correcting Metabolic Abnormalities in Nephrolithiasis Patients

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Objectives: Directed dietary and/or medical therapies are often initiated to correct metabolic abnormalities identified on 24-hour urine collections in an effort to prevent stone recurrence. We sought to evaluate the efficacy of these therapies in correcting various metabolic abnormalities.

Methods: All Litholink 24-hour urine collections obtained at our institution between 2004 and 2020 were retrospectively reviewed. The initial and final collections were analyzed to assess for improvement or normalization of metabolic abnormalities. Patients with under- or over-collections were excluded from analysis. Gender-specific reference ranges were used to define abnormalities.

Results: 391 patients were included with a mean age of 56 years (55% male, 45% female). Table 1 shows the changes in metabolic abnormalities after therapy. 60% of patients who had low urine volume at presentation were able to improve their fluid intake and normalize their urine output ($p<0.001$). 44% of patients who presented with hypercalciuria normalized their urinary calcium ($p<0.001$). 36% of patients who presented with hypocitraturia had normal citrate levels on final collection ($p<0.001$). 68% of patients with low urine pH (<5.5) had normalization on final collection ($p<0.001$). 50% of patients with hyperoxaluria had normal oxalate levels on final collection ($p<0.001$). 34% of hyperuricosuria had normalization of their urinary uric acid on follow-up ($p<0.001$). Only 27% of patients with high urinary sodium upon presentation were able to correct their levels on follow-up ($p<0.001$).

Conclusions: Elevated urinary sodium was the most common presenting metabolic abnormality, however, the least likely to be corrected. Low urine volume and low urine pH are the most frequently corrected abnormalities with dietary and medical therapies. Therapies were less effective at correcting the other abnormalities. Efficacy and compliance with current dietary and medical therapies can be challenging and highlight the need for improved treatment approaches.

Table 1. Mean changes and overall proportion of metabolic abnormalities that were corrected between initial and final collection.

		Paired T-Test		***One-Proportion Z-Test***	
Abnormality Type	**Prevalence (n=391)**	**Mean Change**	***P-Value***	**Patients with Corrected Abnormality (%)**	***P-Value***
Low Urine Volume	49%	+0.81 L/day	*<0.001*	60%	*<0.001*
Hypercalciuria	46%	-70 mg/day	*<0.001*	44%	*<0.001*
Hyperoxaluria	42%	-11 mg/day	*<0.001*	50%	*<0.001*
Hypocitraturia	46%	+136 mg/day	*<0.001*	36%	*<0.001*
Low Urine pH (<5.5)	14%	+0.6 pH units	*<0.001*	68%	*<0.001*
Hyperuricosuria	25%	-0.11 g/day	*<0.001*	35%	*<0.001*
High urine sodium	57%	-25 mg/day	*<0.001*	27%	*<0.001*