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Complete Metabolic Evaluation is Indicated after a First Stone Event

CON

A fundamental tenet in medicine is that more testing is not always better. Should we be performing 24-hour urine collections as part of a complete metabolic evaluation on every stone former? In other words, is the initial evaluation we do for first time stone formers sufficient to rule out pertinent metabolic disorders, and inform and direct dietary/lifestyle changes to prevent recurrence?

There is already a treasure trove of information gained from the initial evaluation with the first time stone former which should not be overlooked. A thorough medical history should elucidate prior urinary tract infections, any component of metabolic syndrome, gastrointestinal diseases and related surgery, relevant medications and familial stone formation. A review of the dietary and occupational history provides insight into dietary and lifestyle habits that contribute towards stone risk. Routine serum chemistry studies, including electrolytes, calcium, creatinine and uric acid, will screen for underlying metabolic disorders including renal tubular acidosis type 1, primary hyperparathyroidism, chronic kidney disease and hyperuricosemia. Urinalysis is helpful when high pH and low pH values are extreme, and an infection type of stone can be suspected when infection is present. Imaging will show whether multiple stones are present, overall stone burden and anatomical data. Stone analysis, when available, is sometimes helpful (uric acid, infection, brushite, genetic and drug stones) but less helpful for the majority of calcium based stones.

Beyond these tests, there is the complete metabolic evaluation, which in current practice is the 24-hour urine collection. Several guideline panels recommend this testing in individuals at high risk for recurrence as determined by the initial evaluation.¹⁻³ Interestingly, the AUA (American Urological Association) also recommends metabolic evaluation in interested first time stone formers.¹

Just as not all patients at low risk for prostate cancer need definitive treatment, not all first time kidney stone formers need 24-hour urine collections leading to potential lifelong pharmacologic therapy

and monitoring. Stone recurrence is not guaranteed after the first event, and many first time stone formers remain never form a stone again for the rest of their lives. In contemporary series symptomatic recurrence after the first episode is 30% after 10 years and 39% after 15 years.⁴ In the ROKS (Recurrence Of Kidney Stone) nomogram created to predict a second symptomatic stone episode all the risk factors for the model can be extracted from the initial evaluation.⁴ No tools exist to predict a second stone event incorporating 24-hour urine collection parameters.

Brushing and flossing teeth are most diligently and attentively performed after a dentist visit. And so it goes with provider visits for kidney stones known as the so-called “stone clinic effect.” Multiple pharmacologic intervention trials have demonstrated significant decreases in stone recurrence in the non-intervention groups compared to pretrial rates.⁵ For a subset of stone formers, maintaining high fluid intake, reducing salt intake and moderating animal protein intake may be enough to prevent the second stone event. These interventions are easily prescribed by urologists and primary care providers, achievable, low cost, safe with minimal side effects and good for general health. Perhaps a trial of nonselective dietary interventions is reasonable before proceeding with a 24-hour urine collection.

Although we have relied on the 24-hour urine collection to become the “complete” metabolic evaluation there are several limitations to the test.⁵ In practice the test often can be more of an art than science to interpret. Its ability to predict recurrence and prognosticate risk is not well established. Collection adequacy has been debated as to whether 1 vs 2 collections are sufficient or if urinary creatinine-to-body weight ratio is a reliable indicator of adequacy. Several of the positive pharmacological trials evaluating citrate did not require hypocitraturia, which is also true for several thiazide trials with hypercalciuria. Rates of urinary metabolic abnormalities among first time and recurrent stone

formers are similar. Laboratory cutoff parameters can seem arbitrary, as many stone formers can have “normal” 24-hour testing results, while many nonstone formers can have abnormal results. The degree to which one should reduce urinary supersaturation or manipulate individual parameters (eg increasing quantitative urinary citrate levels) for calcium stones to prevent recurrence has not been established.

Despite these drawbacks, the 24-hour urine collection provides objective data that can be serially monitored and focuses dietary and pharmacological intervention on specific issues. It can help monitor fluid intake and compliance with medications (eg increased urinary potassium with compliant oral potassium citrate supplementation). It gives hope to a lifelong disease.

PRO

BEFORE defending a position of appropriate metabolic evaluation in patients with stones, an agreement as to the appropriate timing and evaluation needs to be determined. For argument's sake I define complete metabolic evaluation as serum complete blood count, basic metabolic panel, calcium, uric acid, phosphorous and vitamin D with a parathyroid assay ordered only if serum calcium is elevated. Additionally, a 24-hour urine is collected for at least volume, pH, creatinine, calcium, citrate, qualitative cystine, oxalate, uric acid, phosphorous, sodium and magnesium. If these are performed, more than 90% of stone formers will have a correctable abnormality.

The 2014 AUA guideline states under Evaluation that “Clinicians should perform additional metabolic testing in high-risk or interested first-time stone formers and recurrent stone formers. (Standard; Evidence Strength: Grade B).”¹ The guideline does not necessarily address the first time stone former other than those described as “interested.” The recurrence rates of urinary stones are staggering with up to 50% within 10 years of the initial occurrence,⁶ and they occur in young patients with many potential years ahead during which stones can develop. The EAU (European Association of Urology) guideline classifies patients into low and high risk groups, and recommends evaluation of the latter.² When combining the AUA and EAU guidelines, it seems reasonable to want to prevent stones in an already susceptible group. In addition to the morbidity of stone procedures, one cannot ignore the economic impact of the disease. Billions of dollars are spent annually managing the disease, not including the indirect costs of time away from work and lost productivity.

This is not prostate specific antigen screening or looking for a disease. These patients have stone

In conclusion, the first time stone former is entitled to a “complete” initial evaluation (without a 24-hour urine collection) to determine future stone risk. As with any testing, a 24-hour urine collection can be subsequently performed after considering the risk of stone recurrence, the pros and cons of testing, and whether the results would influence management.

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disease and it is up to the urologist to prevent subsequent recurrences and minimize morbidity in a largely young, productive segment of our population. Why would a patient not be interested in stone prevention? The treating urologist has a profound influence on whether these patients get evaluated, and I believe in many instances stone prevention is thought of as a mundane, useless and uneconomical endeavor. In reality, the urologist is uniquely positioned to prevent stones in our population but they have to be aggressive in doing so. Therefore, I would assert that the urologist must also be interested in stone prevention to convince the patient to get interested. As we know, kidney health and overall body health are intimately related. So if we are to counsel and empower patients with lifestyle choices that help prevent stones, we may have a significant influence on other organ systems and systemic diseases.

Patients who suffer from hypertension and diabetes are inundated with educational materials and testing options to optimize their health. The advice we give to our young immortal stone patients frequently falls on deaf ears. We have the opportunity to engage these younger patients to experience the stone clinic effect, which has been shown to decrease stone recurrence rates. Doing this after the first stone episode makes inherent sense. While I am a firm believer in evaluating patients from the initial episode, I also believe that close follow-up is mandatory. After reviewing the results of the first 24-hour urine and making recommendations in behavior modification, repeat testing is mandatory to provide positive or negative feedback to the patient. This not only identifies potential risk factors, it also engages the patient and makes him/her part

of the process as opposed to the disassociation of medical testing.

Clearly 1 problem we have is the lack of high level evidence supporting or refuting any definitive tools to assess stone risk. I think all of us would admit frustration with the accuracy and usefulness of the 24-hour urine assessment let alone the inconvenience and awkwardness for the patient. As a stone patient who has undergone ureteroscopy twice, stent placements twice and 24-hour urine tests 5 times, I can truly understand patient perspective but, more importantly, the need for a long-term, comparative trial to help answer the

question “Can we truly help prevent stone disease through metabolic evaluations?” I think the real answer will become more clear as the etiology of lithogenesis becomes elucidated. Until then, simpler, more accurate and less expensive testing are necessary before we can truly have an impact on this worldwide, debilitating common disease.

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REFERENCES

1. Pearle MS, Goldfarb DS, Assimos DG et al: Medical management of kidney stones: AUA guideline. *J Urol* 2014; **192**: 316.
2. Skolarikos A, Straub M, Knoll T et al: Metabolic evaluation and recurrence prevention for urinary stone patients: EAU guidelines. *Eur Urol* 2015; **67**: 750.
3. Gambaro G, Croppi E, Coe F et al: Metabolic diagnosis and medical prevention of calcium nephrolithiasis and its systemic manifestations: a consensus statement. *J Nephrol* 2016; **29**: 715.
4. Rule AD, Lieske JC, Li X et al: The ROKS nomogram for predicting a second symptomatic stone episode. *J Am Soc Nephrol* 2014; **25**: 2878.
5. Hsi RS, Sanford T, Goldfarb DS et al: The role of the 24-hour urine collection in the prevention of kidney stone recurrence. *J Urol* 2016; October 13, Epub ahead of print.
6. Uribarri J, Oh MS and Carroll HJ: The first kidney stones. *Ann Intern Med* 1989; **111**: 1006.