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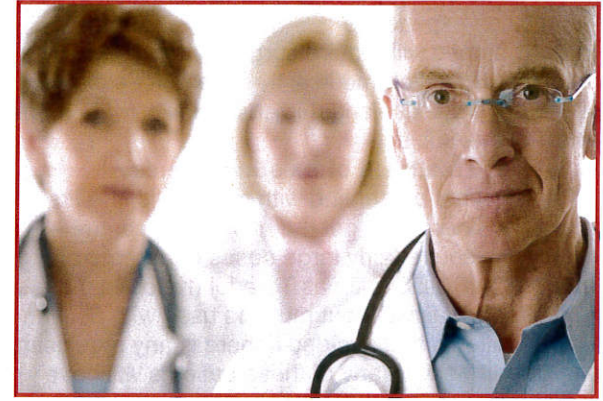


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Medical Management of Urinary Calculi

Doctor to Doctor

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Provided as a service for
Nebraska Health Care Professionals
by the



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Medical Management of Urinary Calculi

R. Michael Kroeger, M.D.

In the United States, the prevalence of Urinary Calculi is 10-15% and it seems to be increasing. Stones are about 1.5 times more common in men than women, but this "gender gap" seems to be decreasing. Stones are more common in the Southeast, and in Nebraska our risk is about average for the United States. Stones are relatively uncommon under the age of 20, with a peak incidence in the fourth to sixth decades of life.

While in some situations stones may lead to kidney damage and even renal failure, they are mainly a source of significant morbidity – renal colic has been described as one of the most painful conditions humans can experience.

Many stones will require surgical intervention by a Urologist. However, medical treatment does play a role in stone disease and this article will provide a brief review of this subject.

Treatment of Existing Stones

For a patient presenting with renal colic, the first order of business is to get the pain under control – which may require fairly large doses of parenteral narcotics. NSAIDs such as Toradol (Ketoralac) are often effective as well, but must be used with caution in older patients and avoided if there is any preexisting renal impairment. Many of these patients will have nausea and vomiting which may require antiemetics.

Non-contrast ("stone protocol") CT scans have become the standard imaging study for suspected urinary calculi. The size and location of the stone will play a major role in determining subsequent management. Theoretically, any stone under 1 cm in size has a chance of passing, but for practical purposes it probably makes more sense to use 5 mm as the cutoff. In other words, if a stone is larger than 5 mm there is a fairly high likelihood that urological intervention will be required eventually. While CT scans are invaluable in diagnosing stones, the cost and relatively high radiation dose make them less desirable for following stone patients. Plain films are less expensive and deliver much less radiation, and are frequently adequate to follow patients who are trying to pass a stone.

Patients frequently want to know if there is a way to medically dissolve their stone – and the answer is pretty much "no" if it is a calcium containing stone (at least 85% of stones contain calcium). Sometimes uric acid stones can be dissolved with urinary alkalinization and Allopurinol.

Medical Expulsive Therapy (MET) refers to using drugs to facilitate passage of stones. While the evidence is somewhat conflicting, there are several

studies that have shown that MET can at least decrease morbidity and shorten the time to stone passage. There is a little bit more uncertainty as to whether MET actually increases the overall rate of stone passage. Drugs used for MET include alpha blockers (e.g. Tamsulosin, Doxazosin) and Calcium Channel Blockers (e.g. nifedipine) which are thought to work by relaxing ureteral spasm. Alpha blockers are probably used most commonly, in part because urologists are more familiar with them.

Prevention of Future Stones

Once the stone has passed or been removed, the patient typically wants to know what he or she can do to prevent further stones. Without treatment there is about a 50% chance that the patient will have another stone at some point.

General Measures

- Increasing fluid intake, with a goal of a 24 hour urine volume of at least 2 liters, which will typically require drinking 2500-3000 ml of fluid. The best fluids to drink are water and citrus juices since they increase urinary citrate, an inhibitor of stone formation.
- Dietary protein restriction, as protein increases urinary calcium, oxalate, and uric acid
- Dietary sodium restriction, since sodium increases calcium excretion and decreases citrate excretion. Generally, dietary calcium restriction is not recommended and surprisingly may increase stone risk in some patients, presumably by allowing more oxalate absorption in the gut. The question of whether to continue calcium supplementation in a stone former comes up frequently. Using calcium citrate and taking it with meals is probably the most "stone-friendly" way to use calcium supplements. I would consider doing a 24 hour urine for calcium while the patient is on the supplemental calcium.

Specific Measures

Any plans to go beyond these general measures would typically require a metabolic workup, and there are differing theories about who should have such an evaluation. Some would argue that it is appropriate only for recurrent stone formers, while others would point out that the incidence of metabolic abnormalities is about the same in single stone formers compared to recurrent stone formers. I think it is reasonable to offer metabolic evaluation to all stone patients. There are laboratories (e.g. Litholink, Mission Pharmacal Stone Risk) that specialize in these evaluations and make it fairly easy for

the provider to obtain a comprehensive evaluation.

Hypercalciuria

- The most commonly used drug for treating hypercalciuria is a thiazide diuretic. Unlike the loop diuretics, the thiazides decrease urinary calcium. Long term use of thiazides can lower urinary citrate, so they are often given along with potassium citrate. Thiazides combined with triamterene (Dyazide) are usually avoided since triamterene has low solubility and some patients will form triamterene stones.
- Dietary sodium restriction may also help lower urinary calcium.

Hyperoxaluria

- For most patients the treatment is simply restriction of dietary oxalate
- Patients with inflammatory bowel disease and who have had certain operations (e.g. bariatric surgery) may have hyperabsorption of oxalate, the management of which is beyond the scope of this article.

Hypocitraturia

- Citrate competes with oxalate for the calcium ions in the urine. Since calcium citrate is more soluble than calcium oxalate, citrate is an inhibitor of stone formation. Various preparations of sodium and potassium citrate are available. UroCit-K is available as a slow release capsule and is probably the most convenient Citrate preparation.
- As noted above, lemonade and orange juice are good sources of citrate

Hyperuricosuria

- Uric acid stones account for less than 10% of all stones, but high urinary uric acid levels can also increase the risk of calcium oxalate stones. Treatment includes a low purine diet and Allopurinol. For uric acid stone formers, urinary alkalinization plays an important role

While this article is not intended to be a comprehensive review, I have tried to cover many aspects of medical management of stone disease that non-urologists may run into with their patients. Medical therapy can play a significant role in reducing the morbidity and the cost of this common disease.

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