

Nephrolithiasis is not a stone in the nephrologist's shoe

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INTRODUCTION

The prevalence of kidney stones (KS) is increasing and occurring sooner in life. Stone-related events affect working-age adults more often than the elderly. They cause a relevant economic burden for health systems and are an important cause of missed working days. Symptomatic KS can recur in up to 50% of patients within 10 years (with high variation in the risk of recurrence from 16-54% depending on several factors)¹.

Patients with KS are often first referred to urologists with acute complications of KS disease (acute renal colic), but a nephrologist evaluation can be an important contribution to the prevention of KS recurrence. Nephrologists can offer a medical perspective and can help to diagnose mineral disorders, osteoporosis, hyperparathyroidism and to manage chronic kidney disease (CKD)^{2,3}.

Nephrolithiasis is the process of KS formation that is caused by a disruption in the balance between solubility and precipitation of salts within the urinary tract. It is possible to identify the underlying cause or the main risk factor(s) for KS formation in the majority of patients with complex KS disease. The identification of these risk factors, or less frequently, a secondary cause, gives us the opportunity to design a patient-specific preventive plan and increase the odds of patient adherence and efficacy.

The KS-oriented metabolic evaluation, medical management and follow-up of KS formers varies widely within nephrologists, even within the same nephrology department (as witnessed by myself)⁴. The absence of a common methodology to approach these patients makes it harder to acquire know-how, develop clinical research and to participate in multicenter studies.

Stone clinic (SC) programs aim to investigate KS patients with high recurrence risk. Each patient undergoes a comprehensive evaluation of the main risk factors; all patients receive dietary and lifestyle recommendations, and selected patients are placed on medication.

With all this in mind, an outpatient SC was created in our nephrology department. Below I will elucidate our methods, difficulties, goals and future perspectives.

CLINIC POPULATION

The stone clinic's target population is younger and healthier than in CKD clinics, offering some relief from the usual overwhelming comorbidities in CKD population¹.

We have found that, the majority of the patients are referred from urology and nephrology clinics, and it will take a while before referrals come from other fields such as emergency departments and general practitioners.

Nephrologists in SC need to learn more about tubular physiology, acid-base balance, parathyroid action, calcium and phosphate metabolism. In this clinic we see rare cases of primary hyperoxaluria, cystinuria, Dent disease, and other rare diseases that present with KS.

We used three main principles to define the criteria for SC evaluation (i.e. for complete metabolic evaluation)^{5,6}:

- Patients with high recurrence rate or with high probability of recurrence
- KS formers with high risk of complications (solitary kidney, pregnancy, etc.)
- Suspicion of a secondary cause of KS (hypercalcemia, first episode early in life, strong family history, etc.)

MULTIDISCIPLINARY TEAM

Our SC is part of the Nephrolithiasis Diagnosis and Treatment Integrated Unit – a multidisciplinary team of urologists, nephrologists, endocrinologists and dietitians, focused on the diagnosis, treatment and prevention of stone diseases. In this unit we provide a multidisciplinary approach to patients with complex nephrolithiasis, enabling them access to complementary perspectives and expertise.

Most frequently, this is a bidirectional workout between two medical specialties: after the initial intervention by a urologist with stone disease management experience, referral to the SC nephrologist follows, in the case of selected high-risk patients (see above). However, sometimes the process works the other way around and the urologist's attention is requested by the nephrologist for the occasional patient.

Thus, the formalization of the SC as a functional unit has allowed not only a closer and easier contact between nephrologists and urologists, but also the systematization of investigation, treatment and follow-up of these patients.

Knowing the stone type is the main factor for further diagnostic tests (EAU guidelines)⁶. The aim to increase the number of patients with a stone type studied represents a fine example of the cooperation necessity between two specialties.

■ EDUCATION AND INVESTIGATION

Most nephrologists have no training in stone prevention during their fellowships. The know-how produced in the SC allowed us to offer some training in stone prevention to nephrology and urology fellows.

Lithogenesis is an overlooked field. There is still a lot to investigate and understand – research, development of registries and participation in trials are needed.

The aggregation of patients in a specific clinic (these patients were previously dispersed in several CKD clinics) and the uniformization of their evaluation and treatment (by creating protocols) have helped us to collaborate in several projects.

Our clinic was enrolled in the European Stone Network – a collaboration of European nephrology and urology centers aimed at sharing protocols and data, allowing more clinical and scientific research in KS disease.

■ DIET

Diet (including adequate hydration) and lifestyle changes are main pillars of stone prevention. It is recommended to have a dietician as part of the SC team, even though only few patients need to have a formal dietician evaluation.

Empiric dietary advice, unrelated to a 24-hour urine collection, can be felt to be impersonal, leading to lower adherence⁷.

Apart from the general recommendations given to all KS formers, we supply specific dietary advices adapted to each particular situation based on the KS-oriented metabolic evaluation.

Dietary evaluation and prescription are particularly relevant for some specific patients: those that show some reluctance about taking medication (such as younger patients); patients with more uncommon causes of KS or patients with other comorbidities such as diabetes and cardiovascular diseases that already have many food restrictions and could easily feel they would have “nothing left to eat”⁷.

Our approach is corroborated by surveys that have shown that most patients with KS have a desire for information regarding what to eat and drink⁸. There are many myths about the relationship between diet and KS, sometimes perpetuated even by less informed/updated physicians. The most frequent myth is that patients with calcium-based stones should restrict calcium intake – however, more dairy intake (or even calcium supplementation) can be linked to lower lithogenic activity.

■ CONCLUSION

Not every KS former needs to be evaluated in an SC. According to the main guidelines (EAU and AUA) only high-risk KS formers require a specific metabolic evaluation. Apart from being an area that requires more investigation, the spectrum of disturbances and rare diseases in this pathology can be a challenge.

New nephrology subspecialities are emerging, such as uronephrology – KS investigation can be a field of focus in this area.

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Our Method

Stone Clinic organization	<ul style="list-style-type: none"> • To delineate the criteria for patient evaluation in the SC • To define laboratory and radiologic assessment and follow-up protocols • To create treatment protocols • To integrate the SC in a multidisciplinary team (with urologists, radiologists, dietitians, etc.) • To create the conditions to favor e-visits (Telehealth Visits) – in our center; after the first appointment, all subsequent visits are remotely performed
First and Second Appointments	<ul style="list-style-type: none"> • Meticulous clinical history <ul style="list-style-type: none"> – Search for symptoms, signs or history of risk factors for stone formation (for instance: mal-absorptive syndromes; drugs or supplements; family history of kidney and/or KS diseases; past-surgical history such as bariatric surgery; etc.) • Collect present and past radiology evaluation of stone disease • Ask for composition analysis of previously eliminated stones • Order a complete KS-oriented metabolic evaluation (blood and 24-hour urine) – included in the first laboratory evaluation protocol • Identify underlying metabolic disorders and/or metabolic imbalances or risk factor(s) for lithogenesis • Define an individualized treatment / preventive plan for each patient – including lifestyle and diet changes, and frequently drug prescription
Follow-up Appointments	<ul style="list-style-type: none"> • Evaluation of the efficacy of the established plan⁹ <ul style="list-style-type: none"> – assess the lithogenic activity (new episodes of renal colic, increase of the number or size of pre-existing stones) – regular radiology follow-up – evaluation of the improvement or elimination of urinary imbalances previously detected (hypercalciuria, hyperoxaluria, etc.) • To establish a long-term strategy – in the vast majority of the situations the preventive plan, if efficient, implies a life-long adhesion (and the patient can be discharged from the clinic) • To search for prescribed drugs toxicity
In every appointment the nephrologist should be aware of findings (such as stone dimensions or position) that mandate a urological evaluation.	

References

1. Goldfarb DS. Editorial: Uronephrology: a new nephrology subspecialty. *Curr Opin Nephrol Hypertens.* 2020;29(2):199–200.
2. Rule AD, Lieske JC, Li X, Melton LJ, Krambeck AE, Bergstralh EJ. The ROKS nomogram for predicting a second symptomatic stone episode. *J Am Soc Nephrol.* 2014;25(12):2878–2886.
3. García-Nieto V, Luis-Yanes MI. The nephrologist and nephrolithiasis. Take it or leave it? *Nefrologia.* 2013;33(2):155–159.
4. Ferraro PM, Arrabal-Polo MÁ, Capasso G, Croppi E, Cupisti A, Ernandez T, et al. A preliminary survey of practice patterns across several European kidney stone centers and a call for action in developing shared practice. *Urolithiasis.* 2019;47(3):219–224.
5. Curhan G, Denu-ciocca CJ, Matlaga BR, Penniston KL, Preminger GM. American Urological Association (AUA) Guideline Medical Management Of Kidney Stones : American Urological Association Medical Management of Kidney Stones. *AUA Clin Guidel.* 2014;(March):1–26.
6. Skolarikos A, Straub M, Knoll T, Sarica K, Seitz C, Petfik A, et al. Metabolic evaluation and recurrence prevention for urinary stone patients: EAU guidelines. *Eur Urol.* 2015;67(4):750–763.
7. Tiselius HG. Metabolic risk-evaluation and prevention of recurrence in stone disease: does it make sense? *Urolithiasis.* 2016;44(1):91–100.
8. Grampas SA, Moore M, Chandhoke PS. 10-year experience with extracorporeal shockwave lithotripsy in the state of Colorado. *J Endourol.* 2000;14(9):711-4.
9. Wollin DA, Kaplan AG, Preminger GM, Ferraro PM, Nouvenne A, Tasca A, et al. Defining metabolic activity of nephrolithiasis – Appropriate evaluation and follow-up of stone formers. *Asian J Urol.* 2018;5(4):235–242.

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