EDITORIAL

Nephrolithiasis: What role a nephrologist can play in prevention and management

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Nephrolithiasis; is a common condition faced by surgeons and physicians dealing with renal disorders. It is more common in some parts of world than others and our country Pakistan lies in Afro-Asian stone belt. The highest prevalence was reported from Sindh and Punjab provinces in a survey done in 1930, when these provinces were part of united Indo-Pak region.[1]

The exact burden of disease in the country according to published reports shows a prevalence of 3-12%.[2,3] Males are more commonly affected by renal stones as compared to females.[4]

Uncomplicated nephrolithiasis is dealt by urologists in general but neglected and complicated stones require joint care from the urology and nephrology team. A review article by Manzoor Hussain in this issue of the journal throws light on evolution of different aspects of urology in the country and discusses in detail the turning points in the changing trends of management of urological problems including renal stones. According to this review 50 % of urology workload comprises of stone surgery. However, with the progress in Urology, open surgery for renal stones has decreased to 8.8% compared to the extensively invasive procedures employed earlier.[5] Not much has been done on the preventive aspect which is a glaring necessity.

Examining the prevalent risk factors for nephrolithiasis, exposure to heat and dehydration are foremost. Other reported correlations are obesity, recent changes in body weight, type 2 diabetes, metabolic syndrome, inflammatory bowel disease, bowel resection, hyperparathyroidism, urinary tract infections and genetic predisposition.[6,7]

Renal stones are mineral deposits of crystals in loop of Henle, distal tubules or collecting ducts; resulting from high levels of urinary calcium, oxalate, sodium or uric acid or low levels of citrate or magnesium. Dehydration causing low urinary volume or any change in urinary pH can precipitate stone formation as higher concentration of two ions aggravates formation of crystals which if not passed in urine will accumulate in the kidneys to form stones. In people with recurrent stone formation 24 hours urinary metabolic studies can help to identify the risk factors and management can be directed towards the problem. Some medications like protease inhibitors, antibiotics and diuretics can also lead to some types of stone formation and patients should be counselled about this risk.

Renal stones are usually classified according to stone composition and most common (about 80%) are calcium oxalate/ phosphate stones, uric acid stones contribute about 10 % and cystine stones which result from inborn metabolic errors, contribute around 1%. Struvite stones also known as infection stones are 1-5% of renal stones, these are composed of magnesium, ammonium and phosphate and frequently present as staghorn stones. These are associated with recurrent urinary tract infections because of alkaline urine resulting from urease splitting bacteria.

Patients with nephrolithiasis are on risk of developing hypertension and chronic kidney disease as direct effect and chronic interstitial nephritis as a result of infection or use of non steroidal anti-inflammatory medications for pain management of stones. According to a published study from our country nephrolithiasis contributes to 7.2% of chronic kidney disease.[8]

In Pakistan, a considerable number of patients with CKD seen by nephrologist have nephrolithiasis as primary disease." They thus have the responsibility to preach prevention and induct initial treatment of nephrolithiasis. Primary prevention will save the individual from stone disease, living in the stone belt area and prone to Nephrolithiasis.

An appropriate diet and nutrient intake and use of medications can prevent stone formation. For example; a diet high in fruits and vegetables and supplements of citrates will keep urine alkaline and prevent formation of calcium oxalate, cysteine and uric acid stones. Whereas keeping urine acidic with use of cranberry juice or betaine in diet can prevent calcium phosphate and struvite stones. Adequate fluid intake specially in the summer months is essential to maintain good hydration.

If nephrolithiasis has been diagnosed, the patient has to be evaluated initially with a good personal, drug and family

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history, to identify risk factors for stone formation. Acute presentation of any type of renal stone, with symptoms of pain, oral hydration and analgesia and for stones ≤ 10 mm in size, use of anti spasmodics like alpha blockers or calcium channel blockers can relax ureteric smooth muscles and stones can easily be passed per urethra in 5 to 7 days time.[7] Those who can not tolerate oral fluids can be given parenteral fluids. Urinary tract infections should be dealt timely according to isolated bacteria and their sensitivity. Larger size stones or those not responding to conservative management or causing obstruction to urinary outflow should promptly be referred to the urology counterpart of the team.

In cases with recurrent stone formation, the stone should be analysed for its composition. This will help in prescribing the diet. Urinary metabolic studies can help in differentiating cases of hypercalciuria, uricosuria or magnesuria. In patients with increased calcium excretion dietary salt intake, acid loads or assessment of vitamin D levels can help in management.

In nephrolithiasis of all types with urinary specific gravity of > 1.105 free water intake and decrease in weight if BMI is >25 is recommended. Blood glucose, serum calcium levels and urinary pH should be checked for any abnormality. Urine should be acidified or alkalinized accordingly. If the serum calcium levels are high, parathyroid work up should be done. In cases where stone analysis has been done, recommendations for patients with calcium oxalate stone are; protein intake <30% of total caloric intake and if urinary oxalate is >40 mg/ day diet with moderate amount of fruits and vegetables and rich in vitamin C. If urinary calcium in 24 hours is > upper limit of gender specific, dietary sodium should be restricted to 2 gram/ day. If urinary magnesium is < lower limit/ day, dietary intake of magnesium should be increased. In cases of low citrate levels in 24 hours urine, lemon or lime juice should be added to water and if urinary phytate levels are low then fibre in diet should be increased.

In calcium phosphate stones, dietary phosphate intake should be reduced. In cases of cysteine stones urinary alkalinization is required. If levels are more than upper limit in 24 hours urine, then sulphur intake is decreased or cysteine binding agents prescribed. For uric acid stones, protein in diet is restricted (<30% of total caloric intake), People indulging in alcohol should either reduce or eliminate alcohol intake. If urinary uric acid excretion is exceeding the upper normal limits, intake of tea or coffee should be increased. With associated history of gout Allopurinol should be prescribed. Sugar sweetened beverages as those containing fructose may increase the risk of nephrolithiasis.

Promotion of changes in life style with regular exercises also plays a role in prevention of nephrolithiasis.

Some herbal remedies or homeopathic medications are frequently used in treatment of nephrolithiasis for many many years. Homeopathic medicines have uncertainty with components thus should always be discouraged. In cases of herbs if sufficient information about basic ingredients is available and if these do not have risk of interaction with prescribed medications, they can be considered. Most herbs are used as teas and address hydration and diuresis so they can be allowed.

To conclude, nephrolithiasis is a common nephro-urological problem with variation in different parts of world. It is mostly dealt by urologists but in cases where renal dysfunction or recurrent stones or familial disorders are present, nephrologists are also taken on board. Prevention of formation of renal stones in high prevalent areas is the key point. A multidisciplinary setting with urologist, nephrologist and dietitian working under one roof is ideal for patients having nephrolithiasis. Dietary suggestions/ restriction along with changes in life style play very important roles in these patients.

References

1. McCarrison RA. Lecture on the causation of stone in India. Br Med J. 1931; 4: 1009-15
2. Buchholz NP, Abbas F, Afzal M, Khan R, Rizvi I, Talati J. The prevalence of silent kidney stones--an ultrasonographic screening study. J Pak Med Assoc. 2003, 53:24-5.
3. Rizvi SAH, Naqvi SAA, Hussain Z, Hashmi A, Hussain M, Zafar MN, Mehdi H, Khalid R. The management of Stone Diseases. BJU Int. 2002, 89:62-8
4. Ljunghall S: Incidence of upper urinary tract stones. Miner Electrolyte Metab. 1987, 13:220-7
5. Hussain M. Past, present and Future of Urology in Pakistan. J of Pak Med Assoc. 2021; 71: 2407-2414.
6. Aune D,Mahamat-SalehY,NoratT,Riboli E. Bodyfatness, diabetes, physical activity and risk of kidney stones: a systematic review and meta-analysis of cohort studies. Eur J Epidemiol. 2018;33:1033-47
7. Frassetto L, Kohlstadt I. Treatment and Prevention of Kidney Stones: An Update. Am Fam Physician. 2011;84:1234-42
8. Rizvi SAH, Manzoor K. Causes of Chronic Renal Failure in Pakistan: a Single Large Center Experience. Saudi J Kid Dis Trans. 2002;13:376-9.