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Review Article on *Ashmari* w.s.r. to Urolithiasis

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ABSTRACT: -

Urolithiasis or Renal Stone Disease, described as *Ashmari* in Ayurveda is the third most common disease condition of urinary tract, after Urinary Tract Infection (UTI) and Benign Prostatic Hyperplasia (BPH). In spite of recent technological advances in the management of the urolithiasis, prevention of recurrence of diseases still remains a very significant challenge. In this review article, an attempt was made to compile the all aspects of urolithiasis from aetiology to management principles. Moreover to this attempt, this review also summarized to recent advancement in the clinical management of disease. The review tried to find out the gaps in the management and prevention of the disease. The review found an enormous need to allocate substantial resources for research & development for filling these gaps. The review found lack of resource allocation in finding the preventive solution for the disease. Moreover lack of focus on preventing the recurrence after surgical clearance. Ayurveda proposes surgery for management of *Ashmari* with large size stone while emphasising on various drugs for management of newly diagnosed case. Ayurveda may be helpful in not only management but also prevention as it stresses upon the role of diet, lifestyle and medicine for the prevention of the disease.

Key Words- *Ashmari*, Urolithiasis, UTI, BPH

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INTRODUCTION

Urolithiasis or renal calculus disease is most common disorder of human excretory system in which solid concretion of mineral salts are found in any part of the urinary tract from kidney to urethra. The stones usually form in the kidney and approach to the lower part of urinary tract as body attempts to expel them out with urine. Urolithiasis is classified as Nephrolithiasis, Ureterolithiasis, Cystolithiasis and Urethrolithiasis as per the site of calculi in kidney, ureter, bladder and urethra respectively. Based on chemical composition of the calculus they can be classified as Oxalate stone, Urate stone, Phosphate stone, Cysteine stone.

Urolithiasis is clinically characterized by characteristic pain in flank region which radiate from loin to groin, scrotum in male, labia in female and even inner medial aspect of upper part of the thigh which may be accompanied with dysuria, urgency of micturition, haematuria, nausea and vomiting. Management of urolithiasis is driven by many factors such as size, site and composition of stone along with presence or absence of associated complications of renal stone such as hydro-ureteronephrosis, upper or lower urinary tract infections, renal insufficiency etc.

Management of urolithiasis involves medical treatment and surgical intervention. Conservative treatments mainly consists of plenty of fluids orally, avoiding certain oxalate and phosphate rich food along with some medications such as thiazide diuretics, Alpha adrenergic blockers e.g. Tamsulosin and Calcium channel blockers (CCB) e.g. Nifedipine. Presently management of urolithiasis is mostly done by minimally invasive procedures like ESWL (Extracorporeal Shock Wave Lithotripsy), URS (Ureteroscopy), PCNL (Percutaneous Nephrolithotomy) while open surgical procedures such as Pyelolithotomy, Nephrolithotomy, Ureterolithotomy, and Cystolithotomy are also being performed for large, multiple or complicated stones especially when minimally invasive procedures are failed to remove the stone.[1]

In Ayurveda urolithiasis is described as *Ashmari*, which is formed in those who do not observe proper cleansing procedures and in those who are indiscrete regarding their dietary habits, the *Kapha dosha* gets aggravated and mixed with urine and enters the urinary bladder and therein it produces calculi. In Ayurveda *Ashmari* is clinically characterized by pain during micturition occurs at any of these regions- the umbilical region, bladder, perineal raphe and penis which may get aggravated sometimes by running, jumping, riding and walking for long distances. Along with that *Ashmari* also results in obstructed flow of urine, haematuria, scattering of urine stream and passage of turbid, sandy urine shining like *Gomeda* gem (like precious stone).[2] Acharya Sushruta advised medical treatment for newly diagnosed case of *Ashmari* while surgical treatment for chronic case of *Ashmari* with enlarged size of stone.[3]

Incidence & Prevalence

Urolithiasis affects all ages, sexes, and races but occurs more frequently in men than in women within the age of 20–49 years. Urolithiasis affects about 12% of the world population at some stage in their lifetime. In the United States, kidney stone affects 1 in 11 people while in Indian population, about 12% of them are expected to have urinary stones.[4] Approximate 2 million people in India are affected with urolithiasis every year and some parts of country has name denoted as a 'Stone Belt' that is, Gujarat, Maharashtra, Punjab, Rajasthan, Delhi, Haryana and part of states on North East India.[5]

Aetio-pathogenesis

Although exact etiology of urolithiasis is still not clear but several factors like low fluid intake, low urine output, excessive intake of calcium and oxalate rich food, Hypercalciuria, Hypercalcemia, Hyperoxaluria, Hyperuricosuria, Hypocitraturia , Hypomagnesuria, Renal Tubular Acidosis, Cystinuria, Xanthinuria etc. play a pivotal role in the development of urolithiasis. There are several hypothetical conditions like super-saturation of urine, crystallization of urine, infection of urinary tract, urothilium microdamage which precipitate the formation of stone in the urinary tract.

As per Ayurveda, *Ashamri* is formed when *Vata*, *Pitta* and *Kapha* with its adhesiveness enter the bladder and mixes with urines just like air and electricity in the sky consolidate the water and form hails storms. *Ashmari* forms in same way as even clean water is kept in a new pitcher, sedimentation does occur in due course of time.[6]

Classification

Urolithiasis is classified on the basis of site of stone (Nephrolithiasis, Ureterolithiasis, Cystolithiasis, Urethrolithiasis, Prostatic calculi, Seminal vesicle calculi), composition of stone (Oxalate, Urate, Phosphate, Cystine, Xanthine), source of origin of stone (Primary stone, Secondary stone), radiodensity (Radiopaque, Radiolucent). All these types of stones have some unique diagnostic and prognostic implication. For example oxalate stones are most common and painful. Bladder stones are usually secondary stone. Urate and cysteine stones are radiolucent.

In Ayurveda it is classified as *Kaphaja Ashmari*, *Pittaja Ashmari*, *Vataja Ashmari* and *Shukraj Ashmari*.[7] *Kaphaja Ashmari* can be correlated with phosphate stone, *Pittaja ashamri* with urate stone and *Vataja Ashmari* with oxalate stone while *Shukraja Ashmari* resembles the features of prostatic or seminal vesicle calculi.[8]

Clinical Features

Pain at the flank region is most common presentation of renal stone situated at the renal parenchyma. Renal colic, pain due to obstruction of the urinary tract by stone, is an excruciating, intermittent pain that radiates from the flank to the groin or to the inner thigh or scrotum or labia, usually associated with urinary urgency, restlessness, haematuria, sweating, nausea, and vomiting and typically comes in waves lasting for 20 to 60 minutes.

In Ayurveda *Ashmari* is clinically characterized by pain during micturition occurs at any of these regions- the umbilical region, bladder, perineal raphe and penis which may get aggravated sometimes by running, jumping, riding and walking for long distances. Along with that *Ashmari* also results in obstructed flow of urine, haematuria, scattering of urine stream and passage of turbid, sandy urine shining like *Gomeda* gem (precious stone).[9]

Diagnosis

Haematological investigations such as complete blood count (CBC), Erythrocyte Sedimentation Rate (ESR) are useful tool to rule out associated urinary tract infection in renal stone disease. Serum biochemistry Serum urea, Serum creatinine, Serum uric acid, Serum blood urea, nitrogen (BUN), Serum electrolytes, Estimated glomerular filtration rate (eGFR), optimal method of reporting renal functions.[10]

Urine analysis or Urine routine and microscopic (Urine R/M) examination or complete urine examination (CUE) is performed by light microscopy or using urine test strips, hence called as urine dipstick test. These following parameters are used to assess the renal function and status of urinary tract by examining the quality of urine by its Colour, Odour, pH, Specific Gravity, presence of RBC, Haemoglobin, WBC, Pus cells, Casts, Crystals, Glucose, Protein, Ketones, Bilirubin, Urobilinogen, Nitrites, Calcium, Oxalate, Phosphate in the urine. Specific Gravity under 1.010 indicates hydration while SG above 1.020 indicates dehydration.

Urine culture and sensitivity is useful in finding out associated urinary tract infections along with renal stone diseases. It is also useful in guiding the appropriate antibiotics therapy as per specific causative organisms.

Stone analysis is advised to find out the composition of stone which is useful for planning of choice of treatment and prevention from the recurrence of disease. Calcium oxalate and calcicum phosphate are the most common composition type of renal stone.[11]

Imaging for renal stone disease includes X-Ray KUB, USG KUB, Non Contrast Computed Tomography (NCCT), Intravenous Pyelography (IVP), Retrograde Urography, and Micturition Cysto-Urethrography (MCU). Non Contrast Computed Tomography (NCCT) is an investigation of choice in the diagnosis of renal stone.[12] Intravenous Pyelography (IVP), also called Intravenous Urography (IVU) or Excretory Urography (EU) is obsolete and has been superseded by NCCT.[13] Micturition Cysto-Urethrography (MCU) is useful to find and evaluate the severity of Vesico-Ureteric Reflux (VUR).

Endoscopy is another advanced tool for diagnosis and management of renal stone disease. It includes Cystoscopy, Ureteroscopy and Renoscopy**.** Dimercaptosuccinic acid (DMSA) renogram, Diethylene triamine penta acetate (DTPA) renogram and Mercaptoacetyltriglycine (MAG3) Renogram are investigations for assessment of renal functions**.**

Management

Diet and Lifestyle Modification is first step of managing renal stone disease. A high fluid intake is advised to prevent super-saturation of urine and maintain at least 2.5 litre of urine output in 24 hours.[14] Patient should measure their 24 hour urine output once a week and adjust the fluid intake to maintain an output of 3L/day or more.[15] Optimal intake of dietary calcium, oxalate, phosphate, citrate, sodium, fibres etc. plays very significant role in management and prevention of disease recurrence. For example high citrate diet can help prevent Calcium Oxalate stone formation by reduces the urine pH by binding itself with urinary calcium.[16] Similarly dietary fibre help in preventing disease as it decreases the intestinal calcium absorption by or binding with intestinal calcium and reducing the intestinal transit time.[17] A low

phosphate diet can be used for the prevention of struvite stones but it may cause hypercalciuria by increasing the production of 1, 25 $(OH)_2$ D_3 which promotes calcium absorption.[18]

Medical management is next attempt to manage renal stones. Medicine are prescribed to achieve alkalinization or acidification of urine and chelation of urinary crystals. Medicines like oral bicarbonates are advised to achieve alkalinization of urine in patient with urate stone. Hydrotherapy is also used as an attempt to expel out impacted renal stones. Oral or intravenous fluid is given to raise pressure in urinary system by increasing amount of urine. Alpha adrenergic blockers are also used to relax the muscles of urinary tract particularly ureter in order to facilitate spontaneous passage of renal stone. In Ayurveda various medicine are available which can be used to manage Urolithiasis. For example *Gokhsura, Pashanbheda, Varun, Shilajatu* etc. are well researched drugs for their potential to break and expel the renal stone.

Nowadays mainstay of management of renal stone disease are minimal invasive procedures like Extracorporeal Shock Wave Lithotripsy (ESWL), Percutaneous Nephrolithotomy (PCNL), Ureterorenoscopy (URS), Double J (DJ) Stenting, Ultrasonographic Lithotripsy (USL), Electrohydraulic Lithotripsy (EHL), Laser Lithotripsy etc. ESWL is the most common form of treatment these days for renal calculi up to 1.5cm in size.[19] PCNL is indicated for the stone size more than 2cm. Ureterorenoscopy (URS) is advisable in ureteric stone which is more than 1cm in size, in lower ureter, or impacted or even in upper ureter after failed ESWL.[20]

Operative Management of renal stone disease includes surgical procedures like Pyelolithotomy, Nephrolithotomy, Pyelo-Nephrolithotomy, Urterolithotomy, Cystolithotomy, Urethrolithotomy, Nephrostomy, Nephrectomy, Bench Renal Surgery and Auto-transplantation. Site and size of the stone dictate the type of procedure performed. Stone at renal calyx requires Nephrolithtomy while stone at renal pelvis required Pyelolithotomy. Ureteric stone may need Ureterolithotomy while Cystolithotomy is performed for bladder stone. Nephrostomy is indicated in Pyonephrosis, Bilateral urinary tract obstruction, Obstruction of solitary kidney. Nephrectomy is advisable in non-functioning kidney with staghorn calculus.

In Ayurveda, Acharya Sushruta emphasised the importance of prevention in management of diseases by describing concepts of *Nidana Parivarjana*[21] that is avoiding causative factors of disease as well as *Anaagatabaadhaapratishedha*[22] which is daily routine lifestyle modification for the prevention of diseases. Along with that several drugs with *Ashmarihara* or anti-urolithiatic properties are described in Ayurveda classics for the management of *Ashmari*. These drugs are being evaluated statistically for their effectiveness in various scientific studies. Acharya Sushruta advised medical treatment for newly diagnosed case of *Ashmari* while surgical treatment for chronic case of *Ashmari* with enlarged size of stone.[23]

Prognosis

The rate of spontaneous passage of ureteral stones does vary with stone size and location. The spontaneous passage rate for stones 1 mm in diameter was 87%; for stones 2-4 mm, 76%; for stones 5-7 mm, 60%; for stones 7-9 mm, 48%; and for stones larger than 9 mm, 25%. Spontaneous passage rate as a function of stone location was 48% for stones in the proximal

ureter, 60% for mid ureteral stones, 75% for distal stones, and 79% for ureterovesical junction stones.[24] Approximately ninety percent of stones <5mm are likely to pass successfully.[25] The annual recurrence for the renal stone disease without treatment is 5-10% per year and averages about 7% per year. Recurrence rates of renal stone are approximately 10% per year, 50% over a period of 5-10 years and 75% over 20 years period. Approximate life time recurrence rate of urolithiasis is 70-80% in males and 47-60% in females.[26]

DISCUSSION

Although urolithiasis is a disease which is known since ancient times but still today its management remains quite challenging. Conservative management is confined only to certain dietary and fluid modifications such as maintaining adequate fluid intake and avoiding of variety of dietary food which might precipitate calculi formation in urinary tract along with few medications such as Potassium Citrate which reduce the chances of stone formation by decreasing the acidity of urine.

In current scenario more and more renal stones are being treated by minimally invasive procedures such as ESWL, URS, PCNL and open surgical approaches like Nephrolithotomy, Pyelolithotomy, or Ureterolithotomy are also not uncommon when multiple, large or complicated stones restrict the usefulness of these minimally invasive procedures. Not only these procedures have their own limitations and complications in the way of treating urolithiasis but also are costly and need expertise. After surgical removal of stone, prevention of recurrence of urolithiasis is still remained a major challenge as till today no medicine can be claimed as effective for prevention of renal stone from recurrence.

So in this review article we found the gap in the management of renal stone disease. In spite of drastic advancement in use of technology in the field of Urology, still the management of Urolithiaisis remains very challenging and recurrence of disease is quite common irrespective of type of treatment modality adopted for the management of disease. Some other studies also noted the lack of effective strategy to prevent the urolithiasis and measures to fill this gap by allocating more research resources.[27,28]

It is noteworthy to suggest that more resources should be allocated for research in the renal stone disease to find out the effective management strategy which can be effectively useful not just for the treatment but also for prevention.

CONCLUSION

Urolithiasis is the third most common disease condition of urinary tract and affects about 12% of the world population at some stage in their lifetime. As conservative treatment of urolithiasis is only confined to increasing fluid intake and some dietary modification while surgical treatment has drastically advanced but the recurrence of disease is still a major concern. Taking all these factors into consideration, it is high time that we must emphasize the need of searching for a particular medical regimen which can be used as prophylactic as well as curative treatment for the urolithiasis

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