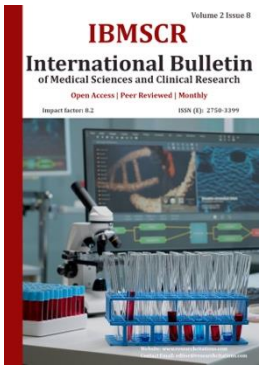

MANAGEMENT OF PATIENTS WITH UROLITHIASIS IN THE EMERGENCY DEPARTMENT: A REVIEW OF THE LITERATURE

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Annotation:

Introduction: Urolithiasis is a common disease in the Central Asian region due to climatic conditions. Patients often go to the emergency room for care, including pain relief and treatment to help stones pass.

Objective: Based on current evidence regarding the assessment and management of urolithiasis, this review summarizes the current literature regarding the management of urolithiasis in emergency departments.

Discussion: Urolithiasis occurs primarily due to oversaturation of urine and usually presents with flank pain, hematuria, and nausea/vomiting. History, examination, and evaluation with multiple laboratory tests are the cornerstones of the evaluation. Urinalysis is not diagnostic but may be used in conjunction with other tests. Risk assessment tools and advanced imaging can help make the diagnosis. Computed tomography (CT) is often considered the gold standard. Newer low-dose CT scans can reduce radiation exposure. Recent studies confirm that ultrasound is an alternative diagnostic method, especially in children and pregnant patients. Nonsteroidal anti-inflammatory drugs remain first-line treatment, and opioids or intravenous lidocaine are prescribed for refractory pain. Tamsulosin may improve passage of larger stones, but has not shown benefit for smaller stones. Nifedipine and intravenous fluids are not recommended to facilitate passage. Surgery depends on the size of the stone, its duration and modifying factors. Discharged patients should be advised to make dietary changes.

Conclusion: Urolithiasis is a common disease whose increasing prevalence may lead to significant morbidity. A focused assessment with history, examination, and testing is important for diagnosis and treatment. Understanding the clinical features, risk assessment tools, imaging options, and treatment options can assist emergency physicians in treating urolithiasis.

Key words: kidney stones, renal stone, nephrolithiasis, urolithiasis, urology, analgesia.

Introduction

Urolithiasis is a common condition that is evaluated and treated in the emergency department (ED). Nephrolithiasis refers to kidney stones, and ureterolithiasis refers to stones in the ureter. Urolithiasis is stones in the kidneys, ureters, bladder or urethra. This review will focus on urolithiasis. Approximately 11-16% of men and 7-8% of women will experience symptoms of urolithiasis by age 70. over 10 years of age.6-8 The prevalence of urolithiasis in 1994 was 5.2%, and in 2017 it more than doubled. This increase in prevalence is associated with more than one million emergency room visits annually and more than 40,000 surgical procedures.8-12 Annual costs will approach $5 billion, and this figure will likely continue to rise. 9,10,12,13 One of the main problems associated with urolithiasis is renal colic, which can

lead to sudden severe pain. Severe consequences may include sepsis and death from blockage of an infected stone. Recent prospective data suggest an increase in the incidence of infected urolithiasis, as well as in the incidence of sepsis and severe sepsis, although mortality rates remain stable.14 Recurrence is also common, occurring in 15% of patients within the first year and in 30–50% within 10 years.2 ,12-17 Men experience stones at a 2:1 ratio compared to women, primarily due to diet, climate, and other risk factors.1,2,12,16 Additional risk factors for urolithiasis include obesity, decreased fluid intake, and older age. age, Caucasian race, lower socioeconomic status, diabetes, and gout.1,2,5,12,16 Conditions such as inflammatory bowel disease, pancreatitis, short bowel syndrome, and hyperparathyroidism also increase the risk of stone formation due to associated metabolic disorders.1,2,12,18.

Materials and methods:

In light of new evidence on both the assessment and treatment of urolithiasis, this review was designed to summarize the current literature relevant to the management of urolithiasis for emergency physicians. The authors searched PubMEO and Google Scholar for articles using a combination of the following keywords and medical subject headings: “kidney stone,” “kidney stone,” “nephrolithiasis,” and “urolithiasis.” The literature search was limited to studies published in English. The authors decided which studies to include in the review by consensus. A total of 125 articles were selected for inclusion in this review.

Anatomy and pathophysiology

Stone formation occurs primarily due to an imbalance of urinary solutes and solvent.19-21 Solutes usually dissolve in solution up to a certain saturation point. When the saturation point is exceeded, stones can form in the urine. Citrate, glycoproteins, and magnesium inhibit crystal formation, while other materials called "nucleation centers" (eg, epithelial cells, urinary casts, and red blood cells) provide areas for crystal collection.12,18-22 These nucleation centers accelerate crystal growth. and unite into larger centers. Urine pH can also influence stone formation by altering solubility. Alkaline urine (defined as urine pH > 6.7) increases the formation of calcium phosphate crystals, while acidic urine (defined as urine pH < 5.5) increases the risk of uric acid stones.22-25 Calcium stones are the most common, accounting for more than 80 % of all urinary stones, although many contain a mixture of solutes.1,2,5,12,20,26-28 Hypercalciuria, hyperuricosuria, hypocitraturia, hyperoxaluria, and urinary pH abnormalities are risk factors for stone formation (Table 1). .1,2,5,12,26-30 Dehydration reduces the amount of solvent available, resulting in increased urine concentration and an increased risk of stone formation. Diets high in salt, protein, or low in calcium also increase the risk of urolithiasis.5,12,29

Stones that form in the kidney may be located in the parenchyma, calyx, renal pelvis, or ureter.1,2,5,12,29,30 Once a stone forms, the size and location of the stone have the greatest impact on the patient's symptoms and treatment. .12,29,30 Intrarenal stones are unlikely to cause pain or hydronephrosis.12,29,30

The likelihood of stone passage depends on the location, size, shape, and degree of ureteral obstruction. 3) the place where the ureter crosses the iliac vessels, and 3) the place where the ureter meets the wall of the bladder and exits into the orifice of the ureter. These locations can lead to stone entrapment and obstruction. 5,12,26,27,31 Obstruction of urinary outflow can cause increased intraluminal pressure and hydronephrosis, which leads to stimulation of urothelial nerve endings and increased stress on the ureteral wall. 12 This causes colic and the release of prostaglandins, which is associated with spasms of the smooth muscles of the

ureteral wall. and pain. Afferent nerves from the kidneys and ureter enter the spinal cord at levels T11–L2, which are shared with the gastrointestinal (GI) tract, other urinary organs, and genital organs. Patients may experience pain associated with these systems, which can mimic other medical and surgical conditions.12,28,32–34 Nausea and vomiting result from stimulation of the celiac axis and vagal afferents. Hematuria is caused by stone injury to the wall of the ureter and bladder, as well as irritation of superficial blood vessels. 32 -35

History and physical examination

Patients may experience a variety of symptoms. The most common symptoms are flank pain, hematuria, nausea and vomiting. 31–35 Various conditions can mimic renal colic, but history, physical examination, and targeted testing are often diagnostic. 12,31–34 The nature and location of pain often varies depending on the location of the stone, although the specific location of the stone does not necessarily directly correlate with the location of the pain.32 Pain usually waxes and wanes in the acute phase. Persistent pain in the acute phase may indicate a more severe obstruction, whereas intermittent pain is more often associated with incomplete obstruction.2,3,12 Because of the dual innervation of the gastrointestinal, genitourinary, and somatic systems, patients may experience pain in the intestines, groin, and urinary tract. bladder or genitalia.12,32 Ipsilateral genital pain is a common site of referred pain from distal ureteral stones. Non-obstructive stones are considered to be asymptomatic, and the finding of non-obstructive stones on imaging requires consideration of another etiology for the patient's symptoms. Nausea and vomiting occur in approximately half of patients with urolithiasis.34 Hematuria is most often microscopic (up to 90% of cases), although it can also be macroscopic. Using hematuria to predict the presence of urolithiasis has only a 60% accuracy, and the absence of hematuria does not exclude urolithiasis.5,12,28,32 Hematuria most often occurs on the first day of symptom onset with a sensitivity of 95%. , but this figure decreases to 65% by days 3 and 4.28 Although approximately 85–90% of patients have some form of hematuria, approximately 25% of patients with hematuria and flank pain have no radiographic evidence of urolithiasis .35 Symptoms associated with urination Common urinary tract infections include urgency, dysuria, urinary frequency, and urethral pain. These symptoms occur due to irritation of the bladder urothelium as the stone passes through the bladder wall. When a stone is completely lodged in the bladder, it may be asymptomatic. Urethral stones are usually asymptomatic.28,33,34 Atypical presentations are more common in older patients, although CVA tenderness and hematuria remain common.39 In older patients, careful evaluation for these symptoms is warranted. Fever, chills, and rigors are not commonly observed in uncomplicated urolithiasis and should raise concern for an infected stone.12,28 Hemodynamic abnormalities usually resolve with analgesia in patients with urolithiasis.41 Upper urinary tract infection in urolithiasis is a major risk factor. for sepsis and requires urgent urological care.28-30 The patient should also be asked about previous episodes, procedures required to remove stones, family history of urolithiasis, fever, chills, shivering, ability to tolerate oral intake, vomiting, and other urinary symptoms. . A patient with renal colic classically cannot find a comfortable position, although this is not universal. Tachycardia and hypertension may also be present due to pain. However, fever and hypotension are rare and require careful evaluation for associated urinary tract infection or abscess and sepsis. On examination, costovertebral region tenderness is detected in 25-52% of cases and is often severe.5,12,28 Examination of the abdominal cavity usually reveals a soft, painless and non-

distended abdomen. However, guarding (61%), rebound soreness (29%), and stiffness (8%) may be present. 12,28 Evaluation of the genitalia and groin should be normal.

Laboratory research

Laboratory testing in the emergency department often involves multiple tests, including serum chemistry and urinalysis. Patients may experience a slight decrease in creatinine clearance, resulting in a small increase in serum creatinine levels.12 However, this is rarely significant enough to qualify as acute kidney injury.12,33 A more severe increase in creatinine may be found in patients with a single increase baseline kidney or baseline level, although the most common cause is prerenal injury due to dehydration due to nausea and vomiting.7,36 Women of reproductive age should undergo pregnancy testing.5,7,12 A complete blood count (CBC) may reveal increased with increased neutrophils, which may be a consequence of a stress response to pain or urinary tract infection.12,30 Clinicians should not rely solely on a complete blood count to differentiate complicated urolithiasis with infection from an uncomplicated stone, but rather as an adjunct to clinical decision making. manufacturing.

Conclusions:

Urolithiasis is a common condition that results in more than a million emergency room visits each year. The most common manifestations include flank pain, hematuria, nausea, and vomiting. However, classic symptoms may not always be present. Urinalysis should not be used to diagnose or exclude urolithiasis. Risk assessment tools and advanced imaging can facilitate the diagnosis of urolithiasis. Imaging options include X-ray, CT, ultrasound, and MRI. Although CT is often considered the gold standard imaging, it is associated with significant radiation exposure, especially among patients with frequent episodes of urolithiasis. Newer low-dose CT scans may reduce radiation exposure. Recent studies have confirmed that ultrasound is an alternative diagnostic method, especially in children and pregnant patients. NSAIDs remain first-line therapy, with opioids or intravenous lidocaine reserved for the treatment of refractory pain. Tamsulosin may improve passage of larger stones, but has not been shown to be effective for smaller stones. Nifedipine and intravenous fluids are not recommended to facilitate passage. Surgery depends on the size of the stone, its duration and modifying factors. Discharged patients should be advised to make dietary changes. Knowledge of clinical features, risk assessment tools, imaging options, and treatment options can assist emergency care providers in the assessment and management of patients with urolithiasis.

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