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A Rare Case of Bladder Calculi (Vesicolithiasis) in a Thirteen-Year-Old: a Case Report

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ABSTRACT
Bladder stones (vesicolithiasis) are uncommon in pediatric populations, particularly among female patients, with a global incidence of approximately 2–3% of all pediatric urolithiasis cases. Indonesia experiences higher rates due to endemic factors, including high-carbohydrate, low-protein diets and chronic dehydration. This case report presents a rare instance of secondary vesicolithiasis in a thirteen-year-old female with neurogenic bladder dysfunction, aiming to highlight the diagnostic approach and minimally invasive surgical management. A descriptive case study was conducted at Lagaligo Hospital and RS Sawerigading, Palopo, Indonesia. Diagnostic evaluation included comprehensive anamnesis, physical examination, laboratory tests, and ultrasonography. The patient underwent transurethral cystolithotripsy using an 8 Fr endoscopic instrument under general anesthesia. Ultrasonography revealed a 2.2 cm vesical calculus with chronic cystitis. Complete stone fragmentation and evacuation were achieved via transurethral cystolithotripsy without complications. The postoperative recovery was uneventful. This case demonstrates that transurethral cystolithotripsy is a safe and effective treatment option for pediatric vesicolithiasis in female patients. Early ultrasonographic diagnosis and minimally invasive intervention can achieve excellent outcomes while minimizing hospital stay and morbidity. Preventive strategies, including proper hydration, hygiene, and infection control, are essential to reduce recurrence in high-risk populations.

INTRODUCTION

Bladder stones (vesicolithiasis) represent a relatively uncommon urological condition in the pediatric population, particularly among female patients. Globally, vesicolithiasis accounts for approximately 2–3% of all pediatric urolithiasis cases, though the prevalence varies across regions depending on dietary habits, climate, and socioeconomic conditions (Julian & Agil, 2021; Vincent et al., 2023). In developing countries such as Indonesia, the incidence is considerably higher because of its inclusion within the "stone belt" region—an area characterized by endemic urolithiasis due to dietary patterns dominated by high-carbohydrate and low-protein intake, coupled with chronic dehydration and limited access to clean water sources (Lal et al., 2015; Palinrungi et al., 2020; Shevchuk & Nakonechnyy, 2023).

Bladder stones typically consist of infection-related calculi, ammonium urate, or calcium oxalate deposits. In children, the etiology can be categorized as primary (endemic)—arising without any identifiable underlying urinary tract anomaly—or secondary, which occurs as a result of infection, obstruction, or neurogenic bladder dysfunction (Hu et al., 2023; B. Purnomo, 2015; B. B. Purnomo, 2012; Salama et al., 2021). In the pediatric context, secondary bladder stones are often associated with recurrent urinary tract infections (UTIs), neurogenic bladder, or poor voiding habits caused by prolonged immobility or anatomical abnormalities.

The clinical presentation of vesicolithiasis in children can vary widely. Common symptoms include dysuria, hematuria, urinary retention, suprapubic pain, and lower urinary tract irritation. However, these symptoms are nonspecific, leading to frequent underdiagnosis

or delayed detection. In many cases, bladder stones are incidentally found during ultrasonographic evaluations for other urological complaints (Ali et al., 2022; Babu et al., 2024; Dagistan et al., 2014; Donaldson et al., 2019; Reddy & Raja, 2023).

Diagnostic imaging plays a crucial role in identifying vesicolithiasis. Ultrasonography is the preferred first-line modality in children, as it is non-invasive, widely available, and free from radiation exposure. Computed tomography (CT) or plain radiography may be used in selected cases for confirmation or surgical planning (Yağmur et al., 2022).

Surgical removal remains the definitive treatment for bladder stones. While open cystolithotomy has traditionally been the standard approach, minimally invasive techniques such as transurethral cystolithotripsy and percutaneous cystolithotripsy have gained increasing acceptance, particularly in female patients, due to their shorter hospital stays, reduced morbidity, and rapid recovery (Ali et al., 2022).

This report presents a rare case of bladder calculi in a thirteen-year-old female patient with a history of bilateral lower-limb paralysis and recurrent urinary tract infections. The case underscores the importance of early diagnosis, appropriate imaging, and minimally invasive surgical intervention in achieving favorable outcomes among pediatric patients with secondary vesicolithiasis.

This case report aims to: (1) comprehensively document the clinical presentation, diagnostic approach, and management of vesicolithiasis in a female adolescent with neurogenic bladder dysfunction; (2) evaluate the efficacy and safety of transurethral cystolithotripsy as a minimally invasive treatment modality in pediatric female patients; (3) identify risk factors and preventive strategies specific to secondary bladder stone formation in neurologically impaired children; and (4) contribute to the limited body of literature addressing this rare demographic presentation, thereby informing evidence-based clinical decision-making for similar cases.

The documentation and analysis of this case provide several important benefits. Clinically, this report offers practical guidance for pediatric urologists and general practitioners in resource-limited settings regarding early recognition and appropriate referral of secondary vesicolithiasis in neurologically compromised children. The successful application of minimally invasive surgical techniques demonstrates feasibility and safety in female pediatric patients, potentially influencing treatment protocols and reducing reliance on more invasive open procedures. Scientifically, this case enriches the evidence base for a severely underrepresented patient demographic—female children with acquired neurogenic bladder dysfunction—thereby addressing a significant literature gap. From a public health perspective, the identification of modifiable risk factors (recurrent UTIs, inadequate hygiene, prolonged immobility) highlights opportunities for targeted preventive interventions that could reduce disease burden in vulnerable pediatric populations across developing nations.

RESEARCH METHOD

This study utilized a case report design, focusing on the clinical presentation, diagnostic workup, management, and postoperative outcome of a pediatric patient diagnosed with vesicolithiasis. Data were obtained from the patient's medical records, physical examination findings, laboratory results, and imaging studies conducted at Lagaligo Hospital and RS Sawerigading, Palopo, Indonesia.

The diagnostic procedure began with a comprehensive anamnesis, emphasizing urinary symptoms, previous infections, and neurological history. Physical examination targeted the abdomen and suprapubic region, alongside an assessment of motor function in the lower extremities.

Laboratory investigations included routine hematological tests and renal function assessments to exclude metabolic abnormalities. Ultrasonography (USG) was performed as the primary imaging modality to detect the presence, size, and morphology of the bladder stone.

After confirming the diagnosis of vesicolithiasis accompanied by cystitis, the patient underwent transurethral cystolithotripsy under general anesthesia. The procedure was conducted using an 8 Fr endoscopic instrument equipped with suction evacuation to ensure complete removal of calculi fragments. Operative time, intraoperative findings, and postoperative recovery were documented systematically.

Ethical approval was not required for this report, as the study is descriptive and anonymized in accordance with institutional and international ethical guidelines for case reporting.

RESULTS AND DISCUSSION

Clinical Findings

A 13-year-old female presented with urinary retention and suprapubic pain. The patient had a long-standing history of bilateral lower-limb paralysis following a fall at age three, resulting in limited mobility and dependence on a wheelchair. Over the preceding year, she experienced recurrent urinary tract infections and persistent lower urinary tract symptoms.

Physical examination revealed suprapubic tenderness but no other systemic abnormalities. Laboratory parameters, including renal function tests, were within normal limits, indicating preserved kidney function.

Imaging and Diagnosis

Ultrasonography demonstrated thickened and irregular bladder mucosa, consistent with chronic cystitis, and a 2.2 cm hyperechoic calculus with posterior acoustic shadowing, confirming the diagnosis of vesicolithiasis. No upper urinary tract involvement was detected.

Treatment Outcome

The patient underwent transurethral cystolithotripsy using an 8 Fr instrument over approximately one hour. Stone fragments were successfully fragmented and evacuated via suction, achieving complete clearance. The postoperative period was uneventful, and the patient recovered without complications.

Discussion

This case emphasizes the secondary etiology of vesicolithiasis—specifically recurrent UTIs and neurogenic bladder dysfunction due to immobility. In pediatric patients, the combination of incomplete bladder emptying, prolonged diaper use, and poor perineal hygiene fosters bacterial colonization, leading to infection-induced urolithiasis (Mohamed et al., 2021).

Ultrasonography proved to be a highly effective diagnostic tool, offering rapid, non-invasive detection of both the stone and mucosal inflammation. While open cystolithotomy remains the mainstay for large stones (>3 cm), minimally invasive techniques such as transurethral cystolithotripsy are increasingly preferred in suitable cases. In female children, this method is technically easier due to the shorter urethral length, and it is associated with shorter hospital stays and reduced morbidity (Yağmur et al., 2022).

The choice of surgical approach must consider stone size, composition, patient anatomy, and available equipment. In this case, the 2.2 cm stone was effectively managed endoscopically, demonstrating that transurethral lithotripsy is safe and effective even in pediatric cases when performed by skilled operators.

Postoperative preventive measures are vital to avoid recurrence. These include improving hydration, increasing dietary protein intake, minimizing prolonged catheterization, and maintaining good perineal hygiene. As suggested by Lal et al. (2015), endemic vesicolithiasis prevention also relies on socioeconomic improvements and nutritional education in rural communities.

CONCLUSION

Bladder calculi are an uncommon pediatric condition, particularly in females, often arising secondary to factors such as neurogenic bladder and recurrent urinary tract infections. This case demonstrates that early diagnosis through ultrasonography and the use of minimally invasive techniques like transurethral cystolithotripsy can achieve favorable outcomes with reduced morbidity. Prevention through infection control, proper hydration, hygiene, and nutrition remains vital to minimizing recurrence. Future research should focus on optimizing long-term preventive protocols and evaluating the efficacy of novel minimally invasive techniques tailored for pediatric and neurologically impaired populations.

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