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Bilateral staghorn renal calculi

Melani Limenco Benly [1], Melly Liman [2]
[1,2]Faculty of Medicine, Tarumanagara University Jakarta

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ABSTRACT

Staghorn calculi are large renal stones that occupy most or all of the renal collecting system. The prevalence of kidney stone disease is estimated at 1% to 15%, varying according to age, gender, race, and geographic location. Although kidney stones are more common in men, staghorn stones occur less often in men and are usually unilateral. Patients with bilateral staghorn calculi might be unique and have complex clinical problems. Meanwhile, complete renal function loss in 50% of affected kidneys can occur after two years without treatment. Case presentation: A patient is a 69-year-old man who was brought to the Emergency Department for bilateral flank pain, with a referral from RSUD Bogor, due to a bilateral staghorn kidney stone. After further examinations, BNO indicated the bilateral nephrolithiasis and laboratory tests with abnormal blood glucose, ureum level, gas, urine leukocyte, and erythrocyte. The patient was then provided medications and experienced right nephrolithotomy.

Corresponding Author:

Melani Limenco Benly
Faculty of Medicine
Tarumanagara University Jakarta
Letjen S. Parman 1, Tomang, Grogol petamburan, Jakarta, Indonesia
Email: melani.benly@gmail.com

INTRODUCTION

Staghorn stones are large kidney stones that occupy most or all of the kidney system ("Campbell Walsh Wein Urology," 2021; Wein *et al.*, 2015). Several stones can be found in calcium oxalate stones, calcium phosphate, uric acid, struvite/magnesium ammonium phosphate/infectious, and cystine (Kasper *et al.*, 2018). The prevalence of kidney stones itself is estimated between 1% and 5%, depending on age, gender, race, and geographic location. Moreover, diet can also be a risk factor that can increase or decrease the risk of stone formation. Animal protein, oxalate, sodium, sucrose, and fructose were found to increase the risk of its disease. Meanwhile, calcium, potassium, and phytate could reduce the risk. Besides, urine conditions, such as volume, concentration, and pH can also affect the risk of stone formation. Although kidney stones are more common in men, staghorn stones occur less frequently in men and are usually unilateral (Diri & Diri, 2018). Patients with bilateral staghorn stones can show a unique and difficult clinical problem (Aminsharifi *et al.*, 2016). Meanwhile, loss of kidney function in 50% of affected kidneys can occur after two years without treatment (Alsawi et al., 2020; Fishel Bartal & Sibai, 2022; Margaret S. Pearle, MD, PhD, Yair Lotan, 2020).

Stones can form due to a supersaturation process, namely the point at which crystalline salts no longer dissolve, but this does not necessarily lead to crystallization, it can be due to the presence of inhibitory factors (Gadzhiev *et al.,* 2020). Crystals precipitate each other form a rock core (nucleation) which will then hold aggregation, and attract other materials so that they become larger crystals. The crystal aggregates then adhere to the urinary tract epithelium (forming crystal retention), and then other materials are deposited on the aggregates to form stones large enough to block the urinary tract. Some compounds that can inhibit stone formation are magnesium, citrate, and pyrophosphate. Other compounds that can inhibit include glycosaminoglycans, such as chondroitin sulfate, osteopontin/uropontin, and urinary glycoproteins (Klein & Gutiérrez-Aceves, 2020).

Patients with nephrolithiasis may be asymptomatic even for years. Complaints that are usually delivered are lower back pain, which can be accompanied by nausea, vomiting, and radiating (if in the upper ureter, then radiating anteriorly, if in the lower ureter, then radiating to the ipsilateral testicles or labia). Colic pain is obtained when peristalsis and non-colic pain is obtained from stretching of the kidneys. In addition, painless hematuria may also be found. The location of the stone that is in the right ureteral pelvic junction can cause symptoms similar to acute cholecystitis. If the stone is located at the cross of the ureter with the iliac artery, symptoms resembling appendicitis/diverticulitis can be found. On the other side, urgency, frequency, and dysuria are found if the stone is located at the ureterovesical junction. Infection of the stone can cause fever and chills. Meanwhile, staghorn stones are usually asymptomatic. On physical examination, there is usually CVA knocking pain, ballotement with the existence of hydronephrosis, and tachycardia, hypertension, and fever. Laboratory tests that can support include checking electrolytes, urea, creatinine, uric acid, and urine tests. The gold standard for kidney stones is a helical CT scan without contrast, but other radiological examinations, such as plain abdominal photos, ultrasound, BNO-IVP can also be performed.

In the emergency room, management can be carried out in the form of IV access for fluids, analgesics, antiemetics (metoclopramide, ondansetron) which aims to prevent dehydration due to vomiting and low intake. If there is obstruction but no infection, analgesics can be provided, whereas if there is infection without obstruction, then antibiotics can be given. If both are present, decompression is performed by placing a ureteral stent or a nephrostomy. Active medical compulsive therapy (MET) with CCBs, alpha blockers, or Phosphodiesterase type 5 inhibitors (PDEI-5) may be performed for stones >5 mm for which active stone removal is not indicated. Several indications for active stone removal of kidney stones include stone growth, obstruction, infection, symptomatic stones, size >15 mm or <15 if not observable. For kidney stones >20 mm, the choice of procedure is PNL, and for stones measuring 10-20 mm, then the choice is SWL or endourology, while for stones <10 mm SWL or RIRS is selected.

RESEARCH METHOD

This type of research is qualitative with a case study approach (Sugiyono, 2017, 2018, 2019). Case taking was carried out at the Bogor Hospital. The research subject is a man with aged 69 years.

RESULTS AND DISCUSSIONS

A 69-year-old men patient has the main complaint of bilateral low back pain for a long time, but he did not remember the exact time. Initially, the patient came to the emergency room with a referral from RSUD Bogor to a surgeon with an X-ray that looked like a left-sided staghorn renal stone. In this current condition, he still feels intermittent low back pain, especially when tilting the body to the right or left, nausea without vomiting, pain when urinating, and a feeling of airiness. Patients also complain of difficulty sitting and standing for a long time. He eats and drinks less, only wants a few spoonfuls. The patient has known of stones in the kidneys since about 20 years ago, but has

not been treated until now. The information include fever (-), body feeling weak (-), bloody urination (-), visible stones in urination (-), and sandy urination (-).

The patient has a history of gout, but does not remember since what time it is. There is a history of DM in his children. He used to drink coffee every day, but now only drinks plain tea occasionally. On physical examination, he was found to be moderately ill, conscious of CM (GCS 15), with stable hemodynamics and it was obtained on inspection of the abdomen visible ribs. CVA knocking pain, tenderness in the right-left side of the waist, and ballottement were not found. A urinary catheter is inserted with an output of 1600 cc/24 hours. Supporting examinations carried out on 18 February – 25 February 2022 are attached.

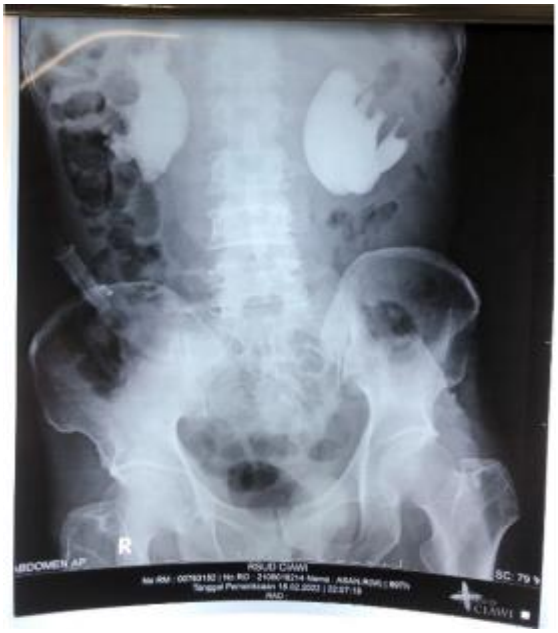
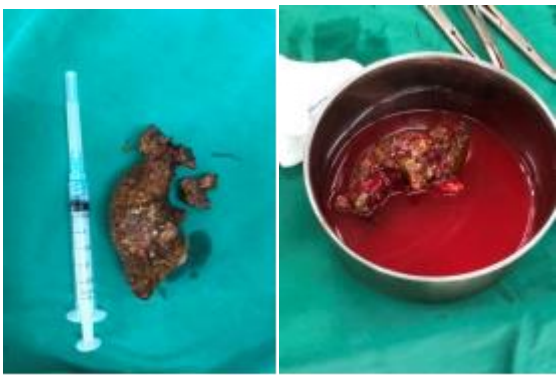


Table 1. Supporting Examination

The patient was diagnosed with bilateral nephrolithiasis, AKI ec low intake, and hyperglycemia, and received pharmacological treatment in the form of Harnal 0-0-1, Renax 2x1, Glimepirid 1x2 mg, Ceftriaxone 1x2 g, Ketorolac 3x1 amp (30 mg), Omeprazole 2x40 mg, Levofloxacin 1x75 mg, Lantus 1x10 mg. Non-pharmacological treatments provided include IVFD NaCl 0.9% 2000 cc/24 hours, DC catheter, and pro nephrolithotomy patients on February 21, 2022.



The picture above shows the results of the surgery to remove kidney stones. Urinary tract stones can cause complications in the form of obstruction and urinary tract infections. Stones that are left in the urinary tract can cause infection, kidney abscess, poinephrosis, urosepsis, and permanent kidney damage (kidney failure). 75% of kidney stones are calcium stones. 60% is composed of calcium oxlate, 20% is a mixture of calcium oxlate and hydroxyapatite, 10% is uric acid and struvite (magnesium ammonium phosphate), and 2% is brushite (Sharbaugh *et al.,* 2019; Tsai et al., 2015).

The stones formation can be caused by various mechanisms. Excessive supersaturation is the cause of the formation of uric acid stones or cystine stones, while infection stones are caused by bacterial metabolism. While the most common stones contain calcium, the cause is still not fully understood. The balance between stone-forming substances and inhibitors determines whether stones are formed or not. Some stone inhibitors include magnesium ions which can inhibit stone formation because if they bind to oxlate, they form magnesium oxlate salts so that the amount of oxlate that will bind to calcium will decrease (Alsawi *et al.,* 2020; Diri & Diri, 2018).

The mechanism for the formation of kidney stones or urinary tract is certainly unknown, but several books mentioned the process of stone formation can be caused by precipitation of salts dissolved in urine, where if the urine is saturated, precipitation will occur and the presence of a nucleus (nidus). For example, if there is an infection, then an ulcer occurs, where this ulcer becomes the formation of stones, as a place for the stone particles to stick to the core and changes in pH. On the other hand, the presence of other colloids in the urine will neutralize the charge and cause sedimentation (Glenn M Preminger, 2020; Petca *et al.,* 2019; Subramonian *et al.,* 2020).

CONCLUSION

Staghorn stones are large and branching stones fill part or all of the pelvicalyceal system. They are usually unilateral and less commonly experienced in men. They are linked to urease-producing bacterial infections and are called struvite infection stones.

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