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Case Report: Staghorn Stone Successfully Treated With Open Nephrolithotomy

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Objectives. Staghorn stones are large branching stones that fill part of all of the renal pelvis and renal calyces and they can be complete or partial depending on the level of occupancy of the collecting system. The case of this Staghorn Kidney Stone was reported at Leona hospital, Kupang, East Nusa Tenggara, Indonesia.
Case. The patient is a 22 year old male with Staghorn renal stone with the size measured 14 x 11 cm. The patient came to the ER with complaints of low back pain and patient complaints of difficulty urinating first. Nephrolithotomy surgical procedure was performed to release the stone.
Conclusions. The cause of the renal staghorn stone should be considered prior to treatment as eliminating the cause and the underlying factor will reduce the complications and recurrence rates.

Keywords: open nephrolithotomy, staghorn stone

Introduction

Staghorn stones are large branching stones that fill part of all of the renal pelvis and renal calyces and they can be complete or partial depending on the level of occupancy of the collecting system. Although the term 'staghorn' provides description of stone configuration, it lacks specific volume criteria and information about stone composition. Previously, it was widely accepted that staghorn stones formed 10–20% of the entire urinary stones. However, this figure is currently reduced to 4% in developed countries due to early and effective management of renal stones [1-3].

Case Report

A 22-year-old-male, who worked as an office worker, visited Leona hospital with complaints of low back pain since last year causing urinary retention. His last miction was prior ER visit. At first the patient complains of difficulty urinating first. Patients. He also had urgency and nocturia. It occurred several times over the last year. Patient's source of drinking water comes from the river. The patient was alcoholic (white smoke – traditional alcohol from East Nusa Tenggara), with a total of more than one glass of alcohol per day and he likes to smoke 1 pack of cigarettes per day. History of certain medication was

denied.

On physical examination , vital signs were within normal limits. There was costo vertebral angle (CVA) knock pain on the left side. There were no abnormalities in the external genitalia. Laboratory test showed normal. X-ray imaging showed radiopaque shadow multiples at pelvis renalis sinistra (Figure 1). CT SCAN (Figure 2) showed kidney multiple stone (4,14 C) with conclusion multiple staghorn stone. From the surgical procedure, the stone measured 14 cm x 11 cm in size (Figure 3). Patient underwent a nephrolithotomy sinistra surgical procedure. The procedure went from lumbothomy incision sinistra went inside until find fascia gerota, after that make sure the renal were free from fat tissue and make sure the renal were fixation. And then the stones were captured and lifted. There wasn't any adhesion during the operation. After cleaning the stone, sew the renal with chromic cat gut 2.0 and wash the area with NaCl 0,9% to make sure it's clean.

After that sew the operation with chromic cat gut 1.0. Make sure the operation wound after sew clean. After the operation , the patient went X-ray imaging again to evaluate and make sure the staghorn stones were cleared. The results of X-ray BOF were clear (Figure 4).

Figure 1. Plain X-ray shows a radiopaque shadow, well defined, regular margins in the pelvic renalis sinistra

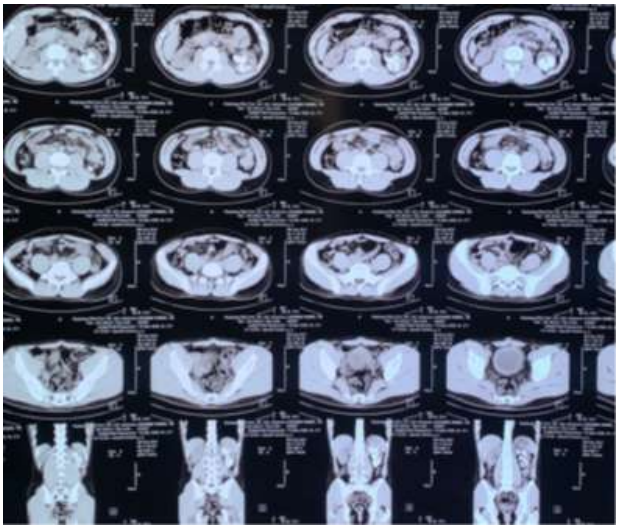

Figure 2. CT SCAN shows renal staghorn stone (4,14 C)

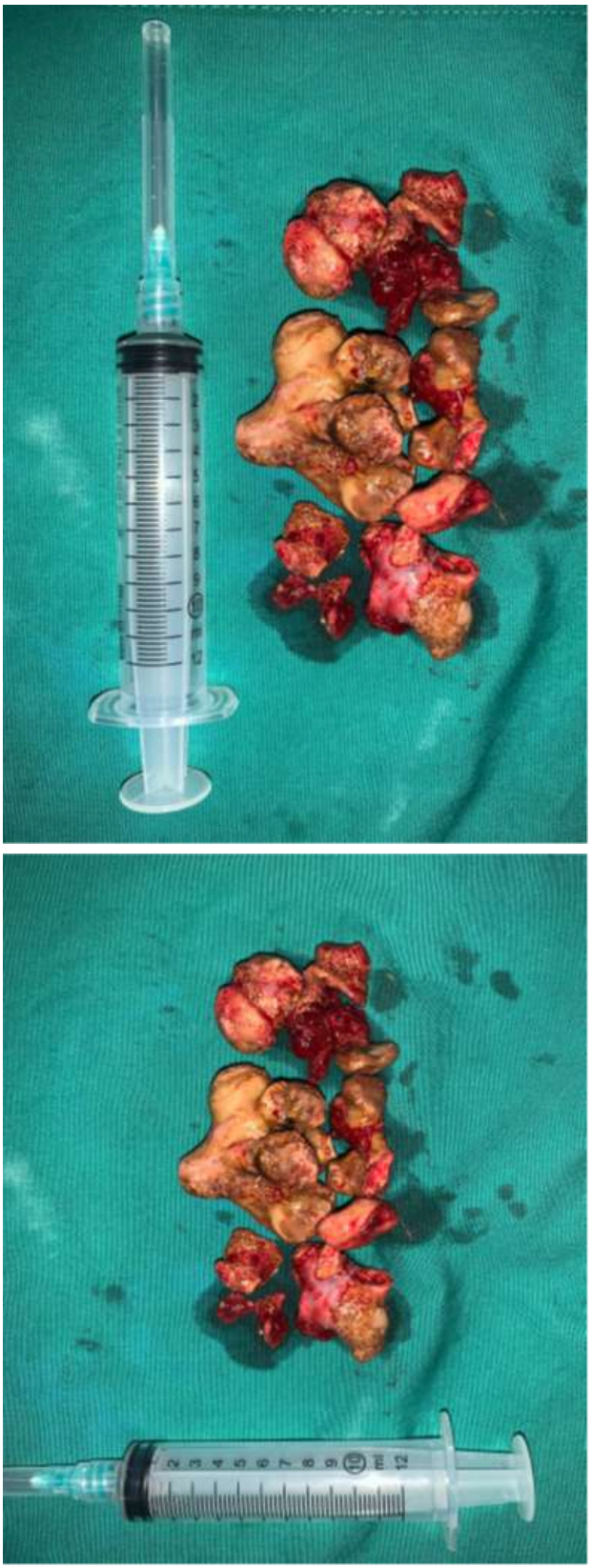

Figure 3. Multiple renal staghorn stone

Figure 4. Plain X-ray shows pelvic renalis sinistra were cleared after nephrolithotomy operation

Discussion

Nephrolithiasis (kidney stone) is one of the kidney diseases due to the formation of hard material that resembles a stone and consists of crystals and an organic matrix. One type of kidney stone is based on stone. A staghorn stone is a kidney stone printed starting from the renal pelvis until it hits two or more times the renalis, thus forming a deer antler-like image.

In Indonesia, urinary tract stones still occupy the most common cases among all urological cases. There is no definite data on the incidence and prevalence of urinary stone in Indonesia currently, but it is estimated to be high. Indonesia is included in the group of "World Stone Belt" countries, where it has a higher prevalence of urinary stone than other countries. In some countries in the world it ranges from 1-20%.The prevalence of the disease is estimated at 7% in adult women and 13% in adult males. Four out of five patients are men, while the peak age is the third to fourth decade. The highest prevalence of nephrolithiasis is in the DI Yogyakarta area (1.2%), followed by Aceh (0.9%), West Java, Central Java, and Central Sulawesi each (0.8%) [4-5].

The formation of kidney stones is thought to correlate with urinary flow disorders, metabolic disorders, urinary tract infections, dehydration, and idiopathic. There are several risk factors for stone formation, including intrinsic and extrinsic factors. Intrinsic factors include heredity (heredity), age (often found at 30-50 years old), and gender (three times as many male patients as female patients). Some of the extrinsic factors include geography, climate, temperature, water intake (lack of water intake and high levels of calcium, minerals in the water consumed), diet (diet with lots of purines, oxalate, calcium), and work (lack of activity or sedentary life) [4].

More than 80% of urinary tract stones consist of calcium stones, both those that bind to oxalates and to phosphates, forming calcium oxalate stones and calcium phosphate;while the rest come from uric acid stones, magnesium ammonium phosphate stones (infection stones), xanthine stones, cysteine stones, and other types of stones. Although the pathogenesis of the formation of the stones above is almost the same, the atmosphere in the urinary tract that allows the formation of the type of stone is not the same. In this case, for example, uric acid stones are easily formed in an acidic atmosphere, while magnesium ammonium phosphate stones are formed because urine is alkaline [5].

Despite the historical fact that a large proportion of staghorn stones are made of struvite, recent reports revealed an increasing number of calcium phosphate staghorn stones, supporting the link between staghorn and metabolic stones. Although, to date, there are no convincing explanations for the shift in staghorn stones composition, it is thought to be secondary to geographical, dietary, and lifestyle changes.

Also, staghorn stones sometimes present as mixed stones, composed of calcium carbonate apatite and struvite. This could possibly be explained by the primary tendency to form calcium oxalate stones which subsequently harbor bacteria triggering the cascade of events leading to secondary struvite deposition. Accordingly, changing composition of staghorn stones clearly suggests that metabolic evaluation of such patients is necessary as metabolic stones are easier to prevent than struvite ones.

Our patient , a male aged 22, was the factor of gender. The other factor is the habit of our patients in terms of drinking habits where our patients drink river water that is cooked but not filtered even though East Nusa Tenggara. This limestone structure is the reason for the high levels of lime in the water source. Groundwater has a higher level of

hardness than surface water [6]. Our patient had no history of BPH.

Apart from that, there are other factors to blame for staghorn stone formation. These include urinary tract infections by urease-producing bacteria explained, urinary tract obstruction or anatomical abnormalities, long-term use of indwelling urethral catheter, previous urinary diversion surgery and, lastly, neurogenic bladder pathology. Crystallization, both inside and outside the bacteria, is facilitated by the formation of struvite–apatite dust. Intra-bacterial crystallization causes bacteriolysis and microlith formation which acts like a nidus for stone formation. Peri-bacterial crystals, on the other hand, form a cover that encloses the bacteria and allows it to act as a source of recurrent infections The clinical presentation of urinary tract stones are asymptomatic, symptomatic to kidney failure. Symptomatic clinical symptoms can be both classic symptoms and or symptoms of complications. Classic symptoms can include low back pain (colic or non-colic) and complication symptoms such as bloody urination (hematuria), spontaneous urinary tract stone discharge, fever to kidney failure. The physical examination of urinary tract stones starts from the examination of the generalisation (general) status and the examination of the urological localist status. Supporting examinations to support the enforcement of the diagnosis of urinary tract stones are laboratory examinations, radiological examinations. The patient at first didn't have any issue so it's asymptomatic. But as the time went by, he felt some classic symptoms (low back pain) [6].

The most common clinical manifestation of staghorn calculous disease was pain, followed by fever, recurrent urinary tract infection and hematuria. These symptoms were more promi- nent in the presence of complications. A palpable flank mass indicated pyonephrosis or xanthogranulomatous pyelonephritis. The incidence of asymptomatic staghorn calculus has been reported as high as 24 percent. Radiological support examination can be done with a plain photo of the abdomen but can only assess radiopaque stones, ultrasound examination where ultrasound can show the size, shape, position of the stone and the presence of obstruction, IVP to see non-opaque stones indicated by the presence of filling defects. If there is a stone, it will show an echoic shadow [7].

Non-contrast CT-Scans can determine the size and density of stones. CT-Scan can detect uric acid stones and xanthine. In this patient, an ultrasound examination was carried out and it was found that there was a multiple left kidney stone. A BNO examination was carried out and a multiple left kidney stone was obtained. A CT scan was performed and a nephrolithiasis sinistra measuring +/- 0.2 cm to 9.3 cm in the renal pelvis was obtained. Calyx major minor pole to bottom: Staghorn stone left. Kidney faal examination needs to be done to determine kidney function and prepare the patient for IVP MRI examination can be used as another modality to assess the presence of urinary tract obstruction and can see stones as a 'filling defect'. The supporting examination carried out to establish the diagnosis in this patient is a laboratory examination in the form of complete blood, which is obtained by anemia and leukocytosis. In this patient, an examination of kidney function was also carried out and it was found that it was still within normal limits.

Stones in the urinary tract that have caused problems in the urinary tract must be removed as soon as possible [8]. The indication to take action on the patient is if the stone has caused obstruction, infection or must be taken due to social indications. Stone treatment can be in the form of medicamentous or surgically. Medicamentosa if the stone is <5 mm in size is expected to come out spontaneously. Other types of surgical options are ESWL if the stone is in the proximal ureter, PNL if the stone is in the kidneys and ureteroscopy is inserting a ureteroscopic device per urethra to see the condition of the ureter then the stone is broken through ureteroscopic guidance (Figure 5).

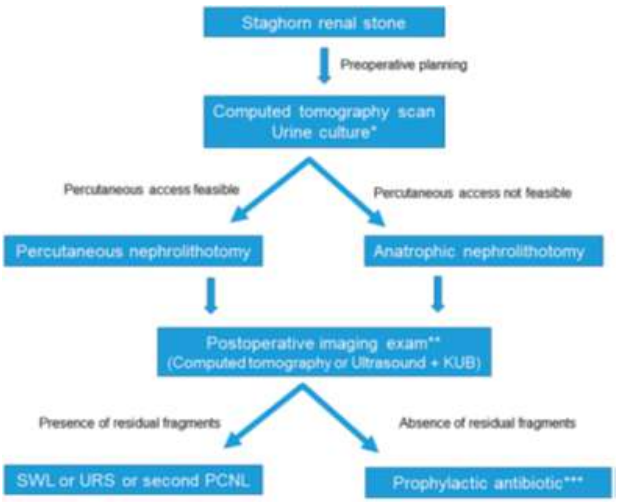

Figure 5. Evaluation after operative

From EAU [1], the gold-standard surgical treatment for staghorn renal stones is the same for most kidney stones bigger than 2.0 cm, which is the percutaneous nephrolithotomy (PCNL). Although a complete stone-free postoperative status with only

one session is a hard achievement when treating a complete staghorn stone, a well-planned approach (staged or not) may lead to very satisfactory outcomes. In a systematic review and meta-analysis comparing PCNL with retrograde intrarenal surgery, authors concluded that PCNL was associated with higher stone-free rate, but also with a higher complication rate and blood loss In this patient, the stone is not immediately removed considering that after the first operation the patient feels that it has improved after his vesica urinaria stone is removed. So that the patient is asked to prepare only to be removed in social indications. To prevent continuation complaints from patients, these actions to remove stones must be taken immediately. We used nephrolithotomy.

Nephrolithotomy or anatrophic nephrolithotomy is still used for patients with staghorn calculi where the largest part of the stone. After the kidneys are exposed through flank slices usually using intercostal incisions between costa 11 and 12, ureter identification and dissection are continued upwards to expose the renal pelvis. The kidneys are entirely mobilized by means of sharp and blunt dissection. In this method the kidneys must be fully mobilized. A vein that continues to run from the posterior part of the Gerota fascia to the posterior part of the abdominal wall is in the middle of the kidney and this vein must be identified and frozen to avoid bleeding. At this stage it should be done carefully so as not to injure the branches of the renal artery. After that the renal pelvis is opened transversely. Incisions should be made some distance from the pelviureteric junction to reduce the risk of devascularization in junction which can cause stenosis. The length and direction of the incision may vary according to the shape of the intra renal anatomy and the stones present in it. Then the stone is lifted.

The rate of this disease will return to a very high (recurrent), depending on how we manage life after the elevation of the stone. After the stones are removed from the urinary tract, it is necessary to carry out prevention. Prevention can be in the form of: 1) Avoiding dehydration by drinking enough and trying to produce 2-3 liters of urine per day; 2) Diet to reduce levels of stone-forming components; 3) Sufficient exercise and 4) Administration of medicamentosa [4].

Conclusion

A case of staghorn renal stone has been reported at Leona Hospital, Kupang, East Nusa Tenggara, Indonesia. The diagnostic methods include anamnesis, physical examination, x-ray and ultrasonography. In this case managed by the open nephrolithotomy surgical procedure. The cause of staghorn renal stone should be considered prior to staghorn renal stone e treatment as eliminating the underlying cause will reduce recurrence rates.

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