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CASE REPORT : GIANT 9 CM KIDNEY STONE SUCCESSFULLY REMOVED WITH BIVALVE NEPHROLITHOTOMY IN A RESOURCE-LIMITED HOSPITAL

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Abstract:-

Background:

Urolithiasis remains a growing global health problem, with the Global Burden of Disease reporting over 106 million incident cases worldwide in 2021. Giant renal calculi represent a challenging subset due to their association with infection, obstruction, and progressive renal dysfunction. Although percutaneous nephrolithotomy is the standard treatment for large renal stones, limited access to endourological facilities in resource-limited settings may necessitate open surgical approaches. We report the successful management of a giant renal calculus using bivalve nephrolithotomy in a district hospital.

Case Illustration

A 53-year-old male presented to the emergency department with a three-year history of intermittent left flank pain. The pain was described as dull in character with radiation, particularly exacerbated in the sitting position. The patient reported adequate fluid intake. however, he admitted to occasionally postponing micturition during work. He primarily consumed drinking water from refill sources. He had a history of smoking cessation in 1994. The patient denied any history of diabetes mellitus, hypertension, drug allergies, or prior surgical interventions. On presentation, the patient was fully alert with a Glasgow Coma Scale score of 15. Vital signs, with a blood pressure of 120/70 mmHg, tachycardia with a heart rate of 82 beats per minute, a respiratory rate of 20 breaths per minute, a body temperature of 36.6°C, and an oxygen saturation of 99% on room air.

Conclusion:

Open bivalve nephrolithotomy continues to hold a crucial and contextually relevant role in the management of giant renal calculi, particularly in healthcare settings with limited endourological resources. While percutaneous nephrolithotomy (PCNL) is widely recognized as the global gold standard, its successful implementation is inherently dependent on the availability of adequate infrastructure, specialized equipment, and experienced operators. In resource-constrained environments, strict adherence to guideline-based approaches without consideration of local capacity may inadvertently delay definitive treatment and increase the overall burden on patients. Therefore, a pragmatic and context-adapted surgical approach, including open nephrolithotomy, remains essential to ensure timely, effective, and equitable patient care.

Keywords:

Giant renal calculus; Bivalve nephrolithotomy; Open nephrolithotomy; Urolithiasis; Resource-limited setting

INTRODUCTION

Urolithiasis remains a significant global health problem and has shown a continuous increase over recent decades. An analysis from the Global Burden of Disease (GBD) 2019 study reported a 48.57% increase in incident cases between 1990 and 2019.[1] More recent data from the Global Burden of Disease (GBD) 2021 study reported approximately 106 million incident cases of urolithiasis in 2021, with around 67% occurring in males, and demonstrated significant variation in distribution across regions and levels of socio-demographic development. Although global mortality rates remain relatively low, the burden of disability (disability-adjusted life years, DALYs) and healthcare utilization associated with urolithiasis remains substantial, underscoring its significant clinical and economic impact.[2]

Large and complex renal stones, particularly staghorn and giant renal calculi, represent a distinct subgroup with unique clinical challenges. These conditions are associated with recurrent infections, urinary tract obstruction, progressive renal function decline, and increased surgical complexity.[3] *Percutaneous nephrolithotomy (PCNL) is currently recognized as the gold standard for the management of large renal stones (>2 cm).*[4] Prospective cohort studies have demonstrated high stone-free rates, albeit with relatively notable complication rates, even among patients with a history of prior renal surgery.[4] However, procedural complexity increases significantly in cases involving distorted anatomy, perirenal fibrosis, or a very large stone burden.

Beyond clinical factors, healthcare system–related aspects also play a significant role in influencing patient outcomes. Delays in performing PCNL have been shown to correlate with increased healthcare resource utilization, including repeated imaging studies, emergency department visits, additional interventions, and significantly higher hospital costs.[5] In populations with limited access to healthcare services, prolonged intervals between diagnosis and surgical intervention are associated with greater economic burden and increased clinical complexity.[5] These findings underscore that the successful management of kidney stones is determined not only by surgical technique, but also by the availability of resources and the capacity of the healthcare system.

Although minimally invasive approaches dominate contemporary urological practice, cases of giant renal calculi are still encountered in healthcare facilities with limited endourological infrastructure and resources.[3] In such settings, open surgical procedures such as nephrolithotomy continue to play a rational and definitive role, particularly in the management of very large stones.[3] However, contemporary literature specifically documenting

the clinical outcomes of open surgical management for giant renal calculi in resource-limited district hospitals remains limited.

Therefore, this case report aims to describe the successful use of bivalve nephrolithotomy in a patient with a giant renal calculus in a resource-limited district hospital, with particular emphasis on operative feasibility and postoperative outcomes. By situating this case within the context of global epidemiology and the dynamics of healthcare systems, this report seeks to provide relevant scientific insight to inform clinical decision-making in settings with limited technological resources.

CASE PRESENTATION

A 53-year-old male presented to the emergency department with a three-year history of intermittent left flank pain. The pain was described as dull and radiating, particularly when sitting. The patient reported adequate fluid intake however, he admitted to occasionally delaying urination during work. He primarily consumed drinking water from refill sources. He had a history of smoking cessation in 1994.The patient denied any history of diabetes mellitus, hypertension, drug allergies, or prior surgical procedures.

On admission, the patient was fully conscious (Glasgow Coma Scale score of 15). Vital signs revealed a blood pressure of 120/70 mmHg, heart rate of 82 beats per minute, respiratory rate of 20 breaths per minute, temperature of 36.6°C, and oxygen saturation of 99% on room air. Physical examination revealed a firm, mobile mass in the left upper flank region.

Laboratory Findings

Creatinine: 1.8 mg/dL

Ureum : 49 mg/dL

Imaging

A non-contrast abdominal MSCT scan with axial, coronal, and sagittal reconstructions demonstrated an oval-shaped hyperdense calculus in the left kidney measuring approximately 6.2 × 5.2 × 9 cm. The prostate was mildly enlarged, with an estimated volume of approximately 29 mL, causing cranial indentation of the urinary bladder by approximately 0.5 cm

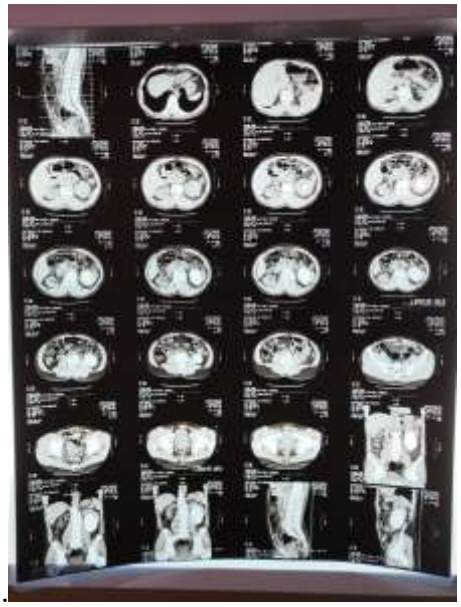

Figure 1. Non-contrast abdominal MSCT scan with axial, coronal, and sagittal reconstructions (original CT scan obtained at RSUD Hajja Andi Depu Hospital).

Figure 2. The surgically excised specimen placed on sterile gauze as part of postoperative management and documentation.

Figure 3. Postoperative day 1 drainage showing approximately 50 mL of blood, with a urinary catheter bag containing cloudy yellow urine of approximately 1000 mL.

Figure 4. Postoperative day 2 drainage showing approximately 10 mL of blood, with a urinary catheter bag containing cloudy yellow urine of approximately 700 mL.

Figure 5 Postoperative day 3 drainage showing approximately 3–5 mL of blood, with a urinary catheter bag containing clear yellow urine of approximately 100 mL.

Diagnosis

A large oval-shaped stone in the left kidney measuring approximately 6.2 × 5.2 × 9 cm, consistent with a giant renal calculus.

Mild prostatic enlargement with an estimated volume of approximately 29 mL, causing cranial indentation of the urinary bladder of approximately 0.5 cm.

Management and Outcome

The patient was admitted to the intensive care unit for postoperative monitoring and stabilization following bivalve nephrolithotomy, including intravenous fluid management, antibiotic therapy, and supportive care. After 24 hours of observation in the intensive care unit, the patient was transferred to the general ward. During three days of hospitalization, the patient remained in good clinical condition without any postoperative complications and was subsequently discharged.

DISCUSSION

This case demonstrates that open bivalve nephrolithotomy continues to have a role in the era of minimally invasive techniques, particularly in hospitals with limited endourological facilities. Although percutaneous nephrolithotomy (PCNL) is recognized as the gold standard for renal stones larger than 2 cm, its implementation is highly dependent on the availability of appropriate equipment, operator expertise, as well as adequate anesthetic and intraoperative radiological support.[5]

Percutaneous nephrolithotomy (PCNL) has been shown to be superior to open nephrolithotomy. A meta-analysis by Yiwen et al. (2019) demonstrated that PCNL is a safe and effective alternative for patients with large renal stones compared to open nephrolithotomy.[6] A study by Nourian et al. (2022) reported that patients undergoing percutaneous nephrolithotomy (PCNL) had shorter hospital stays and lower postoperative complication rates compared to those undergoing open nephrolithotomy.[7]

In resource-limited settings, insisting on adherence to the gold standard approach using percutaneous nephrolithotomy (PCNL) may lead to increased healthcare costs. A study by Palasi et al. (2024) demonstrated that delays in treatment of up to six months were associated with a cost increase of up to 36%. In the absence of alternative management strategies, such as open nephrolithotomy, these delays may substantially increase the financial burden on patients.[4]

A case report by Islam et al. (2024) highlighted that open nephrolithotomy offers distinct advantages in the management of large renal stones, particularly due to improved

surgical exposure, facilitating complete stone removal, minimizing the need for repeated procedures, and reducing the risk of complications associated with residual stone fragments. Furthermore, operator experience and the availability of appropriate equipment are critical determinants for the successful implementation of minimally invasive procedures such as percutaneous nephrolithotomy (PCNL).[2]

Therefore, adequate surgical planning, optimal utilization of available resources, and operator expertise are key factors in minimizing the economic burden on patients.

CONCLUSION

Open bivalve nephrolithotomy remains a relevant and contextually appropriate operative option for the management of giant renal stones in hospitals with limited resources. Although percutaneous nephrolithotomy (PCNL) is widely accepted as the global gold standard, its effective implementation is highly dependent on infrastructure readiness, equipment availability, and operator expertise.

In resource-limited settings, strict adherence to guideline-based algorithms without consideration of infrastructural capacity may risk delaying definitive treatment. In selected patients, an open approach can achieve comprehensive stone clearance in a single procedure, with acceptable perioperative morbidity and predictable clinical outcomes.

This report underscores the importance of adaptive surgical decision-making tailored to the healthcare system context. Rather than being regarded as an outdated approach, open nephrolithotomy retains strategic relevance when aligned with local capacity, patient safety considerations, and the need for timely management.

LIMITATIONS

This report has several limitations that should be considered. First, it represents a single case report, which limits the generalizability of the findings to a broader population of patients with giant renal calculi. The clinical outcomes reported may not fully reflect the variability of cases encountered across different healthcare settings.

Second, the management strategy in this case was influenced by the limited infrastructure available at the district hospital where the procedure was performed. Advanced endourological facilities, including equipment for percutaneous nephrolithotomy (PCNL), intraoperative fluoroscopy, and specialized endoscopic instruments, were not available. Therefore, the therapeutic approach was adapted to the available surgical resources, which may differ from the standard management recommended in tertiary referral centers.

LEARNING POINTS

- **Open bivalve nephrolithotomy** remains an effective operative option for the management of giant renal calculi.
- **Although percutaneous nephrolithotomy (PCNL**) is the gold standard for large renal stones, its implementation is highly dependent on the availability of infrastructure, equipment, and operator expertise.
- **This case repor**t highlights the importance of context-based clinical decision-making, particularly in district hospitals with limited resources.

DECLARATIONS

Ethical Approval and Consent: Written informed consent was obtained from the patient and family for publication of this case report and accompanying images.

Conflict of Interest: None declared.

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