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Case report

Open stone surgery in the treatment of bilateral complex renal stones with left infected hydronephrosis: A case report

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ABSTRACT

Introduction and importance: With the strong development of percutaneous nephrolithotomy as well as other less invasive procedures, the indication of open surgery for the treatment of nephrolithiasis has been significantly reduced and is only applied in selective cases.
Case presentation: A 55-year-old male was admitted to the Department of Urology due to fever and left flank pain. Clinical examination and imaged studies reveal staghorn calculi in the right kidney and infected hydronephrosis with multiple stones on the left side. The stone removal surgery was performed in 2 sessions, left first - right after. The two operations came out with no peri- or post-operative complication, no blood transfusion.
Clinical discussion: The two reasons for the indication of open surgery instead of percutaneous nephrolithotomy were i/ the stone's sizes were very large and very hard, and ii/ the multi-tract nephrolithotomy increased the risks of blood transfusion and parenchymal's damage. Also, a long-time and difficult nephroscopy was not the good choice for the left-infected hydronephrosis.
Conclusion: Open stone surgery is still a good alternative approach for kidney complex stone burden, especially infected hydronephrosis.

1. Introduction and importance

Nowadays, extracorporeal shock wave lithotripsy (ESWL), retrograde ureteroscopy, and percutaneous nephrolithotomy (PCNL) occupy an essential place in the treatment of urinary calculi as increasing technologic advancements allow easier access to stones in all parts of the kidney and ureter [1–3]. Despite the less frequent indication, open surgery currently holds an important role because urologists still face patients with complex urinary stone disease due to the high stone burden and/or anatomical anomalies of the collecting system [2–4]. It can be offered as an initial treatment option to these patient groups for a high stone-free rate with fewer interventions and low costs [1,5–7]. Recently, a patient with bilateral kidney complex stones and left infected hydronephrosis was successfully treated by open surgery in our clinic. We collected the patient's information and reviewed documents to share some individual comments on the indication of open surgery in the modern era of minimally invasive procedures.

2. Case presentation

This work has been reported in line with the SCARE 2020 criteria [8]. In the middle of 2019, a 55-year-old man was admitted to the hospital due to bilateral complex kidney stones. He had been diagnosed with multiple stones on both kidneys for five years, but he had refused the surgical treatment because of not afford to pay the surgical bill.

The patient had no family history for any relevant genetic information, psychosocial history, or relevant pre-existing illnesses.

About 2 weeks before admission, he was suffered from not only intermittent fevers with the highest temperature of over 39 °C but also felt chills, left flank pain, and cloudy urine. The patient had been previously treated by an intravenous antibiotics course in a province hospital. At the time of admission, he was no fever anymore but still having left flank pain; the left hydronephrosis was suspected with the bimanual examination. The blood test showed that there was mild anemia, but the white blood cell count and the neutrophil percentage were in the normal range; the urine culture was negative (Table 1). The plain x-ray and abdominal CT-Scan with contrast showed the images of completed right renal staghorn calculi and multiple left renal stones; the right renal

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Table 1
Results of blood/urine tests over time.

Indexes		Left stone surgery		Right stone surgery	
		Prior to surgery	Discharge	Prior to surgery	Discharge
Blood	Red blood cells	3.52	3.09	4.06	3.45
	Hemoglobin	123	110	139	116
	White blood cells	7.56	7.11	4.4	6.31
	Urea	6.02	5.57	5.72	6.14
	Creatinine	101	88	92	85
Urine	Red blood cells	Moderate	–	Moderate	–
	White blood cells	Large	–	Small	–
	Nitrite	Negative	–	Negative	–
	Culture	Negative	–	Negative	–
Pelvic urine	Culture	–	Negative	–	–

parenchymal was good but the left grade 3 hydronephrosis appeared very clearly (Figs. 1, 2).

So, the diagnosis was made as bilateral complex renal stones with left-infected hydronephrosis. With the patient's consent, the bilateral open stone removal was indicated and the plan was divided into two sessions. Operations were performed by the author (T.D.N.). The patient underwent surgery with general anesthesia.

2.1. First session of treatment: left kidney stone removal by pyelolithotomy

A skin incision was made at the level of the 12th ribs from the mid-axillary line and extended medially to the lateral border of the rectus abdominis muscle. The renal pelvis and proximal ureter were carefully dissected and thoroughly mobilized, preserving the periureteral tissues. An incision was made in the lateral edge of the renal pelvis, the large

Fig. 1. KUB radiograph, before surgery.

pelvic stone and caliceal stones were carefully dislodged and removed using Randall forceps (Fig. 3). The pelvic urine was cloudy with milky purulent materials. After the collecting system being irrigated with warm normal saline, a 6 Fr double-J stent was placed into the ureter. The pyelotomy was closed using a running 4–0 Vicryl suture. The operation time was 80 min. There was no intra- or post-operative blood transfusion. The patient was discharged 1 week after surgery with the normal range of serum urea and creatinine concentration (Table 1). The double-J stent was removed 1 month later despite small lower calyces' residuals on the postoperative KUB radiograph. After 2 months, renal ultrasonography showed the left mild renal pelvis dilatation.

2.2. Second session of treatment: right kidney stone removal by extended pyelolithotomy

It was 2 months after the left kidney stone removal, the patient was readmitted and planned for surgery in the right kidney. The standard flank approach was also used on the right side. The whole kidney was exposed also the renal vascular and pelvis. The main renal artery was dissected carefully and clamped with a Satinsky clamp. An incision is made in the renal pelvis using a 12-blade scalpel and extended to the lower pole through the inferior caliceal infundibular. The staghorn stone was extracted using the blunt Randall forceps (Fig. 4). Afterward, residual stones that existed in the middle and upper calyces were removed through the infundibulum. The lower infundibular was sutured with running 4–0 Vicryl and the nephrotomy was closed with interrupted Catgut Chromic 2–0 sutures. A 6 Fr double-J stent was placed into the ureter. The pyelotomy was closed using a running 4–0 Vicryl suture. The operation time was 90 min in which the renal warm ischemia was 14 min. The estimated blood loss was 250 ml, but it did not require the blood transfusion perioperatively. There was no change of serum urea or creatinine concentration at discharge (Table 1). The right double-J stent was removed 1 month later (Fig. 5).

Following the postoperative advice, the patient came back for the check-up twice at one year and two years. He was glad, and there was no morbidity related to surgery.

3. Discussion

In recent years, with the strong development of percutaneous nephrolithotomy as well as other less invasive procedures, the indication of open surgery for the treatment of nephrolithiasis has been significantly reduced and is only applied in selective cases. The open stone removal used to be the first choice for surgical indication at 108 Military Central Hospital in the 1990s. Recently, many alternatives such as ESWL, standard PCNL, and mini PCNL have been applied in the treatment of urinary stone disease for over 10 years in our department. However, open surgery was more suitable in this situation.

3.1. Why did we not indicate the standard percutaneous nephrolithotripsy?

It is obvious that mini-PCNL or ESWL is not appropriated due to the high kidney stone burden as well as the left infected hydronephrosis [1,3,6].

Generally, the standard PCNL with 26–30 Fr Amplatz sheath and ultrasonic lithotriptor to fragment stones and suction debris simultaneously is used in most of the cases with staghorn calculi in our clinic. But there were 2 unfavorable factors of this case. First, the stone's sizes were very large and very hard (1620 HU and 49 × 26 mm of right staghorn; 1353 HU and 45 × 21 mm of left pelvic stone, Fig. 2). Second, the multi-tract nephrostomy would be almost certainly because of stone-involved calyces, so the risks of blood transfusion and parenchymal's damage would have increased [3]. The application of flexible nephroscope during PCNL is an alternative to multi-tract PCNL [1–3,7]. But it is obvious that a long-time and difficult nephroscopy with high intrarenal

Fig. 2. Preoperative abdominal CT scan with contrast (1620 HU and 49 × 26 mm of right staghorn; 1353 HU and 45 × 21 mm of left pelvic stone).

Fig. 3. The left stones were removed.

Fig. 4. The right stones were removed.

pressure is not the good choice for the left infected hydronephrosis. According to the Vietnam Urology and Nephrology Association (VUNA) and The Urological Association of Asia (UAA), for large stones or stones requiring complete removal (esp. infection stones), open surgery might clear all stone burden within a single session [6,7]. Moslemi MK and Safari A (2009) reported a case with huge staghorn stones of the left kidney. The authors stated that was an inevitable open surgery because of the heavy and complex stone burden and increased chance of failure of percutaneous nephrolithotomy [9]. Similarly, Bove AM et al. (2012) performed an open anatrophic left kidney nephrolithotomy on a patient with bilateral staghorn calculi and complaining about occasional left flank pain. He considered that endoscopic and laparoscopic approaches should not be indicated due to the patient's comorbidities (obesity, hypertension, type II diabetes, and chronic obstructive pulmonary disease) [10]. Therefore, open surgery was our reasonable choice.

3.2. Some other alternative procedures could be used

Laparoscopic/robotic surgery could be offered in rare cases of anatomic abnormalities, with large or complex stones, or those requiring concomitant reconstruction [1,2,6]. Giedelman C et al. (2012) performed eight laparoscopic anatrophic nephrolithotomies in adult patients with renal staghorn stones [11]. All procedures were completed laparoscopically with 20.8 min of the mean warm ischemia. The stone-free rate was 62.5% (5 patients) during follow-up imaging at 15 days. For Giedelman's report, we consider the term 'modified anatrophic laparoscopic nephrolithotomy' is more exactly because the surgical description did not include the stage of renal hypothermia. Likewise, laparoscopic anatrophic nephrolithotomy is more complex than open surgery and requires an experienced team to perform. In some centers, conventional laparoscopic kidney stone removal could be replaced by robotic surgery because of the excellent visual and flexibility of tools. Madi R and Hemal A (2018) described three viable robotic techniques in managing staghorn kidney stones, such as anatrophic nephrolithotomy, pyelolithotomy, and nephrolithotomy [12]. In our opinion, the transperitoneal laparoscopic approach is not suitable for the left infected kidney. It must have been difficult to perform the left retroperitoneal laparoscopic nephrolithotomy due to large hydronephrosis. For the right staghorn stones, transperitoneal laparoscopic/robotic anatrophic nephrolithotomy could be an acceptable option.

Our patient was in good recovery and satisfactory. There was no blood transfusion or postoperative complication. The residuals were tiny and did not require any additional treatment.

4. Conclusion

Although the treatment of choice for renal stones is being minimally invasive procedures, open surgery is still playing a limited but important role. This option can be applied to selective cases of complex stone burden, especially infected hydronephrosis.

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Fig. 5. Postoperative KUB radiograph, after right stone removal.

Ethics approval

The author declares that patient data or samples will be used for educational or research purposes. All procedures were approved by the 108 Military Central Hospital's Institutional Review Board, Hanoi, Vietnam.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Availability of data and materials

The data used to support the findings of this study are available from the corresponding author upon request.

CRediT authorship contribution statement

Dr. The Do Ngoc: Conceptualization, Surgery, Writing - Review & Editing, Supervision.

Declaration of competing interest

The author declares that he has no competing interests.

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References

[1] C. Türk, A. Neisius, A. Petřík, et al., EAU guidelines on urolithiasis. https://uroweb.org/guideline/urolithiasis/, 2021.
[2] D. Assimos, A. Krambeck, N.L. Miller, et al., Surgical management of stones: American Urological Association/Endourological Society guideline, J. Urol. 196 (4) (2016) 1153–1169.

[3] B.R. Matlaga, A.E. Krambeck, J.E. Lingeman, Surgical management of upper urinary tract calculi, in: A.J. Wein, L.R. Kavoussi, A.W. Partin, C.A. Peters (Eds.), CAMPBELL-WALSH Urology, 11th edition, Elsevier, 2016, pp. 1260–1290.
[4] I. Khalaf, E. Salih, E. El-Mallah, S. Farghal, A. Abdel-Raouf, The outcome of open renal stone surgery calls for limitation of its use: a single institution experience, Afr. J. Urol. 19 (2) (2013) 58–65.
[5] Ö.U. Çakici, K. Ener, M. Keske, et al., Open stone surgery: still-in-use approach for complex stone burden, Cent. Eur. J. Urol. 70 (2) (2017) 179–184.
[6] V.L. Chuyen, T.N. Sinh, H.V. Tung, et al., in: VUNA Guideline on Urolithiasis: Diagnosis and Treatment, Medical Publishing House, Hanoi, 2015, p. 79.
[7] K. Taguchi, S.Y. Cho, A.C. Ng, et al., The urological Association of Asia clinical guideline for urinary stone disease, Int. J. Urol. 26 (7) (2019) 688–709.
[8] R.A. Agha, T. Franchi, C. Sohrabi, F. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.
[9] M.K. Moslemi, A. Safari, A huge left staghorn kidney, a case report of inevitable open surgery: a case report, Cases J. 2 (1) (2009) 8234.
[10] A.M. Bove, E. Altobelli, M. Buscarini, Indication to open anatrophic nephrolithotomy in the twenty-first century: a case report, Case Rep. Urol. 2012 (2012) 1–5.
[11] C. Giedelman, J. Arriaga, O. Carmona, et al., Laparoscopic anatrophic nephrolithotomy: developments of the technique in the era of minimally invasive surgery, J Endourol. 26 (5) (2012) 444–450. https://www.ncbi.nlm.nih.gov/pubmed/22142215.
[12] R. Madi, A. Hemal, Robotic pyelolithotomy, extended pyelolithotomy, nephrolithotomy, and anatrophic nephrolithotomy, J Endourol. 32 (S1) (2018) S73–S81. https://www.ncbi.nlm.nih.gov/pubmed/29774807.