

Case Report

Laparoscopic removal of a giant middle ureteral stone: A case report and review of literature

Alimohammad Fakhr Yasseri, Seyed Naser Seyed Esmaili, Mahboobe Asadi, Seyed Mohammad kazem Aghamir^{*}

Urology Research Center (URC), Tehran University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Keywords:

Ureter lithotomy
Laparoscopy
Ureteric calculus
Giant
Ureterolithiasis

ABSTRACT

Giant ureteral calculi stones defined as larger than 5 cm in length or circumference. Although many giant ureteral stones have been reported, the laparoscopic removal of these stones is rare. A 45-year-old male patient presented to our clinic with right flank pain and discomfort from 6 months ago. Abdominopelvic computed tomographic scan showed a giant left middle ureteral stone. On the first stage laparoscopic ureter lithotomy was performed with 3 ports and the stone was extracted from 12 mm port successfully. We used transperitoneal laparoscopic approach in the full lateral decubitus position. three trocars were placed: one camera 11-mm port was placed at the level of the umbilicus on the lateral border of the rectus muscle, a 5-mm port was placed in the midline below the umbilicus, and a 12-mm port was at the superior border of the rectus muscle. The extracted stone size was 6.5*1.7 cm with 33 gm in weight. Due to the advantages of laparoscopic ureter lithotomy in giant ureteral stones and its feasibility to perform in a single session, we could suggest this minimally invasive treatment as a first choice in this group of patients.

1. Introduction

Ureteral stones are a common entity in urology. Flank pain and hematuria are the classic symptoms of the ureteral stones, however, others such as urinary urgency, nausea, frequency and straining, testicular or penile pain are some of atypical symptoms. Vast majority of the stones are composed of calcium oxalate or calcium phosphate. Others may be Struvite (magnesium ammonium phosphate), cysteine stones and uric acid. The giant ureteric calculus has been defined as those larger than 5 cm in length, circumference or weighing more than 50 g [1]. In this study, we report a case of bilateral ureteral obstruction and giant left ureteral stone with 6.5*1.7 cm dimensions and 33 gm weight which was extracted by laparoscopic transperitoneal ureter lithotomy from 12 mm port.

1.1. Case presentation

A 45-year-old male patient presented to our clinic with right flank pain and discomfort from 6 months ago. Although bilateral urinary lithiasis had been diagnosed for him for 2 years ago, he neglected the treatment. No significant medical or family history was mentioned and

in the laboratory findings: Haemoglobin: 13.2 g/dL, blood urea nitrogen: 95 mg/dL, Creatinine: 2.5 mg/dL, Na: 142 m mol/L, K: 3.9 mmol/L. Results of his physical examination were unremarkable.

The kidney, ureter, and bladder X-ray showed a huge left middle ureteral stone with 6.5 cm length. In abdominopelvic computed tomographic scan, there was moderate hydronephrosis and many pelvises and caliceal stones in the right side and severe hydronephrosis with loss of kidney cortex on the left side and those giant ureteral stone was seen as well (Fig. 1).

We first performed ureteroscopy to resolve urinary tract obstruction by renal pelvis stone in right side and insert a double j stent in right ureter. We used transperitoneal laparoscopic approach in the full lateral decubitus position. three trocars were placed: one camera 11-mm port was placed at the level of the umbilicus on the lateral border of the rectus muscle, a 5-mm port was placed in the midline below the umbilicus, and a 12-mm port was at the superior border of the rectus muscle. After performing pneumoperitoneum, the colon was reflected medially, and the retroperitoneum was exposed. The stone was inspected as a bulge; the ureter was incised using a laparoscopic hook and the stone was removed (Fig. 2). Double j stent was inserted from the ureterostomy site into lower and upper ureter by using a guidewire in the stent, which

^{*} Corresponding author. Urology Research Center, Sina Hospital, Hassan Abad Sq., Imam Khomeini Ave., Tehran, Iran.

E-mail address: mkaghamir@tums.ac.ir (S. Mohammad kazem Aghamir).

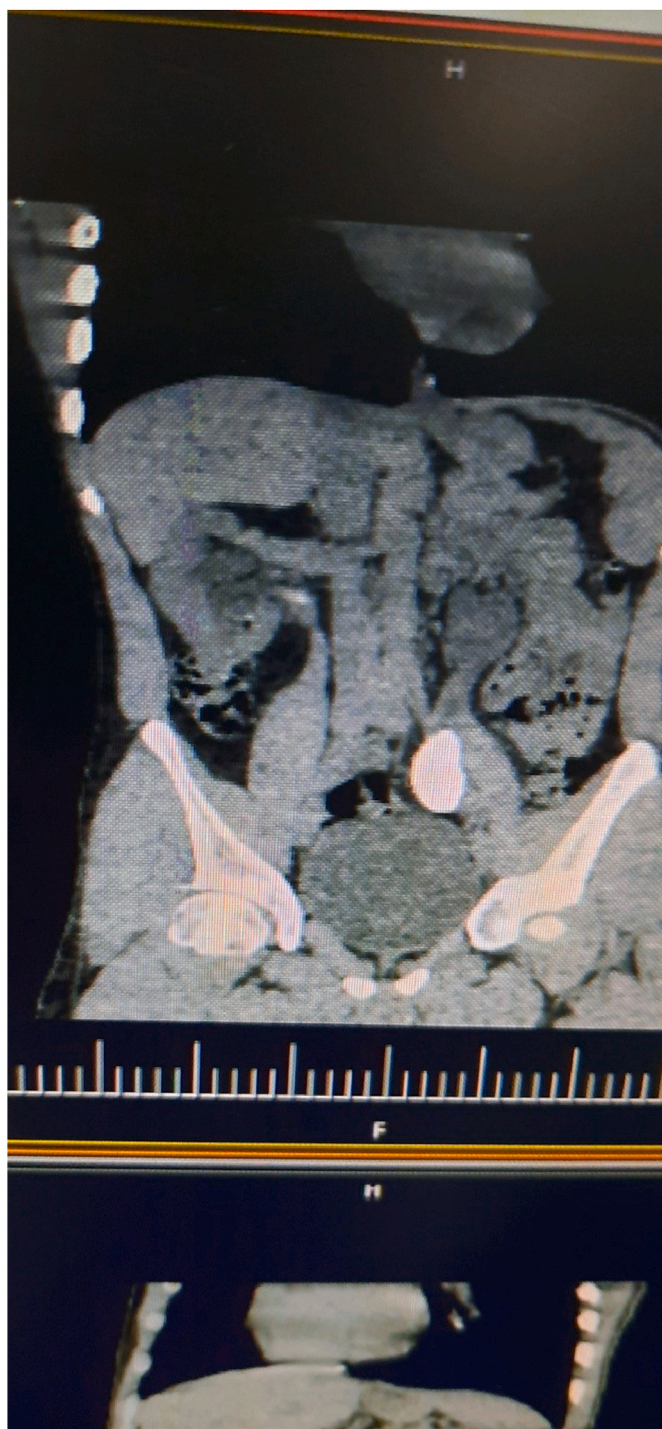


Fig. 1. Extracted giant ureteral stones measuring 6.5 *1.7 cm

was inserted from middle orifices of the stent which extracted after proper insertion of the stent. Ureteral closure was performed by intracorporeal interrupted Vicryle sutures. A corrugate drain was left and port sites were closed. The operation time was 175 min and blood loss were 25 mL. The patient was discharged after 5 postoperative days without complications. A plain abdominal radiograph was performed postoperatively to assure the proper position of double j stents. The extracted stone size was 6.5*1.7 cm with 33 gm in weight (Fig. 2).

The creatinine level was maintained on 2.2 mg/dL. The patient was discharged a few days later. Six weeks later, in the second session, percutaneous nephrolithotomy (PCNL) was conducted to remove the



Fig. 2. Extracted giant ureteral stones measuring 6.5*1.7 cm.

right kidney stones. In follow up we planned to perform diethylene-triaminepentaacetic acid (DTPA) scan to estimate the function of each kidney separately. This case report was written with considering all aspects SCARE guidelines 11 (supplementary file).

2. Discussion

Due to early diagnosis and treatment of urinary stones, giant ureteral calculi are rarely reported today. Although many giant ureteral stones have been reported in the literature, the laparoscopic removal of these stones are rare [2,3]. Our case is third biggest ureteral stone which has

Table 1

Case reports of laparoscopic management of giant ureteral stone.

Patient	1	2	3	4	5
gender	Male	Male	NA	Female	Male
Ag (years)	52	21	NA	35	45
location	Upper ureter	Upper ureter	NA	lower	middle
Stone Size (cm)	8.6 * 1.8	5 * 1.5	6.2 * 2.2	11 * 1.5	6.5 * 1.7
Stone weight (gm)	NA	52	NA	40	33
method	transperitoneal	transperitoneal	transperitoneal	NA	transperitoneal
Extracted port size (mm)	11	10	NA	NA	12
Num. of trocars	4	3	NA	NA	3
Refer.	[3]	[2]	[4]	[5]	Our case

Cm: centimeter; gm; gram; mm; millimeter; refer; reference number.

been laparoscopically removed. We reviewed the scientific literature in the Medline database (www.ncbi.nlm.nih.gov) and the Scientific Information Database ([http://www. https://www.sid.ir/](http://www.sid.ir/)) using different English associations and Persian translation of the following keywords: Huge, big, giant, ureterolithiasis, calculi, ureteral, calculus, ureteral and ureter lithotomy. Case reports or case series were selected and analyzed. We found 64 articles. After abstract reading, 4 were included in the table due to their laparoscopic method (Table 1).

The longest ureteral stone was reported by Taylor in 1934 which was 21.5 cm in length [6], however, The longest stone one which was extracted laparoscopically was reported by Rajiv Rathod in 2013 in India which was 11 cm in length (5). the stone reported in the present article is the third-longest ureteral calculi so far reported in the world which extracted laparoscopically (Fig. 2). In Iran, there are only few reports of giant ureteral stones and the largest ureteral stone was reported 14 cm in length [1,7], however, none of them was extracted laparoscopically, thus our report is the first one in our country. When it comes to weight, the largest calculus so far reported was by Mayer, weighted 286 g [1]. In our patient, stone weight was 33, so this is the third-heaviest stone which was laparoscopically removed so far.

There are over 66 reports of giant ureteral stones in the literature from many countries. The best way of management of these stones is controversy. Most of surgeons preferred open approach [7,8], however, others used extracorporeal shock wave lithotripsy (ESWL), transurethral lithotripsy (TUL), percutaneous nephrolithotomy (PCNL) (for upper ureteral stones) or combination of these methods [1,9]. But there are only a few reports of laparoscopic technique [2–5]. Even though most of studies performed the transperitoneal approach, the retroperitoneal approach is also feasible. The number of trocars is different. one of the studies used 3 trocars similar to us, however, one of them use 4 of them (Table 1). We usually use 3 trocars for laparoscopic ureter lithotomy, but in obese patients with much adipose tissue in mesentery and around ureter, fourth trocar is helpful. The size of stone-extracted port was reported from 10 to 12 mm (Table 1). As our stone width was 17 mm, we preferred 12 mm port to extract stone easier. Another aspect is the stone location, which could be in upper, lower and middle ureter. The position and laparoscopic technique could be vary based on stone location. We used full lateral decubitus position, but in lower ureteral stones semi lateral or supine position could be feasible. The technique of double j insertion in upper ureteral stones is easier than lower and middle ones. In our technique in middle ureteral stones a guidewire was inserted from one of middle orifices of double j and after insertion into urethrotomy site, this guidewire was removed carefully. This technique was challenging, which lengthened our operation time. In lower ureteral stone, double j could be inserted after changing position into lithotomy with ureteroscope. The renal cortex in computed tomography there was evidence of loss of the kidney cortex on the left side. As scintigraphy renal scans are not accurate during obstruction, we decided to perform diethylenetriaminepentaacetic acid (DTPA) scan 6 weeks after resolution of obstruction to estimate the function of each kidney separately. After that further surgical plans would be selected due to its indications.

Although other minimal-invasive techniques such as TUL and ESWL

are less invasive than laparoscopy, they have some drawbacks in huge ureteral stones. Need for multiple treatment sessions and longer hospital stay are some of these disadvantages. These factors encourage some surgeons to choose an open approach. Laparoscopic ureter lithotomy is considered a minimally invasive approach as an alternative to open surgery for the treatment of giant ureteral stones [10]. The main drawbacks of laparoscopy are the technical experience requirement, dependence technology and developmental equipment and higher surgical cost [11]. These factors could be some barriers which prevent the popularity of this method in giant ureteral stones. The main positive aspects are less postoperative pain, quicker convalescence and decrease hospital stay in comparison with open surgery. Reaching to the distal end of the stone is not necessary during dissection. During laparoscopy, small urethrotomy incision can be used at the proximal end of the stone, and a simple manipulation can cause stone extraction easily [2]. Since, giant ureteral stones are usually huge, hard, long-standing and generally impacted, laparoscopic ureter lithotomy as first choice may be preferred to multiple transurethral efforts or multiple ESWL. As, huge ureteral stones are rare, randomized clinical trials is not feasible in this entity. However, Further case series studies using the laparoscopic or robotic-assisted techniques are required for this group of patients.

Regarding the advantages of laparoscopic ureter lithotomy in giant ureteral stones and its feasibility do perform in a single session, we could suggest this minimally invasive treatment as initial therapy in these groups of patients.

Ethical approval

This research has been done under the Tehran University of medical sciences committee.

Funding

There is no founding to report.

Author contribution

SMK Aghamir had main idea for this research and conceived the study. A Fakhri Yasseri was involved in protocol development, gaining ethical approval, patient recruitment and data analysis. SN Seyed Esmaili and M Asadi wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

Registration of research studies

Name of the registry:

Unique Identifying number or registration ID:

Hyperlink to your specific registration (must be publicly accessible and will be checked):

Guarantor

Seyed Mohammad kazem Aghamir

Patient perspective

“I felt so astonishing when I saw this huge stone, which was in my body! I hope that my kidney function returns to normal. I promise to use enough liquids to prevent further” **Informed 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.

Provenance and peer review

Not commissioned, externally peer reviewed.

Declaration of competing interest

The authors have declared no competing interests.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.amsu.2020.10.026>.

References

- [1] M. Natami, A. Makarem, F. Ahmed, N. Dastgheib, A.H. Zahraei, A giant ureteral stone in a 32-year-old man: a case report, *Int. Med. Case Rep. J.* 12 (2019) 43–46.
- [2] P.V. Magdum, R.B. Nerli, S. Devaraju, M.B. Hiremath, Laparoscopic ureterolithotomy for giant ureteric calculus: a case report, *Urol Case Rep* 3 (5) (2015) 135–137.
- [3] Y.S. Shin, J.H. You, M.K. Kim, A novel laparoscopic ureterolithotomy with renal stone removal using a rigid nephroscope and ultrasonic lithotripter through a laparoscopic port in a patient with giant ureteral and renal stones, *Clin. Nephrol.* 82 (5) (2014) 351–352.
- [4] Y.B. Jeong, J.K. Park, H.J. Kim, Y.G. Kim, M.K. Kim, Giant ureteral stone in a patient with a single functioning kidney: a case report, *Clin. Nephrol.* 75 (6) (2011) 547–549.
- [5] R. Rathod, P. Bansal, S. Gutta, A giant ureteric calculus, *Indian J. Urol* 29 (3) (2013) 263–264.
- [6] W. Taylor, Large ureteral calculi. Report of a case, *J. Urol.* 32 (1) (1934) 93–102.
- [7] B.J. Mohammad Reza Barghi, Mohammadmohsen Mazloomfard, Hooman Mokhtarpoor, [Giant ureteral stone: a case report] article in Persian [Internet], *kosar medical journal* 14 (2) (2009) [- pp.]. Available from: <https://www.sid.ir/fa/journal/ViewPaper.aspx?ID=99547>.
- [8] G. Hayrli, U. Balpukov, E. Ainaev, A. Gaipov, S. Abdugaliyev, E. Zhiyenbaev, [A giant ureteral stone: case report and literature review], *Urologiia* (6) (2015) 136–138.
- [9] S.M. Rabani, Combined percutaneous and transurethral lithotripsy for forgotten ureteral stents with giant encrustation, *Nephro-Urol. Mon.* 4 (4) (2012) 633–635.
- [10] D. Demirci, İ. Gülmez, O. Ekmekçioğlu, M. Karacagil, Retroperitoneoscopic ureterolithotomy for the treatment of ureteral calculi, *Urol. Int.* 73 (3) (2004) 234–237.
- [11] R.A. Agha, M.R. Borrelli, R. Farwana, K. Koshy, A. Fowler, D.P. Orgill, For the SCARE Group, The SCARE 2018 statement: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 60 (2018) 132–136.