Urosepsis secondary to ureterosciatic hernia corrected with ureteral stent placement: a case report and literature review

Kohei Kakimoto *, Mayu Hikone, Ko Nagai, Jun Yamakawa, Kazuhiro Sugiyama and Yuichi Hamabe

Abstract

Background: Ureterosciatic hernia is a rare type of pelvic floor herniation that occurs through the sciatic foramen. The resulting ureteral obstruction may lead to hydrenephrosis and to further complications including urinary tract infection and urosepsis. There have been 30 reported cases of ureterosciatic hernia. Ureteral stenting and surgical repair have been used as treatment options.

Case presentation: We report the case of an 86-year-old woman who was transferred to Tokyo Metropolitan Bokutoh Hospital with symptoms of fever and septic shock. Her computed tomography scan revealed left hydronephrosis and deviation of the left ureter into the sciatic foramen; she was therefore diagnosed with a left ureteral sciatic hernia and admitted to our intensive care unit for further treatment with resuscitative fluids, vasopressors, and antibiotics. Following a retrograde insertion ureteral catheter insertion, ureteral incarceration was relieved, and a double-J ureteral stent was placed in situ. Antibiotic treatment was initiated, and the patient’s hemodynamic status gradually improved.

Conclusions: Although ureterosciatic hernia is a rare disorder, it is associated with serious complications including urinary tract infection with sepsis, which may warrant urgent corrective procedure to relieve the structural obstruction. Treatment may be conservative or surgical, though treatment with ureteral stent placement may be a favorable approach in elderly patients with multiple comorbidities presenting with urosepsis.

Keywords: Ureterosciatic hernia, Sepsis, Urinary tract infection, Ureteral catheter replacement

Background

Ureterosciatic hernia is a relatively rare disorder that commonly occurs in elderly women, wherein the ureter herniates through the sciatic foramen [1]. This condition may lead to ureteral occlusion, and subsequent complications including hydrenephrosis and urinary tract infection, which warrant urgent treatment to relieve the structural ureteral obstruction [2]. Although reports of conservative treatment by ureteral stent placement have increased in recent years, there are no fixed guidelines on determining a particular treatment approach such as surgery or stent placement. We report the case of a patient who developed urosepsis secondary to ureterosciatic hernia and who improved following ureteral stent placement. We also review the existing literature on the treatment of ureterosciatic hernia that will help determine a treatment strategy in affected, comorbid patients who may be hemodynamically unstable at presentation.
Case presentation
An 86-year-old woman was transferred to the emergency and critical care center of Tokyo Metropolitan Bokutoh Hospital from a nearby general hospital with vital signs indicative of shock. She had been diagnosed with urinary tract infection. She had a medical history of chronic heart failure with pulmonary hypertension and was on home oxygen therapy for chronic respiratory failure.

On initial physical examination at arrival to our facility, she was conscious and oriented with a Glasgow Coma Scale score of 15 and a body temperature of 36.0 °C. On receiving a 0.3 μg dose of noradrenaline, her blood pressure, pulse rate, and respiratory rate were maintained at 91/63 mmHg, 90 beats/min, and 24 breaths/min, respectively. Her oxygen saturation was 100% while receiving 10 L/min oxygen through a face mask. On physical examination, her left abdominal and left lumbar areas were tender. Her initial arterial blood gas analysis while on 10 L/min oxygen revealed a pH of 7.441, PaCO₂ of 44.6 mmHg, PaO₂ of 275.5 mmHg, HCO₃⁻ of 29.9 mmol/L, SaO₂ of 93.1%, and lactate of 1.3 mmol/L.

The patient’s urine was negative for nitrite, white blood cells, and bacteria. Serum white blood cell count was 11,900/mm³, platelet count was 17.8 mm³, total bilirubin was 0.46 mg/dl, creatinine was 1.94 mg/dl, and C-reactive protein was 6.92 mg/dL. An unenhanced abdominal computed tomography scan revealed left hydronephrosis, adipose tissue opacity around the left kidney, and deviation of the left ureter to the sciatic foramen (Figs. 1 and 2). She was diagnosed with obstructive pyelonephritis associated with septic shock due to a ureterosciatic hernia. She was admitted to our intensive care unit for further treatment with resuscitative fluids, vasopressors, and antibiotics. As the patient was hemodynamically unstable, placement of a ureteral stent was attempted for relieving the herniation-associated structural obstruction. On a retrograde ureteral catheter insertion, the ureteral incarceration reduced, and we were able to place a double-J ureteral stent in situ (Figs. 3 and 4).
Initially, she required 0.35\(\gamma\) of noradrenaline and resuscitative extracellular fluids to maintain hemodynamic status. However, the day after the stent placement, she gradually recovered from septic shock and was tapered off vasopressors by day 4. Both blood and urine cultures revealed \textit{Escherichia coli} with good antimicrobial sensitivity. She continued to receive antibiotic treatment and underwent rehabilitation, with the goal of discharge and continued outpatient care. Unfortunately, she experienced exacerbation of respiratory failure and died on the 32nd day of hospitalization.

\textbf{Discussion and conclusions}

While ureteral herniation is relatively uncommon, ureter prolapse into the inguinal canal and in the femoral canal may be observed, though the occurrence of sciatic herniation is extremely rare \cite{3}. Elderly women are more susceptible, possibly because they experience increased abdominal pressure due to conditions such as a history of childbirth, wide pelvic opening, pregnancy, constipation, and age-related piriformis muscle atrophy and weakening \cite{4}. In Japan, where nearly 30% of the population is 65 or older, it is necessary to distinguish this condition in elderly patients presenting with hydronephrosis and pyelonephritis. While computed tomography is useful for diagnosing ureterosciatic herniation, considering that it is a rare condition, the cause of obstruction may not be identifiable without including it in the differential diagnosis.

On searching the PubMed database using the keywords “ureterosciatic hernia” or “uretero sciatic hernia,” we identified 30 reported cases of ureterosciatic hernia since 1999, from English-language papers (Table 1) \cite{1–3, 5–31}. The median patient age was 75.5 (57–97) years; all were female. The left side was affected in 22 patients (one bilateral disease). We speculated that the laterality was...
observed as the left ureter tends to be anatomically longer than the right ureter [32]. The initial therapeutic approaches used were stent placement in 21 patients, surgical repair in six patients, manual reposition in one patient, and simple observation without any treatment procedures in two patients. The initial attempt at ureteral stent placement was successful in 18/21 patients. Of these, 11 patients did not need additional procedures, while seven required further surgical treatment (in one case, surgery was planned in advance). Two patients treated solely with ureteral stenting relapsed after stent removal and also required surgical management. Of the total 16 patients who finally underwent surgical treatment, 12 patients underwent laparoscopic (four robot-assisted procedures), and four patients underwent open surgery.

In our case, ureterosciatic herniation of the left ureter occurred in an elderly woman, which was consistent with previously reported clinical characteristics. Since the patient was elderly, had baseline respiratory dysfunction, and was hemodynamically unstable at the time of admission, she was considered a high-risk surgical candidate and was therefore treated using a stent. The ureteral obstruction improved after stenting. As the patient had chronic respiratory failure at baseline, the chronic increase in abdominal pressure due to respiratory failure may have contributed to the development of the ureterosciatic hernia.

In conclusion, we report the case of a patient presenting with ureterosciatic herniation and urosepsis, who improved after ureteral stent placement, and review the

| Case no. | Author | Age | Sex | L/R | UTI | Shock | Initial treatment | Result of stent placement | Definitive treatment |
|----------|--------|-----|-----|-----|-----|-------|-------------------|------------------------|---------------------|
| 1        | Gee et al. [5] | 60 | F   | L   | –   | –     | Stenting          | Recurrence after stent removal | Laparoscopic surgery |
| 2        | Weintraub et al. [6] | 87 | F   | R   | +   | –     | Stenting          | Repaired                | Stenting            |
| 3        | Noller and Noller [7] | 62 | F   | L   | –   | –     | Stenting (failure) | –                      | Open surgery        |
| 4        | Touloupidis et al. [8] | 61 | F   | R   | –   | –     | Surgery           | –                      | Open surgery        |
| 5        | Loffroy et al. [1] | 81 | F   | L   | –   | –     | Surgery           | –                      | Open surgery        |
| 6        | Tsai et al. [9] | 91 | F   | L   | –   | –     | Observation       | –                      | Observation          |
| 7        | Hsu et al. [10] | 69 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 8        | Clemens et al. [11] | 80 | F   | L   | –   | –     | Stenting          | Not repaired            | Stenting (not repaired) |
| 9        | Sugimoto et al. [12] | 76 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 10       | Whyburn and Alizadeh [13] | 74 | F   | both | –   | –     | Stenting          | Recurrence after stent removal | Laparoscopic surgery |
| 11       | Hemal et al. [14] | 75 | F   | L   | –   | –     | Stenting          | Removed due to discomfort | Laparoscopic surgery |
| 12       | Tsuzaka et al. [15] | 78 | F   | L   | –   | –     | Surgery           | –                      | Laparoscopic surgery |
| 13       | Kato et al. [16] | 72 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 14       | Salari et al. [17] | 87 | F   | R   | –   | –     | Stenting          | Repaired                | Stenting            |
| 15       | Yanagi et al. [3] | 92 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 16       | Regelman and Raman [18] | 60 | F   | L   | –   | –     | Surgery           | –                      | Laparoscopic surgery |
| 17       | Demetriou et al. [19] | 76 | F   | L   | –   | –     | Observation       | –                      | Observation          |
| 18       | Wai et al. [20] | 68 | F   | L   | –   | –     | Surgery           | –                      | Laparoscopic surgery |
| 19       | Lin et al. [21] | 81 | F   | R   | –   | –     | Stenting          | Not repaired            | Open surgery        |
| 20       | Nakazawa et al. [22] | 92 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 21       | Fadel et al. [2] | 65 | F   | R   | +   | +     | Stenting          | Repaired                | Stenting            |
| 22       | Destan and Durand [23] | 80 | F   | R   | +   | –     | Stenting + Surgery |Performed before surgery | Laparoscopic surgery |
| 23       | Moon et al. [24] | 72 | F   | R   | –   | –     | Stenting (failure) | –                      | Laparoscopic surgery |
| 24       | Kimura et al. [25] | 86 | F   | L   | –   | –     | Manual reposition | –                      | Manual reposition   |
| 25       | Nagasubramanian et al. [26] | 57 | F   | L   | –   | –     | Stenting          | Not repaired            | Laparoscopic surgery |
| 26       | Kubota et al. [27] | 85 | F   | L   | +   | +     | Stenting          | Removed due to discomfort | Laparoscopic surgery |
| 27       | Kim et al. [28] | 68 | F   | L   | –   | –     | Stenting          | Repaired                | Stenting            |
| 28       | K amisawa et al. [29] | 70 | F   | R   | –   | –     | Surgery           | –                      | Laparoscopic surgery |
| 29       | Rose et al. [30] | 68 | F   | L   | –   | –     | Stenting (failure) | –                      | Laparoscopic surgery |
| 30       | Chan et al. [31] | 97 | F   | L   | +   | –     | Stenting          | Repaired                | Stenting            |

F, female; L, left; R, right; UTI, urinary tract infection
existing literature on this rare type of hernia. It is necessary to distinguish this underlying condition in elderly women with hydronephrosis and pyelonephritis. Although there is no established treatment strategy, we believe that stent placement is a better approach in co-morbid, elderly patients who may be hemodynamically unstable at presentation and may therefore be unable to tolerate corrective surgery.

Acknowledgements
We would like to thank Editage for the English language editing.

Authors’ contributions
All authors meet the International Committee of Medical Journal Editors (ICMJE) authorship criteria. MH, JY, and KS were involved in the treatment and clinical management decision-making. KK wrote the manuscript and reviewed the published literature, and MH revised and edited the manuscript. KN, JY, KS, and YH critically revised the manuscript contents. All authors approved the final version of the manuscript for publication.

Funding
Not applicable

Declarations

References
1. Loffroy R, Bry J, Guiu B, Dubrulle T, Michel F, Cercueil JP, et al. Ureteric hernia: a rare cause of ureteral obstruction visualized by multislice helical computed tomography. Urolgy. 2007;69:385e1–3.
2. Fadel MG, Louis C, Tay A, Bolgeri M. Obstructive uropathy secondary to ureteric herniation into the sciatic foramen. BMJ Case Rep. 2018;2018: bcr2018255253.
3. Yanagi K, Kan A, Sejima T, Takenaka A. Treatment of ureterosciatic hernia with a ureteral stent. Case Rep Nephrol Dial. 2015;5(1):83–6. https://doi.org/10.1159/000380944.
4. Cali RL, Pitsch RM, Blatchford GJ, Thorson A, Christensen MA. Rare pelvic hernias: a case series. J Urol. 2012;188(2):498–502. https://doi.org/10.1016/j.juro.2012.01.102.
5. Wilkins GE, Kamel SM. Ureterosciatic hernia causing hydronephrosis and renal colic. Urol Clin North Am. 2001;28(2):411–6. https://doi.org/10.1016/S0090-4295(05)67304-1.
6. Regelman M, Raman JD. Robotic assisted laparoscopic repair of a symptomatic ureterosciatic hernia. Can J Urol. 2016;23(2):9237–9. https://doi.org/10.37414/cjurology.v23i2.9237.
7. Tsuzaki Y, Saisu K, Tsuru N, Homma Y, Ishara H. Laparoscopic repair of a ureteric sciatic hernia: report of a case. Case Rep Urol. 2014;2014:787528. https://doi.org/10.1155/2014/787528.
8. Kato T, Komiya A, Ikeda R, Nakamura T, Akakura K. Minimally invasive endourological techniques may provide a novel method for relieving urinary obstruction due to Ureteroschatic herniation. Case Rep Med. 2015;2015:13–9. https://doi.org/10.1159/000366615.
9. Salari K, Yura EM, Harisignhani M, Eisner BH. Evaluation and treatment of a ureterosciatic hernia causing hydronephrosis and renal colic. J Endourol Case Rep. 2015;1(1):1–2. https://doi.org/10.1089/cren.2015.29005.sa.
10. Ablorh E, Neghem F, Bonyadi SH. Ureterosciatic hernia: report of three cases. BJU Int. 2018;121(11):1482–7. https://doi.org/10.1111/bju.14489.
11. Clemens AJ, Thiel DD, Broderick GA. Ureteric herniation into the sciatic foramen. BMJ Case Rep. 2010;2010: bcr2010201032.
12. Yang J, Wei W, Wu X, et al. Ureterosciatic hernia successfully treated by ureteral stent placement. Int J Urol. 2011;18(10):716–7. https://doi.org/10.1111/j.1442-2042.2011.02831.x.
13. Whyburn JJ, Alizadeh A. Acute renal failure caused by bilateral ureteral herniation through the sciatic foramen. Urology. 2013;81(6):e38–9. https://doi.org/10.1016/j.juro.2013.02.047.
14. Hennal A, Singh I, Patel B. Robotic repair of a rare case of symptomatic “Ureteroscopic Hernia”. Indian J Urol. 2013;29(2):136–8. https://doi.org/10.4103/0970-1911.114037.
15. Tsuzaki Y, Saisu K, Tsuru N, Homma Y, Ishara H. Laparoscopic repair of a ureteric sciatic hernia: report of a case. Case Rep Urol. 2014;2014:787528. https://doi.org/10.1155/2014/787528.
16. Kakimoto Y, Morita N, Chikazawa I, Mysawat K. Ureterosciatic hernia treated with ureteral stent placement. BMJ Case Rep. 2018;2018: bcr201722908.
17. Destan C, Durand X. Management of Lindblom’s hernia (ureterosciatic hernia). J Visc Surg. 2019;156(4):366–7. https://doi.org/10.1016/j.jviscsurg.2019.812.002.
18. Moon KT, Cho HJ, Choi JD, Kang JY, Yoo TK, Cho JW. Laparoscopic repair of a ureterosciatic hernia with urosepsis. Urol J. 2019;16(6):616–8. https://doi.org/10.22037/uj.v0i6.004459.
19. Kimura J, Yoshikawa K, Sakamoto T, Lefor AK, Kubota T. Successful manual reduction for ureterosciatic hernia: a case report. Dis Colon Rectum. 1992;35(6):604–12. https://doi.org/10.1007/BF02050544.
20. Nagasubramanian S, George AP, Chandrasingh J. Case of ureterosciatic hernia managed by laparoscopic repair. ANZ J Surg. 2020;90(2):2571–3. https://doi.org/10.1111/ans.15940.
21. Kubota M, Makita N, Inoue M, Kawakita M. Laparoscopic repair of ureteral diverticulum caused by Ureterosciatic hernia. Urology. 2020;140:e1–6. https://doi.org/10.1016/j.urology.2020.03.017.
22. Kim YL, Cho JH, Song PH. Ureterosciatic hernia causing obstructive uropathy successfully managed with minimally invasive procedures. Yeungnam Univ J Med. 2020;37(4):337–40. https://doi.org/10.12701/uj.v0i37.020.00402.
23. Kamisawa K, Ohgashi T, Omura M, Takamatsu K, Matsui Z. Ureteric hernia treated with laparoscopic intraperitonealization of the ureter. J Endourol Case Rep. 2020;6(3):150–2. https://doi.org/10.1089/cren.2019.0161.
24. Rose KM, Canis K, Arora K, Pearson D, Harold K, Tyson M. Robot-assisted repair of ureterosciatic hernia with mesh. J Robot Surg. 2020;4(1):121–5. https://doi.org/10.1007/s11785-019-00699-4.
25. Chan CYC, Lai TCT, Yu CHT, Leung CLH, Chan WKW, Law LC. Ureteric hernia with pyonephrosis and obstructive uropathy: a case report. Hong Kong Med J. 2021;27(1):50–1. https://doi.org/10.12899/hkmj.208542.
26. Jackson LA, Ramirez DMD, Carrick KS, Pedersen R, Spritzos A, Cotton MM. Gross and histologic anatomy of the pelvic ureter: clinical applications to pelvic surgery. Obstet Gynecol. 2019;133(5):896–904. https://doi.org/10.1097/AOG.0000000000002321.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.