Case report

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양태환 · 임형은 · 유기환

Spontaneous Perinephric Urinoma after the Removal of a Foley Catheter in a Girl with Acute Kidney Injury

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Urinomas can occur after renal trauma or perforation of the collecting system during an endosurgical procedure. However, spontaneous urinomas are very rare. Here we report a case of a spontaneous perinephric urinoma following the removal of a Foley catheter in an 18-year-old girl with acute kidney injury caused by septic shock. The patient had been treated for septic shock, acute kidney injury, and acute respiratory distress syndrome, and had a Foley catheter in place for seven days. After Foley catheter removal, the patient complained of consistent voiding difficulty. An abdominal computed tomography scan showed a large amount of left perinephric fluid, and the aspirated fluid included urothelial cells, confirming the diagnosis of a urinoma. The urinoma was successfully treated by insertion of a double-J stent into the left ureter. This report discusses the available literature on urinomas, and their clinical features, diagnosis, and treatment.

Key words: Acute kidney injury, Foley Balloon Catheterization, Urinary Retention, Urinoma, Vesico-Ureteral Reflux

Introduction

Urinoma is described as an encapsulated collection of extravasated urine from the genitourinary system in the perinephric space [1]. It is predominantly associated with renal traumas or perforations of the collecting system during an endosurgical procedure [2]. In contrast, spontaneous urinoma occurs less commonly as a result of a transmitted back pressure caused by obstructive uropathies such as posterior urethral valves and uretero-pelvic junction obstruction, or mechanical obstruction of urinary

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tract secondary to increased intrapelvic pressure with pregnancy in conjunction with reflux [3, 4]. We report a case of spontaneous perinephric urinoma, following the removal of foley catheter in an 18-year-old girl with acute kidney injury (AKI).

Case report

An 18-year-old girl was referred to our hospital because of oliguria and dyspnea for 2 days. Also, she suffered from vomiting and high fever for 5 days. She had Down syndrome and undertook a cardiac operation for ventricular septal defect, however, she was able to communicate with her parents well and had no history of voiding problems. Upon admission, vital sign was as follows; arterial blood pressure 60/20 mmHg, pulse rate 110/min, respiration rate 48/min and body temperature 38.9℃. On physical examination, her weight was 155 centimeter (cm) and weight 72 kilograms (kg). The mental status was in a stupor and generalized edema on the whole body was observed. Breathing sound with crackle was auscultated on both lung fields. The 24-hour urine output during the 1st day of hospitalization decreased significantly to 0.83 ml/kg/hr. The arterial blood gas analysis showed severe metabolic acidosis with an arterial pH less than 7.1 and the peripheral blood investigation was as follows: hemoglobin 11.0 g/dL, white blood cell counts (WBCs) 33,200/mm^3, platelets 310,000/mm^3, fibrinogen degradation product (FDP) 189.3 ug/mL, fibrinogen 531 mg/dL, PT 15.8 sec, aPTT 23.3 sec, blood urea nitrogen 196 mg/dL, creatinine 15.4 mg/dL, sodium 126 mmol/L, potassium 8.2 mmol/L, chloride 84 mmol/L, protein 7.0 g/dL, albumin 3.3 g/dL, total calcium 7.4 mg/dL, phosphorus 11.1 mg/dL, uric acid 20.8 mg/dL, total cholesterol 182 mg/dL, AST 26 IU/L, ALT 20 IU/L, and c-reactive protein 20 mg/dL. The fractional excretion of sodium and creatinine clearance rate were 2.8% and 12.07 ml/min/1.73m^2, respectively. The urine analysis showed microscopic hematuria (>60 red blood cells/high power field), proteinuria (random urine protein to creatinine ratio 0.94) and pyuria (10-29 WBCs/high power field). However, no bacteria were grown on blood and urine cultures. The chest x-ray revealed a severe pulmonary congestion, and abdomen ultrasonogram done on the 2nd day of hospitalization showed mild bilateral hydronephrosis (Society for Fetal Urology, grades 1-2). The echogenicity of both kidney was normal and renal lehgths were 12.3 cm on the right side and 11 cm on the left side. She was diagnosed as septic shock, AKI and acute respiratory distress syndrome, and was treated with intravenous (IV) isotonic fluid bolus, vasoactive drugs (dopamine and dobutamine; >5 mcg/kg/min), IV antibiotics (3rd cephalosporin, ampicillin and clindamycin), steroid pulse therapy (methylprednisolone; 20mg/kg) and mechanical ventilation. The acute peritoneal dialysis was performed for 3 days from the 1st day of hospitalization; however the peritoneal catheter was removed one week later because of catheter dysfunction. Although peritoneal dialysis was maintained for a short period, her clinical course markedly improved with other supportive therapy. On the 3rd day of hospitalization, the 24-hour urine output increased above 3.0 ml/kg/hr. The high fever subsided on the 5th day and her consciousness was regained on the 6th day. The blood investigation showed as follows on the 7th day: white blood cell counts 20,300/mm^3, C-reactive protein 7.21 mg/dL, blood urea nitrogen 37.0 mg/dL, creatinine 1.4 mg/dL and creatinine clearance 59.9 mL/min/1.73m^2. However, after the removal of foley catheter on the 8th day of hospitalization, she began to complain of voiding difficulty from the day when foley catheter had been removed despite anticholinergic medication. In addition, the urine output decreased from 2.3 ml/kg/hr on the 7th hospital day before the removal of foley catheter to 0.81 ml/kg/hr on the 9th hospital day. However renal function was not worsen. Abdomen computed tomography (CT) scan revealed a large amount of fluid collection in the left retroperitoneal and perirenal space, suggesting a huge urinoma (size 9.1×12×21 cm) on the 22nd hospital day (Fig. 1A), and it was confirmed as urinoma by the aspirated fluid, including clusters of the urothelial cells. Then, double-J catheter was placed, confirming leakage of contrast agent on rupture site of the left renal pelvis (Fig. 1B). After double-J catheterization, the size of urinoma

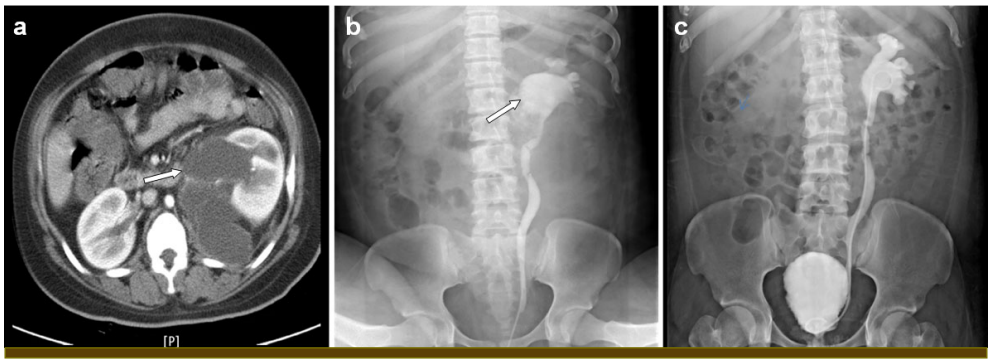

Fig. 1. (a) A computed tomography scan of the abdomen showing a huge perirenal urinoma with dimensions of 9.1×12×21 cm (arrow). (b) Retropyelography demonstrating leakage of contrast medium from the ruptured left renal pelvis (arrow). (c) Voiding cystourethrogram showing grade III vesicoureteral reflux of the left kidney.

markedly decreased and voiding difficulty subsided. Voiding cystourethrography (VCUG) showed the grade IV/V of the left vesico-ureteral reflux (VUR) (Fig. 1C). She was discharged and double-J catheter was removed 6 weeks later. At that time, her self voiding became better markedly and renal function was improved as follows; blood urea nitrogen 8.0 mg/dL, creatinine 0.6 mg/dL. After 4 months, left perinephric urinoma and VUR disappeared, finally.

Discussion

Spontaneous perinephric urinoma is extremely rare and has been reported in cases secondary to obstructive uropathies, such as uretero-pelvic junction obstruction, ureterocele, ureteral stone, posterior urethral valves, and bladder outlet obstruction [5]. Cases of spontaneous perinephric urinoma caused by elevated intra-bladder pressure have been reported in a child with myelodysplasia and in a boy with significant history of voiding dysfunction and repeated episodes of urinary tract infection [6, 7]. In our case, the patient had shown normal voiding habits and no trauma history. She was diagnosed as septic shock, AKI and acute respiratory distress syndrome, and was successfully treated with IV antibiotics, vasoactive drugs, steroid pulse theraphy and supportive cares. During this management period, the foley catheter had been indwelled on urinary tract for a week, and after foley catheter removal, the spontaneous urinoma with obstructive uropathies occurred unexpectedly. Urethral catheterization is one of the most common procedure in healthcare settings worldwide and commonly inserted in the emergency department at the time of hospital admission [8, 9]. However, the vast majority of nosocomial Urinary tract infection are catheter related [10]. Also, anterior urethral injuries and long-term sequelae, such as urethral stricture can occur by iatronic injury of urinary catheterization [11]. In our case, the urinoma with VUR may occur secondary to abnormally increased intra-bladder pressure, induced by narrowing of urethra or loss of coordination of bladder function due to a foley catheter placement or by an unexplained neurogenic bladder due to septic shock.

Clinically, urinary leakage can be asymptomatic or shows manifestations, such as acute abdomen symptoms, paralytic ileus, electrolyte imbalances, or abscess formation [12]. In current case, after recovery of AKI and septic shock, she only had the difficulty of urination without any notable symptoms, signs and worsening renal function from the day when foley catheter had been removed.

Ultrasonogram can evaluate abdomen organs, including the genitourinary system at an early stage, and color duplex doppler sonography may also be useful to detect a development or an improvement of the obstruction by measuring resistance index and pulsality index values in the interlobular arteries [12]. Abdominal CT is the most sensitive and least invasive radiologic technique that assesses the leakage of urine and contrast into perirnephric space accurately [5]. However, if the extravasation of contrasted urine is not revealed on the nephrographic

phase of CT scan, contrast-enhanced CT with delayed imaging could be the key for demonstrating renal pelvic rupture because iodinated urine increases the attenuation of the urinoma [5, 13]. Also, retrograde pyelogram can play complementary diagnostic roles [5]. In our case, before the development of voiding difficulty, abdomen ultrasonogram showed only a mild hydronephrosis of both kidneys. However, after several days of sustained obstructive symptoms, contrast-enhanced CT revealed a large amount of fluid collection in retroperitoneal and left perirenal space, and urinoma was diagnosed. Retrograde pyelogram also confirmed the leakage of contrast agent on rupture site of the left renal pelvis.

In the management of urinoma, small urinomas have a tendency to be resolved spontaneously [14]. Pyrpasopoulou et al [15] reported a case that was resorbed itself completely with only prophylactic antibiotics and analgesics 24 hours later from the diagnosed time. However, if urinoma is huge and not resolved spontaneously, an ultrasonogram- or CT-guided percutaneous drainage of urinoma should be placed into the dependent portion of urinoma to relieve the pressure of urinary system [5, 16]. Furthermore, other reviews have demonstrated that double-J stent decompression was highly effective [13, 17]. Our patient was also treated with double-J catheterization successfully without any complications. The size of urinoma was markedly diminished and obstructive urinary symptoms were improved in two weeks. Double-J catheter was removed after 6 weeks, and the following abdomen ultrasonogram demonstrated no residual perinephritic urinoma. VCUG also showed no VUR in 4 months.

In summary, we report a case of spontaneous perinephric urinoma with VUR after foley catheter removal in a patient with AKI and septic shock. We did not find any evidence of factors that lead to ureteric rupture other than urinary retention. This case emphasizes that children who have obstructive uropathic symptoms require prompt diagnosis with an explanation of the cause, and pediatricians should take more concerns and efforts for an accurate diagnosis and proper management.

한글요약

요낭종이란 신장 및 비뇨기계로부터 누출된 소변이 신장 및 신우 주위에 캡슐상의 낭종을 형성하는 드문 질환으로 자연발생적인 신우의 파열로 인한 누출은 매우 드물며, 대부분 요로와 신우 내강의 압력 증가에 의해 발생한다. 본 증례에서 18세 여자 환아는 내원 7일 전부터 시작된 고열과 핍뇨 및 호흡곤란을 주소로 내원하였다. 환아는 출생시 다운 증후군을 진단받았으며 평소 배뇨는 원활하였다. 입원 후 환아는 패혈증 쇼크 및 급성 신손상, 급성 호흡 곤란 증후군 진단 하에 항생제 및 스테로이드 충격 요법 시행 후 핍뇨, 호흡곤란 및 혈액검사 호전 소견 보였으나 7일 동안 유치된 도뇨관 제거 후 환아는 요 폐색 소견이 관찰되었다. 복부 전산화 단층 촬영상 좌측 신장 주위에 요낭종이 확인되어 좌측 요관에 Double-J catheter가 삽입 되었으며 신우의 파열 부위에 조영제 누출이 확인되었다. 시술 후 요 폐색 소견은 호전되었고, 배뇨성 방광 요도 조영술 상 좌측 신장의 4단계 방광 요관 역류가 관찰되었다. Double-J catheter 제거 3개월 후 좌측 신장 주변의 요낭종은 대부분 소실되었고, 좌측 신장의 방광 요관 역류는 보이지 않았다. 저자들은 급성 신부전 환아에서 유치 도뇨관 제거 후 배뇨곤란 및 요 폐색 소견을 보인 신 주위 요낭종 1례를 경험하였기에 보고하는 바이다.

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