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Purulent-septic complications in patient with renal calyx diverticulum

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The calyx diverticulum is a cavity lined with urothelium that communicates through a narrow canal with the renal calyx-pelvis system. Most calyx diverticula are 0.5 to 2.0 cm in diameter and require surgical treatment exclusively for clinical manifestations of associated diseases. The most common complications of this nosology include urolithiasis and recurrent urinary tract infections. This article presents a rare case of a large diverticulum of the middle group of the calyces of the left kidney. The dimensions of the cavity filled with urine were 10 cm, which resulted in recurrent pyelonephritis, paranephritis and urosepsis.

Keywords: calyx diverticulum; pyelonephritis; kidney resection; bacteriotoxic shock; urosepsis; paranephritis.

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Гнойно-септические осложнения у пациента с дивертикулом чашечки почки

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Дивертикул чашечки почки представляет собой выстланную уротелием полость, которая сообщается через узкий канал с чашечно-лоханочной системой почки. Большинство дивертикулов чашечек имеют размеры от 0,5 до 2,0 см в диаметре и требуют хирургического лечения исключительно при клинических проявлениях ассоциированных с ними заболеваний. К наиболее частым осложнениям этой нозологии относятся уролитиаз и рецидивирующие инфекции мочевыводящих путей. В настоящей статье представлен редкий случай крупного дивертикула средней группы чашечек левой почки. Размеры полости, заполненной мочой, составили 10 см, вследствие чего имел место рецидивирующий пиелонефрит, развившийся паранефрит и уросепсис.

Ключевые слова: дивертикул чашечки почки; пиелонефрит; резекция почки; бактериотоксический шок; уросепсис; паранефрит.

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INTRODUCTION

Calyx diverticulum is a rare urological disease with a prevalence of 0.2%–0.6% of all patients examined using X-ray [1–3]. In recent years, its incidence has increased, which is associated with the widespread use of contemporary imaging methods (computed tomography [CT] urography, magnetic resonance imaging [MRI]) in clinical practice. According to several researchers, disease prevalence can be much higher if not for the inadequacies in diagnostics. Ultrasound identification of cystic cavities in the kidneys without further examination using radiation methods is common [4]. The term "calyx diverticulum," first proposed by Prather in 1941, indicates the presence of a cavity lined with urothelium communicating with the renal pelvicalyceal system [1, 5]. Most authors believe that the diverticulum is caused by disorders of the intrauterine development of the urinary tract. Acquired or secondary diverticula are much less common [4, 6, 7]. Pathological processes such as localized cortical abscess, neuromuscular disorders (achalasia, leading to impaired calyx emptying), kidney injury, etc., can lead to their development [6, 7].

Calyx diverticula are often asymptomatic and revealed incidentally, with clinical manifestations mainly associated with the infectious and inflammatory process and intradiverticular formation of urinary stones [4, 8]. Concrements in the cavity of the diverticulum are detected in 9.5%–50.0% of cases [6, 9]. Additionally, most patients have permanent leukocyturia and frequent recurrent pyelonephritis. In the present study, we demonstrate the possibility of the development of large diverticula of the kidney calyces and of purulent-septic complications.

CLINICAL CASE DESCRIPTION

Patient K was admitted to the urology clinic in an urgent order for clinical and laboratory signs of acute left-sided pyelonephritis and paranephritis complicated by bacteriotoxic shock.

History-taking revealed that the patient was under a long-term follow-up by a urologist due to a large cyst of the left kidney, leukocyturia, and recurrent exacerbations (2–3 times a year) of urinary tract infections. In this regard, with another exacerbation of chronic left-sided pyelonephritis, the patient did not seek medical help immediately, and instead took antipyretics and antibiotics for a week without clear improvement. Due to condition deterioration manifested by progressive asthenic syndrome, hypotension, persistent severe pain syndrome in the left lumbar region, and high fever, the patient called an ambulance and was taken to the urology clinic.

Upon admission to the hospital, the patient's condition was extremely severe; she was immediately transferred to the anesthesiology and intensive care department. She was soporous and had a pulse rate of 116/min and blood pressure of 70/40 mmHg. Table 1 shows the laboratory changes diagnosed in the patient upon admission.

Table. Dynamics of laboratory blood parameters in patient K. with a diverticulum of the renal calyx during hospitalization
Таблица. Динамика лабораторных показателей крови у пациентки К. с дивертикулом чашечки почки за время госпитализации

Laboratory indicator	Value	
	upon admission	after drainage
Leukocytes, 10^9/L	13.22	10.34
Neutrophils, %	89.0	70.4
Lymphocytes, %	5.5	18.5
Stab cells, %	47	3
Platelets, 10^9/L	119	149
C-reactive protein, mg/L	185.0	67.3
pH	7.46	7.42
HCO_3, mmol/L	15.6	26.6
BE (D), mmol/L	–6.7	1.9
Билирубин общий, mmol/L	40.7	12.36
Alanine aminotransferase (ALT), U/L	42.7	15
Aspartate aminotransferase (AST), U/L	56.0	17

Note. BE (D), base excess (deficiency).

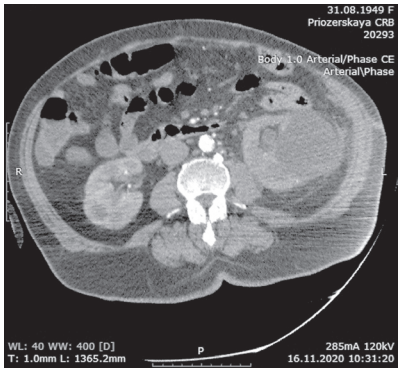

Fig. 1. Multispiral computed tomogram of the kidneys and retroperitoneal space

Рис. 1. Мультиспиральная компьютерная томограмма почек и забрюшинного пространства

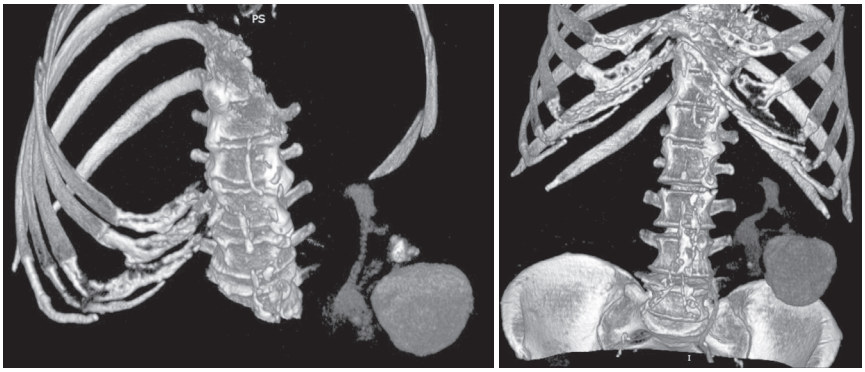

Fig. 2. Multispiral computed tomogram of the kidneys (3D reconstruction). Large diverticulum of the calyx of the left kidney

Рис. 2. Мультиспиральная компьютерная томограмма почек (3D-реконструкция). Крупный дивертикул чашечки левой почки

Upon admission, the patient's expressly increased level of C-reactive protein, leukocytosis with neutrophilia with toxic granularity, and decompensated metabolic acidosis were remarkable. On day 1, with the occurrence of bacteriotoxic shock, acute renal failure developed. Physical examination revealed severe pain in the left lumbar region, and the kidney punch symptom in the left lumbar region was noticeable. Based on clinical and laboratory changes, the patient required intensive therapy with inotropic support.

Multispiral CT (MSCT) revealed a 10-cm cavity contrasted at the minute 20 and filled with an inhomogeneous fluid and radiological indications of paranephritis. No other purulent-septic foci were observed (Fig. 1).

The MSCT images clearly showed a narrow junction between the calyx of the middle group and the diverticular cavity (Fig. 2).

Given the condition severity, the extremely high risk of extended surgical, and anesthetic procedures, it was decided to avoid surgery. The patient underwent percutaneous puncture drainage of the diverticulum of the middle calyx of the left kidney and stenting of the left kidney. Over the next 2 days, the patient's condition stabilized, with an improvement in laboratory parameters (Table 1).

On day 10, the patient was discharged in satisfactory condition for outpatient treatment. After 1.5 months, the patient was admitted repeatedly on a scheduled basis for resection of the diverticulum of the middle group of the left kidney calyces. Histological examination showed the presence of a diverticular cavity lined with urothelial tissue.

DISCUSSION

According to the data presented in the literature, diverticula are more often formed in the upper group of the kidney calyces (70% of patients), whereas in the middle and lower groups of the calyces, they are formed in 12 and 18% of cases, respectively [10]. Studies by other authors have indicated that diverticula in the upper calyces are detected in 48.9% of patients and that in 29.7% and 21.4% of cases, they are diagnosed in the middle and lower groups, respectively [6]. Most diverticula are small, ranging from 0.5 to 2.0 cm in diameter; however, cases of giant diverticula have been reported [2, 6]. In 2010, Kaviani et al. described a diverticulum of the upper group of the calyx of 18×16 cm in size [10]. Riggs and Kaefer [11] presented a case from clinical practice and described a giant diverticulum of the calyx, diagnosed in a 10-year-old child, when the lesion size reached 22 cm. Our clinical case seems to be a rare case demonstrating defects in diagnosing the pathology throughout the patient's adult life, the possibility of a long existence of a large calyx diverticulum, and the development of purulent-septic complications.

Historically, a patient with a calyx diverticulum was treated by diverticulectomy with suturing of the pelvicalyceal system defect. Since the mid-1980s, minimally invasive approaches have been actively used, mainly ureteroscopic and percutaneous methods [3, 6, 9, 12]. Their use is aimed at the removal of intradiverticular calculi and the formation of a wide course for adequate drainage of the cavity. Furthermore, cases of giant calyx diverticula are extremely rare and require timely diagnosing and resection.

CONCLUSION

Kidney calyx diverticulum is a rare urological disease that can be easily diagnosed using X-ray. Identification of the cystic cavity of the kidney in combination with recurrent urinary tract infections requires the mandatory use of excretory X-ray studies. Surgical treatment is indicated for patients with large diverticular cavities and in cases of disease complications.

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