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Chronic kidney disease with hydronephrosis complicated by spontaneous renal collecting system rupture in the third trimester of pregnancy: A case report and review of the literature

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SUMMARY

AUTHORS' CONTRIBUTION: (A) Study Design · **(B)** Data Collection . **(C)** Statistical Analysis · **(D)** Data Interpretation · **(E)** Manuscript Preparation · **(F)** Literature Search · **(G)** No Fund Collection

Spontaneous rupture of the urinary collecting system is defined as extravasation of urine. It occurs rarely during pregnancy. Diagnosis of renal pelvis rupture is difficult because it can be easily confused with other more common diagnoses. During pregnancy, there is an increased risk of compression of the ureter due to the developing pregnancy. We present the case of a 36-year-old woman who developed renal pelvis rupture on day 4 after cesarean section with coexisting chronic kidney disease. JJ stent placement ameliorated the condition, avoiding surgery. We here discuss risk factors, diagnosis, and treatment of this disorder.

Keywords: Renal colic; Flank pain pregnancy; Kidney; Ureter; Hydronephrosis; Spontaneous urinary tract rupture

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INTRODUCTION

During pregnancy, anatomic and physiological changes are found in the urinary tract, including physiological hydronephrosis found in 90% of women in the third trimester of pregnancy [1]. Prominent among the causes are the effects of progesterone and a growing uterus that presses on the ureter [2]. Accompanying hydronephrosis, a urinary tract infection can lead to urosepsis, or pyelonephritis. Treatment can be conservative or surgical, depending on the condition of the pregnant woman [3].

A spontaneous rupture of urinary tract is defined as a rupture and extravasation of urine that is not accompanied by a surgical/trauma history. Spontaneous renal pelvis rupture is rare, representing a severe urological disorder that requires special supervision. Rupture of the renal collecting system is hard to diagnose because it can resemble other, more common disease entities [4]. Among the known causes leading to renal pelvis rupture are: malignant tumors, uretaral calculus and urinary tract infection [5].

We present the case of a pregnant woman with chronic kidney disease and bilateral hydronephrosis who developed spontaneous renal collecting system rupture in the third trimester of pregnancy.

CASE PRESENTATION

36 year old woman gravida III, para III, 34 weeks of pregnancy. First pregnancy ended at 33 weeks gestation, fetal hypotrophy and pPROM were identified. The second pregnancy was induced at 34 weeks gestation, no information on the indications for induction.

She was admitted to the hospital, to the Obstetric Department as a result of lower abdominal pain and contraction activity. No bleeding or spotting was noted. She has chronic kidney disease along with bilateral massive hydronephrosis. Vesicoureteral reflux was treated in childhood. She has not claimed any other incidents or renal problems. Ultrasound examination confirmed the presence of bilateral hydronephrosis. The right kidney was enlarged-160 mm, with dilated greater calyxes-23 mm, and a dilated right ureter-14 mm. The parenchyma of the right kidney was segmentally compressed by the dilated pelvicalyceal system. The left kidney was also

enlarged- 154mm, thinning of the parenchymal layer was found-5mm. An ultrasound of the fetus showed no abnormalities. The fetal biparietal diameter (BPD) measured by ultrasound was 76 mm (30 Hbd), and the femoral length. (FL) was 56 mm (29+4 Hbd), which was not consistent with gestational age in either case. There was a normal amniotic fluid volume. Cervical canal was closed and cervical length was 24mm. Laboratory tests showed no abnormalities, and there were normal creatinine level [0,89 mg/dl] and glomerular filtration rate (GFR) [>60 ml/min]. The patient was admitted for further observation, during which analgesic, spasmolytic treatment was administered. On the fourth day of admission, no contraction action was detected. The patient was in good general condition.

On the sixth day of hospitalization, the patient reported hematuria. At that time, laboratory tests showed an increase in creatinine [1.66 mg/dl] and a decrease in GFR [37.15 ml/min]. In addition, painful, colicky discomfort in the right kidney area was noted. There were no complaints on the area of the left kidney. Due to the lack of diuresis lasting 6h, the patient was consulted urologically. A caesarean section (CS) was recommended and that the kidneys are decompressed later, if necessary. CS was performed immediately using the Pfannenstiel method. After opening the shells, there was a straw-colored fluid of 1500 ml in the surgical field, which was taken for examination. The right appendages were fused to the uterine wall. There were encapsulated fluid spaces between the intestinal loops and the right appendages. The patient gave birth to a healthy baby boy via caesarean section, with a weight of 2640g and an Apgar score of 8/2/6/7 at 1,3,5,10 min, respectively. Oxytocin was administered to the uterine muscle and an intravenous oxytocin analogue was given sequentially due to insufficient uterine contraction. The placenta was manually extracted and the placenta was found to be ablated with an area of 5x5 cm in the peripheral part. A drain was placed into the peritoneal cavity. Catheterized urine was clear, straw-colored. The postoperative period was complicated by relaparotomy on the 1st postoperative day due to the inability to remove the drain; the surgery was performed without complications.

On day 4 after the cesarean section, there was increasing hydronephrosis, inflammatory parameters-C-Reactive Protein (CRP)-130 mg/dl, creatinine level 2,6 mg/dl, and a decrease in GFR-22 ml/min. During abdominal ultrasound, a suspicion of perforation within the collecting system of the right kidney was raised. On physical examination, right lower abdominal soreness, bleeding subluxations in the right mediastinum and increasing edema of the lower extremities for one day, BP 135/85 mmHg, HR 104/min were noted. Due to the totality of the clinical picture and vital indications, a contrast-enhanced abdominal CT was performed.

The CT scan showed massive stasis in the pelvicalyceal system of the left kidney, the calyx was 80 mm wide, the pelvic dimension in the transverse plane was 85x65 mm, and the ureter was 20 mm wide. Delayed secretory function of the left kidney in the delayed phase after 10 minutes. Reduced thickness of the renal parenchyma was observed. Right kidney in bipolar dimension, 135 mm wide, with loss of parenchymal layer 12 mm wide within the upper calyxes - possible site of perforation. Similar area seen at the level of the lower calyxes with a width of 16 mm, at this level a thread-like septum is seen separating the calyx from the peri-renal space. In the delayed phase, leakage of contracted urine through a channel into the right perinephric space is visible. Streaks of fluid seen around the cecum and ascending colon. Elevated densitization of adipose tissue in the retroperitoneal space periaortically. Due to his clinical condition, the patient was transferred to another hospital with a urology department.

In the urology department, the patient had ureteral stenting (also known as double JJ stenting) inserted into both ureters.

The patient was readmitted to the gynecology ward on day 11 after CS due to retention of puerperal feces. Abrasion of the uterine cavity under analgosedation was performed, without complications. The collected material (scrapings from the uterine cavity) was submitted for histopathological examination. In laboratory tests performed on the day of admission, both the creatinine level (0.87 mg/dl) and GFR (>60 mg/dl) were normal. The patient was discharged home in good general condition and with recommendations.

DISCUSSION

Due to anatomical and physiological changes, the risk of urinary problems increases during pregnancy. This is due to increased urinary stasis, which successively increases the risk of pyelonephritis, or hydronephrosis [4,6,7]. Hydronephrosis is a relatively common occurrence during pregnancy, unlike urinary tract rupture. It can occur at any stage of pregnancy [8].

The occurrence of a rupture in the urinary tract that is not accompanied by a history of surgery or trauma is defined as a spontaneous rupture of the kidney or urinary tract [9]. Middelton et al. distinguished the following division for urinary tract ruptures in pregnancy: 1) pregnancy without comorbidities, 2) comorbid non-neoplastic urinary tract disease, 3) comorbid ruptured renal tumor [10]. A large proportion of kidney ruptures are caused by underlying conditions. This was also the case in our case, as the patient had chronic kidney disease with associated massive hydronephrosis [11].

An increased incidence of spontaneous rupture of the right kidney compared to the left kidney is found [5,11]. It is a complex mechanism, consisting of mechanical as well as hormonal factors. Several hypotheses have been put forward: 1) physiological dextrogenization of the uterus, which presses on the right ureter; 2) a clamped right ovarian artery or vein pressing on the right ureter; 3) hormonal atony of the uterus. Shifting of the pregnant uterus to the right occurs around the 20th week of pregnancy and lasts until 2 weeks after delivery. The pelvic brim is believed to be the site of pressure [12]. Increased pressure in the

calyceal-pelvic system results in excessive distension of these structures and an increased risk of rupture [13].

Among the most common clinical signs accompanying urinary tract rupture is pain corresponding to the side of the rupture, which may be accompanied by fever. The presence of a palpable mass on physical examination may indicate a rupture of the collecting system. Rupture of the renal collecting system on the right side is easily confused with acute appendicitis. The result is the need for an unnecessary appendectomy. Other significant differential diagnoses include nephrolithiasis, renal colic, preterm labour and twisted fallopian tube [13].

The clinical symptoms accompanying kidney rupture are nonspecific, and imaging studies are necessary for diagnosis. An X-ray is adjunctive when perforation is suspected [14]. The 8th to 15th week of pregnancy is the period of time when there is the greatest risk of fetal abnormalities as well as cancer development, as a result of radiation exposure. The solution is to use double shielding, but there is still a chance of radiation exposure to the fetus [15].

Contrast-enhanced CT is the preferred imaging modality for the kidney, but should be considered with special care in early pregnancy, as it may adversely affect further fetal development [16].

MR imaging is the safest alternative used for maternal diagnosis. It can be performed in all trimesters of pregnancy and can be used in the diagnosis of many diseases, such as hydronephrosis, assessment of placental function, and changes in maternal cerebral blood flow [17].

Treatment options include conservative management and surgery, JJ stenting and nephrostomy are recommended by the authors as first line management. Among its advantages are its low invasiveness, free drainage and reduced pain. In case of a large rupture, nephrostomy and drainage may be necessary [18]. In our patient, a JJ stent was used.

CONCLUSION

The diagnosis of spontaneous rupture of the renal collecting system is rare. However, it should always be considered, as a differential diagnosis for diagnoses such as renal colic or appendicitis. It is a life-threatening condition for the mother and the fetus. Temporary placement of a ureteral catheter or total nephrectomy depending on the clinical condition of the pregnant patient is mentioned as the recommended management.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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