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The Practice of Approaching the Clinic of Renal Colic in Pregnant Patients Admitted to the Emergency Department: 5-Years Retrospective Observational Study

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Abstract

Objective: Renal colic in pregnant women; it is a difficult situation to manage in the emergency department. This study aims to examine the emergency service evaluation and approach to kidney stone cases in pregnant women.

Materials and Methods: Pregnant patients who applied to our hospital between 2016-2022 were included in this study. The diagnoses of the patients were made by ultrasonography and other imaging methods. Demographic data, complaints, laboratory results, and treatment methods of the patients were recorded and analyzed.

Results: Fifty-two pregnant patients presenting with renal colic were included in the study. Patients' presenting symptoms: 46 (88.5%) flank pain, 9 (17.3%) pyuria, 7 (13.5%) nausea and vomiting, 6 (11.5%) macroscopic hematuria, 2 (3.8%) microscopic hematuria. In 49 (94.2%) patients, the diagnosis was made by ultrasonography (USG). The diagnosis was made by magnetic resonance imaging in 2 (3.8%) patients and by computed tomography in 1 (1.9%) patient. Conservative treatment was applied to 50 (96.2%) patients; endoscopic surgical treatment, to 2 (3.8%) patients.

Conclusion: Renal colic accompanying pregnant patients admitted to the emergency department it is an important problem that should be evaluated with a multidisciplinary approach due to limitations in diagnosis and treatment steps, and potential complications that may affect maternal and fetal health. USG is a valuable method for detecting complications that may cause loss of kidney function in these patients. These patients are managed in emergency departments. When they are referred to the urology clinic, they are treated conservatively. In cases where conservative treatment fails, patients can be treated effectively and safely with endourological interventions.

Keywords: Pregnancy, renal colic, emergency, ultrasonography

Introduction

Although kidney stones are uncommon during pregnancy, affecting approximately 1 in 200 to 1 in 500 women, they represent the most frequent non-obstetric cause of acute hospitalization in this population (1-4). Pregnancy-induced physiological changes-including urinary tract dilatation, elevated progesterone levels (which reduce ureteral peristalsis), uterine compression of adjacent organs, hydronephrosis, and increased urinary pH-heighten the risk of stone formation (2-5). Symptomatic kidney stones during pregnancy are associated with recurrent miscarriage, mild preeclampsia, chronic hypertension, gestational diabetes, premature rupture of membranes, and cesarean delivery (5,6).

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Although conservative methods are mostly sufficient in the treatment, the management of renal colic is difficult in pregnant patients and it is a peculiar situation due to the risk of the fetus being affected by this situation (7). Although a multidisciplinary approach is recommended in the management of these patients, the diagnosis and treatment of these patients are carried out by emergency room doctors. Therefore, it is important to evaluate pregnant renal colic patients in the emergency department. Our study aims to evaluate pregnant patients who applied to the emergency department and were found to have stones in the urinary system the approach to these patients.

Materials and Methods

The study was designed as a descriptive and retrospective analysis. The study was started after the approval of the University of Health Sciences Türkiye, Prof. Dr. Cemil Taşcıoğlu City Hospital, Ethics Committee, (decision number: 76, date: 24.02.2025). Among the pregnant patients who visited our hospital's tertiary emergency department between April 2016 and July 2022, those who were diagnosed with renal colic and stones in the urinary system as a result of the examinations and tests performed in the emergency department were included in the study. Two groups were defined based on hydronephrosis severity: Group 1 (no/mild hydronephrosis, grades 0-2) and Group 2 (moderate/severe hydronephrosis, grades 3-4). Hydronephrosis grading followed the Society of Fetal Urology classification (grade 0: no dilation; grade 4: severe dilation with parenchymal thinning).

Patients

Age, trimester of pregnancy, complaints of admission to the emergency department, blood urea, creatinine values, urine analysis, imaging [ultrasonography (USG), magnetic resonance imaging (MRI), computed tomography] results, and treatments applied (conservative, ureteral stent, wiggly nephrostomy) were scanned from the hospital electronic data system and recorded. Patients under the age of 18, trauma patients, and patients whose pregnancy was terminated for any obstetric reason were excluded from the study. The study complied with the principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics software (Version 22; IBM Corp., Armonk, NY, USA) under an institutional license held by the University of Health Sciences Türkiye, İstanbul, Türkiye. The suitability of continuous variables for normal distribution was evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Descriptive statistics are presented as mean ± standard deviation (SD) for normally distributed data, median (interquartile range) for non-normally distributed data, and frequency (percentage) for categorical variables. For comparisons between two groups, Student's t-test was used for normally distributed parameters, and the Mann-Whitney U test was used for non-normally distributed parameters. Categorical variables were compared using the chi-square test, Fisher's exact test, Fisher-Freeman-Halton exact test, or Yates' correction test, as appropriate. Spearman's correlation analysis was employed to assess relationships between ordinal variables. A p-value <0.05 was considered statistically significant.

Results

The mean age was 27.25±4.93 years. Most admissions occurred in the third trimester (34.6%), and multiparous patients predominated (65.4%). The number of multiparous patients was more than the number of nulliparous patients (65.4%). The most frequent presenting symptoms were pain (88.5%) and pyuria (17.3%). The most common complaint was right flank pain (67.3%). 75% of the patients had no previous history of urinary tract stones. 96.2% were treated conservatively. The diagnosis was made by USG in 94.2% of the patients. There was no sign of hydronephrosis in 67.3%. The location of the stone was located 51.9% of the time in the ureter. The mean creatinine value was 0.51±0.12 mg/dL, and the mean urea was 18.45±6.12 mg/dL (Table 1). Lower creatinine is expected during pregnancy due to an increased glomerular filtration rate.

No statistically significant correlation was found between the hydronephrosis level and the creatinine and urea levels of the patients ($p=0.930$, $p=0.719$) (Table 2). A statistically significant difference was found between hydronephrosis levels and the treatments applied. Medical treatment was applied to 100% of the patients with hydronephrosis 0-1-2, a ureteral stent was applied to one patient with hydronephrosis level 3, and percutaneous nephrostomy was applied to one patient with hydronephrosis level 4 (Table 3).

Discussion

Renal colic in pregnant patients presents a diagnostic and therapeutic challenge in emergency departments, necessitating a multidisciplinary approach due to risks to maternal and fetal health. These patients are managed in emergency departments using the correct diagnostic steps.

Renal USG is the imaging method that should be preferred in pregnant patients with suspected nephrolithiasis (8,9). MRI and/or low-dose CT are recommended for patients whose stones cannot be visualized on USG but whose symptoms persist (1). In our study, 94.2% of the patients were diagnosed via ultrasound. Since our study was retrospective and included patients diagnosed through stone visualization, the diagnostic accuracy of USG may be high. In addition to diagnosing, USG

Table 1. Distribution and percentage ratios of the parameters considered in the study among patients

Age mean ± SD (min.-max.)		27.25±4.93 (18-41)
Trimester n (%)	1. Trimester	18 (34.6)
	2. Trimester	16 (30.8)
	3. Trimester	18 (34.6)
Parity n (%)	Nullipar	18 (34.6)
	Multipar	34 (65.4)
Obstetric complication n (%)		0 (0.0)
Symptom n (%)	Pain	46 (88.5)
	Pyuria	9 (17.3)
	Nausea-vomiting	7 (13.5)
	Macroscopic hematuria	6 (11.5)
	Microscopic hematuria	2 (3.8)
Side n (%)	Right	35 (67.3)
	Left	13 (25.0)
	Bilateral	4 (7.7)
Treatment n (%)	Conservative	50 (96.2)
	Ureteral stent	1 (1.9)
	Percutaneous nephrostomy	1 (1.9)
Stone story n (%)	Yes	13 (25.0)
	No	39 (75.0)
Diagnostic tool n (%)	USG	49 (94.2)
	USG+MRI	2 (3.8)
	USG+CT	1 (1.9)
Hydronephrosis grade n (%)	0	35 (67.3)
	1	9 (17.3)
	2	6 (11.5)
	3	1 (1.9)
	4	1 (1.9)
Stone localization n (%)	Renal pelvis	6 (11.53)
	Parenchyma	5 (9.6)
	Ureter	27 (51.9)
	Bladder	14 (26.9)
Creatine mean ± SD (min.-max.)		0.51±0.12 (0.12-0.82)
Urea mean ± SD (min.-max.)		18.45±6.12 (8-38)

SD: Standard deviation, min.-max.: Mininmum-maximum, USG: Ultrasonography, MRI: Magnetic resonance imaging, CT: Computed tomography

Table 2. Relationship between hydronephrosis degree and blood urea-creatinine levels

	Hydronephrosis	
	r	p*
Creatine	-0.013	0.930
Urea	-0.052	0.719

*Spearman correlation analysis

is recommended to detect conditions that may cause kidney dysfunction and to decide on the treatment method (10,11). While 67.3% of our patients had hydronephrosis of grade 0, 32.7% had hydronephrosis of grade 1-4. We observed that all patients with hydronephrosis grade 0-1-2 received medical treatment; a ureteral stent was placed in one patient with hydronephrosis grade 3; and a percutaneous nephrostomy was applied to one patient with hydronephrosis grade 4. Surgical indications are rarely required in pregnant patients with renal colic. However, since both the fetus and the mother are at risk, it is important to decide on the treatment method.

Hydronephrosis severity guided treatment: milder cases (grades 0-2), responded to medical therapy, while severe cases (grades 3-4) required intervention. A previous study that evaluated pregnant renal colic patients reported that a ureteral stent was applied to 35 patients and percutaneous nephrostomy was applied to 5 patients (12). Another study reported that a stent was applied to 13 patients, and percutaneous nephrostomy was applied to one patient (13). Both studies reported that conservative treatment was sufficient in most of the patients (13). They recommended that the patients receive analgesic and hydration therapy before surgical intervention and that they be re-evaluated for surgery if no response was observed. Dhangar et al. (14) in their study evaluating the indications for surgical intervention, revealed that surgical intervention is required in patients with prolonged high fever, pain unresponsive to analgesics, long-lasting pain, stones larger than 8 mm, and stones remaining in the ureter. In addition, the study emphasized that the degree of hydronephrosis must be taken into account. Consistent with the findings of these studies, a statistically significant difference was found between the level of hydronephrosis and the treatments applied in our study. Thus, from the results we obtained, we demonstrated the importance of the presence and severity of hydronephrosis in treatment management. In our patients, those who either did not have hydronephrosis or had hydronephrosis at the 0-1-2 level were given medical treatment. 96.2% of our patients responded to medical treatment. Analgesia, antibiotics, and hydration are recommended as medical treatment in pregnant renal colic (1). McAleer and Loughlin (15) reported that pregnant patients presenting with renal colic mostly responded to medical treatment.

Table 3. The relationship between the degree of hydronephrosis and the treatment method

		Treatment						
		Conservative		Ureteral stent		Percutaneous neph		
		n	%	n	%	n	%	p*
Hydronephrosis	0	35	100	0	0.0	0	0.0	**<0.001**
	1	9	100	0	0.0	0	0.0	
	2	6	100	0	0.0	0	0.0	
	3	0	0.0	1	100	0	0.0	
	4	0	0.0	0	0.0	1	100	

*Chi-square test

Finally, when we evaluated the demographic characteristics of the patients, the mean age of our patients was 27.25±4.93 years, a figure consistent with studies conducted with pregnant renal colic patients (14). We mainly determined the application time as the 3rd Trimester. In their studies, Abruzzese et al. (12) reported the gestational week as 24.5 weeks, Dhangar et al. (14) as 23 weeks, and In Swartz et al. (16) 2-3. The study emphasized that it is common in the third trimester. In the evaluation of our patients according to the number of previous pregnancies, we found that multiparous patients outnumbered nulliparous patients (65.4%). Conservative management of ureteral stones during pregnancy is the standard approach (17). Renal colic in pregnancy most commonly occurs during the third trimester, with multiparity emerging as a potential risk factor in our cohort. Gestational hydronephrosis occurs in 90% of cases on the right side and up to 67% on the left side in the third trimester due to the compression of the growing uterus (18). The predominant complaint was right flank pain (67.3%). Prolonged dilation and high progesterone levels have been identified as the main factors that reduce ureteral peristalsis and lead to stasis. The increased glomerular filtration rate during pregnancy enhances the excretion of uric acid, oxalate, sodium, and calcium, thus increasing the susceptibility to stone formation (11,19). Our findings are consistent with these studies.

As reported in previous studies, the most common complaints of our patients were pain (88.5%) and dysuria (17.3%). Fever, vomiting, and hematuria may also be seen in patients with renal colic during pregnancy. Renal colic radiating to the groin or severe flank pain is the main symptom (5). Other symptoms are nausea, vomiting, dysuria, frequent urination, and hematuria. In the presence of fever and pyuria, initiation of appropriate antibiotic therapy and evaluation of the patient in terms of sepsis were recommended (7,14,20).

As a result, diagnosing and managing the pregnant patient with urinary tract stones is difficult and complex. In the emergency department setting, the patient's symptoms and risk factors should be evaluated, and appropriate tests should be conducted to decide the treatment. Appropriate analgesia and, if necessary, appropriate antibiotic therapy and hydration should be administered. Although it is rare, the option and necessity of surgical intervention should be considered.

Study Limitations

This study has several limitations. First, its retrospective design inherently restricts the ability to control for confounding variables. Second, the relatively small sample size, which stems from the inclusion criteria (selecting only patients with imaging-confirmed stones), may introduce selection bias. Moreover, as the data were derived from a tertiary referral center, the cohort might disproportionately represent severe or complex cases, potentially limiting the generalizability of the results to broader populations. Future prospective studies with larger, multicenter cohorts are warranted to validate these findings and mitigate potential biases.

Conclusion

In our cohort, renal colic during pregnancy most commonly occurs in the third trimester, and it is associated with multiparity. USG remains the primary diagnostic tool, effectively detecting stones and guiding management. While conservative treatment (analgesia, hydration, and antibiotics) suffices for most cases, the severity of hydronephrosis (grades 3-4) strongly correlates with the need for endourological interventions such as ureteral stenting or percutaneous nephrostomy. This link between hydronephrosis severity and intervention aligns with existing literature and represents a key contribution of our findings to clinical practice. A multidisciplinary approach is critical in emergency settings to address maternal-fetal risks and tailor trimester-specific strategies. These findings underscore the importance of trimester-specific evaluation and vigilant monitoring of hydronephrosis severity to optimize clinical decision-making in emergency care. The results further emphasize prioritizing hydronephrosis severity in management protocols, while highlighting the need for future studies to explore the causality of parity-related risk associations.

Ethics

Ethics Committee Approval: The study was started after the approval of the University of Health Sciences Türkiye, Prof. Dr. Cemil Taşcıoğlu City Hospital, Ethics Committee, (decission number: 76, date: 24.02.2025).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: A.S., A.A., R.K., Concept: A.A., N.U., R.K., Design: A.S., N.U., R.K., Data Collection or Processing: A.S., A.A., R.K., Analysis or Interpretation: A.A., N.U., R.K., Literature Search: A.S., A.A., N.U., Writing: A.A., N.U., R.K.

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