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Correlation of Acute Flank Pain with the Number of Pregnancies and Hydronephroses; An Observational Study

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What's known on the subject? and What does the study add?

Hydronephrosis may occur frequently in pregnancy and may cause no symptoms or signs. However, it may present as acute flank pain or pyelonephritis in nullipara patients. Our study showed that pregnancy-related hydronephrosis symptoms are mostly seen in the late second or third trimester. Whenever the degree of hydronephrosis increases, the severity of accompanying symptoms also increases. Ureteral JJ stent placement is a safe method for patients who do not respond to conservative therapy.

Abstract

Objective: We investigated the correlation of acute flank pain incidence with the number of pregnancies and hydronephrosis.

Materials and Methods: Forty-eight patients were included in the study. Patients with urinary tract infection, abnormal urinalysis and urinary stone have been excluded. Twenty-four patients were nulliparous, and the remainder multiparous. All patients underwent urinary ultrasound by the same radiologist. The visual analog scale (VAS) was completed at the time of admission. Intravenous fluid, paracetamol and oral nitrofurantoin were administered to all patients. Patients who did not benefit from conservative treatment underwent ureteral JJ stent placement.

Results: Nulliparous pregnant were younger and had earlier gestational weeks (25.1±3.7 - 28.7±3.8 p=0.004 and 22.9±3.7 - 26.3±4.0 p=0.005), as well as higher VAS scores. In nulliparous pregnant women, a significant, medium level-positive correlation was found between the degree of hydronephrosis (DoH) and the VAS scores. We observed that the higher DoH was related to higher VAS scores. However, in multiparous pregnant women, no correlation was observed between DoH and VAS scores. In the comparison of two groups, there were no significant differences in body mass index, DoH, hydronephrosis side, serum creatinine levels, type and side of pain. Forty-two percent of the patients described colic pain. Forty-four patients benefitted from conservative treatment, whereas only 4 patients underwent JJ stent insertion.

Conclusion: This study demonstrates the correlation between acute flank pain and hydronephrosis. The DoH increases as the pain intensifies, especially in the nulliparous, where the correlation is stronger.

Keywords: Pregnancy, hydronephrosis, acute flank pain, nulliparous, multiparous

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Introduction

Flank pain is a condition that commonly leads to emergency department visits and not infrequently observed in pregnant women. In pregnant women, flank pain is mostly due to hydronephrosis. Mild hydronephrosis is reported in 90% of pregnant women during pregnancy, with most being nulliparous (1-3).

It has been claimed that the mechanism of hydronephrosis formation in pregnancy, in addition to uterine compression, is progesterone hormone's relaxing effect on the smooth muscle (4,5). Hydronephrosis in pregnancy may cause pyelonephritis and urosepsis. It is frequently seen on the right side, probably due to uterine dextrorotation and protection of the left ureter by the sigmoid colon (6,7).

Although hydronephrosis may be seen in 90% of pregnant women, in most cases they are followed up without any symptoms. But certain patients may present with severe flank pain, recurrent urinary tract infections, and even renal dysfunction (6,8). Most the patients benefit from the conservative approach and medical treatment. However, invasive procedures such as ureteral stent or renal nephrostomy may be required in 6% of patients (6,9).

In this study, we investigated the relationship between nulliparity and multiparity with hydronephrosis and pain, as well as the relationship between the degree of hydronephrosis and pain. Factors other than pregnancy, such as ureteral or renal stones and urinary tract infection that may lead to hydronephrosis and pain were excluded.

Materials and Methods

This study was conducted in Iğdır State Hospital between the dates of October 2018 and February 2019. During this time, 237 pregnant women had outpatient visits to the hospital. Among these patients, there were 93 pregnant women accompanied by acute flank pain. Among these 93 pregnant women, 48 patients who met the criteria were included in the study. The study consisted of 2 groups and a total of 48 patients comprising of group 1 nulliparous (n=24) and group 2 multiparous (n=24) pregnant women who were admitted to ER, gynecology, or urology wards.

Written informed consent was obtained from patients' and their spouses before the study. The consent explained that no additional intervention was performed other than routine protocols and treatments, and only the requisite findings would be used in the study. Urinalysis, urine culture, serum creatinine values were obtained from all patients and the described character of pain and demographic data were recorded. All patients had urinary ultrasound (US) by the same radiologist. To assess the degree of hydronephrosis (DoH), maximal anterior-posterior diameter of the renal pelvis was measured by US. A visual analog scale (VAS) with a numerical evaluation was obtained from all patients. Patients who had hematuria or pyuria on urinalysis, had signs of urinary calculi, pyelonephritis, or pyelonephrosis on urinary US and had positive urine culture result were excluded from the study. Every patient had an obstetric consultation, and the fetus and pregnancy status were evaluated. All patients were hospitalized, administered intravenous fluid therapy, paracetamol as analgesic, oral nitrofurantoin as antibiotherapy and were recommended to bed rest. Antibiotic treatment was initiated as a prophylaxis and was administered for 5 days. The specific antibiotic treatment was not based on any guideline recommendations. Ureteral JJ stents were placed in patients who did not respond to conservative treatment.

Statistical Analysis

In the statistical analyses, compliance with normal distribution was evaluated with Kolmogorov-Smirnov analysis. Mann-Whitney U test was employed for continuous data and chi-square test for categorical data. The covariance of the Dog and the VAS score values were evaluated with Spearman Correlation analysis (In the interpretation of the correlation coefficient, values were categorized as follows: 0.0-0.24 weak, 0.25-0.49 medium, 0.50-0.74 strong, 0.75-1.00 compelling). For statistical significance, in the 95% confidence interval, p-value below 0.05 was considered significant. SPSS v 21.0 program was used for statistical analysis.

Results

Of the patients included in the study, 56.25% (n=27) were in the second and 43.75% (n=21) were in the third trimesters. Of the second trimester patients, 66.6% were nulliparous (n=18) and 33.4% multiparous (n=9). No first trimester or the early second trimester patient existed. Most were through the late second trimester or in the third trimester. The number of births given by the multiparous was 2.9±0.9 (2-5).

Hydronephrosis was observed in 66.7% of patients and 62% of the pain was observed on the right side. Of the patients presenting with acute flank pain, 50% (n=12) of the nulliparas and 33.3% (n=8) of the multiparas described colic-like pain, while the rest described suppressive, blunt, or aching pain. There were no statistically significant differences between the two groups.

In this study, age and gestational age values were found to be significantly lower in nulliparous pregnant women compared with multiparous (age 25.1±3.7 - 28.7±3.8 p=0.004 and gestational week 22.9±3.7 - 26.3±4.0 p=0.005 respectively), however VAS score values turned out to be higher in nulliparous (7.2±1.2

and 5.8±1.9 p=0.004, respectively) (Table 1). In the total cohort, a significant, medium level, positive correlation was spotted between DoH and VAS score values. VAS score values increased as the DoH increased in the total cohort (r=0.349, p=0.015) (Table 2). When the two groups were evaluated separately, a medium level, same-direction, significant correlation is found between DoH and VAS scores in the nulliparous (Table 3). As the hydronephrosis increased in the nulliparous, VAS score values also increased (r=0.494 p=0.014). Whereas in multiparas, there was no correlation between the degree of hydronephrosis and VAS score (r=0.178 p=0.405) (Table 3). To our knowledge, this is one of the first studies comparing nulliparous and multiparous pregnant women.

Comparing the two groups, no statistically significant difference existed in terms of body mass index, hydronephrosis grade, hydronephrosis side, creatinine value, type and side of pain (Table 1). In both groups, 91.7% of the patients (n=20) benefited from conservative treatment and 8.7% (n=4) were placed with ureteral JJ stent. Two of the pregnant women who had ureteral stents were nulliparous, and two were multiparous. One patient with ureteral stent had grade II and the other 3 had grade III hydronephrosis. Ureteral JJ stent was placed on the left side in one patient and on the right side in 3 patients. All patients with ureteral JJ stenting described colic pain and had VAS scores of 9 (n=2) and 10 (n=2). Ureteral JJ stent placement significantly decreased the hydronephrosis and pain. Control US was performed 2 weeks following JJ stent placement. The patients included in the study were followed until 36th-38th gestational weeks on average. However, obstetric data were not obtained after giving birth.

Discussion

This prospectively evaluated study demonstrated that DoH and the number of pregnancies correlated with the severity of pain in pregnant women. While our findings are similar to the literature at some points, they seem to support the opposite

Table 1. Patient demographic and clinical data

	Nullipara					Multipara					
	Mean	Standard deviation	Median	Minimum	Maximum	Mean	Standard deviation	Median	Minimum	Maximum	p
Age	25.1	3.7	25.0	18.0	33.0	28.7	3.8	28.0	20.0	37.0	**0.004**
Gestational age (week)	22.9	3.7	22.0	18.0	30.0	26.3	4.0	28.0	19.0	34.0	**0.005**
Number of births						2.9	0.9	3.0	2.0	37.0	
BMI	23.7	3.4	23.8	16.2	31.6	25.6	3.6	26.1	19.2	35.0	0.081
Creatinine mmol/L	0.6	0.1	0.6	0.4	0.8	0.6	0.1	0.6	0.4	0.8	0.983
VAS score	7.2	1.2	7.0	5.0	10.0	5.8	1.9	5.5	2.0	10.0	**0.004**

BMI: Body mass index, VAS: Visual analog scale

Table 2. Correlation of hydronephrosis grade with VAS score in total cohort

		Hydronephrosis grade – VAS score
Spearman's rho	r	0.349
	p	**0.015**
	n	48

*Correlation is significant at the 0.05 level (2-tailed), VAS: Visual analog scale

Table 3. Correlation of hydronephrosis grade with VAS score

Nulliparous-Multiparous		
Nullipar	r	0.494
	p	**0.014**
	n	24
Multipar	r	0.178
	p	0.405
	n	24

*Correlation is significant at the 0.05 level (2-tailed), VAS: Visual analog scale

view at others. The incidence of acute flank pain and higher hydronephrosis on the right side is consistent with the literature (6,7,10). Some studies have reported that hydronephrosis is more common, especially in primigravidae (1,6). In our study, especially in the nulliparous, hydronephrosis and pain were found to have medium level, positive correlation. In the literature, there are studies which state that hydronephrosis is common in pregnant women; that there is no relationship between hydronephrosis and acute flank pain and that most cases develop asymptomatically (6,8). Farr et al. (11) reported that hydronephrosis was not observed in some patients with flank pain. In the same study, Farr et al. (11) stated that there was no correlation between hydronephrosis and pain intensity. Many studies in literature have investigated hydronephrosis and its prevalence, as well as the relationship between hydronephrosis and pain. The main difference in our study is that all patients were admitted with acute flank pain. The detection of hydronephrosis in the pregnant women admitted caused us to consider hydronephrosis to be associated with acute flank pain. It is also possible that anatomic factors and gestational anxiety might have been effective in the positive correlation between the pain and the DoH and in higher VAS scores of the nulliparous than the multiparous (12). In the lack of concrete evidence such as psychiatric examination results, we think that this may be subject of another study.

In the literature, cases of complicated urinary tract infection such as pyelonephritis that developed during and after the second trimester causing serious complications have been reported (13). No patients with urinary tract infection were included in our study and none of the patients included in the study developed pyelonephritis on follow-up. The majority of patients (91.7%) benefited from conservative treatment. Only 4 patients (8.3%) underwent ureteral JJ stent placement. This ratio is consistent with the literature, yet the small number of patients is a limiting factor for a strong interpretation (6).

The most important difference that distinguishes our study from other studies is the comparison between multiparous and nulliparous patients together with assessing the relationship between flank pain and DoH. In some studies, patients with symptoms like fever and signs of white blood cell and C-reactive protein elevation were included (14). In contrast to these studies, patients who had only flank pain and normal biochemical tests but had no symptoms like fever were included in our study. We think that our study also enables a stronger evaluation of the relationship between hydronephrosis and flank pain without different symptoms and signs. In some studies, it has been reported that hydronephrosis is common during pregnancy and is asymptomatic (6,8). However, patients with mild hydronephrosis were also included in these studies, and pregnant women with mild hydronephrosis constitute the vast majority. In our study, there are patients in the late periods of the second trimester and in the third trimester. As a result, we think that hydronephrosis increases with the progression of pregnancy and pain associated with it is observed.

As we were the only urology center in the city, all patients were followed up by the same team. Ureteral JJ stent placed in a patient was removed before delivery and the other three stents were removed in 3-4 weeks following delivery. The removal of a stent before delivery was done upon the demand of the patient due to hematuria and irritative stent symptoms. This patient had weekly US follow-up until birth, reported minor pain on the side of stent removal resolved with conservative treatment without the need to re-intervene. No major complication developed in the patients with ureteral JJ stents. Although we cannot make a strong interpretation due to the small number of patients, this result is consistent with the literature (15). The degree of hydronephrosis in the patients who were placed stents were grade 2 and grade 3 (n=1, n=3, respectively) and their VAS scores were 9 and 10 (n=2, n=2, respectively). In concurrence with the study of Tsai et al. (15) we think that JJ stents are more effective than conservative treatment in pregnant women with advanced hydronephrosis. JJ stents may safely be inserted in these patients. The most important limiting factor in our study was the number of patients. A stronger result might be obtained with a higher number of patients. It should also merit to mention that birth and postnatal data of the patients included in our study are not available.

Conclusion

This study demonstrates that there is a relationship between acute flank pain and hydronephrosis as well as the severity of pain increases with the DoH. Especially in nulliparas, this relationship is stronger. Ureteral JJ stent is a safe and effective treatment method for pregnant women who do not respond to conservative treatment.

Main Points

- There is a relationship between acute flank pain and hydronephrosis as well as the severity of pain increases with the DoH,

- In the total cohort, a significant, medium level, a positive correlation was observed between hydronephrosis grade and VAS score values.

- In nulliparas, this relationship is stronger,

- Ureteral JJ stent is a safe and effective treatment method in pregnant women who do not respond to conservative treatment.

Ethics

Ethics Committee Approval: Not approved.

Informed Consent: Written informed consent was obtained from patients' and their spouses before the study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.B., L.M.Ö., R.İ., Concept: A.B., L.M.Ö., R.İ., Design: A.B., R.İ., S.V., S.E., T.T., Data Collection or Processing: A.B., L.M.Ö., R.İ., M.M.Ö., Analysis or Interpretation: A.B., S.V., M.M.Ö., T.T., Literature Search: A.B., S.V., Writing: A.B., S.V., S.E., T.T.

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