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

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Abstract

Aim: We aimed to investigate the correlation of acute flank pain incidence with number of pregnancies and hydronephrosis. Material and method: Forty-eight patients admitted with acute flank pain have been included in this study. Patients with urinary tract infection, abnormal urinalysis, kidney or ureteric stone have been excluded. Twenty-four were nulliparous and the remaining pregnancies were multiparous. All patients had urinary ultrasound (US) by the same radiologist. Visual analogue scale (VAS) was used. All the patients had conservative management firstly. same radiologist. Visual analogue scale (VAS) was used when patients admitted to the hospital. All the patients had intravenous fluid therapy as conservative management, paracetamol as analgesic treatment and oral nitrofurantoin as antibiotherapy. Patients who did not benefit from conservative treatment had 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), but higher VAS scores. In the nulliparous pregnant women, a significant, medium level positive correlation was found between the degree of hydronephrosis and the VAS scores. It was observed that the higher the hydronephrosis, the higher the VAS scores were. On the other hand, in multiparous pregnant women, no correlation was detected between the degree of hydronephrosis and the VAS scores. In comparison of two groups in relation to BM, hydronephrosis degree, hydronephrosis side, serum creatinine levels, type and side of pain, no significant difference was identified. Forty-two percent of patients described a colic pain. While 91.7% of the patients benefitted from conservative treatment, 4 patients had JJ stent insertion. Conclusion: This study demonstrates that there is a correlation between acute flank pain and hydronephrosis and that the degree of hydronephrosis increases as the pain intensifies, especially in the nulliparous, such correlation is stronger. Keywords: Pregnancy, hydronephrosis, acute flank pain, nulliparous, multiparous

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What is already known about this topic?

Hydronephrosis can be occurred frequently in pregnancy and may generally cause no symptom or sign. However, it can occur severe acute flank pain or pyelonephritis in nullipar patients.

What does this article add?

Pregnancy-related hydronephrosis symptoms are mostly seen in the late second trimester or third trimester. If the hydronephrosis degree increases, the severity of accompanying symptom increases. Ureteral JJ stent placement is a safe method for patients who don't respond to conservative therapy.

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Introduction

Flank pain is a clinical condition occurring as well as in pregnancy and causes frequent emergency room (ER) visits. Most of the pregnant women presenting with flank pain might have hydronephrosis.[(1)] During the course of pregnancy mild hydronephrosis is reported in 90% of the patients. It is more frequently experienced by the nulliparous [(1-3)]. In pregnancies, hydronephrosis mostly develops in the right kidney and might cause pyelonephritis and urosepsis [(4)]. More frequent occurrence on the right side is ascribed to dextrorotation of the uterus and protection of the left ureter by the sigmoid colon.[(5)] It has been asserted that in the mechanism of hydronephrosis formation, in addition to uterine compression, is progesterone hormone's relaxing effect on the smooth muscle.[(6, 7)] In many studies, such issues as urinary stone disease causing urinary obstruction and urinary tract infection secondary to ureteric obstruction have been addressed.[(4)] Although hydronephrosis may be seen in 90% of pregnancies, in most of the cases they are observed without any symptoms.[(5, 8)] Some of these patients may present with severe flank pain, recurrent urinary tract infections and even renal dysfunction.[(5)] Most of the patients benefit from conservative approach and medical treatment. However, invasive procedures such as ureteral stent or renal nephrostomy may be needed in 6%. [(5, 9)]

In this study, factors other than pregnancy such as ureteral stones and urinary tract infection that might cause hydronephrosis and pain were excluded. We aimed to investigate the relationship between nulliparity and multiparity with hydronephrosis and pain, as well as the relationship between the degree of hydronephrosis and pain.

Material and methods

This study was carried out in Iğdır State Hospital between the dates of October 2018 and February 2019. During this time, 237 pregnant women applied to the hospital. In these patients, there were 93 pregnant

women accompanied by 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 consisting of Group 1 nulliparous (n = 24) and Group 2 multiparous (n = 24) pregnant women. Patients admitted to ER, gynecology and urology wards with acute flank pain were included in the study.

Written informed consent was obtained from patients' and their spouses prior to 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 US by the same radiologist. To assess the degree of hydronephrosis, maximal anterior–posterior diameter of the renal pelvis was measured by ultrasound. Visual analogue scale with numerical evaluation was obtained from all patients. Patients who had hematuria or pyuria on urinalysis, had signs of stone, pyelonephritis, or pyelonephrosis on urinary US and had positive urine culture were excluded from the study. Every patient had obstetric consultation, and the fetus and pregnancy status were evaluated. The patients included in the study were hospitalized, administered intravenous fluid replacement, paracetamol as analgesic, oral nitrofurantoin as antibiotic and were recommended bed rest. Antibiotic treatment was initiated as a prophylaxis and was given for 5 days. This antibiotic treatment was not based on any guideline recommendations. Ureteral JJ stents were placed in patients who did not respond to conservative treatment.

In the statistical comparison of the data, 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. Covariance of the degree of hydronephrosis 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 very strong). 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 early second trimester patient existed. Most were through 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 66.7% 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 was no statistically significant difference between the two groups.

In this study, age and gestational week values were found to be significantly lower in nulliparous pregnant women compared to 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 (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 hydronephrosis grade and VAS score values. VAS score values increased as the degree of hydronephrosis 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 was found between hydronephrosis grade 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 BM, 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 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 2 and the other three had grade 3 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 the pain. Control US was performed 2 weeks after JJ stent placement. Patients included in the study were followed up until 36^{th}-38^{th} gestational weeks in average. However, obstetric data were not obtained after giving birth.

Discussion

This study with prospectively evaluated pregnant women demonstrated that the degree of hydronephrosis and the number of pregnancies correlated with the severity of pain. While our findings are similar with the literature at some points, they seem to support the opposite view with some others. The incidence of acute flank pain and hydronephrosis more on the right side is consistent with the literature.[4, 5, 10] Some studies reported that hydronephrosis is more common especially in primigravidae [1, 5]. 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[5, 8]. Farr et al. reported that hydronephrosis was not observed in some of the patients with flank pain.[11]. In the same study, Farr et al. stated there was no correlation between hydronephrosis and pain intensity[11]. Many studies in the literature investigated hydronephrosis and its prevalence and the relationship between hydronephrosis and pain. The main difference in our study was that all patients were admitted with acute flank pain. Detection of hydronephrosis in all the pregnant women included in our study made us 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 degree of hydronephrosis and in higher VAS scores of the nulliparous than the multiparous [12]. In 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 and causing serious complications were reported [13]. No patients with urinary tract infection were included in our study and none of the patients included in the study developed pyelonephritis later. 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[5].

The most important difference that distinguish our study from other studies is the comparison between multipar and nulliparous patients and assessing only the relationship between flank pain and degree of hydronephrosis. In some studies, patients with symptom like fever and signs like WBC and CRP increase were included to study[14]. In contrast to these studies, patients who had only flank pain and normal biochemical tests but had no symptoms like fever were included to our study. We think that our study also enables a stronger evaluation for 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 [5, 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 one of the patients was removed before delivery and the other three stents were removed about 3-4 weeks after delivery. Removal of one of the stents before delivery was done upon the demand of the patient due to hematuria and irritative stent symptoms. 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 degrees 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. we think that JJ stent is

more effective than conservative treatment in pregnant women with advanced hydronephrosis [15]. JJ stents may be applied as a reliable method in these patients. The most important limiting factor of our study was the number of patients. A stronger result could be obtained with more patients. Birth and postnatal data of the patients included in our study are not available as well.

Conclusion

This study demonstrates that there is a relationship between acute flank pain and hydronephrosis and that the severity of pain increases as the degree of hydronephrosis increases. Especially in nulliparas, this relationship is stronger. Urinary US should be performed in all pregnant women presenting with acute flank pain. Ureteral JJ stent is a safe and effective treatment method in pregnant women who do not respond to conservative treatment.

Main Points:

- There is a relationship between acute flank pain and hydronephrosis and that the severity of pain increases as the degree of hydronephrosis increases,

- In the total cohort, a significant, medium level, positive correlation was spotted 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

References:

1. Rasmussen PE, Nielsen FR. Hydronephrosis during pregnancy: a literature survey. Eur J Obstet Gynecol Reprod Biol. 1988;27(3):249-59. Epub 1988/03/01. doi: 10.1016/0028-2243(88)90130-x. PubMed PMID: 3280355.

2. Goldfarb RA, Neerhut GJ, Lederer E. Management of acute hydronephrosis of pregnancy by ureteral stenting: risk of stone formation. The Journal of urology. 1989;141(4):921-2. Epub 1989/04/01. doi: 10.1016/s0022-5347(17)41053-6. PubMed PMID: 2926891.

3. Cietak KA, Newton JR. Serial qualitative maternal nephrosonography in pregnancy. Br J Radiol. 1985;58(689):399-404. Epub 1985/05/01. doi: 10.1259/0007-1285-58-689-399. PubMed PMID: 3904901.

4. Puskar D, Balagovic I, Filipovic A, Knezovic N, Kopjar M, Huis M, et al. Symptomatic physiologic hydronephrosis in pregnancy: incidence, complications and treatment. Eur Urol. 2001;39(3):260-3. Epub 2001/03/29. doi: 10.1159/000052449. PubMed PMID: 11275715.

5. Fainaru O, Almog B, Gamzu R, Lessing JB, Kupferminc M. The management of symptomatic hydronephrosis in pregnancy. BJOG. 2002;109(12):1385-7. Epub 2002/12/31. doi: 10.1046/j.1471-0528.2002.01545.x. PubMed PMID: 12504975.

6. Roy C, Saussine C, LeBras Y, Delepaul B, Jahn C, Steichen G, et al. Assessment of painful uretero-hydronephrosis during pregnancy by MR urography. Eur Radiol. 1996;6(3):334-8. Epub 1996/01/01. doi: 10.1007/BF00180604. PubMed PMID: 8798002.

7. Clayton JD, Roberts JA. The effect of progesterone on ureteral physiology in a primate model. The Journal of urology. 1972;107(6):945-8. Epub 1972/06/01. doi: 10.1016/s0022-5347(17)61177-7. PubMed PMID: 4624517.

8. Sadan O, Berar M, Sagiv R, Dreval D, Gewurtz G, Korczak D, et al. Ureteric stent in severe hydronephrosis of pregnancy. Eur J Obstet Gynecol Reprod Biol. 1994;56(2):79-81. Epub 1994/08/01. doi: 10.1016/0028-2243(94)90260-7. PubMed PMID: 7805971.

9. Zwergel T, Lindenmeir T, Wullich B. Management of acute hydronephrosis in pregnancy by ureteral stenting. Eur Urol. 1996;29(3):292-7. Epub 1996/01/01. doi: 10.1159/000473763. PubMed PMID: 8740034.

10. Faundes A, Bricola-Filho M, Pinto e Silva JL. Dilatation of the urinary tract during pregnancy: proposal of a curve of maximal caliceal diameter by gestational age. Am J Obstet Gynecol. 1998;178(5):1082-6. Epub 1998/06/03. doi: 10.1016/s0002-9378(98)70552-6. PubMed PMID: 9609588.

11. Farr A, Ott J, Kueronya V, Margreiter M, Javadli E, Einig S, et al. The association between maternal hydronephrosis and acute flank pain during pregnancy: a prospective pilot-study. J Matern Fetal Neonatal Med. 2017;30(20):2417-21. Epub 2016/11/04. doi: 10.1080/14767058.2016.1252328. PubMed PMID: 27806658.

12. Schutz H, Donovan ER, Hayes JP. Effects of parity on pelvic size and shape dimorphism in Mus. J Morphol. 2009;270(7):834-42. Epub 2009/01/06. doi: 10.1002/jmor.10723. PubMed PMID: 19123249.

13. Archabald KL, Friedman A, Raker CA, Anderson BL. Impact of trimester on morbidity of acute pyelonephritis in pregnancy. Am J Obstet Gynecol. 2009;201(4):406 e1-4. Epub 2009/08/21. doi: 10.1016/j.ajog.2009.06.067. PubMed PMID: 19691948.

14. Ercil H, Arslan B, Ortoglu F, Alma E, Unal U, Deniz ME, et al. Conservative/surgical treatment predictors of maternal hydronephrosis: results of a single-center retrospective non-randomized non-controlled observational study. Int Urol Nephrol. 2017;49(8):1347-52. Epub 2017/05/19. doi: 10.1007/s11255-017-1619-6. PubMed PMID: 28516385.

15. Tsai YL, Seow KM, Yieh CH, Chong KM, Hwang JL, Lin YH, et al. Comparative study of conservative and surgical management for symptomatic moderate and severe hydronephrosis in pregnancy: a prospective randomized study. Acta Obstet Gynecol Scand. 2007;86(9):1047-50. Epub 2007/08/23. doi: 10.1080/00016340701416713. PubMed PMID: 17712643.

Table List

Table 1. Patient demographic and clinical data

Table 2: Correlation of Hydronephrosis Grade with VAS Score in Total Cohort

Table 3: Correlation of Hydronephrosis Grade with VAS Score

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