

# Ureteral Stent Use in Pregnant Women with Persistent Flank Pain: Our Clinical Experience

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## ABSTRACT

**Objective:** The aim of this study was to evaluate the efficacy of JJ stent placement in pregnant patients with persistent flank pain.

**Methods:** The records of pregnant women with flank pain who presented between January 2011 and March 2016 were retrospectively reviewed. Patients who did not respond to initial conservative treatments and were hospitalized were enrolled in the study. Demographic data, clinical and laboratory findings, and surgical interventions, such as JJ stenting or percutaneous nephrostomy, as well as any complications were all recorded and evaluated.

**Results:** Forty-one pregnant women were included in the study. No surgical intervention was required in 7 (17%) cases after secondary conservative management, while 34 patients with persistent flank pain required JJ stenting/nephrostomy. The mean duration of hospitalization was  $2.9 \pm 2.7$  days. Complications of migration (n=3), lower urinary tract symptoms (n=1), and hematuria (n=2) were observed in the patients who had a stent inserted. Postpartum imaging (abdominal computed tomography scan) indicated that 5 (15%) of 32 patients required additional stone surgery.

**Conclusion:** Urgent JJ stent placement was found to be effective and safe and have a low complication rate in the management of pregnant women with persistent flank pain.

## INTRODUCTION

Renal colic during pregnancy is a rare but important condition that can have adverse effects on both the mother and the fetus, and may require hospitalization and invasive treatment.<sup>[1]</sup> Renal colic is the most common nonobstetric reason for hospitalization during pregnancy.<sup>[2]</sup> Urolithiasis is one of the main causes of renal colic in pregnant women.<sup>[3,4]</sup> The physiological dilation of the urinary tract may become symptomatic during pregnancy.<sup>[5]</sup> Hydronephrosis is the main finding in cases of a renal obstruction due to physiological dilatation or ureterolithiasis. As it uses no radiation, ultrasound (US) is the safest imaging method to determine the presence of obstruction<sup>[6]</sup> and perform routine evaluations in pregnancy with renal colic. However it may not be sufficient to differentiate etiological factors in pregnancy-induced hydronephrosis and lithiasis.

Conservative treatment, including hydration, antibiotics, and analgesia, represent the first-line therapy for renal colic during pregnancy.<sup>[7]</sup> If conservative therapy fails, or if there is a suggestion of febrile urinary tract infection, sepsis, obstructive uropathy, obstruction of a solitary kidney, or acute renal failure,<sup>[8]</sup> surgical intervention may be needed.

The objective of this study was to evaluate the efficacy as

well as the safety of JJ stent placement in pregnant women presenting with persistent renal colic attacks.

## MATERIAL AND METHODS

The records of pregnant women with symptomatic hydronephrosis (renal colic) who presented at the outpatient clinic between January 2011 and March 2016 were retrospectively reviewed. All of the patients were initially treated using conservative management, including hydration, analgesics, and the use of antibiotics in the event of bacteriuria. Secondary conservative management for patients who did not respond included hospitalization with bed rest, intravenous hydration together with analgesics, and antibiotics when bacterial infections were present. The patients who didn't respond to these therapies were considered to have persistent flank pain. The hospitalized patients were included in this retrospective cohort study program.

The medical files of these cases were evaluated with respect to patient age, pregnancy week, presenting symptoms, history of stone disease, degree of hydronephrosis, management, and hospitalization period. White blood cell (WBC) count, urinalysis, urine culture, and renal sonogra-

phy were performed for all patients at the first visit, and were repeated according to clinical findings. Pyuria was defined as  $>10$  WBCs/mm<sup>3</sup> of urine.<sup>[9]</sup> Bacteriuria was defined according to Schaeffer.<sup>[10]</sup>

Urological interventions, such as ureteral stent insertion or percutaneous nephrostomy (PCN), were performed when conservative therapy failed or in cases of febrile urinary tract infection, sepsis, obstructive uropathy, acute renal failure, or obstruction of a solitary kidney. Both interventions were performed under local anesthesia or sedo-analgesia. Intraoperative US was used to confirm the placement of the upper portion of the JJ stent. It was removed 3 to 6 weeks after delivery and control renal screening was performed 2 to 4 weeks after catheter removal with a CT scan. Catheters were replaced when required for more than 2 months. Complications of JJ stent placement, postpartum urinary system findings (presence of stone), as well as additional procedures were all recorded and evaluated.

## Statistical Analysis

Statistical analysis was performed with IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). All data were reported as mean value $\pm$ standard deviation, frequency, and percentage.

## RESULTS

Forty-one pregnant women were included in the study. The mean age of the patients was  $24.2\pm 5.3$  years and the mean gestational week was  $25.2\pm 6.2$ . All of the patients had flank pain and hydronephrosis. Renal stones larger than 5 mm were observed in 9 (22%) patients on the first visit using US imaging. All of the demographic and clinical data of the patients are provided in Table 1. No surgical intervention was required in 7 (17%) patients who had relief from their symptoms after secondary conservative management (parenteral treatment). In all, 34 patients with intractable flank pain required a surgical intervention. The most common indication was persistent pain (34/34), with 14 cases of acute pyelonephritis (14/34) and 1 case of anuric acute renal failure in a single kidney (1/34). A unilateral ureteral stent was inserted into 31 patients and a bilateral application was performed for 2 patients. One patient treated with PCN as a result of the failure of a ureteral stent placement; however, nearly all (33/34) ureteral stent placements were successfully completed. The clinical presentation and treatment methods can be seen in Table 2. The mean duration of hospitalization was  $2.9\pm 2.7$  days. The median duration of the stenting period was 13 weeks (min-max : 1–30 weeks). Complications such as migration (n=3), lower urinary tract symptoms (LUTS) (n=1), and hematuria (n=2) were observed in some stent patients. JJ stents that migrated were replaced with a new catheter in 2 patients, while the third patient who experienced migration declined to have a new catheter inserted. Hematuria

**Table 1.** Demographic and clinical data

Parameter (n=41)	n	%
Age (year), Mean $\pm$ SD	24.2 $\pm$ 5.3	
Pregnancy week, Mean $\pm$ SD	25.2 $\pm$ 6.2	
Trimester on presentation		
First	4	10
Second	17	41
Third	20	49
Positive history of urinary calculus	7	17
Preoperative Ultrasound findings		
Presence of 6 (15)		
Right	30	73
Bilateral	5	12
Presence of stone in any kidney (5 mm<)	9	22

SD: Standard deviation.

and LUTS were observed in 3 patients approximately 2 weeks after the stent placement and were managed conservatively. The details of complications observed in stent patients are given in Table 3. No pregnancy complication was noted in any of the patients, and all of the fetuses were delivered without complications. Postpartum imaging (abdominal CT scan) of 31 patients with a JJ stent and 1 patient who underwent PCN was performed to determine the need for additional intervention. Ureteral stones were found in 2 (6%) patients, kidney stones were found in 7 (22%) patients, and both ureteral and kidney stones were found in 1 (3%) patient. No stone was found in 22 (69%) patients. Two patients with a stent were excluded due to the lack of final imaging results. In all, 5 of 32 patients required additional intervention. Uretorenoscopy (URS) plus laser lithotripsy was the primary treatment (n=3; 9%), and percutaneous nephrolithotripsy (PNL) (n=1; 3%) as well as extracorporeal shock wave lithotripsy (ESWL) (n=1; 3%) were also used as definitive treatments.

## DISCUSSION

Conservative treatment is the preferred first-line therapy for renal colic during pregnancy.<sup>[7,11]</sup> Surgical intervention, such as ureteral stent insertion, URS, or PCN, is applied when conservative treatment fails. In the present study, in the management of pregnant women presenting with persistent flank pain or hydronephrosis, emergency JJ stent placement was found to be a safe and effective approach with a very low complication rate.

The physiological dilatation of the urinary tract in pregnancy may become symptomatic, and if left untreated, it can result in severe renal infection and urinary sepsis that may threaten the life of the mother and child.<sup>[5]</sup> The progression of asymptomatic bacteriuria to symptomatic infection may be a result of the presence of hydronephrosis during pregnancy. Stasis may also contribute to stone formation in the urinary collecting system.<sup>[12]</sup>

**Table 2.** Clinical presentation and treatment methods for renal colic during pregnancy

	n	%
Symptoms and findings		
Flank pain	41	100
Acute pyelonephritis	14	34
Acute renal failure	1	2
Intervention		
Ureteral JJ stent	33	81
Percutaneous nephrostomy	1	2
Conservative	7	17

**Table 3.** Complication rate in stent patients

Presence of complication	JJ stenting patients (n=33)	
	n	%
Migration	3	9
LUTS	1	3
Hematuria	2	6
Total	6	18

LUTS: Lower urinary tract symptoms.

US offers the advantages of being non-invasive, it is readily available, and requires no radiation exposure,<sup>[1]</sup> but it has limited sensitivity to detect stones and visualize the ureter. It can be difficult to differentiate the causes of renal obstruction.<sup>[13]</sup> The sensitivity of US in such cases has been reported to be between 38% and 95%.<sup>[14-16]</sup> In our study, US visualized at least a renal stone in 22% of cases. US is still the first-line imaging method to determine hydronephrosis in pregnant women. The presence of a ureteral stone with symptomatic hydronephrosis during pregnancy is a rare condition, affecting about 1 in every 1500 to 3000 pregnancies.<sup>[14,16]</sup> There is a similar probability of occurrence in a non-pregnant woman.<sup>[17]</sup>

Due to the limitations of US imaging in the detection of a stone during pregnancy, postpartum CT imaging was also used to determine stone incidence. As a result, 10 (31%) of 32 patients were found to have stone disease, and 5 (12%) of the total 41 patients also received definitive treatment for urinary stone disease: URS and laser lithotripsy (n=3), PNL (n=1), and ESWL (n=1).

Physiological hydronephrosis during pregnancy is more common on the right side due to uterus enlargement on the right side and a dilated uterine vein compressing the right urinary tract<sup>[18,19]</sup> while the sigmoid colon protects the left ureter from the compression. Andreoiu et al.<sup>[1]</sup> found a larger proportion of right-sided hydronephrosis due to uterine compression and determined that left-sided colic was more likely to indicate the presence of a stone. Our study confirmed that the right-sided hydronephrosis was much common than left-sided hydronephrosis.

Some studies in the literature have demonstrated that the success rate of conservative treatment in patients with symptomatic hydronephrosis was between 92.9% and 94%.<sup>[5,20]</sup> In contrast, our success rate was determined to be 17%. This may be due to not including patients who were successfully treated with the first effort at conservative therapy.

Indications for mechanical drainage in pregnant patients with hydronephrosis include unresponsiveness to conservative therapies (ongoing sepsis despite antibiotherapies) and any impairment of renal function, pain, or obstruction.<sup>[21]</sup> In our study, drainage was necessary for 34 patients. Fainaru et al.<sup>[20]</sup> reported a mean duration of hospitalization of 5.3 days in a similar study, while in this study the mean duration was 2.9 days. The longer period of hospitalization in that study may have been due to the fact that conservative treatment was applied to more than 90% of the patients, and the shorter duration in our study may be related to progressive healing after invasive treatment, such as ureteral stenting. The retrospective design of our study prevented the addition of quality of life or pain scoring data, which can be considered a limitation; however, the short duration of hospitalization suggests a dramatic response to treatment. Urinary infection rates with symptomatic hydronephrosis in pregnancy have been reported as occurring in 22.9%<sup>[22]</sup> and 28%<sup>[23]</sup> of patients. In our study, the rate was 34%, and ureteral stenting were performed in these cases. Stent placement may have complications, such as catheter migration, stent irritation, stent encrustation, hematuria, ascending pyelonephritis caused by vesico-urethral reflux, or stone formation.<sup>[24-28]</sup> The overall complication rate of JJ ureteric stenting, i.e. stent migration, LUTS, and hematuria, was found to be 18% in this study, which is consistent with other series (6-37%). Similarly, as expected, we also found that most of the cases occurred after mid-pregnancy.<sup>[11]</sup> Tortuosity of the ureter in late pregnancy may limit the placement of a JJ stent.<sup>[29]</sup> Yet, although most of our patients were in the third trimester, nearly all stenting applications were successful.

In this study group, ureteroscopy was not required and therefore all of the surgical procedures were performed under local anesthesia or sedo-analgesia. Although ureteroscopy and holmium laser lithotripsy can be used safely for diagnostic and therapeutic purposes during pregnancy,<sup>[30]</sup> it should be considered that drugs often used in general anesthesia, such as halothane and nitric oxide,<sup>[1,30,31]</sup> are pregnancy category C drugs and the effects on the fetus are still unknown.

## CONCLUSION

Based on our findings and the available literature data, it was concluded that urgent JJ stent placement had a very low complication rate and was a safe and effective approach in the management of pregnant women presenting with conservative therapy-resistant flank pain.

### Ethics Committee Approval Retrospective study.

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### Peer-review

Internally peer-reviewed.

### Authorship Contributions

Concept: U.C., M.T.; Design: U.C., M.T.; Data collection &/or processing: U.C., F.N.; Analysis and/or interpretation: U.C., M.T., K.S.; Literature search: U.C., M.T., K.S.; Writing: U.C., F.N., K.S.; Critical review: U.C., M.T., F.N., K.S., K.S.

### Conflict of Interest

None declared.

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## İnatçı Flank Ağrısı Olan Gebelerde Üreteral Stent Uygulanımı: Klinik Deneyimlerimiz

**Amaç:** İnatçı flank ağrısı olan gebe hastalardaki JJ stent uygulanmasının güvenilirliğini ve etkinliğini değerlendirmeyi amaçladık.

**Gereç ve Yöntem:** Ocak 2011 ve Mart 2016 tarihleri arasında flank ağrı nedeniyle başvuran, birincil konservatif tedavilere cevap vermeyen ve bu sebeple kliniğimize interne edilen hastalar geriye dönük olarak tarandı. Hastaların yaş, gebelik haftası, başvuru semptomları, taş öyküsü, hidronefroz derecesi, uygulanan tedavi şekli ve yatış süreleri yanında JJ stent ya da perkütan nefrostomi uygulanan hastalar ve komplikasyonlar kaydedildi.

**Bulgular:** Çalışmaya 41 gebe hasta dahil edildi. Yedi hasta ikincil konservatif tedavilere yanıt verdi ve tedavi sonrasında ek bir girişim ihtiyacı duyulmadı. Tedaviye yanıt alınamayan ve inatçı flank ağrı olarak değerlendirilen 33 hastaya JJ stent, bir hastaya ise JJ stent uygulanamaması üzerine perkütan nefrostomi katateri uygulandı. Ortalama hastane yatış süreleri  $2.9 \pm 2.7$  gündü. Stent uygulanan olgularda migrasyon (n=3), alt üriner sistem semptomları (n=1) ve hematüri (n=2) gibi komplikasyonlar izlendi. Otuz iki hastanın postpartum dönemdeki görüntülemelerine göre; 5 (%15) hastada taşa yönelik ek girişim uygulandı.

**Sonuç:** Mevcut literatür bilgileri ile bulgularımız ışığında inatçı flank ağrı ile başvuran ve renal dilatasyon saptanan gebe hastalarda JJ stent uygulaması etkili ve düşük komplikasyon oranları ile güvenli bir yaklaşım olarak tespit edilmiştir.

**Anahtar Sözcükler:** Flank ağrı; gebelik; hidronefroz; JJ stent.