

## Original Research Article

# Minimally invasive procedures for urological disorders in pregnant patients: our experience

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## ABSTRACT

**Background:** Urological disorders like stone disease, pyonephrosis secondary to obstruction and trauma are common during pregnancy with global incidence of 1 in 250 to 1 in 3000. These diseases can complicate any pregnancy and timely diagnosis and management is of utmost importance for safety of the mother and fetus. Managing these cases entails morbidity and minimally invasive procedures avoiding anesthesia have definite advantage.

**Methods:** It was an observational study. Pregnant patients with nephrolithiasis, pyonephrosis, complicated post-traumatic ureteropelvic junction (PUJ) obstruction (PUJO) and trauma were included in the study.

**Results:** Out of total 84 cases, 45 required intervention. Percutaneous nephrostomy (PCN) for pyonephrosis secondary to PUJO and obstructed PUJ calculus was done in 11 and 14 cases respectively. Bilateral PCN for bilateral nephrolithiasis was done in 7 cases. Silicon double-J stenting for ureteric calculus was done in 13 cases. One case of spontaneous fornicial rupture of kidney without stone disease was managed conservatively as were 4 cases of trauma with concomitant renal injury, 18 cases of non-obstructive renal stones and 16 cases of pyelonephritis. Seven patients lost follow-up. One case each of pyonephrosis and polytrauma had fetal death at term unrelated to urological cause. In rest 75 patients, primary pathology was tackled after 6-8 weeks of delivery.

**Conclusions:** Urological diseases during pregnancy are not an uncommon entity and can pose risk to both mother and fetus. With good clinical vigil, use of minimally invasive procedures, close monitoring and follow up, these patients can be safely managed without any adverse events to the fetus and mother.

**Keywords:** Pregnancy, Minimally invasive, Urological disorders, Renal calculi, PCN

## INTRODUCTION

Pregnancy induces significant physiologic and anatomic changes in the body including urinary system with dilatation of renal calyces, pelvis, and ureters which may be seen in up to 90% of pregnant women.<sup>1</sup> The dilatation more prominent on right side, results from mechanical compression of the enlarging gravid uterus as the pregnancy goes on as well as from muscle relaxing effect of circulating progesterone.<sup>2,3</sup> The development of

hydronephrosis and dilatation in urinary tract is most pronounced during the third trimester and parallels the occurrence of pyelonephritis during pregnancy in susceptible women.<sup>4</sup> A pregnancy may be complicated by several different urological problems including hydronephrosis, stone disease, pyonephrosis secondary to obstruction, trauma with significant impact on fetal and maternal wellbeing and outcome of pregnancy.<sup>5-7</sup> These diseases can complicate any pregnancy and timely diagnosis and intervention is of utmost importance for

safety of the mother and fetus. However, management of urological diseases during pregnancy is constrained by inability to use the usual diagnostic and therapeutic modalities as most of them entail using ionizing radiation. A further reduction in morbidity can be achieved by using minimal invasive procedures avoiding anesthesia with inherent risks.

With this back ground we conducted the present study to find out the feasibility of minimally invasive procedures for complicating urological issues during pregnancy at our institution.

## METHODS

The study was conducted between September 2014 and august 2018 at Department of urology, Sheri Kashmir Institute of Medical Sciences Srinagar, Kashmir. All pregnant patients with a complicating urological issue admitted in our department were included in the study. Pregnant women with a urological malignancy were excluded from the study. A total of 84 patients were included in the study. Imaging modalities deemed safe to pregnant patients including ultrasonography (2 USG) and magnetic resonance imaging (MRI) were used during the work up of the patients. Patients were managed conservatively or by minimally invasive intervention in close coordination with the obstetric and radiology team. All patients were followed till term and definitive urological procedure where ever indicated was done 6-8 weeks after delivery.

### Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS version 20.0 (SPSS Inc., Chicago, Illionos, USA). Relevant tests were applied for specific type of variable.

## RESULTS

The study included 84 pregnant women with a complicating urological issue. Sixteen (19%) patients presented in first trimester, 19 (22.6%) in second trimester while majority i.e. 49 (58%) presented in last trimester. Table 1 shows the urological disease among the study population. Thirty nine (46.43%) patients were managed conservatively while the remaining 45 (53.57%) patients required intervention in the form of percutaneous nephrostomy (PCN) or double-J (DJ) stenting as detailed in Table 2. PCN for pyonephrosis secondary to PUJO and obstructed PUJ calculus was done in 11 and 14 cases respectively with seven cases requiring bilateral DJ stenting for bilateral nephrolithiasis. Patients managed conservatively included one patient with spontaneous fornicial rupture, 4 patients with renal trauma (grade-II in two patients and grade-III in two patients as defined by American Association for the Surgery of Trauma Organ Injury Severity Scale for the kidney), 18 patients with

non-obstructing calculi and 16 patients with pyelonephritis which were managed by supportive care and antibiotics as indicated. Seven (8.33%) patients were lost to follow up subsequently and fetal outcome was available for remaining 77 (91.66%) patients which included a fetal demise in 2 (2.38%) patients and uneventful term and neonatal period in remaining 75 (89.28%) [Table 3].

**Table 1: Urological diseases among study population.**

Diagnosis	No. of patients (n=84) (%)
Pyonephrosis	11 (13.10)
Obstructing renal calculi	34 (40.48)
Non-obstructing renal calculi	18 (21.42)
Pyelonephritis	16 (19.05)
Spontaneous fornicial rupture	1 (1.19)
Renal trauma	4 (4.76)

**Table 2: Interventions carried out.**

Intervention	No. of patients (n=45) (%)
PCN Unilateral	
PUJO	11 (24.44)
Obstructing calculi	14 (31.11)
PCN Bilateral	
Obstructing calculi	7 (15.55)
DJ Stenting	13 (28.89)

**Table 3: Foetal outcome.**

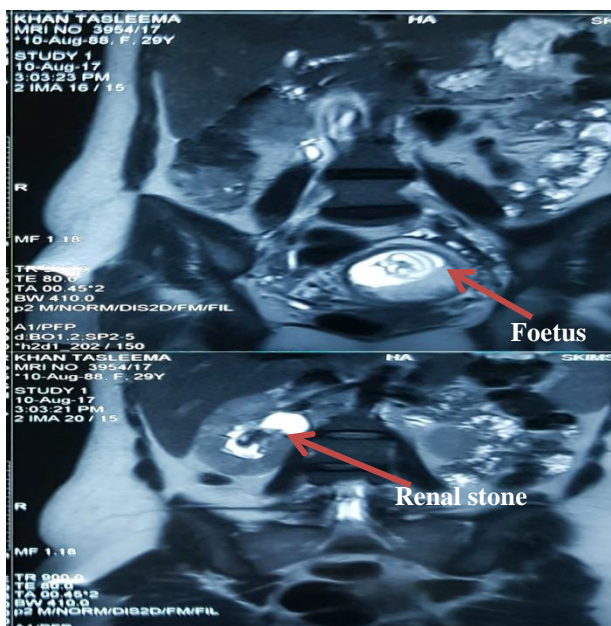
	N (%)
Lost to follow up	7 (8.33)
Foetal demise	2 (2.38)
Uneventful term and neonatal period	75 (89.28)

## DISCUSSION

Urological diseases complicating a pregnancy present a difficult diagnostic and treatment dilemma for the urologist. The incidence of urolithiasis and associated disorders is approximately 1 per 1500/3000 deliveries.

A common nonobstetric reason for admission during pregnancy is pyelonephritis which can complicate 1-2% of pregnancy with potential for serious maternal and fetal morbidity including preterm labor and delivery.<sup>8</sup> Among the patients with pyelonephritis, 60-75% of the women develop it during third trimester at the time when stasis and hydronephrosis are most pronounced.<sup>9</sup> The anatomic and physiologic changes of gravid state alters the morbidity of the bacteriuria in pregnant women with higher progression to pyelonephritis and possibly pyonephrosis if not treated in time.<sup>10,11</sup> This underscores the need for treating screening bacteriuria in pregnant

women which has been shown to significantly reduce the incidence of acute pyelonephritis.<sup>12</sup> In our series 16 pregnant women with pyelonephritis were managed by intravenous antibiotics and supportive care. Third generation cephalosporins were started empirically after obtaining urine and blood culture and the antibiotics were tailored as per culture sensitivity reports taking safety of drug during pregnancy into due consideration. Eleven patients in our series presented with pyonephrosis and were managed by PCN and intravenous antibiotics. We used a PCN instead of internal stent in pyonephrosis during pregnancy to achieve a good and dependable drainage with the option of flushing in case of blockage of PCN tube. Denstedt et al also recommend PCN over internal stent in pregnant patients with urosepsis.<sup>13</sup> The antibiotics were given parentally till patients was afebrile for more than 24 hours.



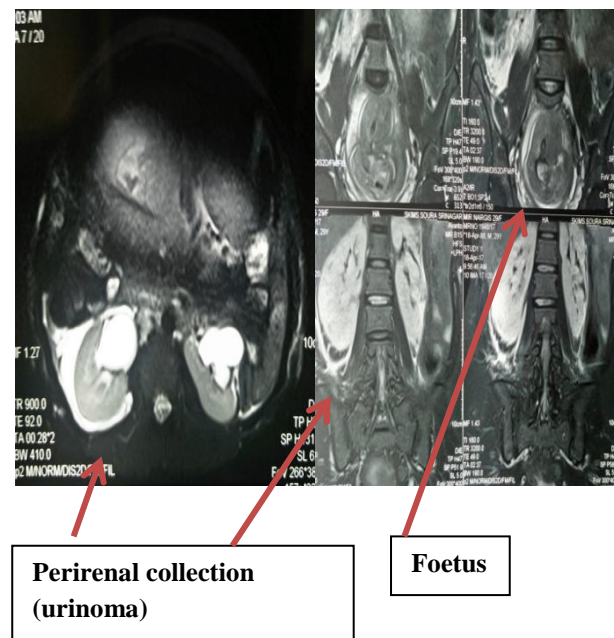
**Figure 1: MRI showing renal stone in a pregnant lady.**

Another common urological problem that can complicate pregnancy and the most common nonobstetric reason for hospital admission during pregnancy is pain from renal colic with symptomatic stones occurring at a rate of 1 in 250 to 1 in 3000.<sup>14-16</sup> The diagnosis of urolithiasis is often challenging in pregnant patient as the symptoms and signs may be masked by gravid uterus and up to 28% women are misdiagnosed as appendicitis, diverticulitis, or placental abruption.<sup>17</sup> In our series use of ionizing radiation was completely avoided and the initial modality to evaluate such patients was USG. Though USG has a low sensitivity for picking up calculi as well as differentiating hydroureteronephrosis of pregnancy from that caused by calculi. MRI was used frequently but judiciously during our study owing to the lack of radiation exposure and calculi were identified as signal voids overlying high signal intensity of urine Figure 1. The disadvantage with the MRI is the high cost, time consuming and the fact that small stones may be missed.

Most patients with urolithiasis presenting with colic were managed conservatively and interventions were reserved for failure of conservative management as 50-80% stones are expected to pass spontaneously.<sup>18,19</sup> Whenever indicated patients were managed by PCN/DJ stenting and definitive procedure was deferred till delivery. Denstedt et al have advocated using a PCN especially in the setting of sepsis while placement of a DJ stent and confirmation of position by ultrasound has been recommended as an alternative by others.<sup>13,20</sup>

Some studies have shown safety and efficacy of ureteroscopy for diagnosis and management of urolithiasis during pregnancy which has the advantage of offering single and definitive intervention and at the same time may avoid a stent or nephrostomy tube with their complications.<sup>21</sup> However, ureteroscopy needs to be done under general anesthesia or spinal anesthesia with the attendant risks to the developing fetus as well as the inability to use fluoroscopy during ureteroscopy in pregnancy may result in suboptimal results and need for auxiliary procedures. In addition, as already mentioned a high spontaneous passage rate of 50-80% justifies a conservative/minimally invasive procedure.

One patient who presented with spontaneous fornicial rupture was managed conservatively (Figure 2). Less than 20 cases of spontaneous rupture of collecting system or renal parenchyma have been reported in literature and management has varied widely from conservative with supportive care to nephrectomy depending upon the degree of extravasation and hemodynamic stability.<sup>22-24</sup>



**Figure 2: MRI showing right perirenal collection in a pregnant lady with right spontaneous fornicial rupture.**

The mode of delivery was decided by obstetric team guided by obstetric indications. In our series two cases

(2.38%) of fetal demise were noted among the patients followed till term. Mandal et al reported a fetal demise rate of 6.06% in their study.<sup>25</sup>

One of the major limitations in our study was absence of a control group.

## CONCLUSION

Urological diseases during pregnancy are not an uncommon entity and can pose risk to both mother and fetus. It seems that with good clinical vigil, use of minimal invasive procedures, close monitoring and follow up, definitive intervention can be deferred till delivery in majority of patients without subjecting the mother and fetus to major surgical stress and without compromising the outcome. It is pertinent to mention that more controlled studies need to be conducted to validate the results.

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