

Urological disorders and pregnancy: An overall experience

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Abstract

Aim: Pregnancy is an anatomical and physiological altered state and the presence of various urological problems not only aggravates the disease itself, but also results in unfavourable pregnancy outcome. Aim is to highlight obstetric outcome in pregnant women with urological problems.

Materials and Methods: Longitudinal prospective cohort study conducted in tertiary care hospital, IPGME and R, Kolkata from Jan 2011 to Dec 2012. All pregnant women with urological problems were included as subjects.

Results: A total of 33 subjects were followed up throughout their antenatal period. Among them majority (72.72%) presented with hydro nephrosis followed by hydroureter (60.6%), PUJ obstruction and pyelonephritis each with incidence of 15.15%, then urolithiasis (12.12%), nephrolithiasis (6.06%) and renal abscess (12.12%). Interventions required were DJ stenting (72.72%), pyeloplasty (15.15%) and others were RURS, abscess drainage and ATT. The pregnancy outcome was complicated with preterm labor in majority of patients (45.45%), oligohydramnios (18.18%), PIH (9.09%) and still birth (6.06%). Twenty four live birth were there. Majority required NICU admissions as predominantly prematurity was an important concern. Majority women with hydronephrosis underwent DJ stenting.

Conclusion: Preterm labor is an important obstetric concern. Vaginal delivery is the choicest mode of termination and LSCS can be reserved for obstetric reason. DJ stenting is safe and practical approach for continuation of pregnancy with hydronephrosis. Regular follow up, vigilant antenatal care and multidisciplinary approach from urologist, obstetrician and neonatologist will bring out successful pregnancy outcome.

Key Words: Double J stenting, hydronephrosis, pregnancy, urological disorders

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INTRODUCTION

Gestation in many times alters the anatomy and physiology of kidney and urinary tract in such way that subsequently it can result in various symptoms and pathological conditions. The kidneys increase in size by 1–1.5 cm during pregnancy and volume increases by up to 30% due to increase in renal vascular and interstitial volume.^[1] The total number of nephrons

remains constant but the glomerular filtration rate (GFR) is raised approximately by 40–50%.^[2] The renal pelvises and calyceal systems are dilated because of smooth muscle relaxing effect of progesterone and also mechanical compression of the ureters by the enlarged gravid uterus at the pelvic brim. Dilatation of the ureters and renal pelvis (hydroureter and hydronephrosis) is more prominent on the right than the left,

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and it has been observed in 80% of pregnant women due to physiological dextrorotation of gravid uterus and engorged right ovarian vein draining into renal vein on the right side.^[3] These changes are visualized on ultrasound examination by the mid-second trimester and it takes to 4–6 weeks for resolving in postpartum period. Serial sonological measurements demonstrate that the incidence of hydronephrosis is maximally reached at 28 weeks which contributes 60–80% of overall incidence.^[4] The dilated collecting system contains increased amount of 200–300 mL urine which is responsible for urinary stasis and 40% increased risk for developing pyelonephritis in pregnant women in comparison to nonpregnant women.^[5] The management options of gestational hydronephrosis are based on the coexisting renal pathological conditions such as stone, pyelonephritis, and intrinsic renal disease. In a previous study conducted where the insertion of double J stent was found more effective than conservative therapy alone in moderate to severe hydronephrosis.^[6] Several urological problems can arise during pregnancy including hydronephrosis, hydroureter, pyelonephritis, urolithiasis, pelviureteric junction (PUJ) obstruction, and bladder tumor along with the different symptoms such as flank pain, fever, retention of urine, hematuria, dysuria, and/or combination of multiple symptoms.^[7] Differentiation from the physiological changes in the pregnancy is an important aspect. With this background, our study was done to find out the different urological disorders in pregnancy and their interventions for better obstetric outcomes.

MATERIALS AND METHODS

Following the approval of Local Ethical Committee of IPGME and R, Kolkata, the study population included pregnant women diagnosed with preexisting and newly diagnosed urological disease. The patients were recruited from the Department of Obstetrics and Gynecology and Urology between 2009 and 2014. It was a prospective longitudinal study. A total of 33 women with preexisting or newly diagnosed urological disorders were included as cases. Age- and parity-matched women with

singleton pregnancies were treated as controls. Exclusions for the study were active urinary tract infection (UTI), lower urinary tract disorders, gestational or nongestational diabetes mellitus, preeclampsia or chronic hypertension, chronic kidney or liver diseases, and chronic vascular or connective tissue diseases. Regular antenatal follow-up was carried out. The well-being of the fetus and the pregnancy was established with a biophysical profile scoring. Gestational age was established by the first date of the last menstrual period and confirmed by the findings of the first trimester ultrasound examinations. The pregnancy events were defined according to Williams Text Book of Obstetrics 22nd Edition.^[8] The demographic data including the maternal age, gravidity, parity and abortion numbers, and the outcome of the previous pregnancies were obtained at the time of first admission.

Numerical variables were compared between both groups by Student's unpaired *t*-test. For paired comparisons, the paired *t*-test was used. The Chi-square test or Fischer's exact test was used for intergroup comparison of the categorical variables. All analyses were two-tailed and *P* < 0.05 was considered to statically significant. The Software used were Statistica version 6 (Tulsa, Oklahoma, USA: Stat Soft Inc., 2001) and GraphPad Prism version 5 (San Diego, California, USA: Graph Pad Software Inc., 2007).

RESULTS

A total of 66 pregnant women diagnosed with urological problems were included in the study. Additional 70 pregnant women without any complications were taken as control. Table 1 showed the demographic variables, this did not show any statistical differences in terms of age, body mass index, and residing place among study and control group. All patients in control group were primigravida, whereas from study group, 36 (54.54%) and 30 (45.45%) patients were primigravida and multigravida (*P* < 0.001), respectively. The study population revealed following urological diseases [Table 2]: moderate hydronephrosis 42 (63.63%), gross hydronephrosis

Table 1: Demographic variables of pregnant women with urological disorders

Characters	Number of patients (<i>n</i> = 66) Study group (%)	Number of patients (<i>n</i> = 70) Control group (%)	<i>P</i>
Age in years			
19–24	22 (33)	45 (64.28)	0.008
25–29	30 (45.45)	14 (20)	
30–34	14 (21.21)	11 (15.71)	
Parity			
Primi	36 (54.54)	70 (100)	<0.001
Multi	30 (45.45)		
Body mass index			
≥24	62 (93.93)	67 (95.71)	1
≥30	4 (6.06)	3 (4.3)	
Residing place			
Urban	22 (33)	22 (31.42)	1
Rural	44 (66.66)	48 (68.57)	

6 (9.09%), hydroureter 40 (60.6%), urolithiasis 8 (12.12%), nephrolithiasis 4 (6.06%), PUJ obstruction 10 (15.15%), pyelonephritis 10 (15.15%), and renal abscess and bladder tumor 8 (12.12%) cases. They presenting symptoms were such as [Table 3] pain abdomen (flank pain) 66 (100%), hematuria 6 (9.09%), dysuria 60 (90.9%), retention of urine 52 (78.78%), fever 22 (33.33%), and often multiple symptoms were presented synonymously in a single patient. The following interventions were carried out [Table 4]: Double J stenting (DJ stenting) 48 (72.72%), pyeloplasty 10 (15.15%), ureteroscopic lithotripsy 2 (3.03%), abscess drainage 8 (12.12%), antitubercular therapy 6 (9.09%), and antibiotics 36 (54.54%) cases. The obstetric outcomes in the study

Table 2: Presenting features in the study group

Presenting features	Number of patients (n=66) (%)
Moderate hydronephrosis	42 (63.63)
Gross hydronephrosis	6 (9.09)
Hydroureter	34 (60.6)
Urolithiasis	8 (12.12)
Nephrolithiasis	4 (6.06)
Pelviureteric junction obstruction	10 (15.15)
Pyelonephritis	10 (15.15)
Renal abscess	8 (12.12)

Table 3: Presenting symptoms in the study group

Presenting symptoms	Number of patients (n=66) (%)
Swelling abdomen	48 (72.72)
Pain abdomen (loin to groin)	66 (100)
Hematuria	6 (9.09)
Dysuria	60 (90.9)
Retention of urine	52 (78.78)
Fever	22 (33.33)

Table 4: Interventions carried out in the study group

Interventions	Number of patients (n=66) (%)
Double J stenting	48 (72.72)
Pyeloplasty	10 (15.15)
Ureteroscopic lithotripsy	2 (3.03)
Abscess drainage	8 (12.12)
Antitubercular therapy	6 (9.09)
Antibiotics	36 (54.54)

Table 5: Pregnancy outcome in both study and control group

Pregnancy outcome	Number of patients in the study group (n=66) (%)	Number of patients in the control group (n=70) (%)	P	RR (95%CI)
Preterm labor	30 (45.45)	10 (14.28)	0.001	3.18 (1.604–6.311)
Abortion	4 (6.06)	0	0.101	-
Oligohydramnios	12 (18.18)	5 (7.14)	0.168	2.55 (0.84–7.74)
PIH	6 (9.09)	0	0.031	-
PPH	6 (9.09)	1 (1.43)	0.096	6.36 (0.69–58.92)
Preeclampsia	2 (3.03)	0	0.320	-
FGR	20 (30.3)	2 (2.86)	<0.001	10.61 (2.46–45.72)
Still birth	4 (6.06)	0	0.101	-
Operative intervention (LSCS)	8 (12.12)	21 (30)	<0.001	0.71 (0.07–0.44)
Vaginal delivery	54 (81.81)	49 (70)	<0.001	2.73 (1.84–4.04)

PIH: Pregnancy-induced hypertension, PPH: Postpartum hemorrhage, LSCS: Lower segment caesarean section, RR: Relative risk, CI: Confidence interval, FGR: Fetal growth restriction

group were [Table 5] preterm labor 30 (45.45%), miscarriage 4 (6.06%), oligohydramnios 12 (18.18%), pregnancy-induced hypertension 6 (9.09%), postpartum hemorrhage 6 (9.09%), preeclampsia 2 (3.03%), fetal growth restriction 20 (30.3%), and still birth 4 (6.06%) cases. However, in the control group, preterm labor was observed only in 10 (14.28%) cases. The mode of delivery was vaginal in 54 (81.81%) cases in the study group and 8 (12.12%) patients underwent cesarean section. However, among control which was 70% delivered vaginally and only 30% underwent cesarean section. Fetal outcome was observed in majority with low birth weight babies and prematurity [Table 6].

DISCUSSION

Hydronephrosis occurs in many of pregnant women and affects the right side more than the left side.^[5,9] Mild physiologic hydronephrosis is evident sometimes as early as 6 weeks of gestation due to the effect of progesterone and it takes 4–6 weeks to resolve in postpartum period which is not a pathological condition. Dilation is usually limited to the ureter proximal to the pelvic brim. Moderate to severe hydronephrosis is a matter of concern and mostly presented at the beginning of third trimester.^[10] The right side is affected more and the left side is protected from dilation by the loaded sigmoid colon.^[10] The management of severe pure gestational hydronephrosis could be done by conservative treatment or by insertion of double J stent. The symptoms of severe pure gestational hydronephrosis improved after conservative or double J insertion treatments.^[11]

Although the study used the predefined calyceal diameter values^[12] to classify the severity of the gestational hydronephrosis, the variation to define hydronephrosis ranged between 43% and 100%.^[13] Faundes *et al.* depicted the normal curve of dilatation of the urinary tract, where upper limit of calyceal diameter was more than 15 mm at mid-second trimester.^[13] To overcome the variability of the definition of hydronephrosis, we had included

Table 6: Fetal outcome

Fetal outcome	Number of fetuses in the study group (n=66) (%)	Number of fetuses in the control group (n=70) (%)	P	RR (95% CI)
Fetal demise	4 (6.06)	0	0.009	-
NICU admission	40 (60)	13 (18.58)	<0.001	3.26 (1.86–5.73)
Low birth weight babies	48 (72.77)	26 (37.1)	0.001	3.18 (1.604–6.311)
Prematurity	30 (45.45)	10 (14.28)	0.001	3.18 (1.604–6.311)

NICU: Neonatal Intensive Care Unit, RR: Relative risk, CI: Confidence interval

the symptomatic patients with flank pain along with calyceal diameter >15 mm of any side. In this study, the conservative treatments followed were, i.e., hospitalization, intravenous hydration, and intravenous antibiotic and had to receive surgical treatment such as DJ stenting during follow-up period in some patients nonresponsive to conservative treatment. Whenever the conservative treatment did not effectively respond, the insertion of a double J stent was done, and subsequently the patients became asymptomatic. Although we did not experience any serious complication related to the insertion of double J stent during pregnancy, the previous literatures observed the procedure not to be completely safe and effective. Ringel *et al.* noted 32% of the stents needed prior removal than the scheduled time because of its side effects.^[14] Frequency, urgency, dysuria, flank pain, or suprapubic pain could be experienced by the patients with ureteral stents *in situ*. UTI, migration of the stents, forgetting of the stent, and obstruction of the stent need its removal or exchange of the device though in our series, no stent-related complications were noted.

Urinary calcium excretion doubles during pregnancy due to increased GFR and thereby causing decreased tubular reabsorption. Increased intestinal absorption of calcium, mobilization of calcium from the bone (driven by the placental formation of 1,25-dihydroxycholecalciferol), and feedback suppression of parathyroid hormone altogether these changes lead to absorptive hypercalciuria.^[15] Due to the increased GFR in pregnancy and subsequent increase in net urinary excretion of uric acid can contribute to calcium oxalate stone formation.^[16] The first consideration in the management of urolithiasis in pregnancy should be conservative therapy (appropriate hydration and analgesia). With conservative therapy, approximately 70–80% of stones will pass through the renal tract spontaneously during pregnancy.^[17] In some patients, when the conservative therapy fails, then surgical intervention is required. Absolute indications for surgical intervention are similar to those for nonpregnant patients and include infected, obstructive stones (usually associated with UTI, fever, and sepsis), an obstructed solitary kidney, or acute renal failure.

Most pregnant women who need an intervention for symptomatic urolithiasis can undergo placement of a ureteral stent or nephrostomy tube. Definitive treatment

for urolithiasis is then deferred until after delivery. Ureteral stents have been placed with ultrasound guidance with the patient under local anesthesia.^[18] Ureteroscopy has gained increasing popularity for the definitive diagnosis and management of urolithiasis during pregnancy. Several studies have established the safety and efficacy of ureteroscopy during all trimesters of pregnancy.^[19,20] Some consider ureteroscopy is the first-line treatment during pregnancy who have failed conservative management for urolithiasis.^[19,20] The advantages of ureteroscopy include the need for not only single surgical intervention during pregnancy but also avoidance of stent or nephrostomy tube complications and quicker resolution of symptoms.

Pyelonephritis is a common nonobstetric indication for admission during pregnancy. It complicates about 1–2% of pregnancies and has the potential to cause severe maternal and fetal morbidity.^[21] The physiologic changes of pregnancy, including decreased ureteral peristalsis, mechanical compression of the ureters, decreased detrusor tone, and incomplete bladder emptying, may predispose a pregnant woman for developing pyelonephritis. It is commonly associated with preterm labor and increased the risk of 6% to 50% preterm delivery.^[21] In our study, also we have seen preterm delivery of 30 (45.45%) patients in the study group. Although our institution does not have a strict protocol for treatment of pyelonephritis, all patients in the study were managed in the hospital as an inpatient until afebrile for more than 24 h on intravenous antibiotics and no longer have pain. Ceftriaxone is the most common empirical primary antibiotic used for the treatment of pyelonephritis at our institution, and other antibiotics are used as per culture sensitivity report. Antitubercular drugs were used in six patients where the source of infection was documented tubercular origin. Abscess was aspirated in all four patients under sonological guidance in our study.

Urological malignancies are rare during pregnancy with an overall incidence of 1 in 1000.^[22] Renal cell carcinoma is the most common urologic tumor of pregnancy followed by benign angiomyolipoma.^[23] Magnetic resonance imaging is a useful diagnostic technique to evaluate renal masses due to the lack of exposure to radiation. No difference has been found regarding the tumor progression during pregnancy as

compared with the nonpregnant state.^[24] Management of the tumor during pregnancy is done after considering the malignant potential of the tumor and survival rate of the fetus at different gestational ages. Advanced tumors should be treated aggressively, despite the increased risk of fetal mortality, whereas smaller tumors may be observed until delivery or until fetal lung maturity. In our study, we observed all four cases of bladder tumors throughout the pregnancy by close follow-up.

The mode of delivery should be guided by obstetric indications. However, vaginal delivery contraindicated where the risks of damaging the pelvic floor are high, and disruption of continence mechanism is anticipated such as in neobladder, history of bladder neck reconstruction, and enterocystoplasty.^[25] In those cases, cesarean section before the onset of labor is recommended.^[26] In our study, we did not find any such cases of pregnancy with bladder neck reconstruction or urinary diversion. So that more than 80% cases delivered vaginally in the study group which is even more than the control group, i.e. 70%. The other incidental obstetric complications apart from urological complications may contribute to this situation in the control group.

CONCLUSION

Several urological problems may arise during pregnancy leading to poor outcome. Differentiation of physiological changes from the pathological conditions by performing the initial diagnostic work-ups is necessary. Urologists play a key role in managing complex urological disease processes. A coordinated approach between the obstetricians, urologists are essential to provide the best care for both the mother and fetus.

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Conflicts of interest

There are no conflicts of interest.

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