

# Symptomatic hydronephrosis in pregnancy: a case series and literature review. Is bigger always better?

Mutiso SK<sup>1</sup>, Sequeira E<sup>2</sup>

<sup>1</sup>Resident, Department of Obstetrics and Gynaecology, Aga Khan University, Nairobi

<sup>2</sup>Senior Lecturer, Department of Obstetrics and Gynaecology, Aga Khan University, Nairobi

**Correspondence to:** Dr. Steve K. Mutiso. Email: steve\_mutiso@yahoo.com

## Abstract

**Introduction:** Hydronephrosis is common in pregnancy affecting a vast majority of women. Most of the cases of symptomatic hydronephrosis in pregnancy resolve with conservative measures with a rare need for surgical management with stent insertion.

**Objectives:** We present a case series of 4 cases of pregnancies complicated with hydronephrosis outlining clinical presentation, diagnostic workup and subsequent management and outcomes. Subsequently we undertake a literature review to assess the body of evidence on symptomatic hydronephrosis in pregnancy focusing on its clinical course and indicators for non-conservative measures of management.

**Conclusion:** The cases presented concur that symptomatic hydronephrosis is a rare complication in pregnancy that mostly responds well with conservative measures. However, it should be suspected in a pregnant lady presenting with non-resolving unilateral flank pain. Early diagnosis and treatment may impact on the prevention of subsequent pyelonephritis. Ultrasound examination usually suffices for diagnosis but renal resistive indices and renal functions may guide on whether one requires a conservative approach or stenting to improve renal outcomes.

**Key words:** Hydronephrosis, Pregnancy, Symptomatic

## Introduction

Hydronephrosis is common in pregnancy affecting a vast majority of women (1). It occurs in up to 90% of pregnant women with the majority of them having mild and asymptomatic hydronephrosis (1-3). This dilation and distension of the renal pelvis and calyces in pregnancy has been attributed to the relaxation of smooth muscles due to progesterone and compression of the gravid uterus on the ureters at the pelvic brim (2, 4). Most of the cases of symptomatic hydronephrosis in pregnancy resolve with conservative measures with less than 10% requiring surgical management with stent insertion (2,3). Furthermore, most patients have good perinatal outcome following symptomatic hydronephrosis although it has been associated with adverse pregnancy complications (2, 5). We report a case series of 4 cases of symptomatic hydronephrosis in pregnancy in whom 2 had mild symptoms and 2 had severe symptoms and required management.

## Case presentation

### Case 1

A 24 year old pregnant woman presented with left sided pelvic pain and low back ache at 35 weeks and 5

days of her first pregnancy. It had started two days prior and was getting worse. The pain was initially dull in nature but intensified afterwards. It was not associated with any contractions and she had urinary symptoms or per vaginum bleeding. Her antenatal history had been unremarkable so far and she had normal tests in the pregnancy with normal blood pressures throughout. She had no antecedent medical conditions or any prior surgeries. On examination she was haemodynamically stable with a normal fetal status. Her uterus was soft with no palpable contractions.

Her laboratory investigations included: A urine analysis which was normal. She had a complete blood count which revealed a normal haemoglobin and white cell count. Her kidney function tests were normal. Her renal ultrasound revealed moderate left hydronephrosis and a mild right hydronephrosis.

She was admitted with a differential diagnosis of acute pyelonephritis for pain management and antibiotics. Her inpatient labs revealed a raised procalcitonin (0.08 and 0.09; upper limit = 0.05). Her pain control was poor with both paracetamol and opioid analgesia and had to have an early delivery soon after which her symptoms improved remarkably. Subsequently she was symptom free 3 days after the delivery and had normal puerperium.

A renal ultrasound done after delivery (5 days) revealed a normal right kidney without hydronephrosis and mild hydronephrosis on the left kidney. Further follow up six weeks after delivery showed that the hydronephrosis had completely resolved in the left kidney.

### Case 2

A 26 year old African woman presented with right flank pain at 30 weeks of her first pregnancy. The pain was sharp in nature and undulating and had no other associated symptoms. She had no other urinary symptoms or bowel symptoms. Her prior antenatal follow up was normal with no complications. Her examination was essentially normal with normal vitals and a normal fetal status.

She had laboratory tests requested which revealed a borderline elevated white cell count ( $12.26 \times 10^9$ ; upper limit = 11.0) with a low haemoglobin of 10.3 g/dl (lower limit = 11.5 g/dl). She had a normal urinalysis results. Her renal function tests (serum urea, creatinine and electrolytes) were all within reference ranges. Her renal ultrasound however revealed a moderate right hydronephrosis with associated right hydro-ureter and increased renal echogenicity with echogenic material in the calyces.

She was managed conservatively with analgesics and had an uneventful clinical course. A repeat ultrasound after 1 month revealed that the moderate right hydronephrosis persisted with resolution of the right hydro-ureter and echogenic changes in the kidney. She had no further symptoms in late pregnancy and subsequently had a term delivery and a normal puerperium.

### Case 3

A 24 year old African woman in her first pregnancy presented with mild right flank pain that was persistent over a couple of days at 28 weeks of pregnancy. The pain was sharp and had no aggravating or relieving factors. She had no associated urinary symptoms and had no fever. Although she was a late booking for antenatal care, she had normal antenatal tests and subsequent follow up. She was haemodynamically stable with normal vitals and also had a normal fetal and systemic examination.

Her laboratory tests done revealed a normal complete blood cell count and her renal function tests (serum urea, creatinine and electrolytes) were all within reference ranges. Her renal ultrasound however revealed a moderate right hydronephrosis and proximal

hydro-ureter with her left kidney being completely normal.

She was managed conservatively as an outpatient with analgesics and adequate hydration and her symptoms resolved within a week of management. She had an uneventful antenatal follow up afterwards and was delivered at term via caesarean delivery due to a prior uterine myomectomy scar.

### Case 4

The last case was a 26 year old African lady in her first pregnancy. She presented at 18 weeks gestation with severe left flank pains with frequency and urgency of urine. She had no fever or headache and had no other symptoms. Her pregnancy had been uneventful so far with normal antenatal tests. On examination she had vital signs within the normal ranges and had no systemic signs. Abdominal exam revealed left costo-vertebral angle tenderness with mild suprapubic tenderness.

Her laboratory tests done revealed an elevated white cell count ( $17.6 \times 10^9$ ; upper limit = 11.0) with a normal haemoglobin and platelet count. Her renal function tests revealed an elevated serum urea (16 mmol/l; upper limit = 8) and creatinine (160 mmol/l; upper limit = 120) with normal electrolytes ranges. Her renal ultrasound however revealed a severe left hydronephrosis and proximal hydro-ureter with the right kidney having mild hydronephrosis. Her renal dopplers with the left kidney having a resistive index of 0.83.

Multidisciplinary approach to management was instituted and a nephrologist and urologist were involved in the management. In view of the elevated renal dopplers, the decision for bilateral ureteral stenting was arrived upon. This was done under cystoscopic guidance under general anaesthesia. Her labs returned to normal about one week after the surgery. She had a normal pregnancy subsequently and had a term delivery. The stents were removed post-partum at 6 weeks and required no further management afterwards.

## Discussion

Although it is well known that hydronephrosis may be a physiologic change in pregnancy, it may generate symptoms and lead to adverse renal complications outlining it as an important cause of acute flank pain in pregnancy (2,5). The above cases outline several cases of symptomatic hydronephrosis in pregnancy that posed a diagnostic and management dilemma in obstetrics.

Physiologic dilatation of the renal calyces and pelvis in pregnancy occurs in the majority of pregnancies (2, 3).

It is thought to result from either the physiologic effects of progesterone or from direct mechanical compressive forces on the ureter (6,7). However it does seem that the mechanical compression of the ureter is the major factor in its causation (8). This is further elucidated by the fact that majority of hydronephrosis in pregnancy has a right sided preponderance in pregnancy affecting the right side in more than 85% of the cases (7). This is also the case in the series of cases we present where all but one had right sided hydronephrosis. This can be explained by the fact that the right ureter crosses the iliac and ovarian vessels at an angle prior to entering the pelvis as opposed to the left ureter which runs at a parallel course with the ovarian vessels (9). Although it's thought that the effect of progesterone on smooth muscle relaxation may also explain this dilatation this is only theoretical and will not explain the unequal distribution in the sides affected (8-10).

Hydronephrosis seems to affect primigravidas more often than multiparous women (2,3,11-13). This is also the case in the series of patients we have discussed where all the patients discussed were in their first pregnancy. There does not seem to be a consensus as to why this is the case though it is postulated that the primigravidas renal system may be more susceptible to compression as opposed to a multigravidas (1,13). The dilatation seems to develop from the second trimester onwards furthermore adding strength to the fact that mechanical compression seems to be the main pathophysiologic mechanism of hydronephrosis (3,13). This was also the finding in our series of patients whose hydronephrosis was diagnosed in the third trimester of pregnancy. Apart from the fact that hydronephrosis affects primigravidas and from the second trimester onwards, there seems to be no other classical risk factors for the development of this condition (1,11).

Majority of the cases of hydronephrosis in pregnancy are asymptomatic (11). However, symptoms associated with it depend on the degree of dilatation and associated complications (14). Acute pain is the most commonly reported symptom, this can be flank pain lateralizing to the affected kidney, this will usually be either due to renal or ureteral colic (2,3). In our series all patients had flank pain that was located to the side of the significant hydronephrosis and one also presented with symptoms of acute pyelonephritis which may be an associated complication (1,3,15). Symptomatic hydronephrosis can also present with symptoms of renal failure or ureteral calculus both of which can be complications (6,13).

The diagnosis of hydronephrosis in pregnancy is usually by conventional ultrasound (12, 16). Furthermore, after diagnosis it can be graded on the basis of maximal calyceal diameters to either mild (5-10 millimeters), moderate (10 – 15 millimeters) or severe (> 15 millimeters) hydronephrosis (12). Usually moderate and severe hydronephrosis are of clinical importance in pregnancy as they are usually associated with symptoms (12, 15). All the symptomatic cases had at least moderate hydronephrosis in our series and this were all diagnosed by ultrasound. Doppler ultrasound may offer additional benefit in assessing the renal Resistive Index (RI) which may differentiate between obstructed and non-obstructed collecting systems (17, 18). A cut off of an RI of > 0.69 has been suggested as the indicator of obstruction (18). The renal RI can also serve as an indicator of whether surgical treatment with stenting should be offered for hydronephrosis in pregnancy (18). None of the patients in the series had their renal RI evaluated and this may have had additional value in those that didn't respond to conservative management. Magnetic resonance urography has also been fronted as a modality that may offer additional diagnostic utility in patients with renal colic in pregnancy, but this has however yet to be utilized well in this setting (19).

Most of the patients with symptomatic hydronephrosis will be managed well with conservative treatment (15). Conservative measures including analgesics, antibiotics and hydration seems to be enough for moderate to severe symptomatic hydronephrosis in more than 80% of the patients (3, 15). Usually a two to five day course of conservative measures leads to resolution of symptoms of all patients with hydronephrosis failure of which may be an indication for the need for further intervention (2). In the present series three of the patients did well with conservative measures although early delivery was required in one of the patients to achieve symptomatic relief. In patients who have persistent symptoms after conservative management or have complications such as renal failure, one can opt for surgical management (2, 15). Renal Resistive Index (RI) has also been fronted as an indicator of when to resort to surgical management with RI values of more than 0.69 is suggested as a cut off of when to consider surgical management (18). This has been achieved mostly by insertion of a ureteral stent either unilaterally in the side of the most affected kidney or bilaterally in some instances (2, 3, 15). The most commonly used surgical approach is the insertion of a pigtail stent that can be done under either epidural

or spinal anaesthesia through cystoscopic guidance (2, 15). Percutaneous nephrostomy is another option that is recommended for patients who are less than 22 weeks especially if it has been complicated with a renal calculi (20). Once stents are inserted, they can be left inside for up to 20 weeks and are usually removed after delivery (21). These stents are usually well tolerated by most patients despite experiencing urine symptoms or suprapubic pain and few will require removal of the stents due to these complications (22). The clinical course of hydronephrosis in pregnancy is usually a benign one with few patients requiring treatment and even fewer requiring ureteral stenting, and hence has good prognosis (12, 22). Virtually all the patients with symptomatic hydronephrosis have term deliveries with good perinatal outcome (2). Indeed the same was observed in our series of patients, moreover only one case of severe pre-eclampsia has been reported in literature due to bilateral obstruction outlining its rare adverse perinatal outcome (5). However, that said, more aggressive intervention and management with stenting may be indicated in patients with compromised renal function or complete obstruction evidenced by elevated renal resistive indices (17, 18).

In conclusion, the cases presented concur that symptomatic hydronephrosis is a rare complication in pregnancy that mostly responds well with conservative measures. However, it should be suspected in a pregnant woman presenting with non-resolving unilateral flank pain. Ultrasound examination usually suffices for diagnosis but renal resistive indices and renal functions may guide on whether one requires a conservative approach or stenting to improve renal outcomes.

**Conflict of Interest:** The authors have no conflict of interest to declare.

## References

1. Brown MA. Urinary tract dilatation in pregnancy. *Amer J Obstet Gynecol.* 1991;**164**(2):642-643.
2. Fainaru O, Almog B, Gamzu R, Lessing JB and Kupferminc M. The management of symptomatic hydronephrosis in pregnancy. *BJOG: an international journal of obstetrics and gynaecology.* 2002;**109**(12):1385-1387.
3. Puskar D, Balagovic I, Filipovic A, Knezovic N, Kopjar M, Huis M, et al. Symptomatic physiologic hydronephrosis in pregnancy: incidence, complications and treatment. *Europ Urology.* 2001;**39**(3):260-263.
4. Clayton JD and Roberts JA. The effect of progesterone on ureteral physiology in a primate model. *J Urology.* 1972;**107**(6):945-948.
5. Thorp JA, Davis BE and Klingele C. Severe early onset preeclampsia secondary to bilateral ureteral obstruction reversed by stenting. *Obstet Gynecol.* 1999;**94**(5 Pt 2):806-807.
6. Lin YJ, Ou YC, Tsang LC and Lin H. Diagnostic value of magnetic resonance imaging for successful management of a giant hydronephrosis during pregnancy. *J Institute Obstet Gynaecol.* 2013;**33**(1):91-93.
7. Schulman A and Herlinger H. Urinary tract dilatation in pregnancy. *Brit J Radiol.* 1975;**48**(572):638-645.
8. Au KK, Woo JS, Tang L and Liang ST. Aetiological factors in the genesis of pregnancy hydronephrosis. *The Australian & New Zealand J Obstet Gynaecol.* 1985;**25**(4):248-251.
9. Cheung KL and Lafayette RA. Renal physiology of pregnancy. *Advances in Chronic Kidney Dis.* 2013;**20**(3):209-214.
10. Schneider DH, Eichner E and Gordon MB. An attempt at production of hydronephrosis of pregnancy, artificially induced. *Amer J Obstet Gynecol.* 1953;**65**(3):660-665.
11. Eckford SD and Gingell JC. Ureteric obstruction in pregnancy--diagnosis and management. *Brit J Obstet Gynaecol.* 1991;**98**(11):1137-1140.
12. Zwergel T, Lindenmeir T and Wullich B. Management of acute hydronephrosis in pregnancy by ureteral stenting. *European Urology.* 1996;**29**(3):292-297.
13. Rasmussen PE and Nielsen FR. Hydronephrosis during pregnancy: a literature survey. *European J Obstet, Gynecol Reprod Biol.* 1988;**27**(3):249-259.
14. Ferguson T and Bechtel W. Hydronephrosis of pregnancy. *Amer Family Phys.* 1991;**43**(6):2135-2137.
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 Obstetrica et Gynecologica Scandinavica.* 2007;**86**(9):1047-1050.
16. Peake SL, Roxburgh HB and Langlois SL. Ultrasonic assessment of hydronephrosis of pregnancy. *Radiology.* 1983;**146**(1):167-170.

- 
17. Shokeir AA, Mahran MR and Abdulmaaboud M. Renal colic in pregnant women: role of renal resistive index. *Urology*. 2000;**55**(3):344-347.
  18. Atar M, Bozkurt Y, Soylemez H, Penbegul N, Sancaktutar AA, Bodakci MN, *et al*. Use of renal resistive index and semi-rigid ureteroscopy for managing symptomatic persistent hydronephrosis during pregnancy. *Intern J Surg* (London, England). 2012;**10**(10):629-633.
  19. Spencer JA, Chahal R, Kelly A, Taylor K, Eardley I and Lloyd SN. Evaluation of painful hydronephrosis in pregnancy: magnetic resonance urographic patterns in physiological dilatation versus calculous obstruction. *J Urology*. 2004;**171**(1):256-260.
  20. Denstedt JD and Razvi H. Management of urinary calculi during pregnancy. *J Urology*. 1992;**148**(3 Pt 2):1072-4; discussion 4-5.
  21. Cecen K and Ulker K. The comparison of double J stent insertion and conservative treatment alone in severe pure gestational hydronephrosis: a case controlled clinical study. *The Scien World J*. 2014; **2014**:989173.
  22. Autorino R and Damiano R. Re: Ureteral stenting and urinary stone management: a systematic review Haleblan G., Kijvikai K., de la Rosette J. and Preminger G. *J Urology*. 2008;**180**(4):1573.