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Evaluation of hydronephrosis condition by use of MR Urography in patients admitted to Obstetrics and Gynaecology department

Dr. Manjari Singh[1], Dr. Satyam Mohan[2*]

[1] Senior Resident, Department of Obstetrics and Gynaecology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India
[2] Senior Resident, Department of Nephrology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India
[*] Corresponding Author: Dr. Satyam Mohan

Abstract
MR urography has been utilised to evaluate entire urinary system with advantage of not using ionizing radiation. Differentiate between physiological hydronephrosis from pathological is main concern in pregnant patients. Early identification of hydronephrosis in cases of ca cervix is required for better prognosis.
The present study was planned at Department of Obstetrics and Gynaecology, Rajendra Institute of Medical Sciences, Ranchi. Total 50 females were enrolled in the present study. The enrolled patients were diagnosed with the hydronephrosis pre detected on the USG method. The study was performed using GE 1.5 Tesla 16 channel MRI machine.
MR Urography delivered highest accuracy to demonstrate the cause, level and degree of obstruction and hydroureteronephrosis. MRU provided Information about structure, function and integrity of the urinary tract, along with identification of neoplasm and its involvement in adjacent structures. So, MRU is a better modality for evaluation of malignant as well as benign causes of obstruction due to its multi planar capability and superior soft tissue contrast. Thus, in patients with clinical features of Hydronephrosis, screening should be done with trans abdominal sonography which can detect level of hydronephrosis and any abnormality if present.

Keywords: hydronephrosis, MR urography, obstetrics, gynecology patients

1. Introduction
Hydronephrosis and hydroureter are common clinical conditions encountered not only by urologists but also by emergency medicine specialists and primary care physicians. Hydronephrosis is defined as distention of the renal calyces and pelvis with urine as a result of obstruction of the outflow of urine distal to the renal pelvis. Analogously, hydroureter is defined as a dilation of the ureter. The presence of hydronephrosis or hydroureter can be physiologic or pathologic. It may be acute or chronic, unilateral or bilateral. It can be secondary to obstruction of the urinary tract, but it can also be present even without obstruction. Obstructive uropathy refers to the functional or anatomic obstruction of urinary flow at any level of the urinary tract. Obstructive nephropathy is present when the obstruction causes functional or anatomic renal damage. Rarely, obstructive nephropathy may occur in the absence of hydronephrosis [1]. Thus, the terms hydronephrosis and obstruction should not be used interchangeably.
The etiology and presentation of hydronephrosis and/or hydroureter in adults differ from that in neonates and children. Anatomic abnormalities (including urethral valves or stricture, and stenosis at the ureterovesical or ureteropelvic junction) account for the majority of cases in children. In comparison, calculi are most common in young adults, while prostatic hypertrophy or carcinoma, retroperitoneal or pelvic neoplasms, and calculi are the primary causes in older patients [2, 3].
Hydronephrosis or hydroureter is a normal finding in pregnant women. The renal pelvises and caliceal systems may be dilated as a result of progesterone effects and mechanical compression of the ureters at the pelvic brim. Dilatation of the ureters and renal pelvis is more prominent on the right side than the left side and is seen in up to 80% of pregnant women [4]. These changes can be visualized on ultrasound examination by the second trimester, and they may not resolve until 6-12 weeks post partum.
The signs and symptoms of hydronephrosis depend upon whether the obstruction is acute or chronic, partial or complete, unilateral or bilateral. Hydronephrosis that occurs acutely with sudden onset (as caused by a kidney stone) can cause intense pain in the flank area (between the hips and ribs). Historically, this type of pain has been described as "Dietl's crisis". Conversely, hydronephrosis that develops gradually will generally cause either attacks of a dull discomfort or no pain. Nausea and vomiting may also occur. An obstruction that occurs at the urethra or bladder outlet can cause pain and pressure resulting from distension of the bladder. Blocking the flow of urine will commonly result in urinary tract infections which can lead to the development of additional stones, fever, and blood or pus in the urine. If complete obstruction occurs, kidney failure may follow [5].
Blood tests may show impaired kidney function (elevated urea or creatinine) or electrolyte imbalances such as hyponatremia or hyperchloremic metabolic acidosis. Urinalysis may indicate an elevated pH due to the secondary destruction of nephrons within the affected kidney. Physical examination may detect a palpable abdominal or flank mass caused by the enlarged kidney.
Hydronephrosis is the result of any of several abnormal pathophysiological occurrences. Structural abnormalities of the junctions between the kidney, ureter, and bladder that

lead to hydronephrosis can occur during fetal development. Some of these congenital defects have been identified as inherited conditions, however the benefits of linking genetic testing to early diagnosis have not been determined [6]. Other structural abnormalities could be caused by injury, surgery, or radiation therapy.

Compression of one or both ureters can also be caused by other developmental defects not completely occurring during the fetal stage such as an abnormally placed vein, artery, or tumor. Bilateral compression of the ureters can occur during pregnancy due to enlargement of the uterus. Changes in hormone levels during this time may also affect the muscle contractions of the bladder, further complicating this condition. Sources of obstruction that can arise from other various causes include kidney stones, blood clots, or retroperitoneal fibrosis [7].

The obstruction may be either partial or complete and can occur anywhere from the urethral meatus to the calyces of the renal pelvis. Hydronephrosis can also result from the reverse flow of urine from the bladder back into the kidneys. This reflux can be caused by some of the factors listed above as well as compression of the bladder outlet into the urethra by prostatic enlargement or impaction of feces in the colon, as well as abnormal contractions of bladder muscles resulting from neurological dysfunction or other muscular disorders [5].

Prenatal diagnosis is possible [8], and in fact, most cases in pediatric patients are incidentally detected by routine screening ultrasounds obtained during pregnancy [9]. However, approximately half of all prenatally identified hydronephrosis is transient, and resolves by the time the infant is born, and in another 15%, the hydronephrosis persists but is not associated with urinary tract obstruction (so-called non-refluxing, non-obstructive hydronephrosis). For these children, regression of the hydronephrosis occurs spontaneously, usually by age 3. However, in the remaining 35% of cases of prenatal hydronephrosis, a pathological condition can be identified postnatally [10].

Diagnostic workup depends on the age of the patient, as well as whether the hydronephrosis was detected incidentally or prenatally or is associated with other symptoms. Blood tests (such measurement of creatinine) are typically indicated, though they must be interpreted cautiously. Even in cases of severe unilateral hydronephrosis, the overall kidney function may remain normal since the unaffected kidney will compensate for the obstructed kidney.

Urinalysis is usually performed to determine the presence of blood (which is typical for kidney stones) or signs of infection (such as a positive leukocyte esterase or nitrite). Impaired concentrating ability or elevated urine pH (distal renal tubular acidosis) are also commonly found due to tubular stress and injury.

Hence the present study was planned to assess of hydronephrosis in obstetrics and gynaecology patients.

2. Methodology

The present study was planned at Department of Obstetrics and Gynaecology, Rajendra Institute of Medical Sciences, Ranchi. Total 50 females were enrolled in the present study. The enrolled patients were diagnosed with the hydronephrosis pre detected on the USG method. The study was performed using GE 1.5 Tesla 16 channel MRI machine.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: All age females with hydronephrosis pre detected on the USG method.

Exclusion Criteria: Females with any other diseases or complications

3. Results & Discussion

The physiologic dilation of the urinary collecting system in pregnant women may become symptomatic, and if left untreated can progress to life threatening infection which may endanger the mother and the fetus [11].

Table 1: Age Distribution

Age	No. of Cases
21 – 30 years	25
31 – 40 years	22
41 – 50 years	3
51 – 60 years	0
Total	50

Table 2: Distribution of patients according to symptoms

Symptoms	No. of Cases
Flank pain	28
Burning micturition	9
Dysuria	4
Increased frequency	6
Nausea	11
Anorexia	7
Pyuria	4

Table 3: Distribution of patients according to etiology of hydronephrosis

Etiology of Hydronephrosis	No. of Cases
Physiological dilatation in pregnancy	20
Calculus	5
Pyelonephritis	3
Carcinoma cervix	15
Ovarian tumor	5
Fibroid	2
Total	50

Hydronephrosis may be observed after the exposure of the ureter, and silent renal function loss may develop in patients suffering from endometriosis in which bladder involvement is seen. Therefore, those patients should be closely monitored with renal function tests [12-13]. Ultrasonography is the first method that should be applied, since it can be easily applied to the patient through abdominal, transvaginal, or transrectal routes depending on the complaints in the diagnosis of rare endometriosis cases such as bladder endometriosis, it is not an expensive method, and it does not cause radiation exposure [13-14]. Moreover, examination of urinary cytology plays an important role in the differential diagnosis of this disease from bladder cancer in the above-mentioned patients [15-16].

Shulman and Herlinger [17] in 1975 retrospectively surveyed 220 intravenous urography carried out on urologically normal pregnant women. They found that dilatation of the upper urinary tract was unusual and slight up until the 20th

week of pregnancy. Shortly thereafter dilatation developed abruptly and remained, on the whole, unchanged with respect to grade and incidence, until term. During the latter half of pregnancy the right ureter and the pelvis were found to be dilated in 76, and the left ureter and pelvis in 36%. Severe dilatation was rare, particularly on the left side. The dilatation ceases in all cases at the level of linea terminalis. Similar observations have been made by other authors [18-20].

In 1979 Fried [21] studied 109 asymptomatic pregnant women by means of ultrasonography of the upper urinary tract at various times during pregnancy and found that dilatation quite possibly started earlier and progressed more slowly than demonstrated in previous pyelographic studies, but otherwise showed the same pattern: most frequently right-sided, progressing throughout pregnancy and only above the linea terminalis. Roughly 60% presented slight dilatation during the first trimester and from the second trimester dilatation occurred on both sides in 70% and on the right side in 90%.

Enhorning [22] has mentioned the possible relationship between obstruction of the ureters and pre-eclampsia. He considered that the hydronephrosis triggered by compression by the uterus could be seen as an attempt at compensation in order to avoid a high pressure in the renal pelvis. If the compensation is insufficient, the pressure in the renal pelvis will rise, and that in the renal parenchymal tissue will also increase gradually. The renal function will be affected, the GFR will fall and the sodium retention increase, which will again increase the pressure in the parenchymal tissue. This results in a permanent high renin and aldosterone excretion, which once more results in a rise in blood pressure and further sodium retention and oedema. Experimental occlusion of ureters will cause changes in the local renal prostaglandin synthesis, especially an increase in thromboxane AZ, which is a very potent vasoconstrictor [23].

Tsurusaki *et al*. reported that 68% of 50 patients undergoing radical hysterectomy developed hydronephrosis, and that it was more frequent and more severe in the right kidney. Approximately 60% of the hydronephrosis disappeared spontaneously one year after surgery [24]. The differences in incidence and severity of postoperative hydronephrosis might result from different cancer stages and surgical techniques.

MR Urography delivered highest accuracy to demonstrate the cause, level and degree of obstruction and hydroureteronephrosis. MRU provided Information about structure, function and integrity of the urinary tract, along with identification of neoplasm and its involvement in adjacent structures. So, MRU is a better modality for evaluation of malignant as well as benign causes of obstruction due to its multi planar capability and superior soft tissue contrast. Thus, in patients with clinical features of Hydronephrosis, screening should be done with transabdominal sonography which can detect level of hydronephrosis and any abnormality if present. USG is a cost effective and easily available method of imaging. Overall MRU is more sensitive and accurate than USG for diagnosing the cause of obstruction. So, MRU should be done to detect exact cause of obstructive uropathy, for better delineation of the abnormality, information about structure, function and integrity of the urinary tract. It could be the imaging modality of choice in patients at risk of radiation like young females and pregnant women.

4. Conclusion

MR Urography delivered highest accuracy to demonstrate the cause, level and degree of obstruction and hydroureteronephrosis. MRU provided Information about structure, function and integrity of the urinary tract, along with identification of neoplasm and its involvement in adjacent structures. So, MRU is a better modality for evaluation of malignant as well as benign causes of obstruction due to its multi planar capability and superior soft tissue contrast. Thus, in patients with clinical features of Hydronephrosis, screening should be done with transabdominal sonography which can detect level of hydronephrosis and any abnormality if present.

5. References

1. Esprit DH, Koratala A, Chornyy V, Wingo CS. Obstructive Nephropathy Without Hydronephrosis: Suspicion Is the Key. Urology, 2017; 101:e9-e10. [Medline].
2. Rose BD, Black RM. Manual of Clinical Problems in Nephrology. Boston, Mass: Little, Brown & Co, 1988, 337-343.
3. Lameire N, Van Biesen W, Vanholder R. Acute renal failure. Lancet. 2005; 4365(9457):417-30. [Medline].
4. Rasmussen PE, Nielsen FR. Hydronephrosis during pregnancy: a literature survey. Eur J Obstet Gynecol Reprod Biol. 1988; 27(3):249-59.
5. "Hydronephrosis: Merck Manuals Home Health Handbook". New Jersey: Merck and Co., Inc. 2009. Retrieved, 2010.
6. Toka HR, Toka O, Hariri A, Nguyen HT. Congenital anomalies of kidney and urinary tract. Semin. Nephrol. 2010; 30(4):374-86. doi:10.1016/j. semnephrol.2010.06.004
7. Koh JS, Wong MY, Li MK, Foo KT. Idiopathic retroperitoneal fibrosis with bilateral lower ureteric obstruction—a case report with literature review. Singapore Med J. 1998; 39(9):416-7. PMID 9885722.
8. Estrada CR. Prenatal hydronephrosis: early evaluation. Current Opinion in Urology. 2008; 18(4):401-3. doi:10.1097/MOU.0b013e328302edfe. PMID 18520762.
9. Woodward M, Frank D. Postnatal management of antenatal hydronephrosis". BJU Int. 2002; 89(2):149-156. doi:10.1046/j.1464-4096.2001.woodward.2578.x. PMID 11849184.
10. Carmody JB, Carmody RB. Question from the clinician: management of prenatal hydronephrosis". Pediatr Rev. 2011; 32(12):e110-2. doi:10.1542/pir.32-12-e110. PMID 22135428.
11. Puskar D, Balagovic I, Filipovic A, *et al*. Symptomatic physiologic hydronephrosis in pregnancy. Eur Urol 2001; 39:260-263.
12. Mettler L, Gaikwad V, Riebe B, Schollmeyer T. Bladder endometriosis: possibility of treatment by laparoscopy. Journal of the Society of Laparoendoscopic Surgeons. 2008; 12(2):162–165.

13. Le Tohic A, Chis C, Yazbeck C, Koskas M, Madelenat P, Panel P. Bladder endometriosis: diagnosis and treatment. A series of 24 patients. Gynecologie Obstetrique & Fertilite. 2009; 37(3):216-221. doi: 10. 1016/j.gyobfe.2009.01.018.
14. Giudice LC, Kao LC. Endometriosis. The Lancet. 2004; 364(9447):1789-1799. doi: 10.1016/S0140-6736 (04)17403-5.
15. Nezhat CH, Malik S, Osias J, Nezhat F. Laparoscopic management of 15 patients with infiltrating endometriosis of the bladder and a case of primary intravesical endometrioid adenosarcoma. Fertility and Sterility. 2002; 78(4):872-875.
16. Westney OL, Amundsen CL, Mcguire EJ. Bladder endometriosis: Conservative management. Journal of Urology. 2000; 163(6):1814-1817. doi: 10.1016/S0022-5347(05)67550-7.
17. Shulman A, Herlinger H. Urinary tract dilatation in pregnancy. Br J Radio1 1975; 48:638-645.
18. Kretschmer HL, Heaney NS. Dilatation of the ureter and kidney pelvis during pregnancy. J Am Med Assoc 1925; 85:406-409.
19. Schumacher P. Die schwangerschaftsveränderungen der ableitenden hamwege im rontgenbild. Arch Gynecol 1930; 143:28.
20. Hundley JM, Siegel IA, Hachtel FW, Dumler JC. Some physiological and pathological observations on the urinary tract during pregnancy. Surg Gynecol Obstet. 1938; 66:360-379.
21. Fried AM. Hydronephrosis of pregnancy: ultrasonographic study and classification of asymptomatic women. Am J Obstet Gynecol 1979; 135:1066-1070.
22. Enhoming G. Pre-eclampsia: a hypothesis for its pathogenesis. Acta Obstet Gynecol Stand Suppl. 1984; 118:7-11.
23. Morrison AR, Nishikawa K, Needleman P. Thromboxane A, biosynthesis in the ureter obstructed isolated perfused kidney of the rabbit. J Pharmacol Exp. 1978; 205:1-8c.
24. Tsurusaki T, Hoshino K, Igawa T, *et al*. Clinical examination and therapies of hydronephrosis after radical hysterectomy. Nippon Hinyokika Gakkai Zasshi. 1994; 85:328- 32.