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MATERNAL HYDRONEPHROSIS IN PREGNANCY: ULTRASONIC EVALUATION AFTER 30 WEEKS OF GESTATION.

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ABSTRACT:

OBJECTIVE: *To determine the incidence of maternal hydronephrosis of right and left kidneys during pregnancy, and to see any compression effect of fetal vertebral column on ureters in pregnant women.*
DESIGN: *A descriptive study.*
PLACE AND DURATION OF STUDY: *Department of radiology, Gynaecology & Obstetrics and Urology Chandka Medical College Hospital, Larkana from June 2008 to February 2009.*
PATIENTS AND METHODS: *500 pregnant women referred for routine obstetric sonography were included in the study. The kidneys were scanned in the longitudinal plane from the lateral to the medial edge with the subject lying prone or semi prone.*
To grade hydronephrosis in our study, a classification system was established
Renal echograms were obtained using just vision 200 ultrasound machine (Toshiba Japan) with convex 3.5 MHz transducer.
RESULTS: *500 pregnant women were examined under ultrasound, hydronephrosis was found in 321(64.2%) patients. Of the 321 patients right side hydronephrosis was present in 224 (69.78%) patients; where as 97 (30.21%) patients had left side hydronephrosis. The position of fetal vertebral column had no compression effect on maternal ureters either on right or left side. Almost equal percentage of hydronephrosis was observed on right and left kidneys irrespective of position of vertebral column.*
CONCLUSION: *we concluded that hydronephrosis of pregnancy with right sided predominance is common. Position of fetal vertebral column seemed to have no effect on maternal ureters or kidneys.*

KEY WORDS: Hydronephrosis, pregnancy, ultrasound.

INTRODUCTION:
Hydronephrosis develops commonly during pregnancy, the term hydronephrosis is used to describe the dilatation of the pelvicalyceal system. The reported occurrence varying between 43% and 100%[1]. The right kidney becomes hydronephrotic two to three times more common than the left[2]. Two etiologies for hydronephrosis of pregnancy have been postulated, one hormonal and an other mechanical. After delivery, hydronephrosis gradually resolves[3]. Despite attempts to categorize the ultrasonographic appearances of hydronephrosis in pregnancy, there is still much confusion regarding the pattern of dilatation throughout pregnancy and the degree of dilatation that can be considered physiological for each stage of pregnancy[4]. This study was undertaken using real-time ultrasonography to examine the kidneys of pregnant women after 30 weeks of gestation. The aims of study were: to determine the incidence of maternal hydronephrosis of right and left kidneys during pregnancy, and to see any compression effect of fetal vertebral column on ureters in pregnant women.

MATERIAL AND METHOD:
500 pregnant women (After30 weeks of gestation) referred to the ultrasound department between June 2008 to February 2009 for routine obstetric sonography, were included in the study. The kidneys were scanned in the longitudinal plane from the lateral to the medial edge with the subject lying prone or semi prone. For purpose of analysis, the right and left kidneys were considered separately. The position of fetal vertebral column

may be on right side, left side, and or central in the maternal abdomen in either the cephalic or breach presentation. In all the cases, the position of fetal vertebral column was also assessed. All the women emptied their bladder immediately prior to renal sonography, to avoid the possible effects of full bladder on upper urinary tract.

Renal echograms were obtained using just vision 200 ultrasound machine (Toshiba Japan) with convex 3.5 MHz transducer.

To grade hydronephrosis in our study, a classification system was established which was based on the measurements of maximum calyceal diameter using ultrasonography with little amendment as detailed by Sandra L. et al [5]. This comprised four grades, as follows:

Grade I: Minimal separation of central echoes, calyceal diameter 1-5mm (Fig: 1)

Grade II: Mild dilatation, calyceal diameter 6-10mm (Fig: 2)

Grade III: Moderate dilatation, calyceal diameter 11-15mm (Fig: 3)

Grade IV: Severe dilatation, calyceal diameter >16mm (Fig: 4)

RESULTS:

500 pregnant women were examined under ultrasound, hydronephrosis was found in 321(64.2%) patients. Of the 321 patients, right side hydronephrosis was present in 224 (69.78%) patients; where as 97 (30.21%) patients had, left side hydronephrosis.

Among 224 right side hydronephrosis 92 (41.07%) patients had minimal (grade-I), 92 (41.07%) patients had mild (grade-II), and 40 (17.85 %) patients had moderate degree (grade-III) of hydronephrosis. Of the 97 left side hydronephrosis, 57 (58.76%) patients had minimal (grade-I) hydronephrosis, while in 35 (36.08%) patients mild (grade-II) hudronephrosis, and 5 (05.15%) patients had moderate degree (grade-III)of hydronephrosis but none of the patient had severe degree of hydronephrosis on either side (Table-1).

Majority of pregnancies with gestational periods of 33 and 35 weeks had a right side hydronephrosis (Table-2).

According to the position of fetal vertebral column, among 224 patients with right side hydronephrosis in 109 (48.6%) patients, the position of fetal vertebral column was on the right side, where as in 110 (49.1%) patients the position of vertebral column was on left side, only in 5 (2.2%) cases, the position of vertebral column was central.

Among 97 cases of left side hydronephrosis in 40 (41.2%) cases, the position of fetal vertebral column was on right side, where as in 53 (54.6%) cases position of vertebral column was on left side, and only in 4

FIG: 1
GRAD 1 MINIMAL SEPARATION (1-5MM)

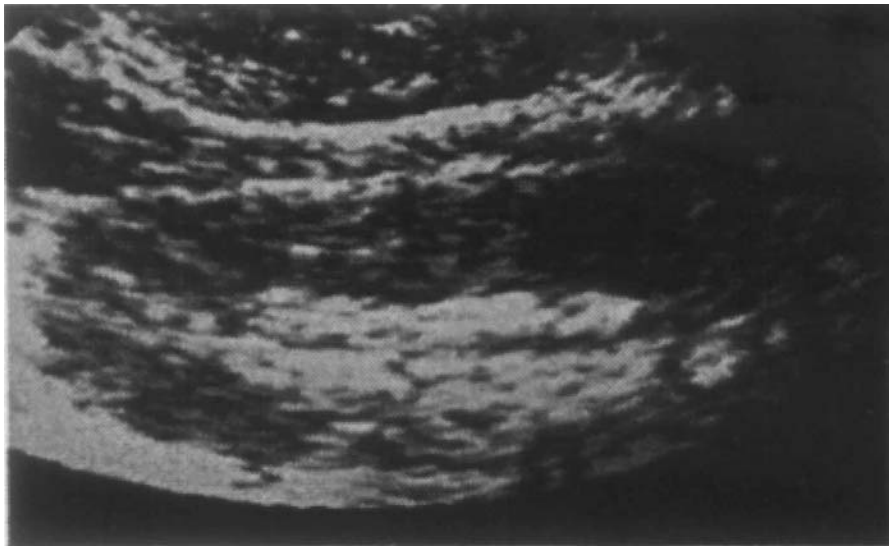


FIG: 2
GRAD 2 MILD DILATATION (6-10MM)

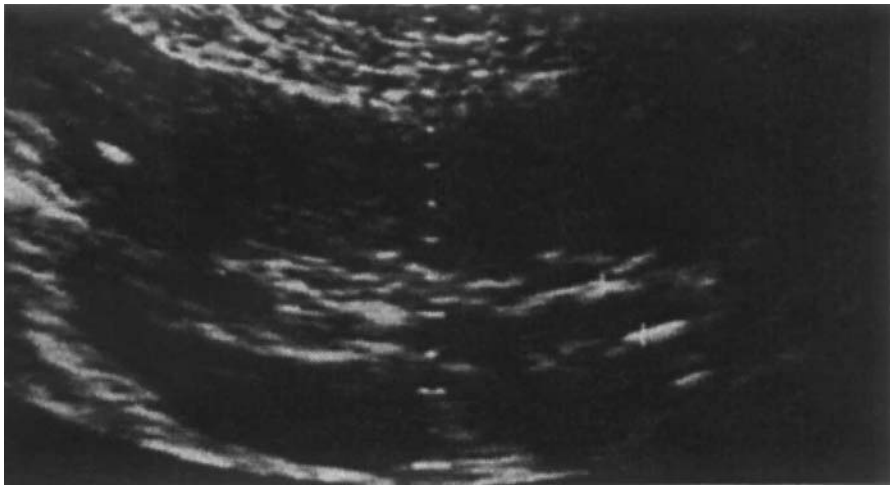


FIG: 3
GRAD 3 MODERATE DILATATION (11-15MM)



(4.1%) cases the position of vertebral column was in the centre (Table-3).

DISCUSSION:

There is very little information, available regarding the maternal hydronephrosis in our population. The incidence of calyceal dilatation in pregnant women in this study is similar to that reported in previous studies of right predominance of hydronephrosis in pregnancy [6,7]. The right sided predominance has been attributed to the differences in the anatomical relations of the right and left ureters. In particular it has been suggested that the relationship of the right ureter to the right iliac artery and ovarian vein at the level of the pelvic brim, accentuates the effects of compression by the gravid uterus.

The etiology of hydronephrosis of pregnancy remains controversial. While many investigators believe that hormonal changes play a significant role[8,9] others are convinced that the mechanical pressure of the gravid uterus is the most important, if not the only, factor responsible[10,11,12].

In our study, 64.2% of pregnant women had hydronephrosis, such figure nearly coincides with the study of Murao where hydronephrosis was 67%, though the Murao's study predicted the severity of hydronephrosis, but this study did not reveal a severity of hydronephrosis save mild and moderate[13].

Woo JS et al, reported in their study that 89% of the patients with mild degree of dilatation, where in our study 85.9% of minimal to mild degree of hydronephrosis was seen[14.]

In this study, compression effect of fetal vertebral column on the maternal ureters and the development of hydronephrosis was observed, perhaps first time in Pakistan. Other causes of hydronephrosis in pregnancy are well known but the dilatation of pelvicalyceal system of maternal kidneys if any by fetal vertebral column position was assessed first time by ultrasonography, in this regard we could not find any compression effect of fetal vertebral column according to its position, the position of fetal vertebral column had no compression effect on maternal ureters either on right or left side. Almost equal percentage of hydronephrosis was observed on right and left kidneys, irrespective of the position of vertebral column.

CONCLUSION:

From this study it is concluded that the right sided hudronephrosis is more predominant than left sided one in the setting of pregnancy. The position of fetal vertebral

FIG: 4
GRAD 4 SEVERE DILATATION (>16MM)

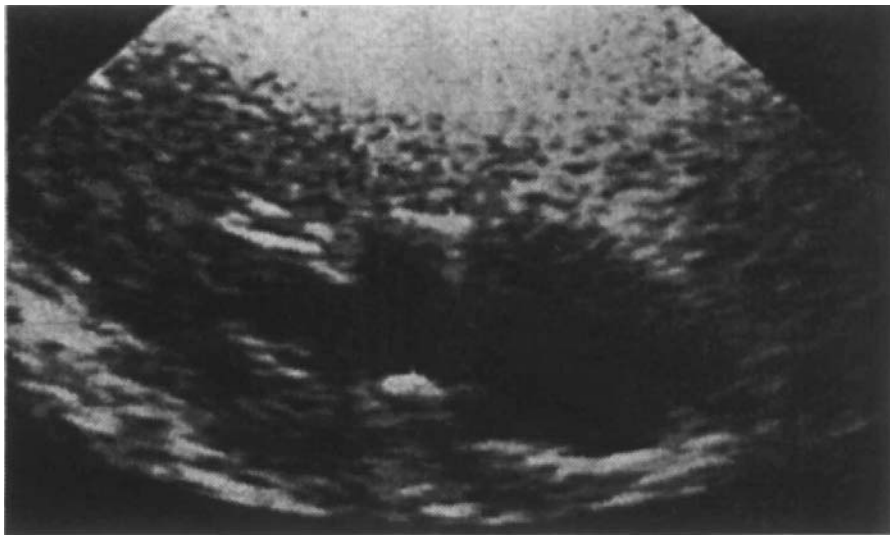


TABLE-1
GRADE OF CALICEAL DILATATION

Grade of dilatation	Right kidney	Left kidney
I	92 (41.07%)	57 (58.76%)
II	92 (41.07%)	35 (36.08%)
III	40 (17.85%)	05 (05.15%)
IV	0	0
Total	224	97

TABLE-2
DISTRIBUTION OF HYDRONEPHROSIS ACCORDING TO GESTATIONAL WEEKS

Gestation weeks	No. of patients	Right kidney	Left kidney
30	25	19	6
31	41	31	10
32	29	21	08
33	59	44	15
34	44	30	14
35	57	37	20
36	48	29	19
37	13	09	04
38	05	04	01
Total	321	224	97

TABLE-3
HYDRONEPHROSIS AND POSITION OF FETAL VERTEBRAL COLUMN.

Right kidney Total Number of patients 224	Right side 109 (48.6%)	Left side 110 (49.1%)	Central 05 (2.2%)
Left kidney Total Number of patients 97	Right side 40 (41.2%)	Left side 53 (54.6%)	Central 04 (4.1%)

column seemed to have no effect on maternal ureters or kidneys. The method ultrasonography used in the assessment of hydronephrosis was easy, noninvasive and reliable one.

REFERENCES:

1. Faundes A, Bricola-Filho M, Pinto e Silva JL. Dilatation of the urinary tract during pregnancy: Proposal of a curve of maximal caliceal diameter by gestational age. Am J Obstet Gynecol 1998; 178:1082-1086.
2. Cietak KA, Newton JR. Serial qualitative maternal nephrosonography in pregnancy. Br J Radiol 1985; 58:399-404.
3. Waltzer WC. The Urinary tract in pregnancy. J Urol 1981; 125: 271-276.
4. Erickson LM, Nicholson SF, Lewall DB, Frischke L. Ultrasound evaluation of hydronephrosis of pregnancy. J Clin ultrasound 1979; 7: 128-132.
5. Schulman A, Herlinger H. Urinary tract dilatation in pregnancy. Br J Radiology 1975; 48: 638-645.
6. Dure-Smith P. Pregnancy dilatation of the urinary tract. Radiology 1970; 97: 545-550.
7. Puskar D, Balagovic I, Filipovic Al. symptomatic physiologic hydronephrosis in pregnancy. Eur Urol 2001; 39: 260-263.
8. Berman LB. The pregnant kidney. JAMA 1974; 230: 111-112.
9. Anteby SD, Ron M, Diamant YZ. Hydroureter and hydronephrosis of pregnancy presenting as acute obstetric or surgical emergencies. Int Surg 1975; 60: 93-95.
10. Horrow BR, Sloane JA,Salhanick L. Etiology of the hydronephrosis of pregnancy. Surg Gynec Obstet 1964; 119:1042-1048.
11. Roberts JA. Hydronephrosis of pregnancy. Urology 1976; 8:1-4.
12. Marchant JF. Effects of pregnancy and progestational agents on the urinary tract. Am J Obstet Gynecol 1972; 487-501.
13. Murao F. Ultrasonic evaluation of hydronephrosis during pregnancy and puerperium. Gynecol Obstet Invest. 1993; 35(2) :94-8.
14. Woo JS, Wan CW, Ma HK. Pregnancy hydronephrosis: a longitudinal ultrasonic evaluation. Aust N Z J Obstet Gynecol. 1984 Feb;24(1):9-13.