



## Persistent uterine artery notch – A predictor of intrauterine growth retardation and pregnancy induced hypertention

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**OBJECTIVE(S) :** To find out the correlation between persistence of uterine artery notch and development of intrauterine growth retardation (IUGR) and pregnancy induced hypertention (PIH), and to see if doppler assessment can help identify high risk pregnancies.

**METHOD(S) :** Fifty-three women, 38 primiparas forming Group I and 15 high risk pregnancies forming Group II underwent doppler evaluation around 24 weeks of gestation. They were followed up and the outcome noted.

**RESULTS :** Eight of the 38 in Group I and nine of the 15 in Group II showed persistence of bilateral notch. Of these 17, nine (52.9%) developed IUGR with PIH, and eight (47.1%) had IUGR alone. Persistence of bilateral notch was more significant and majority of women with persistence of unilateral notch had a normal outcome.

**CONCLUSION(S) :** Uterine artery should be evaluated along with routine scan in all patients whenever possible but in high risk patients uterine artery evaluation should specifically be done at 24 weeks.

**Key words :** uterine artery notch, intrauterine growth retardation, pregnancy induced hypertention

### Introduction

Normally nonpregnant uterine artery shows a systolic notch, which disappears by 24 weeks of pregnancy. The aim of our study was to find out the correlation between persistence of uterine artery notch and development of intrauterine growth retardation (IUGR) and pregnancy induced hypertention (PIH), and whether doppler assessment helps in identifying these high risk pregnancies and improve their outcome.

### Methods

Fifty-three women were included in the study. Out of these 38 were primiparas (Group I) and 15 were having

some high risk factors (Group II). Primiparas were randomly selected. The high-risk group consisted of patients with history of IUGR, intrauterine fetal death (IUD), and PIH. Doppler uterine artery evaluation was done along with routine scanning around 24 weeks of gestation. Uterine artery evaluation was done transabdominally with full bladder at the level of internal or lateral to the uterus<sup>1</sup>.

These women were then followed up for fetal growth, amount of liquor, and development of PIH. Fetal outcome was noted at birth. For statistical evaluation phi square test was used.

### Results

Out of 38 primiparas eight (21.8%) showed persistence of bilateral uterine artery notch and all of them developed some complication – one (12.5%) had IUD, four (50%) developed IUGR with PIH, and three (37.5 %) developed IUGR without PIH (Table 1).

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**Table 1. Observations in Group I.**

Notch	Number	Normal outcome	Intrauterine death	IUGR with PIH	IUGR without PIH
Bilateral notch	8	0	1	4	3
Unilateral notch	10	6	—	1	3
Absent notch	20	19	1	—	—

Ten patients had persistent unilateral uterine artery notch whereas the other uterine artery blood flow was normal. Out of these six (60%) had normal outcome, one (10%) had IUGR with PIH, and three (30%) had IUGR alone.

Twenty women had normal bilateral uterine artery flow and out of these only one developed IUGR followed by IUD. Probable reason was severe anemia with irregular antenatal attendance. Remaining 19 women had a normal outcome.

In the high risk Group II nine women out of 15 had persistent bilateral notch out of whom five had IUGR with oligohydramnios and PIH, and four had IUGR without PIH. Two women had persistent unilateral notch and developed mild IUGR and four had normal bilateral flow with normal outcome (Table 2).

**Table 2. Observations in Group II.**

Notch	No. of cases	Mild IUGR	IUGR with PIH	IUGR without PIH
Bilateral notch	9	—	5	4
Unilateral notch	2	2	—	—
Absent notch	4	—	—	—

Thus out of the total 53 women persistence of bilateral notch was seen in 17 (Table 3). Out of these nine (52.9%) developed IUGR with PIH, and eight (47.1%) IUGR alone.

**Table 3. Overall results**

Notch	No. of patients	Normal	Intrauterine death	IUGR with PIH	IUGR without PIH
Bilateral notch	17	—	1	9	7
Unilateral notch	12	8	—	1	3
Absent notch	24	23	1	—	—

Persistent unilateral notch was found in 12 women out of whom four (33.3%) developed IUGR (one with PIH) where as eight had normal outcome.

Statistical analysis shows that sensitivity of persistence of uterine artery notch in relation to development of IUGR or PIH or both was 84%, specificity 71.4% and positive predictive value 72.4%.

## Discussion

Doppler velocimetry is a noninvasive technic which uses high frequency sound for investigation of blood flow. The feasibility of its fetal application was first reported by Fitzgerald and Drumm<sup>2</sup>. It made possible noninvasive investigation of uteroplacental circulation. Normal uterine artery has a complex wave form in a nonpregnant state showing a steep systolic notch and an early diastolic notch with small amount of diastolic flow indicating high vascular resistance<sup>3</sup>. Approximately 4 weeks after implantation well defined low resistance vessels are seen at the site of future placenta<sup>4</sup>. Most dramatic changes are seen in second trimester when there is uncoiling of main uterine and spiral arteries<sup>5</sup>. As pregnancy progresses it changes to a low resistance vessel and there is gradual removal of notch, increase in diastolic flow, and fall in resistance index (RI). RI estimation has been done in uterine artery but it was found to have a low sensitivity to be used alone as a screening tool<sup>6</sup>.

Pai<sup>7</sup> found persistent diastolic notch to be a better parameter than abnormal RI and findings at 24-28 weeks correlated better with the outcome than those at 18-22 weeks. We also found that persistent diastolic notch at or after 24 weeks correlated with the development of IUGR and PIH. Table 4 gives the efficacy of diastolic notch reported by Bower et al<sup>6</sup> and Pai<sup>7</sup> and compares it with our findings. The differences in the efficacy may possibly be due to the fact that our study included high risk group also.

**Table 4. Prediction of PIH by diastolic notch.**

Author	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Bower et al <sup>6</sup>	78	96	28	99.5
Pai <sup>7</sup>	45.45	92	38	93.87
Present study	84	71.4	72	-

Figures represent percentages.

Uterine artery notch was investigated and uteroplacental wave form was evaluated as a screening tool for hypertension<sup>6</sup>. During pregnancy this notch normally persists up to 22 weeks or at the most till 24 weeks of pregnancy following which high resistance flow becomes low resistance and notch disappears<sup>8</sup>. The placentation process continues till 24-26 weeks of pregnancy after which there is only a small decrease in values. In some women a unilateral or bilateral notch persists even beyond 24 weeks.

These women were found to develop IUGR and PIH. In women where placenta is lateral, the ipsilateral uterine artery shows low resistance pattern with absence of notch but contralateral uterine artery shows persistence of notch. In them the outcome is usually normal. Uteroplacental wave form study may not be very useful in general population but should be considered for use in at risk group <sup>9,10</sup>.

### Conclusion

Persistence of uterine artery notch, specially bilateral one, can be a good predictor of future growth retardation and PIH. It can be evaluated along with a routine scan in all women if possible. But in high risk women it should be specifically evaluated so that necessary timely intervention can be done.

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