



Structural changes in placenta of hypertensive pregnancies in North Indian Population

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Abstract

Most important factor for fetal well-being is placental growth. Villous volume contributes to main mass of placenta. Purpose of this study is to correlate villous changes in hypertension. Thirty placentae were collected from two colleges i.e. Government Medical College, Chandigarh and ESIC Medical College, Faridabad, and divided into two group i.e. normal placentae and placenta from hypertensive mothers. After morphological examination, histological examination was done with H&E stain. Villous volume was calculated with 'Point Counting Technique' as described by Mathur et al. Significant decrease in villous volume and other parameters were seen.

Keywords: Placenta, Chorionic Villi, Histomorphometry, Hypertension.

Introduction

Villi are functional unit of placenta with average diameter of 30 – 40 µm. Maternal blood circulates in the intervillous spaces and bathes the villi¹. Spiral arteries are present in myometrium of uterus and open in the intervillous space. Increase in maternal blood pressure significantly affect the decidual spiral artery and intervillous space². Present study was undertaken to correlate changes seen in the hypertension.

Material and Method

The present study was done in two colleges i.e. Government Medical College, Chandigarh and ESIC Medical College, Faridabad. Study material were placentae obtained either by normal vaginal or caesarean section. Mother of age group 20-35

years, gestational age of 32-40 weeks was included. Total of thirty placentae were collected. Fifteen cases were of hypertensive case with reading of >140/100 in antenatal checkup after 30 weeks of gestation. All cases with concomitant Diabetes mellitus, Anemia etc were excluded. Informed consent from all cases were obtained. Morphological examination of each placenta was done and characters like weight, volume, size, shape, diameter, umbilical cord attachment site etc were noted.

Volume of placenta was measured by fluid displacement method. Placental and fetal birth weight was measured by electronic weighing machine.

Mean value along with standard deviation were calculated for each parameter.

For histological examination four specimen were taken from each fresh placenta after removal of decidua. Specimen were immediately fixed in 10% formalin solution for 7-10 days. Slides were prepared after H&E staining and histological parameters were noted. Size of villi were measured with micrometer eye piece. Relative component of villous, intervillous space was calculated by a technique as described by Mathur et al³. For this purpose, a grid was prepared by drawing 25 points at equal distance on a white sheet. Image of slide was projected on this grid by attaching a mirror to monocular eye piece. Points on grid were used as counting unit. If a point fall on a measured component, it was measured as hit for that component. Twenty different fields were examined in each section and in all minimum of 500 points were counted in each slide. Percentage of grid point falling on placental component indicate proportion of volume of that component. In this way relative proportion of villous and intervillous space was determined. This result was computed and analyzed statistically.

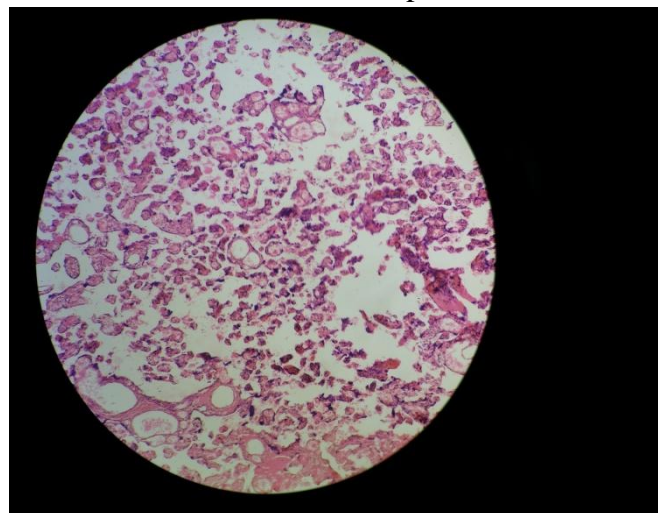
Result

In hypertensive placentae the mean length of umbilical cord was 42.79 ± 11.05 cm with range of 30.12 to 50.33 cm. Marginal insertion of umbilical cord was seen in 5 cases of hypertension, whereas it was only in one case in control group. In control cases mean placental length of umbilical cord was 53.20 ± 12.09 cm. Mean birth weight in normal cases was 3.02 ± 0.32 kg, whereas in hypertensive it was 2.80 ± 0.41 kg. Placental weight in normal cases was 505 ± 34 g whereas in hypertensive cases it was 385 ± 54 g. Mean placental/ fetal weight ratio was 0.37 ± 0.3 in hypertensive placentae and 0.21 ± 0.4 in normal placentae. Mean surface areas of hypertensive placenta was 170 ± 13.2 cm² with range of 139 – 179 cm² and in normal placentae it was 185 ± 18.3 cm² with range of 155-190 cm². Mean placental volume was 380 ± 90 ml, whereas in hypertensive it was 290 ± 102.3 ml. Mean surface area in control group was 185.6 ± 18.3

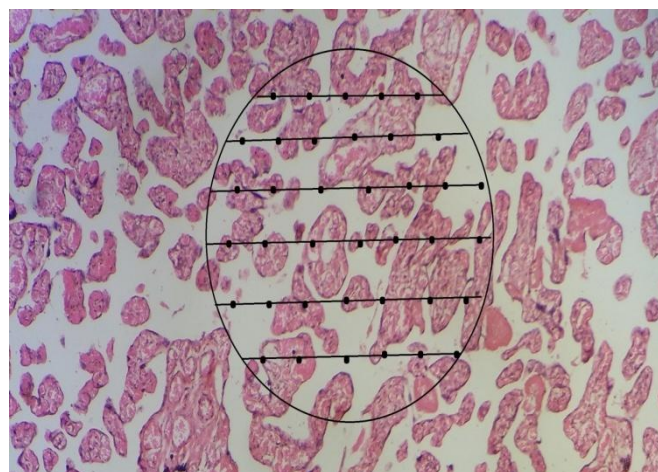
cm² (range 155-190 cm²) whereas in hypertensive it was 150.6 cm² with range of 130-180 cm². Significant relation was seen between birth weights, placental weight, placental volume ($p < 0.01$).

In hypertensive placentae percentage of villous volume was 48.32 ± 5.7 % and in normal placentae was 54.59 ± 3.7 %. Villous volume in hypertensive placenta was 130 ± 32 ml (range 112-146 ml), whereas in normal placentae it was 138 ± 31.02 cm³ (range 100-230 cm³). Mean size of villi was 40.13 ± 8.03 μm in normotensive, whereas it was 31.01 ± 10.2 μm in hypertensive. There was significant decrease in size and volume in villi in hypertensive placenta ($p < 0.01$).

Histological changes noted in hypertensive cases were increase in syncytial knot, hyalinization of villi and decrease number of capillaries.



Pic 1 Increase in syncytial knots in hypertensive case



Pic 2 Measurement of villous volume by a grid

Discussion

Maternal blood pressure is closely related to fetal and placental outcome. Morphological characters and histological features were assessed in control and hypertensive cases. Significant decrease in fetal weight was noted in hypertensive group. Placental morphological characters like weight, surface area and volume showed significantly lower value in corroboration with studies of other workers^{4,5,6}. In another study⁷ placental weight and size were directly proportional to birth weight. According to Rath et al⁴ altered intra cotyledon vasculature and placenta causes low birth weight.

Marginal attachment of umbilical cord was noted in five cases in contrast to only one case in control group. This finding is similar to studies of other authors^{5,9}. In a study¹⁰, marginal attachment was seen in 42 % of hypertensive placentae.

In our study relative component of villi and intervillous space was calculated by technique as described by Mathur et al³. By correlating it with total volume of placenta, villous volume was obtained. Villous volume showed a significant decrease in hypertensive cases ($p < 0.01$). This can be explained due to stricture of spiral arteries in maternal deciduae, thereby causing decreased perfusion of villi.

Structural changes like increase in syncytial knot, hyalinization and decrease number of capillaries was in accordance with other authors¹¹.

Grants: Nil

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