



Morphological Study of Placenta in Pregnancy with Hypertension in Western Odisha.

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Accepted on: 07-05-2015; Finalized on: 30-06-2015.

ABSTRACT

The aim of my study is to compare the morphological changes of placenta in preeclampsia with that of normal placenta and to analyze placental changes in the pregnancy induced hypertension. The material consisted of fifty term placenta collected from the labour room and operation theatre of the department of obstetrics and gynaecology, V.S.S. Medical College Hospital, Burla, after the normal or induced delivery of women clinically diagnosed as pre-eclampsia, severe pre-eclampsia, eclampsia, pre-eclampsia superimposed on essential hypertension and normal uncomplicated pregnancies as control. The weight, diameter, thickness of centre, infraction, calcification, retroplacental hematoma is observed. The weight, diameter, thickness of placenta, in study group appears to be towards lower side in comparison to the controls. There is higher incidence of marginal insertion of cord in study group in comparison to controls. Retroplacental hematoma, multifocal and central infraction observed in study group. This study will help in understanding of the specific aetiologies of adverse outcome which will lead to specific treatment and preventive measures for those with risk for recurrence in subsequent pregnancies, specifically in pre-eclampsia and eclampsia cases.

Keywords: Placenta, Pregnancy Induced Hypertension, Infarction, Retroplacental haematoma.

INTRODUCTION

Pregnancy Induced Hypertension (P.I.H.) is a matter of serious concern at present as regards to fetal outcome in pregnancy, as well as maternal morbidity and mortality. The exact etiology of hypertension in pregnancy is little known to medical fraternity. Toxemia of pregnancy, a multi system disorder, peculiar to pregnancy is characterised by gestational hypertension, proteinuria and activation of coagulation cascade with associated abnormalities in renal and hepatic function. Structural and functional derangement of placenta, evoke a considerable interest, as these may be the only yardsticks to measure adequacy of the foetal environment.

The foetus, placenta and mother consist the vital triad in pregnancy. Placenta is the most accurate record of the infants' prenatal experience as stated by Benirschke (1981)¹.

Placenta in Latin means cake, that is floppy mass. Placenta is a vital organ for fetal development, derived from both foetal and maternal tissues, the maternal portion being the decidua basalis and the fetal portion is chorionfrondosum. Harold Fox, Neil J (2007).² It is basically meant for exchange of nutrients between maternal and foetal circulation to ensure an optimal environment for foetal growth and development Chang KT (2009)³, Shams F, Rafique M, Samoo NA, Irfan R (2012)⁴. Common pathologies of pregnancy like intrauterine growth retardation, preeclampsia (pregnancy induced hypertension), are associated with incomplete

vascular remodeling in the placenta. Standing S, Collins P, Healy JC⁵.

Hypertensive disorders complicating pregnancy are common and form one of the deadly triads along with haemorrhage and infection, which result in large number of maternal deaths and thereof foetal deaths.

The present study intends to compare the morphological changes of placenta in preeclampsia with that of normal placenta and to analyze placental changes in the preeclampsia-eclampsia syndrome.

Morphological study will include placental shape, weight and thickness through a mid-placental section, and calculation of placenta: fetus weight ratio.

Umbilical length and thickness will be recorded, and umbilical cord insertion will be divided into two categories:

- (i) normal, which comprised central and lateral cord insertion, and
- (ii) abnormal, which constituted marginal (<2 cm from the placental margin) and velamentous umbilical cord insertion.

As the placenta is the direct link between mother and foetus, the examination of placenta gives the clear idea of what had happened with it, when it was in the mother's womb and what is going to happen with the foetus in the future.

With this objective, the present study was carried out. In fact, there is very limited data available on the



relationship between placental pathology and perinatal outcome.

The present study was undertaken to analyze the quantitative placental changes in toxemia of pregnancy which included mild pre-eclampsia, severe pre-eclampsia and pre-eclampsia superimposed on essential hypertension.

To compare and to correlate with the severity of maternal disease, the study of placenta from uncomplicated pregnancies were taken as control.

MATERIALS AND METHODS

The present study has been carried out in the department of Anatomy, V.S.S Medical College, Burla, Odisha, during the period from October 2011 to September 2013.

The material consisted of fifty term placentae collected from the labour room and operation theatre of the department of obstetrics and gynaecology, V.S.S. Medical College Hospital, Burla, after the normal or induced delivery of women clinically diagnosed as pre-eclampsia (12 cases), severe pre-eclampsia (10 cases), eclampsia (14 cases), pre-eclampsia superimposed on essential hypertension (4 cases) and normal uncomplicated pregnancies (10 cases) as control.

Soon after the delivery, placenta was collected in a clean tray and umbilical cord, membranes and placental disc were examined sequentially.

In umbilical cord its length, attachment to placenta (central/eccentric/marginal/vilamentous), true knots or congestion is observed. In membranes colouration/haemorrhage regions/membranous vessels was noted.

After trimming the membranes and the cord following observations were noted in respect of the placental disc, its weight, diameter, thickness at center, infarction fresh/old/both, marginal/central/both, calcification, thrombus, haemorrhage fibrin deposition, retroplacental haematoma.

RESULTS

Out of fifty singleton placentae undertaken for gross and microscopic analysis in the present series, 40 were in study group and 10 were in control group.

The study group was further sub classified into grade I (Mild pre-eclampsia), grade II (Severe Pre-eclampsia), grade III (eclampsia) and grade IV (Pre-eclampsia superimposed on essential hypertension).

The total number of cases in each grade has been shown in Table 1

The control group consisted of ten placentae collected from women having no bad obstetrics history, no history of bleeding during pregnancy, duration of amenorrhoea corresponded to height of uterus and had normal foetal presentation.

All of these were normotensive and their haematocrit values were within normal limits.

Maternal Data

Taking all grades into consideration, maximum number of toxemia of pregnancy were noted below 20 years of age (50%), followed by the age group between 21-25 yrs. (27%).

Pre-eclampsia superimposed on essential hypertension were observed in elderly patients only (Table 2).

The toxemias of pregnancy were seen mostly in primigravida (67.5%) and the occurrence showed a downward trend as the gravida increased.

Pre-eclampsia superimposed on essential hypertension were seen in multigravida (Table 3).

Table 1: Distribution of Cases

Study Group	Toxemia of Pregnancy	No. of Cases (n)	Percentage of Toxemia cases
Gr. I	Mild Pre-eclampsia (Mild PET)	12	30%
Gr. II	Severe Pre-eclampsia (Severe PET)	10	25%
Gr. III	Eclampsia	14	35%
Gr. IV	Pre-eclampsia superimposed on essential hypertension	4	10%
	Total no. of study group	40	100%
Control group	Uncomplicated pregnancies	10	100%

Table 2: Maternal Age Distribution of Various Cases

Grades of Toxemia	Maternal age in years				
	Under	21-	26-	31-	36-
Gr. I (n=12)	5	5	2	-	-
Gr. II (n=10)	5	2	1	2	-
Gr. III (n=14)	10	4	-	-	-
Gr. IV (n=4)	-	-	-	2	2
Total (n=40)	20	11	3	4 (10%)	2
Control group	1 (10%)	4 (40%)	5 (50%)		

Table 3: Gravida Distribution of Cases

Grade of toxemia	G1	G2	G3	G4	G5
Gr. I (n=12)	9	3	-	-	-
Gr. II (n=10)	7	1	1	1	
Gr. III (n=14)	11	2	1	-	-
Gr. IV (n=4)	-	1	1	1	1
Total (n = 40)	27 (67.5%)	7 (17.5%)	3 (7.5%)	2 (5%)	1 (2.5%)
Control (n=10)	4 (40%)	3 (30%)	3(30%)	-	-



Table 4A: Macroscopic Findings of Placenta in Different Grades of Toxemia Cases

Group	Placental Weight N=400-550gm			Diameter N = 18-20cms			Thickness N=2.5cm -3.5cm			Insertion of cord			
	N	< N	> N	N	< N	> N	N	< N	> N	Central	Eccentric	Marginal	Vila-Mentous
Gr.I (12) Mild PET	7	5	-	5	7	-	8	4	-	6	5	1	-
Gr.II (10) Severe PET	2	8	-	1	9	-	2	8	-	5	4	1	-
Gr.III (14) Eclampsia	1	13	-	-	14	-	1	13	-	7	7	-	-
Gr. IV (4) Pre-eclampsia superimposed on essential hypertension	3	-	1	3	-	1	3	-	1	2	2	-	-
Total(40)	13	26	1	9	30	1	14	25	1	20	18	2	-
	32.5%	65%	2.5%	22.5%	75%	2.5%	35%	62.5%	25%	50%	45%	5%	-
Control(10)	8	2	-	8	2	-	8	2	-	8	2	-	-
	80%	20%	-	80%	20%	-	80%	20%	-	80%	20%	-	-

Table 4B: Macroscopic Placental Leisons (Contd.)

Group	Placental Infraction										Calcification	Retroplacental Hematoma
	Fresh	Old	Both	Focal	Multi Focal	Mar-ginal	Central	Both	Size			
				(F)	(MF)	(M)	(C)	(MC)	≤1cm ³	>1cm ³		
Gr.I(12) Mild PET	7	2	2	3	4	7	4	4	3	4	3	3
Gr.II(10) Severe PET	9	7	7	2	7	9	7	7	2	7	3	5
Gr.III(14) Eclampsia	10	12	10	1	13	14	12	12	3	11	4	4
Gr.IV(4) PET Superimposed on essential hypertension	3	3	2	-	4	4	4	4	2	2	-	1
Total(40)	29	24	21	6	28	34	27	27	10	24	10	13
Toxemia Cases	72.5%	60%	52.5%	15%	70%	85%	67.5%	67.5%	25%	60%	25%	32.5%
Control	3	-	-	3	-	3	-	-	3	-	4	-
10cases	30%	-	-	30%	-	30%	-	-	30%	-	40%	-

Macroscopic Placental Lesions (Table 4 – A & B)

Placentae from 65% of toxemia of pregnancy weighed below normal as compared to 20% amongst the controls. The lowest placental weight found in this study was 180gms.

Both the diameter and thickness were reduced in study group (62.5%), compared to normal (20%).

Reduction in weight, diameter and thickness were correlated to increased grade of toxemia.

This study revealed interestingly a higher incidence of eccentric or marginal insertion of cord in study group (50%) as compared to controls (20%).

Multifocal and central infarctions were observed in (67.5%) placentae of study group. Also, the size of infarction measuring more than 1cm³, were seen more often in toxemia cases (60%).

The infarction was absent in 70 percent of normal placentae, but whenever present (30%) it involved marginal area and the size was less than 1cm³.

Placental calcification, was seen in 25% of toxemia cases and in 40% cases of disease free women.

Present study revealed 32.5% cases of pre-eclampsia and eclampsia were associated with retro placental hematoma; where as it was absent in the control group.



DISCUSSION

The placenta has been described as the mirror of the perinatal mortality. A glance at the literature reveals that the preeclampsia-eclampsia syndrome exerts its deleterious effects on the placenta. So, the present study was undertaken to analyse placental changes in the preeclampsia eclampsia syndrome with a view to assess the significance of villous abnormalities by histopathological methods because these changes serve as a guide to the duration and severity of disease.

The majority of cases of various grades of toxemia of pregnancy were found *in younger age range and in primigravida*, has also been observed by Baker⁶; Page⁷; Kher⁸; Dutta⁹ and William Manjunatha HK¹⁰. According to Page⁷, Primigravida have unyielding abdominal wall leading to higher intra-abdominal pressure that could lead to decreased uterine blood flow by external compression of myometrium as the uteroplacental blood flow in part is controlled by tone of myometrium through which all blood vessels must pass to reach the intervillous space. The second hypothesis is immunological where effective immunisation by previous pregnancy is lacking in primigravida.

Present study revealed 65% of placentae belonging to toxemia group *weighed significantly less as compared to placentae of the control group*. This was also observed by Nummi¹¹; Kher⁸; Bhatia¹²; Sodhi¹³ and Dutta¹⁴; Narasimha A¹⁵; Nobis and Das¹⁶ in their study have shown that the placental weight in toxemic cases varies from 279 to 407 gm. This finding is comparable with Virupaxi¹⁷. In high risk pregnancies like anemia and PIH, the placental weight is significantly reduced with the severity of the disease. (Narasimha A¹⁵)

In the study done by Virupaxi¹⁷ the umbilical cord insertion was more towards the margin with the increase in severity of anemia.

At term the fetoplacental ratio varies between 6:1 and 8:1 (Morrison, 1963). Variable findings are available about fetoplacental weight ratio. Nummi¹¹; Holz and Soma¹⁸ found increased fetoplacental weight ratio whereas, Fox¹⁹; Kher⁸ Dutta¹⁴ found this ratio to be decreased.

However the present study revealed fetoplacental weight ratio *at near normal range in all grades of toxemia of pregnancies except grade IV (Pre-eclampsia superimposed on essential hypertension) where it was found to be decreased*. It was also observed that mean placental weight in grade IV was more than mean placental weight of control.

Fox²⁰ has explained that hypertrophy of placental mass in response to chronic hypoxia in previously hypertensive patient leads to increased placental weight disproportionate to foetal weight resulting in low fetoplacental weight ratio. Improper antenatal care, poor socioeconomic condition, lack of education in rural

women gave rise to low foetal as well as placental weight in Grade I, II, and III cases ultimately keeping the fetoplacental weight ratio within normal limit.

Diameter and thickness of placentae were reduced in 62.5% of toxemia cases. Similar observation was also made by Dutta¹⁴, Majunatha HK¹⁰

In the present study *eccentric or marginal insertion of cord was noted in 50 percent of toxemic placentae*, while Dutta¹⁴ observed in 42.2% of cases. Similar observation was also made by Majumdar S²¹.

The present study revealed both (red) and old (white) infarcts in majority of cases suffering from eclampsia and pre-eclampsia. Placental infarction more than 5% area considered pathological and more frequently seen in toxemia due to thrombotic occlusion of maternal uteroplacental vessels.

Similar finding was noted by Bandana Das²² where they showed an increased finding of infarction in cases of PIH. Udainia²³ had also observed an increase in the incidence of placental infarction with severity of toxemia.

Similar observation was also made by Dutta¹⁴, Narasimha A¹⁵.

Placental calcification has shown variable values among study and control groups in previous studies. Calcification is regarded as evidence of placental senescence or degeneration.

In the present study 25% cases of study group showed calcification and 40% in control group showed the same. Similar observation seen by Fox¹⁹; Dutta¹⁴ and Manjunatha HK¹⁰.

Retroplacental haematoma with co-existent infarct observed in 40% of cases of toxemia of pregnancy, has also been seen by other workers (Mathews²⁴, Fox²⁵, Dutta¹⁴; Manjunatha HK¹⁰ and Maham A²⁶. Large haematoma that separates the considerable portion of villi from maternal blood supply are associated with high incidence of foetal hypoxia and death.

CONCLUSION

The foetus, placenta and mother constitute triad of contributors to pregnancy outcome. Placental examination becomes an important but not the only assessment of pregnancy-related problems. The placental examination will help in understanding of the specific etiologies of adverse outcome which will lead to specific treatment and preventive measures for those with risk for recurrence in subsequent pregnancies specifically in pre-eclampsia and eclampsia cases.

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Source of Support: Nil, Conflict of Interest: None.

