

Insertion of Umbilical Cord on Placenta in Hypertensive Mother

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Abstract

Background: Hypertensive disorders in pregnancy are responsible for significant amount of maternal and perinatal morbidity and mortality. This study was designed to see the association of umbilical cord insertion on placenta in hypertensive mothers. **Objective:** This purpose of the present study was to find out the site of umbilical cord insertion on placenta in pregnancy associated with hypertension and to correlate it with the weight of the placenta and the condition of the newborn. **Methodology:** This descriptive cross-sectional study was conducted at the Department of Anatomy, Rajshahi Medical College and Department of Obstetrics & Gynaecology at Rajshahi Medical College & Hospital, Bangladesh. Placental weight, diameter, thickness, insertion site of umbilical cord, insertion percentage of the cord and weight of newborn were noted. The site of cord insertion was detected and insertion percentage was calculated with the help of $d/r \times 100$. **Results:** A total 130 cases were selected for the study, 30 from normal, 33 from mild, 34 from moderate and 33 from severe hypertensive group respectively. The study demonstrated that mild to severe hypertension had smaller placentas with the tendency of deviation of umbilical cord towards the margin for insertion. Newborns of such mothers had low birth weight mostly; few of them had birth asphyxia. **Conclusion:** This study has been established that the marginal insertion of umbilical cord on placenta is associated with hypertension and severity of hypertension deviates the insertion site towards the margin. [Journal of National Institute of Neurosciences Bangladesh, 2016;2(2): 89-93]

Keywords: Placenta; umbilical cord; insertion; hypertension

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Introduction

Placenta is the first platform for life¹ and umbilical cord is the life line² inserted on it through which pregnancy is maintained up to term. It is a unique gestational organ that connects the developing foetus to the uterine wall to allow nutrient uptake, waste elimination & gaseous exchange through the mother's blood supply³. A

pregnancy cannot be proceeding without a healthy placenta⁴. Therefore, any complication during pregnancy may affect both the mother and the foetus. Hypertension is such a common complication still now, especially in developing countries like Bangladesh and also many other developed countries. Pregnancy may induce hypertension in normotensive or may aggravate

this condition in those who are already hypertensive⁵. It may reduce utero-placental circulation causing foetal hypoxia, distress, intra uterine growth retardation, preterm delivery, low birth weight, foetal and neonatal death⁶. Hypertensive disorders in pregnancy are responsible for significant amount of maternal and perinatal morbidity and mortality⁷.

Placenta is the mirror of maternal and foetal status; it reflects the changes due to maternal hypertension. It was observed by Damania et al⁴ that hypertension causes low birth weight, low placental weight and other placental abnormalities. Dunhill⁵ described the relation between birth weight, placental area and volume in hypertensive mother. Thomson et al⁸ reported that placental weight and size are directly proportional to the birth weight.

The site of insertion of umbilical cord on placenta is variable. It inserts more commonly centrally or slightly eccentrically on the foetal surface of placenta⁶. The umbilical cord is normally inserted on the placenta at or near the centre. The incidence of cord insertion is 18% central, 73% eccentric, 7% marginal and 1-2% velamentous⁹. There is much controversy about the marginal insertion. Percival¹⁰ observed that eccentric insertion of umbilical cord was most common in normal placenta. It was noticed by Shanklin¹¹ that velamentous or marginal type of umbilical cord insertion was found in newborn weighing less than 2500 gms. Rath et al¹² observed that marginal insertion is more commonly present on placenta of hypertensive mother. The reports on insertion of umbilical cord on placenta especially in hypertensive pregnancy are scanty. Pregnancy complications like hypertension reflect on placenta and umbilical cord insertion is changed towards the margin in a significant way. Uteroplacental blood flow is decreased in pre-eclampsia because there is maternal vasospasm¹³. Reduced uteroplacental blood flow leading to constrict the fetal arteries associated with the changes seen in placenta of pre eclamptic and eclamptic mothers. This purpose of the present study was to find out the site of umbilical cord insertion on placenta in pregnancy associated with hypertension and to correlate it with the weight of the placenta and the condition of the newborn.

Methodology

This descriptive cross sectional study was done at the Department of Anatomy, Rajshahi Medical College and Department of Obstetrics & Gynaecology, Rajshahi Medical College & Hospital, Rajshahi, Bangladesh. This study was done from January 2010 to December 2010 for a period of one (1) year. Admitted

hypertensive pregnant mothers in Obstetrics Indoor, RMCH were considered as study population. Placental weight, diameter, thickness, insertion site of umbilical cord, insertion percentage of the cord and weight of newborn were noted. The minimum distance between the site of insertion of umbilical cord and the placental margin was measured by the metallic scale and denoted as 'd'. As placenta is more or less circular in outline, the mean radius was estimated from the surface and denoted as 'r'. Then the insertion percentage was calculated by $d/r \times 100$. Low insertion percentage indicates marginal insertion, while high insertion percentage implies central insertion. Each placenta was placed on the following categories depending upon the insertion percentage like central, eccentric-lateral, eccentric-medial and marginal. The mean birth weight of newborn falling into each placental group and insertion category was noted. All collected data were methodically recorded into a pre-designed data collection form and analyzed by using computer based SPSS 16.0 program and expressed as mean+SD or in frequency or in percentage. The level of significance was expressed in P value and P value <0.05 was considered as a level of significance.

Results

A total 130 cases were selected for the study, 30 from normal, 33 from mild, 34 from moderate and 33 from severe hypertensive group respectively. The study was done on 130 pregnant mothers both normotensive (30) and hypertensive (100) group. Age range of the cases was 28 to 40 years with the mean age 24.79+5.06 years. Majority (87.0%) of pregnant mothers belongs to 18-28 years group. 77% of study group were hypertensive and 23.0% were normotensive. The mean diastolic blood pressure was 99.12+18.86 mm of Hg (Table 1).

Table 1: Distribution of Diastolic Blood Pressure status of mothers

DBP (mm of Hg)	Pregnant mother	
	Frequency	Percentage
Normal 60-89 (n=30)	30	23
Mild HTN 90-99 (n=33)	100	77
Modt HTN 100-110 (n=34)		
Severe HTN >110 (n=33)		
Total	130	100

Mean+SD=99.12±18.86 mm of Hg; HTN=Hypertension; DBP=Diastolic Blood Pressure; Modt=Moderate

The insertion of umbilical cord on placenta was central 11.0%, eccentric-lateral 25.0%, eccentric-medial 31.0% and marginal 33.0% (Table 2).

Table 2: Distribution of Umbilical cord insertion on placenta

Site of Insertion	Frequency	Frequency
Central (76-100)	14	11
Eccentric-medial (51-75)	32	25
Eccentric-lateral (26-50)	41	31
Marginal (0-25)	43	33
Total	130	100

Mean+SD = 33±23.23

The mean insertion percentage was 33.22 + 23.23. The maximum insertion site was found 47.0% eccentric-medial in normal, 39% eccentric-lateral in mild, 41% marginal in moderate and 48.0% marginal in severe hypertension respectively (Table 3).

Table 3: Distribution of Umbilical Cord Insertion site in different categories Blood Pressure Status of Mothers

BP status	Site of Insertion of Umbilical Cord				Total
	Central (76-100)	Eccentric-M (51-75)	Eccentric-L (26-50)	Marginal (0-25)	
Normal	6(20.0%)	14(47.0%)	6(20.0%)	4(13.0%)	30(100.0%)
Mild HTN	4(12.0%)	7(21.0%)	13(39.0%)	9(27.0%)	33(100.0%)
Modt HTN	3(9.0%)	7(21.0%)	10(29.0%)	14(41.0%)	34(100.0%)
Severe HTN	1(3.0%)	4(12.0%)	12(36.0%)	16(48.0%)	33(100.0%)
Total	14(11.0%)	32(25.0%)	41(31.0%)	43(33.0%)	130(100.0%)

L=Lateral, M=Medial, U cord=Umbilical cord, DBP=Diastolic Blood Pressure; HTN=Hypertension; DBP=Diastolic Blood Pressure; Modt=Moderate

The marginal insertion of umbilical cord on placenta is strongly significant (P≤0.05) in relation to birth weight of newborn (Table 4).

Table 4: Correlation between the insertion of umbilical cord on placenta and birth weight of newborn

Site of insertion (%)	Mean wt of newborn	P value
Central (76-100)		0.448NS
Eccentric- medial(51-75)	2585 ± 598.43 gm	0.301NS
Eccentric- lateral (26-50)		0.603 NS
Marginal (0-25)		0.014 S

NS=Not significant, S=Significant

The marginal insertion was highly significant in relation to Diastolic Blood Pressure especially in severe hypertension (P<0.005) (Table 5).

Table 5: Correlation between the umbilical cord insertion on placenta and DBP status of mothers

Site of insertion (%)	DBP status	Frequency	Percentage	P value
Central (76-100)	Normal	6	20	0.17
	Mild HTN	4	12	0.64
	Moderate HTN	3	9	0.84
	Severe HTN	1	3	0.11
Eccentric-medial (51-75)	Normal	6	20	0.42
	Mild HTN	6	18	0.97
	Moderate HTN	5	15	0.55
	Severe HTN	5	15	0.90
Eccentric-lateral (26-50)	Normal	14	47	0.11
	Mild HTN	10	30	0.83
	Moderate HTN	9	26	0.81
	Severe HTN	8	24	0.11
Marginal (0-25)	Normal	4	13	0.06
	Mild HTN	13	39	0.85
	Moderate HTN	17	50	0.30
	Severe HTN	19	58	0.01S

S=Significant

There was significant (p<0.05) relation between the birth weight of newborn and marginal insertion (Table 6).

Table 6: Correlations between the Birth Weight of Newborn and Insertion Percentage of Umbilical Cord

Insertion percentage	Birth Weight of Newborn		P value
	<2500gm	≥2500gm	
Central (76-100)	42(32.3%)	88(67.7%)	1.00NS
Eccentric- M (51-75)			0.04S
Eccentric-L (26-50)			
Marginal (0-25)			

NS= Not significant; S=Significant

Discussion

This study was done with the object to see the insertion of umbilical cord on placenta in hypertensive mother. This study showed the prevalence of marginal insertion of umbilical cord on placenta was higher in hypertensive mother especially in moderate and severe hypertension. The age distribution of mothers was revealed that the majority (87.0%) were in the age group of 18 to 28 years. The age group was higher which indicates that, this age group is more prone to develop hypertension including eclampsia and pre eclampsia during pregnancy in our country. This age group of pregnancy draws special attention to bring them under proper antenatal check up and follow up.

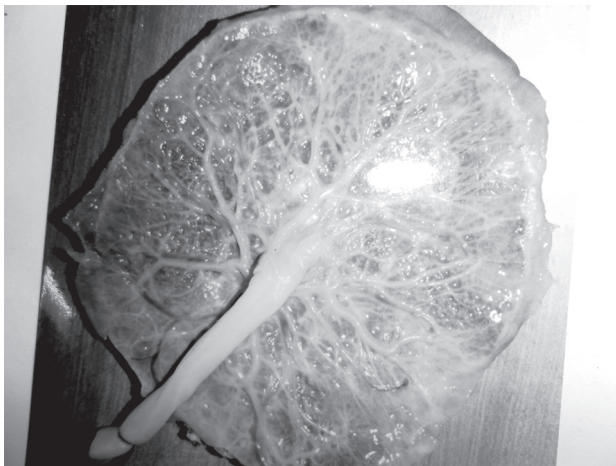


Figure II: Eccentric insertion

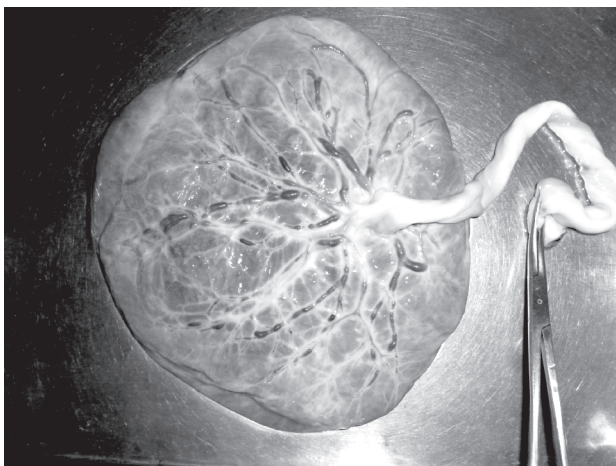


Figure II: Eccentric insertion



Figure III: Marginal insertion

Figure: Site of umbilical cord insertion: Figures of insertion of umbilical cord on placenta central, eccentric and marginal are given below (Figure I, II, III)

The umbilical cord normally inserted on the placenta at or near the centre. In a study, marginal insertion

with 0-25 insertion percentage was seen in 13% cases which were higher by 7% as noted by Percival¹⁰. In another study it had been revealed that the marginal insertion with 0 to 25 insertion percentage had a higher score and it was 42.0%¹². This study showed that in normal, mild and moderate hypertensive cases the findings were 27%, 26% and 26% respectively. In this study, it has been found that among 130 cases, marginal insertion in normal, mild, moderate and severe hypertension were 13.0%, 27.0%, 41.0% and 48.0% respectively. In moderate and severe hypertension, this score was slightly higher than the previous study. It also showed that marginal insertion was highly significant in relation to weight of newborn ($P < 0.05$). Low birth weight neonates mostly had low insertion percentage like marginal insertion. The marginal insertion might be responsible for low birth weight babies. Statistically marginal insertion was highly significant in relation to diastolic blood pressure of mother especially in severe hypertension ($P < 0.05$).

Conclusion

This study established that the marginal insertion of umbilical cord on placenta was associated with hypertension. Increased severity of hypertension would deviate the insertion site towards the margin. Hypertension in pregnancy might be responsible for low placental weight and low birth weight due to altered vascular pattern. This study showed the method of precise location of umbilical cord insertion by calculating insertion percentage and significant change of insertion site of umbilical cord on placenta. Early detection during antenatal check up by available technique to prevent further risk to mother and fetus by instituting adequate and appropriate measures and to guide health care planning.

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