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RELATION BETWEEN UMBILICAL CORD INSERTION AND FOETAL OUTCOME IN PREGNANCY INDUCED HYPERTENSION

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ABSTRACT

The study of relation between umbilical cord insertion and foetal outcome in PIH was carried out by dissection method in Government Medical College Surat. The attachment of umbilical cord on placentae was examined after careful dissection of membranes in 75 cases of PIH and 25 cases of normotensive pregnancy.

It was noted that as insertion of umbilical cord moves towards periphery, it severely affects the foetal weight. In control group, average baby weight is 2.778 Kg in central insertion, 2.580 Kg in eccentric insertion and 2.200 Kg in marginal insertion. In mild PIH group, average baby weight is 2.667 Kg in central insertion, 2.492 Kg in eccentric insertion and 2.263 Kg in marginal insertion. In severe PIH group, average baby weight is 2.200 Kg in central insertion, 2.115 Kg in eccentric insertion in marginal insertion and 1.475 Kg in membranous insertion. There was no case of membranous insertion in control and mild PIH groups. Dispersal type distribution of umbilical vessels has a baby weight of 2.636 Kg in control group as compared to 2.497 Kg in mild PIH and 2.053 in severe PIH. Magistral type distribution of umbilical vessels has a baby weight of 2 Kg in severe PIH. As foetal outcome is already compromised in PIH and it is adversely affected by abnormality in umbilical cord, so early diagnosis of latter would give an insight into the former.

Keywords: Umbilical Cord, Pregnancy Induced Hypertension (PIH), Dispersal, Magistral, Insertion

INTRODUCTION

Umbilical cord connects the foetus with foetal surface of placenta, which is attached to the uterine endometrium. Umbilical cord attachment on placenta varies from central, eccentric, marginal to velamentous and even furcated placenta (Standring *et al.*, 2008; Sadler, 2010; Moore and Persaud, 2009; Singh and Pal, 2009). In case of PIH, umbilical cord insertion is more towards periphery. So eccenteric insertion is the commonest variety in PIH (Garg *et al.*, 1996). Even velamentous insertion is also found with much higher frequency in PIH (Chakravorty, 1967). In velamentous type, cord inserts to the chorio-amniotic membranes of placenta rather than to the placental mass (Kouyoumdjian, 1980; Paavonen *et al.*, 1984; Bjoro, 1983). Boyd and Hamilton established the fact that the basic pattern of distribution of vessels of the chorionic plate is determined by funicular attachment (Boyd and Hamilton, 1967). The intrauterine development of foetus is dependent on this vital organ- The Placenta. Now a days hypertensive disorders are quite common and responsible for large no. of maternal deaths and there off foetal deaths. Foetal weight is also significantly reduced in PIH (Kouyoumdjian, 1980). Foetus is already in danger zone in PIH. So early detection of umbilical cord anomalies is very important in PIH to save a precious baby.

MATERIALS AND METHODS

The present study has been conducted in the Department of Anatomy, Government Medical College, Surat. The placentae were collected from Labour room and Gynaecology operation theatre, New Civil Hospital, Surat. A total of 100 cases were studied. Out of 100 cases, 75 cases belong to PIH and 25 cases belong to normal pregnancy. In PIH, only those cases having blood pressure 140/90 and above, with and without oedema, and / or proteinuria were included. Some cases also had eclamptic fits. None of these cases had hypertension prior to pregnancy.

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The mothers and neonates were given code numbers and studied at the hospital. Placenta with cord and membranes were collected immediately after delivery. Any abnormality of cord and membrane was noted. The placentae along with the umbilical cord identified by corresponding code numbers were preserved in 10% formalin solution (in water).

Observations

Observations of the insertion of the umbilical cord of placentae are recorded under 4 groups as shown in figure no 1 to 4 and also in Table 1.

The common site of insertion of umbilical cord in both the groups (Control and PIH) is eccentric. Central insertion is found in 36% placentae in the control group as compared to only 12% placentae in the PIH group. Where as eccentric insertion is more common (70.67%) in the PIH group as compared to 60% in the control group. Marginal insertion is also more common (14.67%) in PIH as compared to 4% in the control group. No case of velamentous insertion is found in the control group as compared to 2.66% cases of velamentous insertion in PIH group. Thus the lateral insertion of umbilical cord is more common in PIH group.



Figure 1: Central attachment of umbilical cord



Figure 2: Eccentric attachment of umbilical cord

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Figure 3: Marginal attachment of umbilical cord



Figure 4: Velamentous /Membranous attachment of umbilical cord

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Group no.	Type of insertion	Control (%)	PIH (in total) (%)	Mild PIH (%)	Severe PIH (%)
1	Central	36.00	12.00	7.50	17.14
2	Eccenteric	60.00	70.67	82.50	57.14
3	Marginal	4.00	14.67	10.00	20.00
4	Velamentous /Membranous	0.00	2.66	0.00	5.72

Table 1: Observations of the insertion of the umbilical cord of placentae

The insertion of umbilical cord in the PIH group is further divided in to mild and severe PIH groups depending on the severity of hypertension. The common site of insertion in both mild and severe PIH groups is eccentric. But marginal insertion is more common (20%) in severe PIH as compared to only 10% in mild PIH. No case of velamentous insertion is present in mild hypertension, where as it is present in 5.72% cases in severe PIH. Thus as the severity of PIH increases, insertion of umbilical cord becomes more marginal to velamentous in nature.

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Observations of the distributions of the umbilical cord blood vessels are recorded under two groups as shown in Table 2.

In control group, only dispersal type distribution is found. In PIH group, dispersal type distribution is found in 93.33% cases. Magistral type distribution is shown in 6.67% placentae in PIH. So dispersal type distribution is most common in both mild and severe PIH. Magistral type distribution is found in 8.57% cases in severe PIH as compared to 5% in mild PIH. This is correlated with increased frequency of marginal and velamentous insertion of umbilical cord in severe PIH.

Group no	Distribution of vessels	Control (%)	PIH (in total) (%)	Mild PIH (%)	Severe PIH (%)
1	Dispersal type	100	93.33	95.00	91.43
2	Magistral type	0	6.67	5.00	8.57

Relation between insertion of umbilical cord and foetal weight are recorded in Table 3.

In control group, average baby weight is 2.778 Kg in central insertion, 2.580 Kg in eccentric insertion and 2.200 Kg in marginal insertion. In mild PIH group, average baby weight is 2.667 Kg in central insertion, 2.492 Kg in eccentric insertion and 2.263 Kg in marginal insertion. In severe PIH group, average baby weight is 2.200 Kg in central insertion, 2.115 Kg in eccentric insertion, 1.893 Kg in marginal insertion and 1.475 Kg in membranous insertion. There was no case of membranous insertion in control and mild PIH groups.

Table 3: Relation between insertion of umbilical cord and foetal weight

Tuble of Relation between more than of anishical cord and focus weight					
Type of insertion	Control	PIH (In Total)	Mild PIH	Severe PIH	
Central	2.778 Kg	2.356 Kg	2.667 Kg	2.200 Kg	
Eccenteric	2.580 Kg	2.350 Kg	2.492 Kg	2.115 Kg	
Marginal	2.200 Kg	2.027 Kg	2.263 Kg	1.893 Kg	
Velamentous	No case	1.475 Kg	No case	1.475 Kg	

Relation between distribution of umbilical vessels and foetal weight are recorded in Table 4. Dispersal type distribution of umbilical vessels has a baby weight of 2.636 Kg in control group as compared to 2.497 Kg in mild PIH and 2.053 in severe PIH. Magistral type distribution of umbilical vessels has a baby weight of 2.200 Kg in mild PIH as compared to 2 Kg in severe PIH.

1 able 4: Relation between distribution of umblical vessels and foetal weight						
Type of distribution	Control	PIH (In Total)	Mild PIH	Severe PIH		
Dispersal	2.636 Kg	2.294 Kg	2.497 Kg	2.053 Kg		
Magistral	No case	2.080 Kg	2.200 Kg	2.000 Kg		

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DISCUSSION

Aberle et al., (1930) and Garg et al., (1996) reported a lower birth weight in correspondence with marginal attachment. Monie (1965) recorded much higher frequency (15.3%) of velamentous insertion in PIH. In present study also velamentous insertion is found only in PIH. A high degree of association between the marginal type of insertion of the umbilical cord and low birth weight was observed in both control and PIH groups.

Chakravorty (1967) found mean foetal weight 2805 grams in normal term pregnancy, 2724 grams in mild PIH and 1759 grams in severe PIH. In present study, mean foetal weight is 2640 grams in control group, 2480 grams in mild PIH and 2050 grams in severe PIH. The foetal weight reduces as insertion moves towards periphery.

In present study, in the control group, average foetal weight with central insertion of umbilical cord in male baby was 2.900 Kg as compared to 2.717 Kg in female baby. Average foetal weight with eccentric

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insertion of umbilical cord in male baby was 2.595 Kg as compared to 2.550 Kg in female baby. Average foetal weight with marginal insertion of umbilical cord in male baby was not available, as there was no case of male baby with marginal insertion of umbilical cord. Average foetal weight with marginal insertion of umbilical cord. Average foetal weight with marginal insertion of umbilical cord in female baby was 2.200 Kg. There was only one case of marginal insertion in the control group.

In PIH group, weight was less as compared to control group. In mild PIH group, average foetal weight with central insertion of umbilical cord in male baby was 2.600 Kg as compared to 2.800 Kg in female baby. Average foetal weight with eccentric insertion of umbilical cord in male baby was 2.622 Kg as compared to 2.337 Kg in female baby. Average foetal weight with marginal insertion of umbilical cord in male baby was 2.400 Kg, as compared to 1.850 Kg in female baby. There was only one female baby with central insertion in mild PIH group and therefore average female baby weight appears more than average male baby weight.

In severe PIH group, marginal insertion of umbilical cord is found with severe reduction in baby weight. In severe PIH group, average foetal weight with central insertion of umbilical cord in male baby was 2.400 Kg as compared to 2.000 Kg in female baby. Average foetal weight with eccentric insertion of umbilical cord in male baby was 2.150 Kg as compared to 2.092 Kg in female baby. Average foetal weight with marginal insertion of umbilical cord in male baby was 2.013 Kg, as compared to 1.733 Kg in female baby.

In present study membranous insertion is found only in severe PIH with markedly less weight. There was only one male baby and one female baby with membranous insertion with weight 1.250 and 1.700 Kg respectively. As the insertion moves towards periphery, it severely affects the baby weight and hence the foetal outcome.

The reduction in placental and foetal weight in PIH as shown by Armitage *et al.*, (1967), Chakravorty (1967), Thomson *et al.*, (1969), Boyd and Scott (1985) and Garg *et al.*, (1996) is also confirmed by the present study. Garg *et al.*, (1996) mentioned eccentric insertion as the most common site of insertion of umbilical cord in both control and PIH. This is also confirmed by the present study. Boyd and Hamilton (1967) found that distribution of umbilical vessels is determined by cord insertion, as magistral type distribution is found with marginal insertion. In present study also magistral type distribution is found with marginal insertion.

Present study shows baby weight 2.636 Kg in control group as compared to 2.497 Kg in mild PIH and 2.053 in severe PIH with dispersal type distribution of umbilical vessels. Magistral type distribution of umbilical vessels has a baby weight 2.200 Kg in mild PIH as compared to 2 Kg in severe PIH.

Conclusion

Present study indicates that commonest type of insertion of umbilical cord in PIH is eccentric type. As the insertion moves towards the periphery the foetal weight reduces significantly. As we move from mild to severe PIH, the anomalies of insertion of umbilical cord are quite common. Velamentous insertion is found in severe PIH and associated with very low baby weight. The weight of male baby is greater than female baby in both control and PIH groups but it is comparatively low in PIH group. The magistral type of distribution of umbilical vessels is significantly associated with low baby birth weight. Hence early detection of umbilical cord anomaly and distribution of umbilical vessels will help in knowing the foetal outcome.

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