

ORIGINAL ARTICLE**STUDY OF UMBILICAL CORD IN PREGNANCY INDUCED HYPERTENSION**Alka Udainia¹, C D Mehta²¹Associate Professor; ²Professor, Department of Anatomy, Government Medical College, Surat, Gujarat, India**Correspondence:** Dr Alka Udainia, Email: alkaudainia@yahoo.com**ABSTRACT**

Introduction: Fetal outcome is already compromised in pregnancy induced hypertension (PIH) and it is adversely affected by abnormality in umbilical cord, so purpose of this study to early diagnosis of latter would give an insight into the former.

Methodology: The study on umbilical cord insertion in pregnancy induced hypertension (PIH) was carried out by dissection method in Government Medical College Surat. The attachment of umbilical cord on placenta was examined after careful dissection of membranes in 75 cases of PIH and 25 cases of normotensive pregnancy.

Results: It was noted that Eccentric insertion of umbilical cord is the commonest type of insertion in PIH group (70.67%). Next common type of insertion is Central insertion 12% in PIH group. Marginal insertion is found in 14.67% cases in PIH group. No case of Velamentous (Membranous) insertion is found in normotensive while 2.66% cases are found in PIH. Whereas PIH group shows both dispersal and magistral type of distribution, in mild PIH 95% placenta shows dispersal type and 5% shows magistral type distribution, but in severe PIH 91.43% placenta show dispersal type and 8.57% placenta show magistral type of distribution.

Key words: Umbilical cord, Pregnancy Induced Hypertension (PIH), Insertion, Velamentous, Magistral, Eccentric

INTRODUCTION

The intrauterine development of foetus is dependent on one vital organ - "The Placenta". Umbilical cord connects the foetus with foetal surface of placenta, which is attached to uterine endometrium. So umbilical cord anomalies adversely affect the foetal outcome, more so in cases of PIH, where foetus is already in danger zone. In early period of gestation, probability of identifying congenital anomalies is much higher with careful cord examination¹.

Now a day with advancing age, stressful life and sedentary habits, hypertensive disorders complicating pregnancy are common and form triad with haemorrhage and infection that result in large no. of maternal deaths and thereof foetal deaths. Since all anabolics needed by foetus and catabolites of foetus pass through the umbilical cord; cord deserves attention right from first trimester. Even if placenta is normal, any anomaly of umbilical cord seriously affects the maternal and foetal outcome^{2,3}.

Umbilical cord is normally inserted in the central portion of placenta well away from placental edge. Sometimes it shows eccentric insertion. Other less common types of insertion are marginal, velamentous and furcated. In furcated insertion, umbilical cord branch before its insertion to placenta⁴. In velamentous

type, cord inserts to the chorio-amniotic membranes of placenta rather than to the placental mass^{5,6,7}. Boyd and Hamilton⁸ established the fact that the basic pattern of distribution of vessels of the chorionic plate is determined by funicular attachment. But very less data is available on this. Present study has been done to enlighten this aspect of knowledge, which is till now in dark.

Two types of distribution of umbilical cord blood vessels, namely Dispersal and Magistral type are found in PIH. Severity of PIH is related with Magistral type of distribution. So not only the cord insertion but also the distribution of umbilical vessels in chorion is equally important and indicates towards the severity of PIH and hence danger to foetus.

MATERIAL AND METHODS

The present study has been conducted in the Dept of Anatomy after permission taken from ethical committee of Government Medical College, Surat. The placentae are collected from Labour room and Gynaecology operation theatre, New Civil Hospital, Surat. A total of 100 cases were studied. Out of 100 cases, 75 (40 mild and 35 severe) 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.

Criteria for mild PIH⁹

1. Diastolic blood pressure >90mm of Hg but <110 mm of Hg
2. Diastolic blood pressure 20mm of Hg above the reading in early pregnancy
3. The mean arterial pressure (MAP) exceeds 105 mm of Hg

Criteria for Severe PIH⁹

1. Systolic BP >160 mm of Hg or diastolic BP >= 110 mm of Hg on atleast two occasion atleast 4 hrs apart
2. Proteinuria >= 5gm in 24 hrs
3. Oligouria <= 400 ml in 24 hrs
4. Cerebral or visual disturbances
5. Severe headache or epigastric pain

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).

Boyd and Hamilton⁸ classified distribution of umbilical cord blood vessels into 2 distinct groups:

1. Disperse type: Umbilical arteries undergo a succession of dichotomous divisions and rapidly diminish in caliber.
2. Magistral type: Arteries give off small side branches and reach the placental margin before marked reduction in their size.

In the chorion, branches of umbilical vessels radiate out from the point of attachment of umbilical cord towards the periphery and are visible easily through the amnion - The veins being deeper and larger than arteries. After careful dissection of placenta, two types of distribution of umbilical vessels are found in the present study. These are correlated with the Boyd and Hamilton study⁸.

OBSERVATIONS

Observations of the insertion of the umbilical cord of placentae are recorded under four groups as shown in Table 1.

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

Type of insertion	Normotensive (n=25) Cases (%)	PIH Group (n=75)		
		Cases (%)	Mild PIH Cases (%)	Severe PIH Cases (%)
Central	9 (36.00)	9 (12.00)	3 (7.50)	6 (17.14)
Eccentric	15 (60.00)	53 (70.67)	33 (82.50)	20 (57.14)
Marginal	1 (4.00)	11 (14.67)	4 (10.00)	7 (20.00)
Velamentous/membranous	0 (0.00)	2 (2.66)	nil (0.00)	2 (5.72)

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 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.

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.

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

Table 2: Observations of the distributions of the umbilical cord blood vessels

Distribution of vessels	Normotensive (n=25) Cases (%)	PIH Group (n=75)		
		Cases (%)	Mild PIH Cases (%)	Severe PIH Cases (%)
Dispersal type	25 (100)	70 (93.33)	38 (95.00)	32 (91.43)
Magistral type	0	5 (6.67)	2 (5.00)	3 (8.57)

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, where as magistral type distribution is more common (8.57%) 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.

DISCUSSION

A sonographic study was conducted by Donald N. Di Salvo et al¹⁰ in 46 pregnancies, out of which 38 singletons and 8 twins for a total of 54 umbilical cord insertions. They found 70.37% central insertions, 22.22% marginal insertions and 7.41% velamentous insertions of umbilical cord. Waldo Sepulveda et al¹¹ studied 825 umbilical cord insertions by colour Doppler ultra sound. They found 93.81% central insertions,

5.21% marginal insertions and 0.96% velamentous insertions. Waldo Sepulveda et. al¹² also studied 138 placenta by sonography. They found 92.02% central insertions, 7.2% marginal insertions and 0.75% velamentous insertions. Jason H Collins et al¹³ found furcated insertion in 1% cases. None of them studied the same in PIH. Present study analyzes insertion of umbilical cord in PIH.

Boyd and Hamilton⁸ established the fact that the basic pattern of distribution of vessels of the chorionic plate is determined by funicular attachment. Different types of insertion of umbilical cord are correlated with the present study results. Comparison of findings of different authors regarding type of insertion (% cases) is given in Table 3.

Table 3: Comparison of findings of different authors regarding type of insertion (% cases)

Type of insertion	Central (Normal)	Eccentric (Normal)	Marginal	Velamentous /Membranous
Donald N. Di Salvo et al ¹⁰ -1998	70.37		22.22	7.41
W. Sepulveda et al ¹¹ (2003)	93.81		5.21	0.96
Waldo Sepulveda et al ¹² (2009)	92.02		7.2	0.75
Singh et al ¹⁴ (1970)	-	82	-	5
Present study Control group	36	60	4	0
Present study PIH group	12	70.67	14.67	2.66

Present study found central insertion in 36%, eccentric in 60% and marginal in 4% in control group. There was no case of velamentous insertion in control group. No data is available on the type of insertion of umbilical cord in PIH group. In present study, in mild PIH, central insertion is found in 7.5%, eccentric in 82.5% and marginal in 10%. There was no case of velamentous insertion in mild PIH group. Similarly in severe PIH, central insertion is found in 17%, eccentric in 57% and marginal in 20% and velamentous insertion in 6%.

In the control group, only dispersal type of distribution of umbilical vessels is found. Whereas PIH group shows both dispersal and magistral type of distribution. In mild PIH 95% placenta shows dispersal type and 5% shows magistral type distribution. But in severe PIH 91.43% placenta show dispersal type and 8.57% placenta show magistral type of distribution.

CONCLUSION

Present study emphasizes that not only the site of insertion of umbilical cord is important but also the distribution of umbilical vessels in the placenta is equally important. No comparable data is available on this in PIH. Both dispersal and magistral type of distribution of umbilical cord blood vessels are found in PIH but magistral type of distribution is comparatively more common in PIH as compare to normal pregnancy. Similarly as the severity of hypertension increases, attachment of umbilical cord also moves towards the periphery. Even velamentous type of insertion of

umbilical cord is found only in severe PIH group. Foetus is already in danger in PIH and it is superadded,

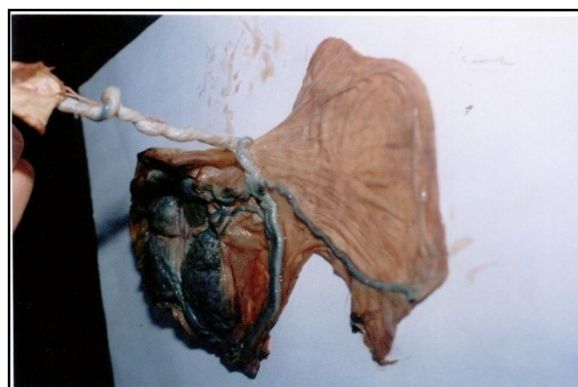


Figure 1: Membranous placenta

by anomaly of umbilical cord. So early detection of umbilical cord anomaly can save precious foetus.

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