

## Original Research Article

# Placental pathology and its correlation with immediate fetal neonatal outcome

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### ABSTRACT

**Background:** Placenta plays a major role in growth and development of the fetus as it helps in both exchange of nutrients and removal of waste. Even though it yields a valuable information of prognostic significance for the newborn, majority of the time it will be discarded after the gross examination. Hence the present study was conducted to determine the placental pathology and its correlation with fetal outcome.

**Methods:** The present study was carried out in Davangere for a period of 2 years. The placenta of 100 parturients, more than 28 weeks of gestation were included for the present study. The data was collected after detailed review of the obstetric case records. Placentas were examined soon after delivery. After the gross examination was complete, the placentas were put in a labelled plastic container. The placentas were re-examined macroscopically again by the pathologist. Cut-section examination was done. Then, at least 4 appropriate blocks were taken for each placenta. They were stained with hematoxylin-eosin stain and examined under the microscope. The histopathological examination was conducted as per proforma.

**Results:** One hundred placentae belonging to one hundred babies were studied among which 80% of the maternal cases had anaemia, 68% were term infant, 37% had IUGR. Eccentric insertion of the cord was observed to be the commonest (51). Marginally inserted membranes were seen most frequently (97).

**Conclusions:** In the present study we conclude that placental reserve is large and small alteration do not affect the pregnancy outcome. The placental changes are not specific to a particular condition affecting the pregnancy.

**Keywords:** Neonatal outcome, Placenta, Pathology

### INTRODUCTION

In India, 25.3 per 1000 births end in stillbirth.<sup>1</sup> Causes of still birth is multifactorial which includes cord abnormalities, implantation site abnormalities, infectious causes and compromise to the circulation.<sup>2</sup> Post-mortem studies of placenta facilitates in determining the factors which further helps in preventing such conditions.

The placenta is a choriodecidual structure developed during pregnancy. This endocrine organ is pivotal for

fetal growth and development as it enables the exchange of nutrients and oxygen from the mother to the fetus and also helps in removal of fetal waste products.<sup>3</sup>

The placenta, so vital in its function for the developing baby is commonly discarded after the most cursory examination. Yet, it may yield valuable information of prognostic significance for the newborn.<sup>4</sup> Hence it is important for the paediatrician or obstetrician to evaluate all placentas and involve the pathologist if deemed necessary.

The placental structural complexity and rapid evolution has made it enormously difficult to define the normal and differentiate it from the abnormal. In particular, the significance of the findings as a characteristic of the fetal prognosis is unclear.

The surge of interest in placental study in the recent times is for medicolegal purpose and also for study of vertical transmission of various infections. In the event of an adverse fetal outcome, parents would want explanations and assessment of future risks. The placenta is also used for extraction of placentrex used in treatment of various diseases. Hence, the present study was conducted with an objective to determine the placental pathology and its correlation with immediate fetal neonatal outcome.

## METHODS

The present study was carried out at Chitgateri General Hospital, Davangere for a period of 2 years from January 2006- December 2008. The placenta of 100 parturients, more than 28 weeks of gestation were included for the present study. Placenta from 10 still births and 90 livebirths were taken. Among that 9 placentae were from normal pregnancies. The others had some obstetric, medical or fetal-neonatal complications.

The data was collected after detailed review of the obstetric case records. The data included maternal age, parity, gestational age, obstetric history, socioeconomic status and relevant past and family history. Investigations done were haemoglobin, blood group and Rh typing, urine routine examination, HIV, HBsAG and VDRL. Ultrasound, renal and liver function tests were done for mothers when indicated.

Details of labor, outcome, neonatal sex, weight, APGAR scores and follow up examination of the newborn during hospital stay were carried out. The newborn who did not require hospital admission were followed up till a period of at least 7 days to cover the perinatal period. The newborns who required admission to the neonatal intensive care unit were followed up till discharge. Any complication in this period was noted. Relevant investigations were done for the neonates when indicated.

### *Collection of placenta*

Universal precautions were observed. Placentas were examined soon after delivery. They were thoroughly washed to remove the blood clots. The following features were noted

#### *Weight*

Placental weight including cord and membranes was taken after removing any retroplacental clot from the maternal surface. The retroplacental clots were weighed separately. Weight was measured using an electronic weighing scale accurate to the 10th gm. Placental

coefficient was calculated as a ratio between placental weight in gms to fetal weight in gms.

### *Dimensions of the placenta*

The largest diameter, the smallest diameter and the thickness were noted. The diameters were noted using a non-stretchable tape accurate to 1mm. A thick knife was used to note the thickness.

### *Gross examination of the placenta*

The fetal and the maternal surfaces were examined. It was done under the headings mentioned in the proforma. Assistance from the pathologist was taken when deemed necessary.

### *Umbilical cord examination*

The cord was measured using a non-stretchable tape. Both the placental and the fetal end were taken into account. The cord was examined as per the proforma

### *Examination of the membranes*

The membranes were examined as per proforma.

After the gross examination was complete, the placentas were put in a labelled plastic container. They were stored in 10% formalin and transported without delay to the pathology laboratory. The placentas were re-examined macroscopically again by the pathologist. Cut-section examination was done. Then, at least 4 appropriate blocks were taken for each placenta. They were stained with hematoxylin-eosin stain and examined under the microscope. The histopathological examination was conducted as per proforma. Photographs were taken for the purpose of demonstration.

### *Statistical analysis*

Continuous data are represented as mean and standard deviation and were analysed by one way ANOVA and Mann-Whitney tests. Frequency variables are presented as number and percentage and are analysed by Chi-Square tests and Fisher's exact test.

## RESULTS

One hundred placentae belonging to one hundred babies were studied. The newborns were examined for a minimum period of 7 days or up till discharge and the neonatal outcome was noted.

Among the placenta examined, 9 placentae belonged to normal delivery. Others were associated with some maternal pathology like pregnancy induced hypertension, anaemia, oligohydramnios etc. majority of them had anaemia (84%) followed by PIH (30%) (Table 1).

It was also noted that placentae with PIH and anaemia were commonly associated with infarction. Intervillous haemorrhage was another finding which was significantly elevated in placentae of Rh incompatibility and anaemia.

**Table 1: Distribution of maternal cases.**

Cases	Number	Percentage
Normal	9	9
PIH	30	30
Anaemia	84	84
Rh incompatibility	5	5
Twins	8	8
Polyhydramnios	6	6
Oligohydramnios	6	6
Diabetes mellitus	1	1

In the present study, 68% of the placentae examined were term gestation. 10% of them were IUD, 37% IUGR and 10% had low APGAR score. It was also noted that infarction, calcification and villitis were significantly increased in placentae of babies with low apgar score at birth. Infarction was significantly commoner in the IUGR group. Calcification and intervillous haemorrhage values were elevated in IUD group compared to the live born group (Table 2).

**Table 2: Distribution of neonatal cases.**

Cases	Number	Percentage
IUD	10	10
IUGR	37	37
Fetal distress	27	27
Congenital anomalies	4	4
Low Apgar score	10	10
Term	68	68
Preterm	27	27
Post dated	5	5
Twins	8	4
Neonatal sepsis	16	16
Neonatal death	8	8

**Table 3: Correlation between mean placental weight, placental coefficient and birth weight.**

	Small for gestational age (37)	Appropriate for gestational age (63)
Mean birthweight (gm)	1924.3 (344.1)	2581 (511.2)
Mean placental weight (gm)	388 (103.3)	452 (93.4)
Mean placental coefficient	0.21 (0.06)	0.18 (0.03)

Eccentric insertion of the cord was observed to be the commonest (51). Marginally inserted membranes were

seen most frequently (97). The mean placental weight in present study was 428.3 gms.

Mean placental weight was significantly lower among small for gestational babies (<0.001). Even mean placental coefficient was significantly lower among small for gestational babies (<0.001). This implies that, though the placental weight is reduced in SGA babies, their birthweight is more affected due to which they maintain a higher placental coefficient when compared to their AGA counterparts (Table 3).

**Table 4: Correlation between mean placental weight, placental coefficient and intra uterine death.**

	IUD (N=10)	Liveborn (N=90)
Mean placental weight (gm)	409.2 (123.3)	430.5 (99.4)
Mean placental coefficient	0.21 (0.04)	0.19 (0.04)

The placental weight was observed to be lesser in the IUD group but did not show any statistical significance (P >0.05). However, the placental coefficient, which takes into account, the placental and the neonatal weight showed significant difference (p <0.05). It was noted to be higher in the IUD group (Table 4).

**Table 5: Correlation between mean placental weight, placental coefficient and fetal distress.**

	Low Apgar score at 5 minutes (<6) n=10	Normal Apgar score at 5 minutes n=80
Mean placental weight (gm)	399.7 (76.6)	434.3 (101.6)
Mean placental coefficient	0.2 (0.04)	0.18 (0.04)

Total 10% of them had low APGAR score and 80% of them had normal apgar score. The mean placental weight was higher among the group which had normal APGAR score at 5min of birth. Even the mean placental coefficient was higher among normal APGAR score group. However, there was no significant correlation between mean placental weight and mean placental coefficient with low Apgar score at 5 min (Table 5).

**DISCUSSION**

In the present study, 100 placentae were examined. 10 placentae were of babies with IUD and 90 placentae were of liveborns. Among these, 9 placentae belonged to normal deliveries. The others were associated with some maternal pathology like PIH, anaemia, oligohydramnios or fetal pathology like IUGR, low Apgar score, IUD. The neonates were followed up for a period of at least 7days

to cover the perinatal period. The neonatal particulars with regard to outcomes were noted.

Umbilical cord insertion: the type of insertion is known to have a bearing on the fetal outcome. There are 4 types of insertion- central, eccentric, marginal and velamentous. Velamentous insertion may undergo trauma and bleed. The may jeopardize the fetal well-being.

In the present study, the most common type of cord insertion was eccentric (51%), followed by central (32%), marginal (15%) and then velamentous (2%). Both cases with velamentous cord insertions were stillborn and one among them had multiple anomalies. A study conducted by Naeye RL, observed eccentric (56%), central (28%), battledore (15%) and velamentous (2%) insertions of the umbilical cord.<sup>5</sup>

Yetter noted that 90% of cord insertions are central or eccentric, 7% are marginal and 1% velamentous.<sup>6</sup> Marginal insertion of the cord was associated with IUGR as noted by Davies BR et al.<sup>7</sup> Authors noted that 46.7% babies with marginal cord insertions had IUGR, while other types of cord insertions had 35.2% incidence of IUGR.

The increasing umbilical cord length has been associated with gestational maturity. Too short (<40 cm) or too long cords (>70 cm) have known to cause adverse fetal events.

The mean cord length in our study was 49.4 cm. There was a definite increase in the length of cord with increasing gestational age. It was 42 cm in the preterms and 51.7 cm in the term babies. This is in agreement with other studies.<sup>8</sup>

Among 10 babies with cord length <40cm, 9 were preterm, 7 were IUGR and succumbed to death in the neonatal period. This shows a definite poor outcome in babies with short cords.

Regarding insertion of membranes, we noted that 97% were marginal insertions, 2% circummarginate and 1% circumvallate. Circummarginate and circumvallate placentae are associated with IUGR.<sup>9</sup>

The placental weight is one of the important variables in the placental examination. The normal term placenta weighs about 500 gms. The mean placental weight is more than 400 gms in 65% of Indian women with normal pregnancy<sup>10</sup>. The mean placental weight for our study was 428.3 gms.

The mean placental weight was significantly lower and the placental coefficient was higher in SGA infants compared to their AGA counterparts. This finding corroborated with other studies.<sup>7,10,11</sup>

In present study, the placental weight did not correlate with IUD or fetal distress. Placental coefficient, however,

was significantly higher in the IUD group. This finding correlates with the study reported by Bhatia et al.<sup>12</sup>

Fox opined that circummarginate placentae were associated with IUGR.<sup>13</sup> Authors had 2 cases of circummarginate placenta. One was of an IUD infant and the other was an IUGR infant.

In present study there was no significant correlation between inflammatory changes in placenta of SGA infants was found in our study. Davies et al, had depicted a positive correlation.<sup>7</sup>

Fox reported 30% to have fibrinoid necrosis and 50% to have inflammatory changes.<sup>14</sup> In present study authors had a similar incidence with regard to inflammation (51.9%).

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