MORPHOLOGY OF PRETERM PLACETA AND IT'S CLINICO-PATHOLOGICAL CORELATION

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Abstract

Preterm labour is a common cause of preterm birth and is associated with increased fetal mortality. Many causes of preterm birth can be detected by gross and microscopic examination of the placenta. A total of 82 preterm placentas were subjected to gross and histopathology examination. The largest number of placentas were from cases between 32-36 weeks of gestation. The following causes of preterm birth was observed: Premature rupture of membrane (47.56%), followed by pregnancy induced hypertension (20.73%), toxaemia of pregnancy (10.97%), diabetes mellitus (07.32%), intrauterine growth retardation (04.88%) and one case each of malaria and Rh incompatibility (01.22%). No specific pathology was seen in (6.10%) of cases.

Key word: *Preterm placenta, clinico-pathological correlation*

Introduction

The placenta unfortunately is often ignored, not only by the gynecologists and pediatricians, but also by the pathologist.[1] The true incidence of preterm births varies from country to country and from one geographic region to another within a country. Preterm labour, or premature labour, is the early onset of uterine contraction before 37 weeks and after 20 weeks of gestation.[1,2] Preterm labour can be caused by a problem with the baby, the mother, or both, often the cause is not known.[2] The incidence of preterm delivery in India was 26% in 2006.[3,4] In 2006 the incidence of preterm births in the following countries was: United States: 11.6%, Sweden: 5.6%, China: 7.4%. Preterm births account for 75-85% of early neonatal deaths which are not due to lethal congenital malformations. **[5,6]**

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Aims and Objectives

1. To study and document gross and microscopic morphological features of pre-term delivered placenta and correlate them with etiological diagnosis.
2. Statistical analysis of gross and microscopic morphological changes occurring in pre- term placenta in order to determine frequency of various lesions.

Material and methods

The present study includes retrospective and prospective cases of preterm placentas between 20 weeks and 37 weeks of gestation diagnosed in Pravara Rural Hospital, Loni, from Jan 2006 to Nov 2008.

Retrospective cases:

Clinical details were obtained from record section of Pravara Rural Hospital and paraffin block section for microscopy were obtained from Dept of Pathology, Rural Medical College.

Prospective study:

Clinical details were obtained by detailed history taking, clinical examination, and ultra sound examination (USG) of the abdomen.

A total of 82 cases of preterm placentas were selected. Criterion for prematurity was based on clinical features and ultrasonography examination of mothers. The clinical and USG gestational ages matched in all 82 cases. Of these 19 placentas were from retrospective and 63 placentas were from the prospective study group. Gross features for prospective placentas were recorded in terms of:Trimmed weight, size, membranes, edema, colour etc.

Superficial fibrinoid material/infarcts or infraction occupying area less than 25%, 25%-50%, more than 50% and calcification /other features of degeneration recorded. Microscopic examination was carried out and presence/absence of the following were noted: Chorioamnionitis, extraplacental membranitis, umbilical cord vasculitis, funisitis, deciduitis, villitis, ischemic changes, infraction, intervillous fibrin strands, avascular villi, and fetal nucleated red blood cell.

Paraffin blocks were made from the following**:**

1. A full transverse section of the umbilical cord at a point 3 cm above the insertion into placental surface**.** One section from full vertical thickness of the placenta from its central area including both chorionic, basal plates and four others one from each quadrant. Hematoxylin and eosin stains were performed on all sections and other special stains as and when required.[7,8]

Observations and results

Table I: Distribution of cases based on clinical diagnosis:Total number of cases: 82

Sr No	Clinical diagnosis	Number of cases	Incidence %
1	Premature rupture of membranes	36	43.90
2	Pregnancy induced hypertension	22	26.82
3	Pre ecclamptic toxemia	8	09.77
4	Diabetes mellitus	06	07.31
5	Intrauterine growth retardation	04	04.88
6	Placenta Previa	03	03.66
7	Rh incompatibility	02	02.44
9	Malaria	01	01.22

Table II: Distribution of cases based on gestational age as determined by ultrasound examination and clinical features: Total number of cases: 82

Sr no.	Gestational Age	Number of cases	Frequency (%)
1	20-23 weeks	08	09.76
2	24-27 weeks	17	20.73
3	28-31 weeks	23	28.05
4	32-36weeks	34	41.46
5	Total	82	100%

The largest numbers of patient were in the age group of 22-25 years (48.78%).

The largest number of cases, 41.46%, were between 32-36 weeks of gestation and the least number of cases were between 20-23 weeks (9.76%).

Table III: Case distribution based on gross morphology: Total number of cases: 82

Sr. no.	Lesion in placenta	Number of cases	Frequency (%)
1	Membranes: Cloudy /opaque	44	53.66
2	Circulatory disorders (total):	34	41.46
	(a)Infract : (Pregnancy induced, hypertension and toxemia of pregnancy)	26	31.71
	(c)Subchorionic Fibrin: (Diabetes Mellitus)	06	07.31
	(d)Retroplacental clot	02	02.44
3	Intrauterine growth retardation: (Decreased in weight for gestational age)	04	04.88

MICROSCOPIC AND GROSS FEATURES OF PLACENTA OBSERVED IN VARIOUS DISORDER:

Table IV: Premature rupture of membranes:
Total number of cases: 39/82 (47.56%)
Gross features:

Sr. No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	36	92.35
2	Underweight for age of gestation	03	07.65%
3	Overweight	nil	-

Table IV: Premature rupture of membranes:
Total number of cases: 39/82 (47.56%)
Microscopic features

Sr. No	Lesion	Number of cases	Frequency (%)
1	Chorioamnionitis	24	61.54
2	Deciduitis	06	15.38
3	Funisitis	01	02.56
4	Deciduitis+ Chorioamnionitis	04	10.26
5	Funisitis+ Chorioamnionitis	04	10.26

Table V: Pregnancy induced hypertention:
Total number of cases: 17/82 (20.73%)
Gross features:

Sr. No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	14	82.35
2	Underweight placenta	03	17.65
3	Overweight placenta	Nil	-

Table V: Pregnancy induced hypertention:
Total number of cases: 17/82 (20.73%)
a)Gross features
b)Microscopic features

Sr No	Lesion	Number of cases	Frequency (%)
1	Significant infraction	06	35.30
2	Arterioslerosis	10	58.82
3	Chorio-amnionitis	01	05.88

Table VI: Toxemia of pregnancy: Total number of cases: 09/82 (10.97%)
Gross features

Sr No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	05	55.55
2	Underweight placenta	04	44.45
3	Overweight placenta	Nil	-

Table VI: Toxemia of pregnancy: Total number of cases: 09/82 (10.97%)
Microscopic features

Sr No	Lesion	Number of cases	Frequency (%)
1	Infraction	01	11.11
2	Fibrinoid necrosis	01	33.34
3	Infraction+ Fibrinoid necrosis	03	11.11
4	Infraction+ Basement membrane thickeniing	03	33.33
5	Infraction+ Fibrinoid necrosis+ Basement membrane thickening	01	11.11

Table VII: Diabetus mellitus: Total number of cases: 06/82 (7.31%)
Gross features

Sr No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	03	50.00
2	Underweight placenta	Nil	
3	Overweight placenta	03	50.00

Table VII: Diabetus mellitus: Total number of cases: 06/82 (7.31%)
Microscopic features

Sr No	Lesion	Number of cases	Frequency (%)
1	Villous immaturity	03	50.00
2	Fibrinoid necrosis	02	16.66
3	Basement membrane thickening+ chorangiosis	01	16.67
4	Infraction+ fibrinoid necrosis	01	16.67

Table VIII: Intrauterine growth retardation: Total number of cases: 04/82 (4.87%)
Gross features

Sr No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	02	50.00
2	Underweight placenta	02	50.00
3	Overweight placenta	Nil	-

Table VIII: Intrauterine growth retardation: Total number of cases: 04/82 (4.87%)
Microscopic features

Sr No	Lesion	Number of cases	Frequency (%)
1	Villitis	04	100

Table IX: Malaria: Total number of cases: 01/82 (1.21%)
Gross features

Sr No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	01	100
2	Underweight placenta	Nil	-
3	Overweight placenta	Nil	-

Table IX: Malaria: Total number of cases: 01/82 (1.21%)
Microscopic features

Sr No	Lesion	Number of cases	Frequency (%)
1	Haemazoin pigment	01	100

Table X: Rhesus incompatibility: Total number of cases: 01/82 (1.21%)
Gross features

Sr No	Lesion	Number of cases	Frequency (%)
1	Normal weight for age of gestation	01	100
2	Underweight placenta	Nil	-
3	Overweight placenta	Nil	-

Table X: Rhesus incompatibility: Total number of cases: 01/82 (1.21%) – Microscopic features

Sr No	Lesion	Number of ases	Frequency (%)
1	Immuture red cells in villi	01	100

No specific pathology was seen in 05/82 cases. (06.10%)

Discussion

Despite great advances in imaging technology and increased sophistication available in biochemical examination, histological examination of placental tissue remains an important tool in multidisciplinary approach towards diagnosis, evaluation and management of preterm labour and delivery.[9]

The common maternal factors of preterm labour are chorionic vasculitis, chronic deciduitis, pre ecclampsia, toxaemia of pregnancy, diabetes mellitus, chronic illness of mother, antepartum haemorrhage, malformations of the uterus, and certain other medical and surgical causes. Non organic fetal causes of prematurity are fetal thrombotic vasculopathy, placental infarct, placental oedema, thrombosis of fetal arteries.[10,11]

In this study an attempt has been made to identify the constellation of morphological changes which define a particular disease.

The diseases encountered in the present study and their relative frequencies were:

a) Premature rupture of membrane (PROM) with accompanying infection: (42.56 %)

b) Pregnancy induced hypertension (20.75%)

c) Toxemia of pregnancy: (10.97%)

d) Diabetes mellitus (07.32%)

e) Intrauterine growth retardation (IUGR): (04.88%)

f) Malaria: (01.22%)

g) Rhesus (rh) incompatibility: (01.22%)

Each of above lesions are discussed below:

1.PREMUTURE RUPTURE OF MEMBRANE:

The most common lesions associated with PROM were chorio-amnionitis, funisitis and deciduitis. Chorio-amnionitis was found in 61.54% of cases. Ebehard Muller Heubach et al (1990)[12] observed chorioamnionitis in 32% of cases.

We observed placental funcitis in 6.10% of cases. Tang M Y (1989) [13] attributed funicitis in PROM to cervical intervention in 11.52% of cases. Study performed by Bruton S Richarden (2006)[14] found funicits in 27% of cases. Deciduitis was present in 76% of cases by T Yee et al (2000).[15] All cases of deciduitis were associated with premature rupture of membranes.

2.PREGANCY INDUCED HYPERTENTION:

Lesions found in our study were infraction, atherosclerosis and it's combination.

J.S. Wigglesworthetheth et al (1962) found infraction in 29.4%. Our study shows incidence of 35.30% which is similar.[16] Salafia C M (1998)[17] studied placenta of 22- 32 weeks gestation in preeclamsia and found that lower birth weight percentile were related to uteroplacental vascular lesions.[17] In present study in all cases of pregnancy induced hypertention, significant infraction was present but arteriosclerosis and chorioamnionitis were minor elements.

3. TOXEMIA OF PREGNANCY:

Almost one third of cases (33.33%) had significant infraction with fibrinoid necrosis and one third of cases (33.33%) had evidence of basement membrane thickening/ combination of basement membrane thickening, infraction with fibrinoid necrosis and chorioamninitis was also found in minority of cases.

4. DIABETES MELLITUS:

Villous immaturity was present in half of the cases and fibrinoid necrosis in one third of cases. Basement

membrane thickening (16.67%) and chorangiosis (16.67%) was present in a minority of cases.

Honda M Toyoda et al (1992)[18] studied placenta in diabetic women and observed increased incidence of syntitial knots and basement membrane thicking in comparison to controls. They also demonstrated fetal growth retardation in such cases.

5. INTRA UTERINE GROWTH RETARDATION:

In our study Villitis was present in 100% of cases. This mismatch between our figure and other authours may be due to very small number of cases (04 in number) of IUGR included in sample size. Geoffry-Altsuler et al (1973) studied placenta associated with small for gestational age.[19] He found villitis of unknown origin in 25% cases and presumed it to be infectious origin, probably viral.

Sun C.C. (2004), [20] studied a large group of placenta on IUGR patient and described various morphological changes such as chronic villitis (21.7%) along with intervillous thrombosis, haemorrhagic endovasculitis, infraction and decidual angiopathy.[20]

6. MALARIA:

Mamudo R Ismail et. al (1999) found that the most significant finding of active malarial infection was intervillous infiltration by mononuclear inflammatory cell.[21] Chornic infections were associated with the most severe changes, particularly intervillous mononuclear infiltration. In our case only haemazoin pigment was observed.

(g)RESUS INCOMPATIBILITY: This disease was diagnosed on the basis of presence of nucleated red cell in villi [7]

Conclusion

Correlation between clinical diagnosis and histological features and statistical analysis of various lesions, lead us to the following conclusions:

1. Infections / inflammation of the placental membranes are largely caused by premature rupture of membranes. They are the foremost cause of pre term delivery and attention to this aspect may go a long way in prevention of this disease with its attendent morbidity and mortality.
2. Of the various circulatory disturbances (pregnancy induced hypertension, toxaemia of pregnancy and diabetes mellitus), the most commonly exhibited feature is infarction caused by vaso- occlusive lesion.

(a) In pregnancy induced hypertension, even though the predominant finding is infarction, other features like hyperplastic arteriosclerosis, fibrinoid necrosis and chorio- amnionitis were also found.

(b) In cases of toxaemia of pregnancy, infraction and villous immaturity and/or thickened basement membrane were seen in majority of cases but fibrinoid necrosis and chorio amnionitis were also found to be present .

(c) In case of diabetes mellitus, vasculopathy was a predominant feature in the form of fibrinoid necrosis, immature villi and chorangiosis.

(d) In case of IUGR, a small sized placenta with features of villitis was almost universal.

3. The single case of malaria showed haemazoin pigment and inter - villocitis.
4. The single case of Rh incompatibility case showed presence of nucleated red blood cell in the villi.

The human placenta is an under examined organ and has no gold standards for relevant clinico-pathological co-relation. Documenting placental lesions are like maintaining a diary of gestational life. Devasting placental disease may have little morphological changes and normal placental histology may be accompanied by serious outcomes. No pathognomic feature /features accompany any of the placental diseases. Only a constellation of lesions taken together against a relevant clinical background is likely to established a positive diagnosis.

Although more questions have been asked than answered, the insights provided by this study and the questions raised by it, direct us towards a new understanding of the relationship of adverse pregnancy outcome and feto – maternal disease.

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