

Original research article

## Morphological and Histopathological Changes in Placenta in Complicated Pregnancies

Kumari Manu<sup>1</sup>, Shweta Anand<sup>2</sup>, Abhishek Singh<sup>3</sup>

<sup>1,2</sup> Associate Professor, Department of Pathology, Prasad Institute of Medical Sciences, Lucknow, Uttar Pradesh

<sup>3</sup> Assistant Professor, Department of Pathology, Maharshi Vishwamitra Autonomous State Medical College(MVASMC), Ghazipur, Uttar Pradesh

Corresponding Author: Shweta Anand

### Abstract

**Background:** The term placenta means flat cake in Latin. The placenta is defined as a fusion of the fetal membranes to the uterine wall. Gross and microscopic examination of placenta is generally not indicated in uneventful pregnancies and deliveries. According to College of American Pathologists criteria, the gross and microscopic examination of placenta is indicated in certain maternal, fetal and placental conditions which may govern the outcome of the next pregnancy and diagnosis of which may prevent fetal loss and maternal complications in next pregnancy. Normally placenta should consist of single round to ovoid disc with no accessory lobes, with a shiny surface and membranes should insert at the margin of the disc. Umbilical cord should contain two arteries and one vein.

Light microscopic features of a normal placenta in third trimester include relatively more number of small sized villi and there should not be any stromal cell hypercellularity or increased syncytial knots or edema

**Material and Methods:** 24 samples of placenta from women in the reproductive age group with complicated pregnancies received in the department of Pathology, grossly examined and routinely processed and stained with H&E stain.

**Results:** It shows that maximum cases 13(56.52%) were of fetal growth retardation followed by premature delivery 4(17.39%) then eclampsia/preeclampsia/help syndrome were 3(13.04%), postdated delivery 2( 8.69%) and IUD and gestational diabetes/preexistent diabetes mellitus were 1 (4.34%)

**Occlusion:** Morphological and histological changes are observed in placenta of complicated pregnancies in comparison to the normal uneventful term pregnancy. Some of which are similar in different cases and some were observed differently.

**Key words:** Placenta, Histopathology, complicated pregnancy

## Introduction

The term placenta means flatcake in Latin.<sup>[1]</sup> The placenta is defined as a fusion of the fetal membranes to the uterine mucosa for the transfer of oxygen and metabolites between maternal and fetal blood.<sup>[2]</sup> It provides oxygen, nourishment, and protection to the fetus. It also has secretory and endocrine function. Gross and microscopic examination of placentas is generally not indicated in uneventful pregnancies and deliveries. According to College of American Pathologists criteria the gross and microscopic examination of placenta is indicated in following conditions like. Maternal conditions- Diabetes mellitus, Hypertension, prematurity (<32wks) , postmaturity (>42wks), Maternal history of previous stillbirths, spontaneous abortions, or premature births, oligohydramnios, Fever, Infection, maternal history of substance abuse, Abruptio placentae .Fetal and neonatal conditions- still birth, congenital abnormalities, fetal growth retardation, prematurity, hydrops, thick /viscid meconium, neurological problems including seizures, suspected infections. Placental conditions- any gross abnormality of placenta including membranes and umbilical cord. Normally placenta should consist of single round to ovoid disc with no accessory lobes, with a shiny surface and membranes should insert at the margin of the disc. Umbilical cord should contain two arteries and one vein. Light microscopic features of a normal placenta in third trimester include relatively more number of small sized villi and there should not be any stromal cell hypercellularity or increased syncytial knots or edema.

## Material & Method:

This study consisted of 24 samples of placenta from women in reproductive age group with complicated pregnancies received in the department of Pathology .

### Inclusion criteria-

1. Premature delivery
2. Fetal growth retardation
3. Eclampsia/ preeclampsia/HELLP syndrome
4. IUD
5. Postdated delivery
6. Gestational diabetes, preexistent Diabetes Mellitus

### Exclusion criteria-

- Term pregnancy with no complications

Proper clinical history was recorded keeping in consideration the age, clinical history of any medical disorder like preexistent diabetes or hypertension and history of previous pregnancies. Formalin fixed specimen of placenta first examined grossly for weight, superficial fibrinoid material, gross infarcts and gross calcifications. Membranes were examined for color, appearance and edema. Umbilical cord were examined for knots, site of insertion and gross features of umbilical cord vessels. The tissue was routinely processed and stained with H&E stain.

Histopathological evaluation was done under light microscope for microscopic findings like spongiosis, calcification, infarction, fibrinoid necrosis, inflammation, number of syncytial knots and mature chorionic villi in placenta. Membranes were evaluated for edema, inflammation and exudates. Umbilical cord was seen for number , dilation and congestion of vessels. Result thus obtained was subjected to statistical analysis and p value <0.5 was considered significant.

**Results:****Table 1:**

Category	Number of Cases	% Of Total Cases
Premature delivery	4	17.39
Fetal growth retardation	13	56.52
Eclampsia/ preeclampsia /HELLP syndrome	3	13.04
IUD	1	4.34
Postdated delivery	2	8.69
Gestational diabetes, preexistent Diabetes Mellitus	1	4.34

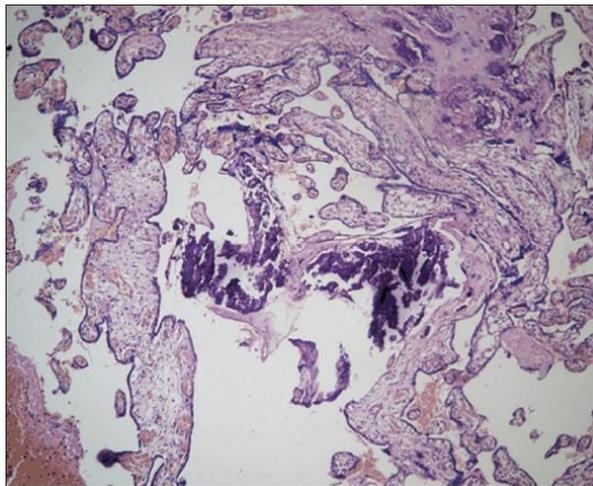
Table 1 shows that maximum cases 13(56.52%) were of fetal growth retardation followed by premature delivery 4(17.39%) then eclampsia/preeclampsia/HELLP syndrome were 3(13.04%), postdated delivery 2( 8.69%) and IUD and gestational diabetes/preexistent diabetes mellitus were 1 (4.34%) each. P value was significant.

**Table 2 :Gross Features**

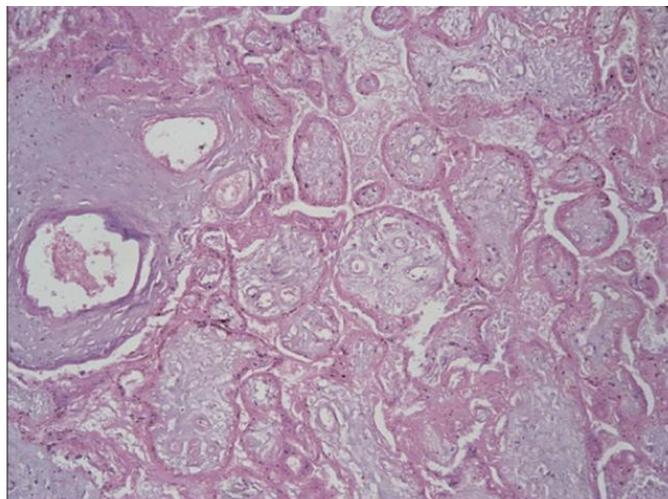
CATEGORY	PLACENTA				MEMBRANES	CORD
	Average Weight	Superficial Fibrioid Material	Gross Infarcts	Gross Calcification		
Premature delivery	475g	Absent	Present in 25% cases	Present in 75% cases (area involved <25% )	Membrane edema present in 25% cases	Central insertion 50% Marginal insertion 50% Knots absent in all Cord vessels NAD
Fetal growth retardation	572g	Absent	Present in 25%	Present in 50% cases (area involved <25% )	Membrane edema present in 25% cases	Central insertion 25% Marginal insertion 75% Knots absent in all Cord vessels NAD
Eclampsia/ preeclampsia /HELLP syndrome	435g	Absent	Absent	Present in 66% cases (area involved <25% )	Membrane edema present in 33% cases	Marginal insertion 100% Knots absent Cord vessels Dilated in 33%
IUD	600g	Absent	Absent	Present (<25% area)	NAD	Central insertion Knots absent Cord vessels NAD
Postdated delivery	420g	Absent	Absent	Present (<25%)	NAD	Marginal insertion Knots absent Cord vessels NAD
Gestational diabetes, preexistent Diabetes Mellitus	410g	Absent	Absent	Absent	Membrane edema present	Marginal insertion Knots absent Cord vessels NAD

**Table 3: Microscopic Changes**

Category	Ischemic change/ Calcification	Meconium	Chorioamnionitis	Abruptio placentae	Infarction	Villitis	Chorangiosis	Increased syncytial knots	Normal
Premature delivery	+ in 75%	-	-	+ in 50%	-	-	+ in 75%	+ in 25%	25%
Fetal growth retardation	+ in 50%	-	+ in 15%	+ in 30%	+ in 15%	-	+ in 50%	+ in 50%	25%
Eclampsia/ preeclamps ia /HELLP syndrome	+ in 75%	-	-	-	-	-	+ in 25%	-	25%
IUD	+ in 100%	-	+ in 100%	-	+ in 100%	-	+ in 100%	+ in 100%	-
Postdated delivery	+ in 50%	-	-	-	-	-	+ in 100%	+ in 50%	50%
Gestational diabetes, preexistent Diabetes Mellitus	+ in 100%	-	-	-	-	-	+ in 100%	-	-



**Figure 1:** Photomicrograph showing intervillous calcification (Hand E, ×100)



**Figure 2:** Photomicrograph showing placental infarction (Hand E, ×200)

## DISCUSSION

Placenta normally weighs 450-500g. Fox have shown that placentae tend to be smaller in preeclampsia than those in uncomplicated pregnancies.<sup>[3]</sup> It is a well-established fact that blood flow to the placenta is reduced in PIH and this result in a small fetus with poor growth. Fox reported that placentae tend to be smaller in preeclampsia than those in uncomplicated pregnancies.<sup>[4]</sup> The mean placental weight in normal group was 489 g and in PIH group it was 383.2g. The placentae were light in PIH and there was a reduction in weight with increasing grade of PIH. Placental weight decreases as the severity of disease progresses. The mean weight of placenta in eclampsia group was 342g, in severe PIH group it was 383.3 g, and slightly more in mild PIH group which was 424.8 g. In our study we received 23 cases of placenta with difficult pregnancy including premature delivery, preeclampsia/eclampsia, gestational diabetes mellitus/ preexistent diabetes mellitus, IUD, postdated delivery, FGR. Our results showed maximum number of cases falling in the category of fetal growth retardation (total 13 cases- 56.52%) followed by premature delivery (total 4 cases- 17.39%) then eclampsia/preeclampsia (3 cases-13.04%), postdated delivery (2 cases-8.69%), least number of cases seen with IUD and gestational diabetes (1 case each – 4.34% each). Majumdar<sup>[5]</sup> and Kurdukar et al.<sup>[6]</sup> observed that fetal birthweights were lower in cases of preeclampsia; our findings correlated with these studies. The difference in the mean fetal birth weight observed by different researchers maybe due to various factors such as socioeconomic status, races, and nutrition of mother. Fox<sup>[3]</sup> reported hypertrophy of placental mass in response to chronic hypoxia in hypertensive cases. This hypertrophy along with low birth weight of fetuses contributes to low fetoplacental weight ratio. In the present study, fetoplacental ratio was 5.38:1. Majumdar and Kurdukar et al. observed reduced fetoplacental weight ratio with increasing degree of PIH. Majumdar and Kurdukar et al. reported values of 6.23 ± 0.87:1 and 5.17:1, respectively. Chakravorty<sup>[7]</sup> also noted similar findings of 5.8:1. Fox<sup>[4]</sup> studied 195 cases of normal placentae out of which 48 (24.6%) showed calcification, and he observed that the incidence of calcification in 6 (6.6%) out of 92 cases was lesser in PIH than in the normal group. He explained of 45 placentae show edretroplacental hemorrhage in PIH, which is comparable to other studies. In our study, the gross features of fetal growth retardation were average weight of the placenta 572 g, gross infarcts present in 25%, calcification present in 50% (area involved <25%), membrane edema present in 25% cases, cord insertion- central in 50% marginal – 50%, knots absent in all and cord vessels- NAD. Dutta and Dutta<sup>[8]</sup> found calcification in 4 out of 32 (12.5%) cases of normal pregnancy and 26 (44.3%) placentae from PIH group of 59 cases. 4 out of 50 (8%) cases of normal pregnancy and 7 out of 49 (14.3%) cases showed calcification in a study by Kurdukar et al.<sup>[5]</sup> The incidence of calcification increases as the severity of the hypertension increases. On microscopy, term placenta (37-40 weeks) showed an average of 28% syncytial knots. A drop-off to a mean of 22.5% was noted at 36 weeks.<sup>[10]</sup> Kurdukar et al. Found an increase in the knot count with 84% cases of severe PIH and 100% cases of eclampsia, while in the present study, we found all the cases of severe PIH and eclampsia showing syncytial knot count more than 30% on low power view. Majumdar et al.<sup>[5]</sup> found an increase in the number of syncytial knots. Further more, studies done by Kalra et al.<sup>[11]</sup> and Sodhi et al.<sup>[9]</sup> showed increased syncytial knots in their studies.

## Conclusion

From the present study, it can be concluded that the hypertensive disorders of pregnancy adversely influence the morphology of the placenta. The pathological changes observed in the placentae of patients with hypertensive disorders of pregnancy such as infarction, cytotrophoblastic proliferation, syncytial knots, basement membrane thickening, and fibrinoid necrosis are statistically significant when compared with control group and adversely influence the perinatal outcome. Though none of these pathological changes of PIH placentae are statistically significant

to fetal outcome, they act collectively to determine fetal outcome. The other disorders also showed signs of decreased blood flow through the placenta leading to ischemic changes, like calcification and chorangiomas.

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