



A STUDY OF RELATIONSHIP BETWEEN PRETERM PLACENTAL CALCIFICATION AND FETAL PROGNOSIS

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ABSTRACT

OBJECTIVE: The objective of this study was to determine the relationship between an inappropriately mature placenta and fetal prognosis.

DESIGN: Prospective study.

METHODS: This study was conducted from January 2018 to 5th February 2019. Total number of subjects included in the study were 120 which were classified into 2 groups amongst which 60 subjects were in group A with sonographic evidence of placental calcification at <32 weeks and group B with 60 subjects who had no placental calcification prior to 32 weeks. The fetal prognosis was determined in terms of preterm birth (PTB), intrauterine growth retardation (IUGR), low-birth weight (LBW), low Apgar score and neonatal death.

RESULTS: A total of 120 subjects were studied. In group A (n= 60), 15 subjects developed PTB, 20 subjects had fetuses with IUGR, 24 fetuses had LBW, 40 fetuses had low Apgar score and 11 had neonatal deaths. Hence risk of adverse fetal outcome was more in those with preterm placental calcification.

CONCLUSION: Women with preterm placental calcification have a higher incidence of adverse pregnancy outcome and may serve as an indicator of fetal prognosis.

KEYWORDS : Preterm placental calcification, preterm birth (PTB), intrauterine growth retardation (IUGR), low-birth weight (LBW), fetal prognosis.

INTRODUCTION

The placenta has been described as a "diary of intrauterine life" as it may elucidate many aspects of intra- uterine life. Placental calcification in pregnancy is a condition in which there is a slow but continuous process of calcium deposition in the placenta. It is seen that more than 50% of placentae have some degree of calcification and 18% of placentae show excessive calcification^[1]. It is normal to have placental calcification towards the end of pregnancy but if the condition occurs before 32 weeks of pregnancy, it can result in unusual pathological changes. If calcification starts before 32 weeks of gestation, it is termed as preterm placental calcification.^[2] Accelerated placental calcification is seen in case of normal placental maturity, hypertension, maternal diabetes, maternal cigarette smoking, maternal SLE, maternal thrombotic disorders. All placentas start at grade zero in early pregnancy. Changes can be seen from 12 weeks onwards. As pregnancy progresses, the placenta matures and calcifies. Calcification in placenta is classified into the following grades at different stages in pregnancy, at approximately the following times:

- Grade I. Around 31 to 32 weeks of pregnancy.
- Grade II. Around 36 to 37 weeks of pregnancy.
- Grade III. Around 38 weeks of pregnancy.

Calcification in placenta is usually not seen before 37 weeks. A grade III placenta is known as a severely calcified placenta. At this stage, a formation of indentations or ring-like structures can be seen within the placenta^[3].

Regarding the etiology of placental calcification, possible mechanisms of tissue calcification involve physiologic (similar to that of bone), dystrophic (ischemia-related), and metastatic processes (mineralization in a supersaturated environment). By the result of examining calcium/phosphate weight ratio and bone morphogenetic proteins (BMPs), it is concluded that the process of placental calcification is consistent with a metastatic mechanism. Typically, these placental depositions noted at term are composed of calcium phosphate and arranged predominantly near the basement membrane, which is believed to be the site of placental calcium pump responsible for calcium transport to the fetus.^[4]

It has been seen that premature separation of the placenta is followed by death of placental tissue followed by accumulation of calcium in infarct which results in decreased utero placental perfusion causing placental dysfunction resulting in fetal growth restriction, reduced fetal length, and preterm delivery^[5].

Nevertheless, the results of the studies on preterm placental

calcification suggest that early placental calcification is not physiologic but pathologic, which implies the earlier change should have a different mechanism from that of placental change at term^[4].

METHODS

This is a prospective study conducted from 2nd January 2018 to 5th Feb 2019 by a highly qualified team of Obstetrician and Radiologist. Total number of subjects included in the study were 120. Ultrasound scans were performed in all the subjects starting at 28 weeks' gestation to establish the diagnosis of preterm placental calcification. The first ultrasound examination for all the subjects was done at between 28 and 32 weeks' gestation and subsequent ultrasound examinations were arranged once a month. All ultrasound examinations were performed using a Seimens Accuson machine equipped with a 2–5 MHz transabdominal transducer, by a qualified radiologist. The study subjects were classified into 2 groups amongst which 60 subjects were in group A with sonographic evidence of placental calcification at <32 weeks and 60 subjects in group B who had no placental calcification prior to 32 weeks of gestation. We recorded the condition of participants and newborns at delivery, and followed the infants for 3 months after delivery.

Fetal outcome was evaluated in terms of preterm birth (birth before 37 weeks' gestation), IUGR, low birth weight (< 2500 g), low Apgar score (< 7 at 5 min), and neonatal death.

INCLUSION CRITERIA

1. Age between 20-35 years.
2. Primigravida.
3. Both vaginal and caesarean deliveries.

EXCLUSION CRITERIA

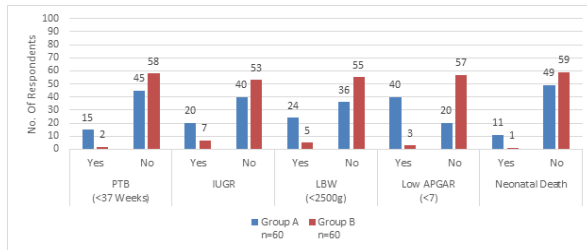
1. Hypertension (Chronic hypertension as well as PIH)
2. Diabetes
3. Smoking and alcohol consumption
4. Thrombophilias
5. Severe anemia (Haemoglobin <8g/dl)
6. Multiple pregnancy
7. Placenta previa and placental abruption
8. Placental anomalies (succenturiate, bipartite, tripartite, circumvallate, battledore).

RESULTS

A total of 120 subjects were studied which were divided into 2 groups: group A (60 subjects) with sonographic evidence of placental calcification at <32 weeks and group B (60 subjects) who had no placental calcification prior to 32 weeks of gestation. Fetal outcome

was evaluated in terms of preterm birth, IUGR, low birth weight, low Apgar score and neonatal death.

		Group A n=60	Group B n=60
PTB (<37 Weeks)	Yes	15	2
	No	45	58
IUGR	Yes	20	7
	No	40	53
LBW (<2500 g)	Yes	24	5
	No	36	55
Low APGAR (<7)	Yes	40	3
	No	20	57
Neonatal Death	Yes	11	1
	No	49	59



As shown in the table, there were notable differences in the distribution of preterm births ($p<0.01$), IUGR ($p<0.01$), low birth weight babies ($p<0.01$), Apgar score at delivery ($p<0.01$) as well as neonatal deaths ($p<0.01$) between the two groups. Our findings suggest that there is a higher risk of preterm births, IUGR, low-birth weight babies as well as neonatal deaths in women with preterm placental calcification.

DISCUSSION

The fetus, placenta and mother form a composite triad of dynamic equilibrium, and dysfunction of any one of them can affect the others. Calcification is common in human placentae and is recognized as normal part of maturation and aging of this organ. The pathological maturation of placenta which occurs due to excess calcification can lead to fetal growth restriction which is the second most common cause of perinatal death after prematurity [1].

In our study, there were 60 patients in group A with evidence of preterm placental calcification amongst which 15 patients had preterm birth, 20 patients had babies with IUGR, 24 patients had low-birth weight babies, 40 patients had babies with low Apgar score and there were 11 neonatal deaths.

In group B, there were 60 patients without placental calcification amongst which only 2 patients had preterm birth, 7 patients had babies with IUGR, 5 patients had low-birth weight babies, 3 patients had babies with low Apgar score and there was only 1 neonatal death. Our study suggests that preterm placental calcification is associated with a higher incidence of poor pregnancy outcome including preterm birth, IUGR, low birth weight, low Apgar score and neonatal death. [6].

CONCLUSION

Our study reveals that placental calcification is not only an aging process, but is also a reflection of underlying placental dysfunction when it is noted in earlier stages of pregnancy. Our study also suggests that pregnant women with preterm placental calcification (noted before 32 weeks' gestation) have a higher incidence of adverse fetal outcome including preterm birth, IUGR, low birth weight, low Apgar score and neonatal death. This suggests that the presence of preterm placental calcification can serve as a predictor of adverse pregnancy outcome, requiring closer surveillance for maternal and fetal well being. Excessive placental calcification causes uteroplacental insufficiency and compromises fetal circulation and growth. More attention should be paid to women with early preterm placental calcification even if the pregnancy is regarded as normal, in the absence of risk factors such as smoking, alcohol consumption, hypertension or diabetes. In these women with early preterm placental calcification, closer antepartum surveillance should be considered for the evaluation of fetal wellbeing.

REFERENCES

- Sarkar M, Ingole IV, Ghosh SsK, Bhakta A, Das RS, Tandale S, Tamekar AM. Calcification in Placenta. J Anat soc India 2007; 56(1):01-06.
- Tian C. Complications of Pregnancy. Archives of Gynaecology and Obstetrics. Jan 2016, Volume 293, Issue 1, pp 29-35.
- Brown HI, Miller JM, Khawli O et al. Premature placental calcification in Maternal Cigarette Smokers. Obstet Gynecol. 1988; 71 (6 pt 1): 914-17.
- Kyo-Hu Chen, LR Chen. Placental calcification: Its processes and impact on pregnancy. Obstet Gynecol. March 2013; pp 33-38.
- Goswami P, Memon S, Pardeep K. Histological and radiological study of calcified placenta. IOSR Journal of Dental and Medical Sciences. 2013; 7(4):37-41.
- Chen KH, Chen LR, Lee YH. Exploring the relationship between preterm placental calcification and adverse maternal and fetal outcome. ultrasound Obstet Gynecol. 2011 ;37(3):328-34.