



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(1): 616-619
www.allresearchjournal.com
Received: 21-11-2016
Accepted: 22-12-2016

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Study of calcified placenta and its correlation with fetomaternal outcome

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Abstract

Aim of this study was to observe the radiological and histological changes in calcified placenta and correlate with obstetric pathologies and neonatal outcomes in terms of level of hypoxia and their level of resuscitation needed to make new born survive and compare between grades of placental calcification and maternal pregnancy induced pathologies. Role of vitamin D was also correlated with placental calcification grades.

Material and methods Total of 100 calcified placenta were enrolled in study. The calcified placenta were assessed morphologically, histologically and radiologically along with mother's clinical history to rule out any high risk pregnancy association in terms of PIH, anaemia, abruption etc. Mother vitamin D level were also performed for further correlations. New born were assessed in terms of normality, /birth asphyxia/IUGR/LBW/Prematurity/IUD. The APGAR score, need of resuscitation and NICU requirement was noted. Placenta were examined grossly for visible calcification and the placental tissue were processed for routine paraffin embedment for radiological grading of placental calcification, placenta were kept on the X-ray plate and graded.

To conclude placental calcification is more common with PIH cases and it is associated with intranatal and postnatal asphyxia necessitates good quality of resuscitation in new born. Ultrasound directed Grannum's grading at 36 weeks of gestation can predict placental calcification. With this it is possible to prevent severe degrees of neonatal asphyxia and also the mother can be evaluated in details for further prevention of complication in subsequent pregnancies.

Keywords: Placenta, radiological, histological, X-ray plate

1. Introduction

The placenta is literally the—tree of life. Placental calcification is usually thought to represent a physiological aging process. Nevertheless, it can be a pathological change resulting from the effects of environmental factors on the placenta. Possible mechanisms of tissue calcification involve physiological, dystrophic (ischemia-related) or metastatic processes (mineralization in a supersaturated environment) [1]

Placental calcification commonly increases with gestational age, and becomes apparent after 36 weeks 'gestation. When it becomes notable prior to 36 weeks 'gestation, it is considered to be preterm placental calcification [1].

In normal pregnancies, placental separation occurs soon after birth, while in pregnancies complicated by abruption, the placenta begins to detach before birth and causes bleeding from the genital tract known as ante partum haemorrhage (APH). As etiology of conditions is unknown, Pregnancy-induced hypertension (PIH) it results from abnormal trophoblast invasion leading to rupture of the spiral arteries and premature separation of the placenta followed by death of placental tissue, and so forth accumulation of calcium in infarct and results in decreased utero placental perfusion causing placental dysfunction resulting in foetal growth restriction, reduced foetal length, and preterm delivery [2]. Both conditions are major cause of perinatal mortality and maternal morbidity in the developing countries. Calcium is actively transported via placenta throughout gestation making foetus relatively hypercalcemia. This action supports the cellular division in foetus and placenta. According to clinical observation enhanced placental calcification is often seen in placenta associated with foetal growth restriction probably via inadequate calcium delivery to growing foetal organs and its disruption in calcium dependent metabolic bonds however calcifications can occur

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with or without other placental pathology [3]. But it has been more likely seen with increasing gestational age and are commonly prominent in late and post term placentas

2. Materials and methods

This was a cross sectional study, where 100 calcified placentas were enrolled, obtained from the patients who delivered either in delivery room or in operation theatre. Placentas were examined grossly for the presence of visible calcification. With the prior approval of institutional ethical committee and written consent of the patients for their placental examination and after enrolment in study group placentas, mothers and new-borns were evaluated further.

Calcified placentas were studied morphologically for gross calcification in relation to whether at periphery or central, maternal surface or foetal surface. Diameter, thickness and weight of placentas were noted

Histologically the placental tissue were processed for routine paraffin embedment, sections were made of 5 mm ribbons with the help of automatic microtome and slides were stained with H & E. Under microscope placenta were looked for micro-calcifications, excessive cyto and syncytio-trophoblastic proliferation, excessive inflammatory cell infiltration, fibrinoid necrosis, basement membranes thickenings, excessive formation of syncycial knots etc. Placental calcification was noted microscopically along with other microscopic findings. For radiological grading of placental calcification, placentas were kept on the X-ray plate and graded as follows

- Grade 0.....No calcification.
- Grade 1.....Slight (two foci of calcification present)/field
- Grade 2.....Moderate (3-6 foci of calcification present)/field
- Grade3.....Severe (more than 6 foci of calcification present or diffuse)/field

The new born were evaluated immediately after delivery in term of their normality. The APGAR score which is noted at one and five minute both. Other outcomes like LBW, Preterm, IUD, IUGR etc were noted

Simultaneously the mother was clinically evaluated in term of any high risk factor association like PIH, anaemia, abruption any other maternal pathology.

Neonatal resuscitation was done according to the guidelines as mentioned below to make the neonates to survive.

Neonatal Resuscitation APGAR Scores and Resuscitation Guidance [4].

- Level 0- No resuscitation
 - Level I- APGAR > 8: suction, warm
 - Level II- APGAR 5-7: O2 by mask (mechanically ventilation if needed), external stimulation
 - Level III- APGAR 3-6: mechanical ventilation by mask, intubation if spontaneous ventilation absent, ABG from double-clamped cord
 - Level IV- APGAR < 2: intubation, chest compression if HR < 60
- All the findings were recorded and tabulated for further analysis

2.1 Statistical Analysis

Data analysis was done using the SPSS (Statistical Package for the Social Science) Version 17 for window. The demographic variable, diagnosis, grade of calcification were calculated with number and percentage. The chi-square test was used to find significance association between maternal

induced pathology, PIH, Anaemia, Resuscitation, Level of Resuscitation, vitamin D etc with grades of calcification. The ANOVA test was used to find the signification difference of APGAR score according grade of calcification. A probability value of 0.05 was accepted as the level of statistical significance.

3. Results

Table 1: Association between grade of calcification and PIH in study groups

PIH	Grade of calcification			Total
	Grade I	Grade II	Grade III	
Present	2	10	18	30
Absent	14	35	21	70
Total	16	45	39	100

Table 2: Association between grade of calcification and anaemia in study groups

Anaemia	Grade of calcification			Total
	Grade I	Grade II	Grade III	
Present	3	18	14	35
Absent	13	27	25	65
Total	16	45	39	100

Table 3: Comparison of APGAR score according to grade of calcification in study groups

Grades of calcification	n	APGAR score at 1 min		APGAR score at 5 min	
		Mean	SD	Mean	SD
Grade I	16	8.31	1.014	9.31	1.014
Grade II	45	6.89	1.874	7.87	1.961
Grade III	39	5.69	2.473	6.64	2.700
F Value		9.96		9.03	
P Value		<0.0001		<0.0001	

Table 4: Association between grades of calcification and level of resuscitation required in study groups

Level of Resuscitation	Grades of calcification			Total
	Grade I	Grade II	Grade III	
Level 0	12	22	8	42
Level I	4	9	12	25
Level II	0	11	9	20
Level III	0	3	10	13
Total	16	45	39	100

Table 5: Association between grade of calcification and neonatal outcome in study groups

Neonatal outcome	Grade of calcification			Total
	Grade I	Grade II	Grade III	
Birth asphyxia	0	1	3	4
IUD	0	1	4	5
IUGR	0	1	5	6
IUGR with birth asphyxia	0	3	0	3
preterm IUGR	0	0	1	1
severe IUGR	0	0	1	1
Preterm	2	2	5	9
preterm neonatal death	0	0	2	2
Preterm with birth asphyxia	0	0	1	1
Normal	14	37	17	68
Total	16	45	39	100

Table 6: Comparison of vitamin D according to grade of calcification in study groups

Grade of calcification	n	Vitamin D		F Value	P Value
		Mean	SD		
Grade I	16	19.82	2.34	78.05	<0.0001
Grade II	45	18.22	3.03		
Grade III	39	11.07	3.17		

4. Discussion

As shown in Table 1, in present study among 30 cases with PIH, 18 cases had grade III and 10 cases had Grade II placental calcification. Among 70 cases without PIH, 21 cases had grade III and 35 cases had Grade II calcification. Chi square test was applied as test of significance and chi square value worked out to be 8.48 which was statistically significant. ($p < 0.05$). Though cases with anaemia and PIH as pregnancy induced pathologies as a whole group were not significantly associated with placental calcification. But in a group of patients who showed presence of pregnancy induced hypertension was significantly associated with high grades of placental calcification. Majority of the cases with PIH had grade II and III placental calcification (Table no 1) Similar findings were noted in a study conducted by Pushpa Goswami, Hem Lata, Samreen Memon, Lal Baksh Khaskhelli (2012) who studied morphological changes in excessive placental calcification in pregnancy induced hypertension (PIH) and its correlated with foetal outcome^[5]

Anaemic status among the cases did not associate with grading placental calcification in the study group. (Table no 2) similar finding was observed in a study conducted by Rohini M, Yogesh AS, Goyal M, Praveen Kurrey (2013) who analyzed placental changes in the anaemia with a view to assess the significance of villous abnormalities by histomorphological methods. Among 35 cases with anaemia, 14 cases had grade III and 18 cases had Grade II placental calcification. Among 65 cases without anaemia, 25 cases had grade III and 27 cases had Grade II calcification. Chi square test was applied as test of significance and chi square value worked out to be 2.36 which was statistically not significant. ($p > 0.05$). Among 30 anaemic cases 14 had calcification of placenta and among non-anaemic group out of 30, 11 had placental calcification. The difference was statistically not significant. Authors concluded that the histomorphological findings of placenta in anaemic mothers might be an adaptation to maternal hypoxia^[6]

In present study as in Table 3, mean APGAR score at one min among grade III, II and I calcification was 5.69 (S.D.±2.47), 6.89 (S.D.±1.87) and 8.31 (S.D.±1.01) respectively. Mean APGAR score at 5 min among grade III, II and I calcification was 6.64 (S.D.±2.70), 7.87 (S.D.±1.96) and 9.31 (S.D.±1.01) respectively. The mean difference among APGAR score was analyzed quantitatively F value worked out to be 9.96 for one min and 9.03 at five min which was statistically highly significant. ($p < 0.0001$). So the APGAR score was significantly low among the cases at one and five minutes respectively in those who had grade III placental calcification. (Table no 3). Similar were the findings observed in a study conducted by B Vijayalakshmi, Sunita Kittali (2015), who assessed the morphological changes of placenta and correlated the findings with severity of PIH and foetal outcome. In their study among 44 cases with placental calcification low APGAR score (less than 7) was observed in 15 cases at one min and more than 7

APGAR score was seen in 29 cases at one min. The difference was statistically significant^[7]

As in our study higher the grades of placental calcification were associated with higher level of resuscitation required after delivery. Level of resuscitation was significantly associated with grading of placental calcification. (Table no 4) Comparative with study done by vijayalakshmi *et al* newborn with lower APGAR score needed higher level of resuscitation^[7]

In our study among 13 cases with level III resuscitation, 10 cases had grade III and 3 cases had Grade II placental calcification. Among 20 cases with level II resuscitation, 9 cases had grade III and 11 cases had Grade II calcification. Among 42 cases with level 0 resuscitation, 8 cases had grade III and 22 cases had Grade II calcification. Chi square test was applied as test of significance and chi square value worked out to be 22.01 which was statistically significant. ($p < 0.001$) similar comparative study was done by Lilyan W. Sersam (2011) who had studied prevalence of a grade III placenta at 36 weeks' gestation in a low risk obstetric population, they explored the association between premature aging observed on ultrasound and pregnancy outcome. Among 23 cases with grade III placental calcification 17 required resuscitation and among 568 cases with grade I and II placental calcification 410 required resuscitation. Which is comparative and statistically significant^[8]

In our study as shown in Table 5, among 16 cases with grade I calcification 2 (12.5%) cases had preterm, 14 (87.5%) cases were normal. Among 48 cases with grade II calcification 4 (8.89%) cases had birth asphyxia along with IUGR, 2 (4.44%) cases were preterm, 1 (2.22%) case developed IUD and 37 (82.22%) cases were normal. Out of 39 cases with grade III calcification 6 (15.38%) cases had IUGR and 6 (15.38%) cases had preterm, 4 (10.25%) cases had Birth asphyxia, 4 (10.25%) cases developed IUD and, 2 (5.13%) cases neonatal death. In present study though we could not show the statistical significance of four case of IUD and four cases of severe grade birth asphyxia, who needed higher level resuscitation and two cases of neonatal death were showing Grade III placental calcification and all patients had severe preeclampsia as well (10 out of 39 cases i.e. 25.6%) indicating probably calcification changes started at early gestation causing all these poor foetal and neonatal outcome^[1]. Out of 39 cases of grade III calcification 17 (43.59%) cases found with normal neonatal outcome (Table no. 5). Chen KH, Chen LR, Lee YH. (2011) explored the relationship between preterm placental calcification and adverse pregnancy outcome, including maternal and foetal outcomes. The foetal outcome among the cases with placental calcification were preterm birth, low birth weight, low APGAR score and neonatal death. These entire outcome were higher among the cases in which calcification was started prior to 32 weeks^[11].

In our study mean vitamin D level was significantly low in grade III calcification than grade II calcification and grade I calcification as $p < 0.0001$ (Table no 6). Similar finding was observed in a study conducted by Bedir Findik R *et al* (2015) who evaluated the relationship between placental calcification and maternal and cord blood 25hydroxyvitamin-D3 [25(OH)D] and serum calcium concentrations. After comparison in their study between grade III placental calcification group and control group, vitamin D level was low in grade III placental calcification group but not statistically significant^[9] Vitamin D and

calcium metabolism are interconnected and also having association with pregnancy induced pathologies

5. Conclusion

Pregnancy induced hypertension was significantly associated among the cases with placental calcification in the study group. Present study has concluded that pregnancy induced pathologies were associated with higher grades of calcification. APGAR score was significantly low among the cases with high grade placental calcification both at one and five minute interval after birth. Resuscitation was significantly required for new born with higher grades of placental calcification. Higher the level of placental calcification higher the level of resuscitation required for newborn in the study group. Grade II placental calcification was seen more commonly among the study group followed by grade III and grade I placental calcification. Higher grade of placental calcification is showing significant correlation with poor foetal outcome like IUGR, preterm and IUD and poor neonatal outcome as well like severe birth asphyxias and neonatal deaths. In the present study it is significantly noted that nearly all cases of placental calcification had vitamin D deficiency.

6. Summary

Placental calcification is more common with PIH cases and it is associated with intra-natal and postnatal asphyxia necessitates good quality of resuscitation for babies. In the antenatal clinics PIH should be predicted and detected at early stage of pregnancy to prevent placental insufficiency and calcification and better foetal outcome. Placental calcification can be detected by performing USG guided Grannum grading at 36 wks of gestation for better neonatal outcome by using good neonatal resuscitation techniques and precautions. Vitamin D levels in Pre-pregnancy and ANC period should be advocated to be performed and supplemented if necessary as present study is showing that low vitamin D levels and high placental calcification are significantly correlated.

7. References

1. Chen KH, Chen LR, Lee YH. Exploring the relationship between preterm placental calcification and adverse maternal and fetal outcome. *Ultrasound Obstet Gynecol.* 2011; 37:328-334
2. 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.
3. Accessed online from <https://pathology.uchicago.edu/sites/pathology.uchicago.edu/files/uploads/PDFs/Placental%20Pathology%20Notes%20Aspen%202014%20-Fritsch%20final.pdf>
4. Accessed online for neonatal resuscitation guideline from webpage https://www.openanesthesia.org/neonatal_resuscitation on 20th october 2016
5. Goswami P, Lata H, Memon S, Khaskhelli LB. Excessive Placental Calcification Observed in PIH Patients and its Relation to Fetal Outcome. *JLUMHS* 2012; 11(3):143-148
6. Rohini M, Yogesh AS, Goyal M, Praveen Kurrey. Histological Changes in the Placentae from Severe Anaemic Mothers. *Int J Med Health Sci.* 2013; 2(1):30-3
7. Vijayalakshmi B, Sunita Kittali. Morphological Changes of Placenta in Cases of Pre-eclampsia and Perinatal Outcome. *International Journal of Scientific Study.* 2015; 3(5):137-142.
8. Lilyan W Sersam. Ultrasonographically Observed Grade III Placenta at 36 Weeks 'Gestation: Maternal and Fetal Outcomes. *The Iraqi postgraduate medical journal.* 2011; 10(1):67-72
9. Bedir FR, Ersoy AO, Fidanci V, Tasci Y, Helvacioğlu Y, Karakaya J *et al.* deficiency and placental calcification in low-risk obstetric population: are they related? *J Matern Fetal Neonatal Med.* 2016; 29(19):3189-92.