Original Research Article

Effect of acute placenta inflammatory changes on fetal outcome among paturients in Nigeria.

Key words: acute inflammation, placenta, fetal outcome, Nigeria.

Abstract

Introduction

The placenta unit is significant for the survival of the fetus. Infections from the mother can cause histologically identifiable inflammatory changes in the placenta, which may adversely affect the fetus.

Aim: to identify the inflammatory changes in the placenta and its effect on fetal outcome.

Study design: prospective cross sectional study

Place and duration of study: Department of obstetrics and Gynaecology and Department of Anatomical pathology of the University of Port Harcourt Teaching hospital, between 1st September – 31st of December, 2015.

Methods: Histological analysis of 192 placenta tissues of singleton birth paturients was carried out. The sociodemographic characteristics of patients and the fetal outcome was collated and analyzed.The information obtained was processed using the SPSS version 20 software and Epi info software version 7. Results were presented in tables, test of association was done using student's t-test and odds ratio with P value < 0.05 set as significant.

Results: The mean age of patients was 30.1± 4.6 years with age range of 19-48years. Acute placental inflammatory changes of varying grades were noted in 71.1%(129) of placenta with severe inflammatory changes constituting 8.3% of all examined placentae. Placenta with severe inflammation had twice increased

risk of low birth weight babies (P=0.3,OR 2.32,CI 0.26-17.22). Severely inflamed placenta was associated with birth asphyxia (χ^2=8.82, P=0.0029,OR 0.31;CI 0.31-0.73) and fetal demise (P=0.0336)

Conclusion. Acute inflammatory changes are common among paturients in Port Harcourt Nigeria. These changes in placenta are associated with birth asphyxia and fetal demise especially when they are severe.

Introduction

The placenta is an integral part of the existence of the fetus, it serves as an interface in the transmission of requisite nutrients and other metabolic materials.[1,2] The placenta histology can be altered by intrauterine infections which is usually acquired as a result of ascending infection from the genital tract, gut or hematogenously resulting in chorioamnionitis which complicates about 10% of all pregnancies with up to 2% occurring during labour.[3,4]

Several organisms have been implicated in the causation of chorioamnionitis inclusive of bacterial and viral organisms with bacterial organisms linked to acute inflammation while viral organisms were associated with chronic changes.[3,5,6] Polymicrobial bacterial organisms contribute to these acute inflammatory changes of which ureaplasma urealyticulum and gardnella vaginitis are the two commonest organisms.[3]

The presence of infectious organisms in the chorioamnion engenders a maternal and fetal inflammatory response characterized by pro-inflammatory and inhibitory cytokines and chemokines in the maternal and fetal compartments; with maternal inflammatory response preceding the fetal response.[7] The placenta changes in the presence of infection can be categorized into acute,

subacute or chronic with acute chorioamnionitis with or without fetal inflammatory response, villitis and decidualitis been the most common types of placenta inflammation observed.[8]

Acute chorioamnionitis can be diagnosed clinically or histologically. Histological chorioamnionitis is defined by the presence of acute histological changes on examination of the amniotic membrane and chorion of the placenta.[9]

Sometimes subclinical infections can be missed but captured by histological examination of placenta and histological diagnosis is the gold standard for evaluation of antenatal inflammatory process that might influence fetal development[10,11].This modality of diagnosis of infection increases the rate of identification of chorioamnionitis than clinically diagnosed chorioamnionitis confirmed by amniotic fluid culture because of lack of detection of some organisms cultured.[10]

Some series have identified that impairment of placental development as a result of infection may have a profound impart in fetal development and pregnancy outcome such as cerebral palsy and high rate of stillbirths.[12,13] It is on these basis that this study seeks to determine the prevalence of severe acute inflammatory placenta changes and its effect on the fetal outcome among paturients who presented for delivery at the University Teaching Hospital in Port Harcourt, Nigeria

Methodology

A cross sectional prospective histological study of all placentae of women who had singleton deliveries between 1st September to 30th December 2015 was conducted. The women were recruited into the study as they presented to the

labour ward after due counseling on the scope of the study by the investigators. All patients who gave consent for the study where included. Exclusion criteria included: multi-order pregnancies, women who had evidence of immunosuppression like diabetes mellitus, on steroids or retroviral disease, patients with preeclampsia were also excluded. The sociodemographic characteristics of patients which include: age, parity,educational status and booking status;birth weight, presence or absence of birth asphyxia and fetal outcome (dead or alive) were collated in a prestructured spread sheet and analyzed.The placenta immediately after delivery was collected and blood stain removed from it using gentle running water, preserved in 10% formaldehyde solution and transferred to the anatomical pathology laboratory of the teaching hospital for processing. Grossing of the placenta was done and representative sections were taken. Tissues were processed in the automated tissue processor and later stained using the hematoxylin and eosin methods.

Two independent pathologists reviewed processed slides and areas of disparity were resolved following a consensus decision of the two pathologists. Histologic grading of acute inflammation assesses the density of neutrophil infiltrates and the relative distance migrated from the vessels of origin. Placental membranes were scored and categorized as: (Nil)-no chorioamnionitis, (+) Mild - subchorionitis, Moderate(++)- patchy acute chorioamnionitis and severe(+++) - severe, confluent chorioamnionitis.

The information obtained was processed using the SPSS version 20 software (SPSS Inc; Chicago USA) and Epi info software version 7. Results were presented in tables, test of association was doneusing student's t-test and odds ratio with P value < 0.05 set as significant.

Results

The mean age of patients was 30.1± 4.6 years with an age range of 19-48 years. 69.3(133) were in the age group 25-34 years and 73.4%(141) were nulliparous patients, 75%(144) had tertiary education and 93.2%(179) of examined placenta belonged to booked patients while 6.8%(13) were unbooked. Other sociodemographic variables are as shown in Table 1.

Table two showed the relationship of booking status to placenta inflammatory changes. Acute placenta inflammatory changes were observed in 123(64.1%) of all patients studied with 16(8.3%) having severe inflammatory changes. Among the patients, 172(89.6%)were booked while 10.4% were unbooked. In patients with severe placenta changes 14(87.5%) were booked while 2(12.5%) were unbooked. Booking status was not significantly associated with placenta inflammatory changes(P=0.0926, OR 0.3, 95% CI 0.05-1.52).Booking status was also not significantly associated with severe placenta changes(P=0.1590, OR 0.2,95% CI 0.02-2.32). Among babies delivered 11(5.7%) had low birth weight while 94.3%(181) had normal birth weight. Among all babies born to mothers with severe placenta inflammatory changes (SPIC), 2(12.5%) were low birth weight while 16(87.5%) were not low birth weight. Other distributions are as showed in Table 2. Patients with placenta inflammatory changes have increased risk of having low birth weight babies (OR 1.07 CI 0.28-4.43). Severe placenta inflammatory changes were associated with twice increased risk low birth weight (OR 2.32, CI 0.26-17.22). But these were not statistically significant (P=0.6,0.3 respectively)

Table 3 showed the relationship between fetal outcome and placenta inflammatory changes. 143(74.5%) had no birth asphyxia while 49(25.5%) had

some form of birth asphyxia. Among those with severe placenta inflammatory changes 12(75%) had some form of asphyxia while 4(25%) had no birth asphyxia. Placenta inflammatory changes are significantly associated with birth asphyxia (χ^2=8.82, p =0.0029,OR 0.31 CI 0.31-0.73). Severe inflammatory changes are significantly associated with severe birth asphyxia (P= 0.0008989). Among the placenta examined, 189(98.4%) belong to babies that were alive while 3(1.6%) were dead. Among the dead babies 2(66.7%) had severe inflammatory changes while one had moderate inflammatory changes (33.3%) Fetal demise was not significantly associated with general placenta inflammatory changes (P= 0.2605), however severe placenta changes was significantly associated with fetal demise (P=0.0336)

Discussion

The average age of paturients was similar to what was observed in other areas in Nigeria [14,15], which is the peak of the sexual and reproductive ages of the patients studied. This study also noted that a large proportion of women with inflammatory placenta changes are nulliparous which is in conformity with what was observed by Baker et al, who identified that acute placenta infections decrease with increasing parity [16]. The reason as postulated by Lagadari et al [17] is the development of protective layer of macrophages between decidua and trophoblastic layers as parity increased as demonstrated in rat models.

Acute placenta inflammatory changes (APIC) of varying degree was observed in more than half of all patients' placentae examined with similar distribution of placenta changes observed by Rhone et al [18] where about 50% of placenta studied by his group identified changes consistent with inflammatory changes.

Variations in the prevalence rate of acute inflammatory changes are related to the differences in tissue sampling techniques and diagnostic criteria.

APIC have a direct correlation to clinical chorioamnionitis, which is linked to poor fetal outcome [19]. These observations brings to the front burner the need to screen paturients for possible organisms that are linked to acute infections such as bacterial vaginosis which is a known etiological factor for chorioamnionitis and preterm membrane rupture.

The unskilled supervised deliveries (unbooked) have been associated with increased risk of chorioamnionitis and puerperal sepsis due to some unhygienic birth practices [20]. In this group of patients placenta inflammatory changes was not associated with the booking status of the paturients; thus there may be some other confounding factors which are not related to the booking status of the patient that need to be unearthed.

Daniele et al and Gracia[19, 21] demonstrated the association between fetal placenta inflammation and poor neonatal growth, which is as result of distortion of placenta function. This observation thus agrees with the authors' findings, which showed an increased risk of low birth weight in the presence of placenta inflammatory changes with risk worsening with the severity of infection.

It was observed that, severe placenta inflammatory changes are associated with poor fetal outcome such as asphyxia and even stillbirths [22,23]. The mechanism by which this is made possible is via placenta damage with loss of function, preterm labour, release of inflammatory mediators which result in fetal organ damage and transplacental infection[5].The fetal inflammatory response syndrome which is related to placenta infections had also be linked with the

development of cerebral palsy and the development of neurological deficits in the babies that survive the infectious onslaught [24].

Based on the above it is pertinent to know that placental inflammatory changes being the hallmark of fetal infection is associated with poor fetal outcome in Port Harcourt Nigeria. Hence it is imperative that steps be instituted to reduce the risk of placenta infection among paturients by creating protocols for screening of bacterial pathogens, reduce the factors that increase risk and possibly prophylaxis therapy of all at risk patients.

Also a protocol of histological examination of placentae of stillborns and babies with severe birth asphyxia is also recommended to eliminate the long-term complications of infections related morbidities.

Conflict of interest: Nil

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Ethical clearance was obtained from the ethics committee of the University of Port Harcourt Teaching hospital before the commencement of the study.

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Tables

Table 1:Sociodemographic characteristics of patients

Variables	Frequency	Percentage
Age		
15-24	16	8.3
25-34	133	69.3
35-44	42	21.9
45-54	1	0.5
Parity		
0	141	73.4
1	21	10.9
2	21	10.9
3	6	3.1
4	3	1.6
Educational status		
-Primary	2	1.0
-Secondary	46	24.0
-Tertiary	144	75.0

Booking status		
-booked	179	93.2
-unbooked	13	6.8

Table 2: Relation of placenta inflammatory changes to booking status and birth weight.

	Placenta inflammatory changes				
	+ Mild	++ Moderate	+++ Severe	0 Nil	Total n(%)
Booking status					
-booked	58	40	14	67	179(89.6)
-unbooked	5	4	2	2	13 (10.4)
Total	63	44	16	69	192(100)
Fetal weight (kg)					
1.5-2.4	4	2	2	4	11(5.7)
2.5-3.4	42	30	8	42	118(61.5)
3.5-4.4	22	11	6	22	61(31.8)
4.5-5.4	1	1	0	1	2(1.0)
Total	69	44	16	69	192(100)

Table 3: Placenta histology and fetal outcome

	Placenta inflammatory changes				
	Nil	+ mild	++ moderate	+++ severe	Total n(%)
Birth Asphyxia					
Nil	60	49	30	4	143(74.5)
Mild	6	11	5	1	23(12.0)
Moderate	3	3	8	7	21(10.9)
Severe	0	0	1	4	5(2.6)
Total	69	63	44	16	192(100)
Fetal outcome					
Alive	69	63	43	14	189(98.4)
Dead	0	0	1	2	3(1.6)
Total	69	63	44	16	192