Early Neonatal Outcome Of Babies Delivered By Cesarean Section Because Of Clinical Diagnosis Of Fetal Distress

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Abstract

Objective: To determine the early neonatal outcomes of babies delivered by cesarean section because of clinical diagnosis of fetal distress (using intermittent auscultation) compared to those delivered similarly because of other reasons.Study design: A retrospective case-control study design was used. For each case (cesarean section performed because of clinical diagnosis of fetal distress), the next cesarean delivery done because of other reason matched for age and/or parity was taken as a control. Results: The prevalence of cesarean section because of fetal distress was 10.07%. There was no significant differences between the cases and controls in terms of age, parity, booking status, presence of obstetrics conditions, duration of operation, and birth weight of the babies (p>0.05). The cases were significantly more likely to have a 5-minute Apgar score of <7 compared with the controls (OR= 4.11, 95%=1.41-12.05)Conclusion: Clinical diagnosis of fetal distress is associated with adverse early neonatal outcome.

INTRODUCTION

Although the fetus is efficient at extracting oxygen from the mother, a complex interplay of antepartum complications, suboptimal uterine perfusion, placental dysfunction, and intrapartum events may be associated with adverse fetal outcome [1]. The uterine contraction of labor subjects the fetus to a possible risk of hypoxic injury due to repeated cord compression or reduction of retro-placental perfusion [2]. Fetal heart rate (FHR) monitoring, introduced over 8 decades ago into clinical use continues to be the predominant method for intrapartum fetal surveillance [3]. Either intermittent auscultation (IA) or continuous electronic monitoring does it. Intermittent auscultation is simple and can provide objective information about fetal heart sounds and some data support the conclusion that within specified intervals, intermittent auscultation of fetal heart sounds is equivalent to continuous electronic fetal monitoring (EFM) for detecting intrapartum fetal compromise [4]. When it is diagnosed clinically as “fetal distress”, swift delivery is the aim to save the fetus from disability or death. This is done normally by cesarean section if delivery is not eminent. With intermittent auscultation, characteristic changes in fetal heart rate were use in the diagnosis of fetal distress [5]. Although it was understood that fetal distress detected by auscultation could be associated with fetal compromise, some interventions that occurred because of this diagnosis resulted in the delivery of a fetus that appeared to be well-oxygenated [6], thereby questioning the utility in addition to the accuracy of the diagnosis of fetal distress using intermittent auscultation.

In 1952, Virginia Apgar proposed her score as a means of evaluating the physical condition of infants’ shortly after delivery and of predicting neonatal survival [7]. A low

Apgar score at 5 minutes is commonly indicative of a neonate that is not well oxygenated who is at greater risk of death [8].

Despite the use of intermittent auscultation as a means of FHR monitoring, critical discussion of its usefulness is scarce in the literatures. The aim of this study was to find out the early neonatal outcomes of babies delivered by cesarean section because of clinical diagnosis of fetal distress compared to those delivered similarly because of other diagnosis.

METHOD

This retrospective case-control study compares the early neonatal condition of babies delivered by cesarean section because of fetal distress diagnosed by intermittent auscultation of FHR with those delivered similarly because

of other diagnosis at the University of Maiduguri Teaching Hospital over a six-year period (January 2002 to December 2007).

The ethical and research committee of the University of Maiduguri Teaching Hospital approved the study. Patients' case notes and labor ward record were used to obtain information. For each case (cesarean section performed because of fetal distress), the next cesarean delivery done because of diagnosis other than fetal distress matched for age and/or parity was taken as a control. Only term singleton pregnancies were included. Presence of medical condition/s and delivery of a baby with congenital anomalies were exclusion criteria. The data extracted include the mother's age, parity, booking status, obstetrics conditions, duration of the operation, estimated blood loss, the weight of the baby, and Apgar scores. The data was analyzed using SPSS version 13 (SPSS, Chicago, IL, USA). Number and percentage were use to report sociodemographic and obstetrics characteristics of the study population and the $\chi 2$ test used to determine associations between the categorical variables. Logistic regression analysis was used to assess the association of having fifth minute Apgar score <7 between cases and control. To control the impact of possible confounding by age, parity, booking status, obstetrics condition, duration of operation and birth weight, these factors were added to the logistic model. P-value ≤ 0.05 indicates statistical significance.

In our centre, a certified nurse midwives or the in-house doctor monitored the fetal heart rate (FHR) in labor base on the established protocol of the unit. For women with low-risk pregnancies the FHR is monitored for one minute every 30 minutes in the first stage, and every 5 minutes in the second stage using Pinnard's stethoscope. Fetal distress is diagnosed if the FHR is greater than 160 beats per minute over 3 consecutive contractions or less than 100 beats per minute after three consecutive contractions unresponsive to resuscitative measures like stoppage of oxytocin if on and intra-nasal oxygen administration, hydration while nursing the patient in left lateral position. All decisions of cesarean section are discussed with the consultant. Apgar scoring by the attending peadiatrician assessed the clinical condition of the newborn infant at birth.

RESULTS

During the study period, there were 1192 cesarean sections out of which 120 were done because of fetal distress, given a prevalence of cesarean section because of fetal distress of 10.07%. The mean age of the study population was 26.5±5.6 years and their mean parity 1.35±1.8. The mean duration of the cesarean section was 54.0±19.1 minutes and the mean birth weight of the babies was 3.25±0.6 Kg. There were four stillborns in the study population (3 in the cases and 1 in the controls), a rate of 1.67%.

Figure 1

Table 1: Sociodemographic characteristics and Obstetrics conditions of the study group

Characteristics	Number (240)	Percentage (100)
Age (Years)		
<20	22	9.2
20-35	202	84.2
>35	16	6.7
Parity		
0	113	47.1
1-4	111	46.3
≥5	16	6.7
Booking status		
Booked	208	86.7
Unbooked	32	13.3
Obstetric conditions		
Eclampsia/Severe PIH	18	7.5
Placenta previa	4	1.7
Placenta Abruptio	2	0.8
Previous CS	18	7.5
Obstructed labor	14	5.8
Failed IOL	14	5.8
Nil	170	70.8
Duration of operation (minutes)		
<30	7	2.9
30-60	198	82.5
>60	35	14.6
Estimated blood loss (mls)		
<500	81	33.8
500-1000	157	65.4
>1000	2	0.8
Birth weight (Kg)		
<2.5	18	7.5
2.5-4.0	209	87.1
>4.0	13	5.4
APGAR 5		
<7	22	9.2
≥7	218	90.8

Table 1 shows the sociodemographic characteristics and obstetrics conditions of the study population. Majority of the patients 202(84.2%) were in the age group 20-35,113(47.1) were primigravidas and 208(86.7%) were booked. Although 18(7.5%) had severe pre-eclampsia/Eclampsia, 170(70.8%) have no any obstetric complication. The duration of the cesarean section was 30-60 minutes in 198(82.5%) patients and 22(9.2%) babies have fifth minute APGAR score <7.

Figure 2

Table 2: Comparison of the Sociodemographic characteristics and Obstetrics conditions of the cases and controls

Characteristics	Cases (No.%)	Control (No.%)	Total (No.%)	Significance
Age (Years)				
<20	11(50.0)	11(50.0)	22(100)	
20-35	102(50.5)	100(49.5)	202(100)	χ^2=0.27
>35	7(43.8)	9(56.3)	16(100)	P=0.87
Parity				
0	57(50.4)	56(49.6)	113(100)	
1-4	55(49.5)	56(50.5)	111(100)	χ^2=0.018
≥5	8(50)	8(50)	16(100)	P=0.99
Booking status				
Booked	105(50.5)	103(49.5)	208(100)	χ^2=0.144
Unbooked	15(46.9)	17(53.1)	32(100)	P=0.70
Obstetric conditions				
Eclampsia/Severe PIH	7(38.9)	11(61.1)	18(100)	
Placenta previa	0(0)	4(100)	4(100)	
Placenta Abruptio	2(100)	0(0)	2(100)	
Previous CS	8(44.4)	10(55.6)	18(100)	
Obstructed labor	9(64.3)	5(35.7)	14(100)	
Failed IOL	8(57.1)	6(42.9)	14(100)	χ^2=8.56
Nil	86(50.6)	84(49.4)	170(100)	P=0.20
Duration of operation				
<30	5(71.4)	2(28.6)	9(100)	
30-60	102(51.5)	96(48.5)	198(100)	χ^2=3.78
>60	13(37.1)	22(62.9)	35(100)	P=0.15
Estimated blood loss (mls)				
<500	38(46.9)	43(53.1)	81(100)	
500-1000	80(51.0)	77(49.0)	157(100)	χ^2=2.37
>1000	2(100)	0(0)	2(100)	P=0.31
Birth weight (Kg)				
<2.5	7(38.9)	11(61.1)	18(100)	
2.5-4.0	107(51.2)	102(48.8)	209(100)	χ^2=1.085
>4.0	6(46.2)	7(53.8)	13(100)	P=0.58

The sociodemographic characteristic and obstetrics conditions of the cases and the controls were compared in table 2. There was no significant differences between the cases and controls in terms of age (χ^2=0.27, p=0.87), parity (χ^2=0.018, p=0.99), booking status (χ^2=0.144, p=0.70), presence of obstetrics conditions (χ^2=8.56, p=0.20), duration of operation (χ^2=2.37, p=0.31) and birth weight of the babies (χ^2=1.085, p=0.58).

Figure 3

Table 3: Comparison of the conditions of the newborn (APGAR 5) of the cases and controls

APGAR 5	Cases	Control	Total	Significance
<7	17(73.3)	5(22.7)	22(100)	χ^2=7.206
≥7	103(47.2)	115(52.8)	218(100)	P=0.007

Table 3 depicts the comparison of the conditions of the newborn (5-minute Apgar score) between the cases and controls. The cases were significantly more likely to have a fifth minute Apgar score of <7 compare with the controls (χ^2=7.206, p=0.007). This association persisted after using logistic regression to control for the effect of possible confounders (OR= 4.11, 95%=1.41-12.05, p=0.01) in table 4.

Table 4 also shows unbooked status to be significantly associated with having 5-minute Apgar score <7 (OR= 3.39, 95%=1.09-10.55, p=0.04) while the association between placenta abruption and having 5-minute Apgar score <7 is tending toward significance (OR= 11.06, 95%=0.63-193.9, p=0.10).

The cases were also found to be significantly more likely to have a stillbirth compare to the controls [3(75%) Vs 1(25%), p=0.000)].

Figure 4

Table 4: Logistic regression analysis showing factors associated with having 5-minute Apgar scores

Factors	Coefficient	Odd Ratio(95% CI)	P value
Cases	1.42	4.11(1.41-12.05)	0.01
Control	-	-	-
Age (Years)			
<20	0.64	1.89(0.14-24.71)	0.63
20-35	0.32	1.37(0.17-10.89)	0.77
>35	-	-	-
Parity			
0	-1.59	0.21(0.35-1.21)	0.08
1-4	-1.97	0.14(0.02-0.84)	0.03
≥5	-	-	-
Booking status			
Unbooked	1.22	3.39(1.09-10.55)	0.04
Booked	-	-	-
Obstetric conditions			
Eclampsia/Severe PIH	0.65	1.91(0.39-9.13)	0.42
Placenta Previa	-0.86	0.42(0.05-3.50)	0.45
Placenta Abruptio	2.40	11.06(0.63-193.9)	0.10
Previous CS	-0.18	0.83(0.09-7.17)	0.87
Obstructed labor	1.07	2.92(0.66-12.82)	0.16
Failed IOL	0.85	2.35(0.43-12.78)	0.32
Nil	-	-	-
Duration of operation			
<30	-0.57	0.60(0.12-3.14)	0.55
30-60	-0.74	0.47(0.15-1.46)	0.19
>60	-	-	-
Birth weight (Kg)			
<2.5	-0.17	0.85(0.04-18.62)	0.92
2.5-4.0	0.39	1.48(0.15-14.99)	0.74
>4.0	-	-	-

DISCUSSION

Despite the almost universal use of intermittent auscultation especially in low-income countries of the world, until recently the test has not been subject to rigorous evaluation and critical discussion of its usefulness is conspicuously absent in the obstetric literatures [9]. This case-control study shows that compare to babies delivered by cesarean section because of other diagnosis those delivered because of the diagnosis of fetal distress using intermittent auscultation are significantly more likely to have fifth minutes Apgar score <7 and to be stillborn.

The age and parity distribution in this study is similar to that reported from other studies [10, 11] and similar to the report of Okezie AO et al [10] majority of the patients in this study were in the group 20-35. This age group represents the reproductively active age group in general.

The frequency of cesarean section depends on the inherent characteristics of the obstetrics population [12] but majority of the patient in this study (70.8%) do not have any obstetrics complication. This is important because these factors might be possible confounder as regard the neonatal outcome. Similarly, the mean duration of the cesarean section and mean birth weight of the babies were also within the accepted normal limits.

In a case-control study, appropriate selection of the control is important to avoid biasing the results. The cases and controls should not differ importantly aside from in the condition in question [13] and in this study, the cases did not differ significantly from the control in terms of sociodemographic and obstetrics characteristics.

Apgar score is widely used as a proxy for asphyxia. A low Apgar score at 5-minute usually imply complications of clinical importance usually a compromise of the infant and is such an unwanted outcome. The goal of Intrapartum Fetal Heart Rate (FHR) monitoring is to detect signs that warn of potential adverse fetal hypoxia in time to permit intervention. Thus when a diagnosis of "fetal distress," is made clinicians aim for a swift delivery [14] but it was not known how closely clinical diagnosis of fetal distress was associated with the clinical condition of the newborn infant [5]. Similar to the reports of other studies [15,16,17] clinical diagnosis of fatal distress was found to be significantly associated with low 5-minutes Apgar score in this study. This association persisted after using logistic regression to control for confounders because some antepartum conditions can modify fetal responses. It appears that cesarean section for fetal distress diagnosed base on intermittent auscultation of FHR rescue some infants with a relative risk reduction of 71% for having 5-minutes Apgar score <7 and 67% for stillbirth. This showed the usefulness of intermittent auscultation as a means of intrapartum FHR monitoring although there are reports to the contrary by some studies [6,18].

The logistic regression analysis also shows unbooked status to be independently associated with having low 5-minute Apgar score similar to the finding of another study [19]. This is might be explained by the fact that these category of patients are likely to have conditions that can compromise the fetus which are undetected because they did not avail themselves to prenatal care. Similarly placental abruption was found to be associated with low 5-minute Apgar score with a relationship that is tending toward statistical significance (OR= 11.06 95%, CI= 0.63-193.9 p= 0.10). Premature separation of the placenta before delivery may deprive the fetus of oxygen and nutrition, leading to handicap among survivors.

In most areas of human endeavor, process, or procedure, uniformity is generally associated with improvement of measures [20]. One of the problems of the use of intermittent auscultation for intrapartum FHR monitoring is the lack of comparative data indicating the optimal frequency at which intermittent auscultation should be performed leading to lot of variations in its application. Despite questioning of the accuracy of the diagnosis of fetal distress using intermittent auscultation this study shows that with a uniform application, the diagnosis of fetal distress using intermittent auscultation is associated with adverse early neonatal outcome (low 5-minute Apgar score) lending credence to its utility especially in low-income countries where electronic fetal monitoring equipments are not available.

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