



Determinants of Decision to Delivery Interval (DDI) in Emergency Caesarean Sections in Ladoke Akintola University Of Technology Teaching Hospital Ogbomosho, Nigeria

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Abstract

Background: Emergency caesarean sections are invaluable when vaginal delivery is either impossible or possess risk to the life of mother and or the fetus. Patients however still encounter delays after the decision has been made, despite recommended time frame.

Objective: This is to identify the common indications for emergency caesarean section, factors responsible for delays after decision has been made and the short-term effect on the mother and neonate.

Materials and Methods: This was a retrospective study in which case records of patients who had emergency caesarean section were retrieved. Information about socio-demographic characteristics, booking status, parity, indications for surgery, decision time, incision time and short term foeto-maternal outcomes were collected with the aid of structured proforma. Data was analyzed with Stata: Release 13 statistical software.

Results: The mean age of participants was 28.9 ± 5.1 years, 51.3% were booked, primary caesarean section rate was 84.0%. The commonest indication was cephalo-pelvic disproportion (40.5%). The mean DDI was 145.3 ± 69.2 mins. Patients' factor was the leading cause of delay due to lack of funds and non-provision of surgical materials (53.5%). Leading hospital factors were non-availability of blood and blood products (32.8%) and power outage (28.0%). Five minute APGAR score was normal in 92.3% of the neonates and 0.5% had severe asphyxia.

Conclusions: This study showed that there are still avoidable delays in emergency caesarean section. Although there were no immediate neonatal complications, improving health care delivery so as to eliminate the identified causes would go a long way in reducing these delays.

Introduction

Caesarean section is a deliberate surgical incision made on the uterus through an anterior abdominal wall incision with the aim of delivering the product of conception after the age of viability [1]. It is indicated when vaginal delivery is either impossible or the risks of vaginal delivery outweighs the benefit to either the mother, her fetus or both [1,2].

According to timing of caesarean section, a four steps classification system has been adopted by the RCOG namely: emergency, urgent, scheduled and elective [2-5].

The decision to delivery interval can be defined as the interval in minutes from the date and time of decision to carry out caesarean section to the date and time of delivery of the baby [4-6]. The RCOG recommended a delivery within 30 minutes for emergency caesarean deliveries and a maximum of 75 minutes for urgent caesarean deliveries [4,7]. In order to be valuable as audit standard, these targets need to be evidence-based and achievable.

Though the feasibility, justification and benefits of these time frames have been questioned, [2,4]. Studies have demonstrated that for both emergency and urgent caesarean sections, maternal and perinatal outcomes deteriorate measurably when the decision to delivery interval exceeds 75 minutes [4,8]. It is therefore important to ensure delivery within a short time frame in order to achieve preservation of maternal and fetal life in the most urgent situations [8,9].

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Table 1: Sociodemographic characteristics of study population.

| VARIABLE | NUMBER (232) | PERCENTAGE |
|-----------------------|--------------|------------|
| AGE | | |
| 15-19 | 4 | 1.7 |
| 20-24 | 35 | 15.1 |
| 25-29 | 95 | 41 |
| 30-34 | 73 | 31.5 |
| 35-39 | 13 | 5.6 |
| >40 | 12 | 5.2 |
| MARITAL STATUS | | |
| Married | 207 | 89.2 |
| Single | 24 | 10.4 |
| Cohabiting | 1 | 0.4 |
| ETHNICITY | | |
| Yoruba | 222 | 95.5 |
| Igbo | 6 | 2.6 |
| Hausa | 2 | 0.9 |
| Others | 2 | 0.9 |
| RELIGION | | |
| Christianity | 177 | 76.3 |
| Islam | 55 | 23.7 |
| OCCUPATION | | |
| Unskilled | 140 | 60.3 |
| Professional | 55 | 23.7 |
| Skilled | 37 | 16 |

Table 2: Obstetric Status of Study Population.

| VARIABLE | NUMBER (232) | PERCENTAGE |
|--|--------------|------------|
| BOOKING STATUS | | |
| Booked | 119 | 51.3 |
| Unbooked | 113 | 48.7 |
| PARITY | | |
| Nulliparous | 123 | 53 |
| Primiparous | 57 | 24.6 |
| Multiparous | 43 | 18.5 |
| Grand multiparous | 9 | 3.9 |
| NUMBER OF PREVIOUS CAESEREAN DELIVERIES (n=37[16%]) | | |
| 1 | 28 | 75.7 |
| 2 | 7 | 18.9 |
| 3 | 2 | 5.4 |

More than half 119(51.3%) of the study population were booked and 53.0% were nulliparous. Only 37(16.0%) had a previous C/S putting the primary C/S rate at 84.0%. Twenty-eight (75.7%) of those who had repeat C/S had 1previous caesarean delivery, 7(18.9%) had 2 previous C/S and 2(5.4%) had 3.

The procedure of caesarean section is complex and multidisciplinary, involving the anesthesiologist and his trained assistant, the obstetrician and his assistant, a theatre Nurse and a Neonatologist. These staff must be assembled, some of them must review patient and also prepare her. Some patients would need extra attention and stabilization to ensure that her condition is optimal before the surgery can be done. Failure to stabilize patient may increase the risk of maternal mortality and morbidity as a result of

Table 3: Indications for Caesarean Section and Decision to Delivery Interval.

| VARIABLE | NUMBER (%) | PERCENTAGE |
|---|------------|--------------|
| INDICATIONS FOR CAESAREAN SECTION | | |
| Cephalopelvic disproportion in labor | 94(40.5) | 145.8 ± 63.8 |
| Suspected fetal distress | 54(23.3) | 145.4 ± 82.1 |
| Failed VBAC* | 30(12.9) | 153.2 ± 88.3 |
| Failed induction | 18(7.8) | 139.1 ± 48.3 |
| Severe pre-eclampsia + unfavorable cervix | 13(5.6) | 128.5 ± 49.4 |
| Antepartum hemorrhage | 11(4.7) | 126.6 ± 46.0 |
| Breech presentation in labor | 7(3.0) | 205.3 ± 26.8 |
| Cord prolapse | 4(1.7) | 87.6 ± 50.6 |
| Retained 2nd twin | 1(0.4) | 130 |

*VBAC: Vaginal birth after caesarean section

showed that the commonest indication for caesarean delivery was cephalopelvic disproportion 94(40.5%) and cord prolapse had the shortest mean decision incision interval (87.6 ± 50.6) mins. One hundred and forty-nine (64.2%) of the surgeries were done during the day and 83(35.8%) were done in the night. The mean DDI for daytime surgeries was 152.2 ± 69.5 and that of night surgeries was 133.0 ± 67.2 minutes.

the surgery or complications of anesthesia [7,9].

Keeping with the recommended time frame is difficult especially in government owned hospitals where the cost of healthcare is born by patients. Lack of money may lead to delay in accessing care. Other factors that have been identified in previous studies include; lack of coordination between the health team involved, increase patient load with resultant long waiting list for surgery, delay in cross matching blood and stabilizing unfit patients, delay due to malfunctioning apparatus, shortage of instruments, absence of sutures drapes and theatre technical staff, power outage and limited number of operating theatres [3,4,7]. The aim of this study was to explore the factors that causes of delay in delivery after a decision have been made for an emergency caesarean section and effect of such delays on the short-term outcome on the mother and her new born baby.

Materials and Methods

The study was conducted at the LAUTECH Teaching Hospital, Ogbomoso, located in Oyo State of Nigeria. It was a cross-sectional hospital based retrospective study. Subjects were patients who had emergency caesarean section. Their records were retrieved and analyzed. The records of all cases of emergency caesarean sections performed in LTH, Ogbomoso between 1st of January 2013 and 31st of December 2014 (repeated) were retrieved. Information was extracted with the aid of a proforma. The information included socio-demographic parameters of the patients, indications for surgery, decision-delivery interval and feto-maternal outcome. Only pregnancies between 37 weeks to 42 weeks were included in the study to avoid bias from complications resulting from gestational age and cases of intrauterine fetal death diagnosed before surgery were excluded. The approval for the study was obtained from ethical review committee of LTH Ogbomoso.

Microsoft excel was used for data entry and the Stata: Release 13 Statistical Software. College Station, TX: Stata Corp LP was used for analysis. Frequency distribution tables were generated. The Chi-square and student t-tests were used to determine relationship between variables where each was applicable and the level of significance was set at P-values of <0.05, at confidence interval of 95% for inferential statistics.

Results

Between 1st of January 2013 and 31st of December 2014, a total of 294 Caesarean sections were performed and 246(83.7%) were emergency caesarean sections out of which 232 (94.3%) patients fulfilled the criteria for the study. The mean age was 28.9 ± 5.1 years. Majority of the patients were married 207(89.2%) Yoruba 222(95.7%) women (Table 1).

Discussion

The mean DDI interval in this study is 145.3 ± 69.2 minutes and is longer than what was observed in similar studies in Benin and Ibadan Nigeria where the mean DDIs were 106 and 119 minutes respectively [3,10]. These centers are old and located in Urban communities, health insurance is also available there. However, this DDI was an improvement over what was observed in Enugu and Ife Nigeria where the mean DDIs were 201 and 264 minutes respectively [2,11]. The apparent improvement may however be due to the fact that these studies were conducted more than 8 years ago and much improvement would have occurred in these centers over the years, moreover the studies with shorter DDI were conducted in 2014 and 2015 respectively. All these DDIs are still far from the recommendation of 30 minutes. Only 0.86% of the surgeries were performed within 30 minutes, which is lower than what was observed by Bello et al in Ibadan and Chukwudi et al in Benin with a percentage of 2.1% and 5.7% respectively. These percentages are still very low [3,11].

Two independent European studies observed a mean DDI of 39.5 and 52.4 minutes respectively. The observed difference may be due to improved facilities, better coordination among the surgical team and more importantly is the practice of post service billing and availability of health insurance, which ensures that in the face of emergencies, patients are first attended to and relatives don't have to procure materials before surgery is done [8,15]. Health insurance is sadly yet to be available in our center, which could be because the center is relatively new and is located in a semi-urban environment.

Lack of funds and non-provision of surgical materials was the leading causes of delay in this study. As post service billing is not available in our center, patients' relatives usually pay surgical fees and also buy materials before the operation could be performed. This is similar to what was observed by Bello et al due to the unavailability of post service billing, health insurance is also yet to be available to all patients at the center. Delay in assembly of personnel for surgery and unreadiness of the operating theatre were the major causes of delay that were observed by Onwudiegwu et al. and Onah et al. [2,10]. This could be due to the relatively lower rate of staffing in teaching hospital at the time these studies were conducted. Another important cause of delay was non-availability of blood and blood products this is so because the donors are provided by patients' relatives rather than volunteers [14]. Many of our patients are un-booked and we are unsure of their baseline blood parameters, it is therefore safe in our environment to ensure that blood is made available before commencing surgery especially in patients who are at risk of bleeding. This usually takes some time. This problem was also observed by Bello et al [11]. These causes of delay are however absent in foreign studies [8,12,15].

There was no statistically significant relationship between measures of fetal outcome and the DDI, which included 5 minutes APGAR score, SCBU admission, perinatal mortality (P-value 0.11,

Table 4: Decision-Delivery Interval (DDI).

| DDI (mins) | NUMBER (%) |
|------------|------------|
| ≤ 30 | 2(0.9) |
| 31-60 | 17(7.3) |
| 61-90 | 45(19.4) |
| 91-120 | 49(21.1) |
| 121-150 | 18(7.8) |
| 151-180 | 42(18.1) |
| 181-210 | 23(9.9) |
| ≥ 210 | 36(15.5) |

Only 2 (0.9%) of the surgeries were done within 30 minutes and 19(8.2%) were done within an hour.

Table 5: Factors responsible for delay.

| FACTORS | NUMBER | PERCENTAGE |
|---|--------|------------|
| PATIENT FACTORS | | |
| Need to stabilize mother | 12 | 5.2 |
| Lack of funds and non-provision of surgical materials | 124 | 53.5 |
| Delay in signing consent | 70 | 30.2 |
| HOSPITAL FACTORS | | |
| Power outage | 65 | 28 |
| Non-availability of blood and blood products | 76 | 32.8 |
| Shortage of theatre staff | 3 | 1.3 |
| Shortage of operating theatre | 10 | 4.3 |
| Delay in administration of anesthesia | 35 | 15.1 |

Table 5 showed the factors responsible for delay, lack of funds and non-provision of drugs and surgical materials was the commonest reason for delay in 124 (53.5%).

Non-availability of blood and blood products was responsible in 76(32.8%) and delay in signing consent form was The reason in 70(30.2%) of the patients. Feto-maternal outcome was assessed and 21(9.1%) had postpartum hemorrhage, 24(10.3%) were transfused post operatively, 1(0.4%) required ICU admission, 10(4.3%) had puerperal sepsis. More than half of the study population had a normal postpartum PCV, less than one-third had mild anemia and 27(11.6%) had moderate anemia. Eleven fetuses were delivered as stillborn and a case of neonatal death was recorded, 12 perinatal mortalities therefore occurred with a perinatal mortality rate of 5.2%. Five minute APGAR score was normal in 206(93.2%) of neonates, mild asphyxia was noted in 5(2.3%), moderate asphyxia in 9(4.1%) and 1(0.5%) was severely asphyxiated. Forty-six (20.8%) of the neonates were admitted in the SCBU.

0.89, 0.59 respectively). Though contrary to what was observed by Thomas et al [6], this lack of relationship have been observed repeatedly in previous studies [2,3,6,11]. It may therefore suggest that some other factors contribute to perinatal morbidities and mortality following emergency C/S which is more important than DDI. Despite the lack of correlation between DDI and perinatal outcome, unnecessary delays are not justified in the face of acute fetal or catastrophic maternal conditions, these conditions include cord prolapse and abruptio placenta which had the shortest mean DDI in this study as observed in other studies too [3,12]. Litigation of Obstetricians should however not be solely on the basis of prolonged DDI in view of its poor relationship with feto-maternal outcomes.

Conclusion and Recommendation

Despite the lack of relationship between DDI and perinatal outcomes, it is important to ensure delivery within short time in emergency C/S. This could be achieved by ensuring a holistic improvement in health care delivery. Ensuring routine antenatal care for all pregnant women such that most of them are booked, some

Table 6: Outcome of Caesarean Deliveries.

| VARIABLE | NUMBER | PERCENTAGE |
|------------------------------|--------|------------|
| MATERNAL OUTCOME | | |
| Postpartum hemorrhage | 21 | 9.1 |
| Postpartum blood transfusion | 24 | 10.3 |
| Need for ICU admission* | 1 | 0.4 |
| Puerperial sepsis | 10 | 4.3 |
| FETAL OUTCOME | | |
| Intrapartum still birth | 11 | 4.7 |
| 5 Minute APGAR Score (n=221) | | |
| ≥ 7 | 206 | 93.2 |
| 6 | 5 | 2.3 |
| 4-5 | 9 | 4.1 |
| <3 | 1 | 0.5 |
| SCBU admission** | 46 | 20.8 |
| Neonatal death | 1 | 0.5 |

*ICU- intensive care unit. **SCBU- special care baby unit.

Table 7: Analysis of DDI and perinatal outcome.

| DDI (min) | ≤30 | 31-75 | >75 | P-value |
|------------------------------|-----|-------|-----|---------|
| 5 MINUTES APGAR SCORE | | | | |
| ≤ 7 | 2 | 26 | 178 | |
| 6 | 0 | 0 | 5 | 0.11 |
| 4-5 | 0 | 6 | 3 | |
| ≤ 3 | 0 | 0 | 1 | |
| SCBU ADMISSION | | | | |
| Yes | 0 | 11 | 35 | 0.89 |
| No | 2 | 21 | 152 | |
| PERINATAL MORTALITY | | | | |
| Yes | 0 | 6 | 6 | 0.59 |
| No | 2 | 32 | 186 | |

of the patients presenting as emergency would have been treated as elective cases in which the patient would have had time to prepare for funds and also get her blood donor in the spirit of birth preparedness and complication readiness.

The importance of post service billing and increasing the coverage of the National Health Insurance Scheme (NHIS) cannot be overemphasized. This would ensure that C/S is done within the shortest possible time for either the poor or the rich patient in accordance with respectful maternity care.

Encouraging volunteer blood donation and making blood donation a routine for every pregnant woman would ensure that blood is always available in the face of emergencies which can be replaced later when the lives of the mother and fetus have been saved.

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