



Is Caesarean Delivery Safe? Experience from a Low Resource Setting

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Authors' contributions

This work was carried out in collaboration between all authors. Author SAU designed the study. Authors NCO and JOA performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NCO and JOA managed the analyses of the study. Author RNO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: In Nigeria, women abhor caesarean delivery because of perceived complications arising from it. We compared the maternal morbidity and mortality associated with caesarean and vaginal deliveries in Port Harcourt, Nigeria to ascertain the safety of caesarean delivery.

Materials and Methods: This was a prospective study of 1000 consecutive caesarean deliveries at the University of Port Harcourt Teaching Hospital, Nigeria over a one-year period. The control group consisted of women matched for age and parity who had spontaneous vaginal delivery after the subject that had caesarean delivery. Information from the case notes was extracted onto a proforma completed by the doctor after delivery. Descriptive and comparative analysis of data generated was done using Epi Info Version 6.04d. Chi-squared test was used to evaluate differences in the morbidity and mortality rates between the two groups.

Results: The caesarean delivery (CD) rate over the study period was 33.1%. Morbidity pattern was similar in both groups in terms of puerperal sepsis (1.1% from CD versus 1.3% from vaginal delivery [VD]) and post-partum haemorrhage (0.6% from CD versus 1.7% from VD). Six maternal deaths occurred among women who had CD, five of which were in those who had emergency CD

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while five maternal deaths occurred among women who had vaginal delivery. The difference was not statistically significant ($p > 0.05$).

Conclusion: There was no significant difference in terms of morbidity and mortality between caesarean and vaginal delivery in our tertiary institution. Women in low resource countries should be counseled appropriately so that their aversion towards caesarean delivery will be minimized.

Keywords: Caesarean delivery; vaginal delivery; morbidity; mortality.

1. INTRODUCTION

Caesarean delivery is the most common major surgical procedure in obstetrics in sub-Saharan Africa [1]. The rate of caesarean delivery (CD) has increased dramatically during the last three decades, in some countries to almost one third of all deliveries [2]. This has been a cause of major concern to healthcare providers in many developed and developing countries as caesarean delivery are associated with increased risk of maternal morbidity [3]. At the same time, there is concern that in less resource countries in general, CD rates are low as they are not always accessible even when clearly indicated [4]. There is no consensus on the "optimal" rate of caesarean delivery at the population level although the World Health Organization (WHO) has suggested values between 5 and 15% as the optimal range for targeted provision of this life saving intervention for mother and infant. An estimate of 1-2% CD rate has been reported in sub-Saharan Africa and a WHO survey done in 2008 puts CD rate in Nigeria at 1.73% at population level [4,5]. Improving the availability, accessibility, quality, and use of services for the management and treatment of complications of pregnancy, labour and delivery is at the top of the WHO's agenda regarding maternal mortality [6]. Thus, this applies to caesarean delivery.

Women in Nigeria still do not readily accept caesarean delivery because of fear of morbidity and mortality, economic reasons and desire to experience vaginal delivery [7-9]. Vaginal delivery is the naturally accepted mode of giving birth and delivery other than the vaginal route is regarded as failure on the part of the woman. Consequently, there is a general aversion to CD even when faced with life threatening complications [8].

Advances in surgical techniques, asepsis, antibiotic therapy, blood transfusion and anaesthesia have reduced the risks associated with CD significantly [10] and available data although limited suggests that planned

caesarean deliveries have similar low rates of absolute and relative short-term maternal morbidity compared to vaginal delivery [11]. Other studies have shown that caesarean deliveries are associated with higher risk of maternal death, [12,13] a longer recovery time and operative complications, [13-15] a higher risk of unexplained stillbirths in subsequent pregnancies and respiratory problems of newborn infants [16,17].

Most previous studies that compared outcomes of CD and vaginal delivery (VD) have been retrospective and have shown an increased risk of major complications in women who had caesarean delivery compared with women who delivered vaginally [6,14,18]. As the debate rages, documenting the safety of CD or otherwise in Nigeria becomes imperative. The current study was designed to determine if caesarean delivery was as safe as vaginal delivery, in the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Site

This study was carried out at the obstetric complex of the University of Port Harcourt Teaching Hospital, where an average of 2,800 deliveries are conducted annually. The complex has a total of 135 beds, with 30 beds in the antenatal ward, 80 beds in the postnatal ward, 13 beds in the first stage room, 4 beds in second stage room, and 8 beds in private/semi-private rooms. Five units man the obstetric complex. Each unit has four consultant obstetricians, five specialist senior registrars and two registrars with complementary number of experienced nurses and midwives.

2.2 Methods

A prospective case-control study of 1000 consecutive caesarean deliveries at the obstetric

unit of the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria from January 1, 2010 to November 30, 2010 were conducted. The control group consisted of 1000 pregnant women matched for age and parity who had spontaneous vaginal delivery after the subject that had caesarean delivery. Information was obtained from the case notes, theatre records and delivery register and entered into a proforma by the doctor after delivery. The variables analysed included unintended trauma (extension of uterine incision, laceration of the ureter, bladder or bowel, cervical and perineal lacerations), haemorrhage (defined as blood loss from the genital tract in excess of 500 mls following vaginal delivery and 1000 mls following CD), peripartum hysterectomy, severe postpartum anaemia (defined as haemoglobin concentration $<7\text{g/dl}$), puerperal febrile morbidity (temperature greater than 38°C on two or more occasions in any 48-hour period excluding the first 24-hours post-partum), wound infection (infected episiotomy in VD group), paralytic ileus, hospital stay and maternal death. The proforma for each patient was checked for completion before it was entered into a spreadsheet and analysed.

For the elective caesarean delivery, women were admitted at least a day prior to the operation, to allow preoperative investigations and anaesthetists' review. Emergency caesarean deliveries were done immediately after the patient was stabilised. Abdominal entries were either through a midline subumbilical or Pfannenstiel incision, and the standard technique of lower-segment caesarean section was used for all cases [19]. The attending anaesthetist gave syntocinon (10IU) intravenously at the delivery of the baby. Syntocinon infusions were selectively administered post-operatively to women considered to be at risk of post-partum haemorrhage. Prophylactic antibiotics in form of ceftriaxone and metronidazole were prescribed for all the patients in the immediate post-operative period. Women with spontaneous vaginal deliveries were given prophylactic antibiotics in the form of cefuroxime and metronidazole only if an episiotomy was given.

Individual patient was financially responsible for the services provided.

The Ethics Committee of the University of Port Harcourt Teaching hospital gave approval for the study.

2.3 Statistical Analysis

Descriptive and comparative analysis of data generated was done using Epi Info Version 6.04d. Chi-squared test was used to evaluate differences in the morbidity and mortality rates between the two groups. The data are represented as median and inter-quartile range (IGR) or mean and standard deviation (SD) where normally distributed. Results are presented in tables and pie charts. Observed differences between the two groups were considered statistically significant where P-values < 0.05 or confidence limits did not embrace unity.

3. RESULTS

A total of 3025 deliveries occurred in 2010, of which 1000 were caesarean deliveries, giving a CD rate of 33.1%. Three hundred and two (30.2%) were elective CD while 698 (69.8%) were emergency CD. The mean age for the CD group was 30.9 ± 4.7 years and 29.8 ± 4.2 years for the VD group. The median parity (IGR) was similar in both groups at 1 (IGR of 0-2). The mean gestational age at delivery was 36.9 ± 7.5 weeks for the CD group and 38.6 ± 2.4 weeks for the VD group (Table 1).

The most common indications for CD were 2 previous CD (26.7%), obstructed labour / cephalopelvic disproportion (13.1%) and hypertensive disorders in pregnancy (12.4%). Regional anaesthesia was used in 92% of cases and senior trainees in 85.5% of cases did the surgery.

Table 2 showed the comparison of delivery outcomes of women who had CD and those that had VD. The morbidity and mortality rates were similar in both groups. Surprisingly, the only peripartum hysterectomy that was done was in one woman who had uncontrollable primary post-partum haemorrhage from uterine atony following VD.

There were six maternal deaths among women who had CD, giving a case fatality rate (CFR) of 0.6% while five maternal deaths (CFR) of 0.5% were recorded among women who had VD. The difference was not statistically significant ($p > 0.05$). The causes of death are shown in Figs. 1 and 2. The mean duration of stay in hospital after delivery was also longer for the CD group compared to the VD group (6.8 ± 4.4 days versus 1.38 ± 0.86 days; not shown in the table).

Table 1. Comparison of maternal characteristics among women who had CD and those who had VD

Characteristic	CD n=1000	VD n=1000
Mean age in years (SD)	30.9 ± 4.7	29.8 ± 4.2
Mean GA in weeks (SD)	36.9 ± 7.5	38.6 ± 2.4
Median parity (IQR)	1 (0-2)	1 (0-2)

SD – Standard deviation; IQR – Interquartile range

Table 2. Comparison of maternal outcome among women who had CD and those who had VD

Maternal outcome	CD n=1000		VD n=1000		Chi square (X ²)	P value
	Freq	(%)	Freq	(%)		
Unintended trauma	21	(2.1)	12	(1.2)	1.90	0.168
Haemorrhage	32	(3.2)	34	(3.4)	0.01	0.906
Peripartum hysterectomy	0	(0.0)	1	(0.1)	-	0.500 [#]
Severe postpartum anaemia	37	(3.7)	31	(3.1)	0.35	0.553
Puerperal sepsis	11	(1.1)	13	(1.3)	0.04	0.841
Wound infection	15	(1.5)	10	(1.0)	0.63	0.428
Paralytic ileus	4	(0.4)	0	(0.0)	-	0.06 [#]
Total morbidity	120	(12.0)	101	(10.1)	1.30	0.253
Maternal death	6	(0.6)	5	(0.5)	0.00	0.998

[#]Fisher exact test

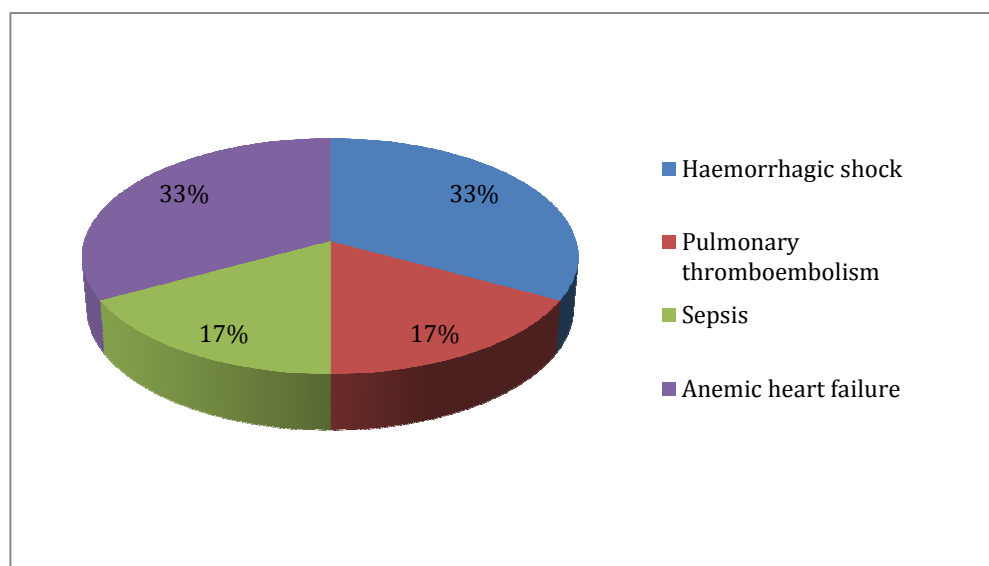


Fig. 1. Causes of maternal death for caesarean delivery

4. DISCUSSION

This study illustrates the maternal morbidity and mortality associated with caesarean delivery in a Nigerian teaching hospital by comparing its outcomes with that of women who achieved vaginal delivery following spontaneous labour at the same centre. The basis for this was to address the comparative risk of CD in an environment where pregnant women desire VD at all costs.

Advances in surgical techniques, asepsis, antibiotic therapy, blood transfusion and anaesthesia have reduced although not eliminated the risks of haemorrhage and sepsis which were the initial complications following CD [20]. Thus, this relative safety of CD and its advantages compared to vaginal delivery have resulted in a change in risk-benefit ratio, which has accelerated acceptance of CD in more resource countries.

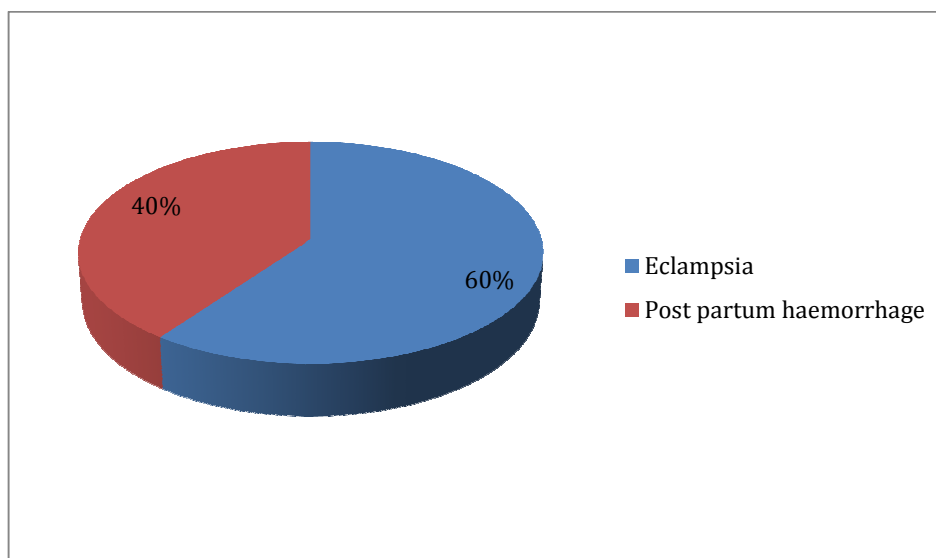


Fig. 2. Causes of maternal death for vaginal delivery

It is apparent from this study that caesarean delivery in this hospital is as safe as vaginal delivery in view of the similarities in maternal outcomes recorded during the period under study in spite of the fact that majority of the CD (69.8%) were emergencies. This is at variance with the report from Sagamu and the WHO multicountry survey, which showed considerably more morbidities among women who had caesarean delivery. Their report also showed a higher rate of blood transfusion and puerperal febrile morbidity despite the routine use of prophylactic antibiotics [13,21]. This difference may be due to the different indications for the caesarean sections, surgical techniques, antiseptic usage, the time of commencement of antibiotics and also the effectiveness of the antibiotics prescribed.

The rate of peri-partum hysterectomy was comparatively low in both groups of women. The only woman who had a peri-partum hysterectomy had uncontrollable primary post-partum haemorrhage from uterine atony following a vaginal delivery. This is contrary to a previous study in which peri-partum hysterectomy was more frequently done in women who had caesarean delivery [13].

As expected, the average lengths of hospital stay for women who had CD were longer than those who achieved VD. This may partly be attributed to the postnatal clinical practice of the hospital where the removal of stitches for patients that had midline sub umbilical incisions is done on the fifth day post operation. It should however be

borne in mind that prolonged hospital stay after uncomplicated caesarean section has financial and social implications for the women, and should be individualised as much as possible [22].

Regional anaesthesia was used in 92% of the caesarean delivery. This may have contributed to the minimal anaesthetic complications observed. The National Institute for Health and Care Excellence (NICE) clinical guidelines on CD recommends that women having CD should be offered regional anaesthesia because it is safer and results in less maternal and neonatal morbidity than general anaesthesia [23].

Contrary to the observations of previous studies, [18,24] but similar to findings in Sokoto Nigeria, [25] six maternal deaths were recorded among women who had caesarean delivery. The maternal deaths were due to anaemic heart failure, haemorrhage, pulmonary embolism and sepsis. The causes of death following CD are similar to the findings from Enugu [26]. Majority of the deaths in both groups occurred in unbooked parturients. These women present late, in poor physical and financial state. They are pale, febrile, dehydrated and have difficulty procuring intravenous fluids, blood and antibiotics as required for patients undergoing surgery in our hospital. This was also observed in the report from Enugu [26].

This study had some limitations in that it was not discriminatory in terms of booking status of the women and type of caesarean delivery as well as

being a single-center hospital based study. The CD rate of 33.1% in this study though higher than the WHO's recommended range, is not unexpected as this is a tertiary hospital and most of the cases were referred being the main provider of comprehensive emergency obstetric care in the study area. Thus most of the CDs were done as an emergency life saving intervention for the mother and baby. This rate is not representative of the general population of Nigeria, which has a 1.73% reported CD rate [5]. We assume the caesarean delivery rate in the general population may be lower. The fact that the study was non discriminatory in terms of booking status may have accounted for the relatively high number of maternal deaths recorded among the unbooked women in both groups as the deaths may have been due to the clinical indication for the CD rather than the procedure itself. In the vaginal delivery group, 60% of maternal death was due to eclampsia not the VD per se. A randomized controlled trial to evaluate the relative risks and benefits of planned elective caesarean versus planned vaginal delivery may be the best way to avoid confounding factors.

Strengths of this study include its prospective nature and large number of deliveries reviewed, as most previous studies were retrospective as well as being the first report from Port Harcourt, Nigeria.

In the absence of adequate population based studies and randomized controlled trials, studies like this which show relatively similar risk profiles between CD and VD could be used to counsel our women that barring exceptions a caesarean delivery is no longer more risky than a vaginal delivery.

5. CONCLUSION

Caesarean delivery is as safe as vaginal delivery as there was no significant difference in terms of morbidity and mortality between both modes of delivery in this study. This provides reassurance as to the safety of CD. Women in low resource countries should be educated to accept CD when clinically indicated thus minimizing their aversion to the procedure.

CONSENT

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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