



Original Article

Maternal and Fetal Outcome in Cesarean Section in Three Referral Hospitals of Yaoundé: What Are the Places of the Type of Anesthesia and the Experience of the Surgeon?

Survenue des complications materno-fœtales au cours de la césarienne dans trois hôpitaux de Yaoundé : Influence de l'expérience du chirurgien et du type d'anesthésie

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RÉSUMÉ

Introduction. La césarienne est la plus fréquente et l'une des opérations les plus importantes en obstétrique et son incidence est à la hausse dans le monde entier. Malgré l'amélioration de la technique de CS et de l'anesthésie, les résultats néfastes maternels et fœtaux restent élevés. Nous avons donc mené cette étude pour évaluer l'influence de l'expérience du chirurgien et du type d'anesthésie dans la survenue des complications materno-fœtales de la césarienne. **Matériels et méthodes.** Nous avons mené une étude de cohorte du 1^{er} novembre 2016 au 30 mai 2017 dans trois hôpitaux de référence à Yaoundé. Nous avons comparé les complications maternofoetales dans la césarienne d'urgence avec celles des césariennes programmées. Les données recueillies étaient saisies avec le logiciel Epi info 7.2.0.1 et analysées avec les logiciels Epi info 7.2.0.1 et SPSS 20.0. L'intervalle de confiance était de 95%. Les valeurs p < 0,05 étaient considérées comme statistiquement significatives. Le risque relatif a été utilisé pour évaluer le degré d'association entre les variables. **Résultats.** L'âge moyen était de 31,91 ± 5,150 dans le groupe césarienne d'urgence et de 26,567 ± 6,088 dans le groupe césarienne programmée. Les femmes ayant reçu une anesthésie générale avaient 2,30 fois plus de risque de complications hémorragiques, 2,95 fois plus de risque d'asphyxie et 3,45 fois plus de risque d'asphyxie néonatal (23,53% vs 10,22%, RR 2,30 [1,01-6,20], p = 0,04) (23,53 % Vs 8,03, RR 2,95 [1,05-8,98] p = 0,04), et (17,65% vs 5,11%, RR 3,45 [1,98-12,11], valeur p 0,04) respectivement. Aucune variation significative des complications n'était notée entre les chirurgiens (résidents vs obstétriciens). **Conclusion.** L'anesthésie générale est associée à un plus mauvais pronostic maternel et fœtal par rapport à la rachianesthésie. Les pronostics maternel et fœtal ne sont pas associés à l'expérience du chirurgien. Nous recommandons de promouvoir la rachianesthésie pour la réalisation des césariennes.

ABSTRACT

Introduction. Caesarean section (CS) is the most common and one of the most important operation in obstetrics and its incidence is on the rise worldwide. Despite the improvement in the technique of CS and anesthesia, adverse maternal and foetal outcomes are still too high. We carried out this study to assess the influence of surgeon's experience and type of anesthesia in maternal and foetal outcomes in case of emergency CS in three referral hospitals of Yaoundé. **Materials and methods.** We carried out a prospective cohort study from the 1st of November 2016 to the 30th May 2017 in three referral hospitals in Yaoundé. Data collected were entered using Epi info 7.2.0.1 and analyzed with Epi info and SPSS 20.0 using a confidence interval (CI) of 95%. Two-tailed p-values < 0.05 was considered statistically significant. The RR was used to assess the degree of association between studied variables. **Results.** The mean age of patients was 31.91 ± 5.150 in the emergency CS group and 26.567 ± 6.088 in the elective CS group. Women who got general anesthesia were at higher risk (at least 2 times) of hemorrhagic complications, still birth and birth asphyxia, compared to those with than spinal anesthesia (p value = 0.04). Complications occurred more frequently in cases operated by residents than those operated by obstetricians, but the difference was not statistically significant. (p value=0.16). **Conclusion.** Maternal and foetal outcomes were not associated to the experience of the surgeon in our study. General anesthesia was more often associated with poor maternal and foetal adverse than spinal anesthesia. We therefore recommended to promote spinal anesthesia for CS.

BACKGROUND

Caesarean section (CS) represents the most common and one of the most important operation in obstetrics and its incidence is on the rise worldwide[1]. This worldwide

rise in CS is a major public health concern and cause of considerable debate due to potential maternal and perinatal risks, cost issues and inequity in access[2]. Caesarean sections are performed for maternal or foetal complications[3]. Caesarean sections, when adequately

indicated, can prevent poor obstetric outcomes and be life-saving procedures for both the mother and the foetus [4]. Unnecessary caesarean sections can increase the risk of maternal morbidity, neonatal death and neonatal admission to an intensive care unit[5].

In the 19th century, mortality was almost 100%, with the major causes being haemorrhage and infections [6]. Over the past years, there have been several reports from well-resourced countries on increased severe maternal morbidity and even mortality[7, 8]. The causes are unclear, but increased CSs, increased obesity and an increased proportion of women giving birth in advanced age are among the causes suspected.

Aseptic and antiseptic methods with antibiotic therapy, use of blood transfusion and improved anesthesia have all contributed to the dramatic decrease in mortality seen during the last century[9]. As with other countries, Cameroon has seen a marked increase in the rate of CS. In our hospitals during the last decade, a doubling in the frequency of caesarean section has been noted, this increase include developing facilities for foetal monitoring and invasive diagnostic procedures, with referral of pathological pregnancies from all over the country[10]. It has been shown that the risks of surgical complications are greater with emergency compared with elective CS. We have also determined the rate of complications accompanying emergency and elective CS and the duration of patient's hospitalization. The condition of the new-born at delivery, the need for resuscitation, poor APGAR scores and duration of stay in the neonatal intensive care unit, as well as any other neonatal injuries or complications have also been studied in the two groups[9].

RATIONALE

CS is the most common surgical intervention in obstetrics and certainly one of the oldest operations in surgery. Its incidence is on the rise worldwide. Its incidence varies from country to country and also from hospital to hospital in the same country, with Latin America having the greatest rate of more than 40% in 2014. During the last 3 decades, the incidence has risen from 5% to more than 30% (Churchill et al)[10]. According to WHO, caesarean section rate greater than 15% is not justified in any region in the world[11]. This increase in incidence could be due to the fact that most Caesarean section is to an increasing extent performed without an obstetric or medical indication, the abandoning of high forceps and reduction in the number of mid forceps, increased intra-partum surveillance, a decreasing number of vaginal breech delivery and an increasing elective and primary caesarean section rate. In the absence of a medical indication for a specific procedure, the excess risk associated with the procedure itself must be considered[12]. Unnecessary CS can increase the risk of maternal morbidity, neonatal death and neonatal admission to an intensive care unit[13].

Despite improvement in the technique of CS and anesthesia adverse maternal and foetal outcomes remain high. Studies done in Africa illustrated maternal complications in 10.3% and Foetal morbidity in 28.23%

in Morocco, 40.55% maternal complications in Guinea[14, 15].

Recent studies in Cameroon revealed CS rates of 19.74% and 16.95% maternal complications[16]. A study in the Far North Region of Cameroon revealed that one of three caesarean deliveries ended in foetal death[16]. Furthermore Forsah, in Buea had a 14.4% Adverse Neonatal Outcome (ANO) following indication for CD, recently a study in the southwest region showed a CS rate of 13.3% and 26.1% adverse foetal outcome [17].

Also studies reveal that emergency CS is related with a higher morbidity than elective CS [6,18–21].

OBJECTIVES

Our objective was to evaluate the places of surgeon and anesthesia in maternal and foetal outcomes of Emergency CS in three referral hospitals in Yaoundé, specifically to describe the social and demographic profile of women undergoing CS in these hospitals, to compare the maternal and foetal outcomes in elective CS versus emergency CS according to the type of anesthesia and to compare the maternal and foetal outcomes in elective CS versus emergency CS according to the experience of surgeon.

MATERIALS AND METHODS

Type, place and duration of the study

We carried out a cohort study in three referral hospitals in Yaoundé: Yaoundé Central Hospital (YCH), Yaoundé University Teaching Hospital (YUTH) and in the Yaoundé Gynaeco-Obstetric and Paediatrics Hospital (YGOPH) during 7 months (from the 1st of November 2016 to the 30th May 2017).

Study population

The study concerned women undergoing CS in the three hospitals retained for the study

Inclusion criteria

All women undergoing CS irrespective of the indication during the period of study

Exclusion criteria

Women with definite antenatal complications that could affect maternal and foetal outcome (diabetes mellitus, renal disease, heart disease, severe anaemia, stroke, hypotheroidism)

Women who will refuse to participate in the study

The sample size was calculated using the formula for cohort study giving $n= 79$

Procedure and data collection

All women who had delivered by cesarean section and admitted in maternity unit were interviewed. We reviewed the files of patient and retained those who met the inclusion criteria of our study. We explained the aim of the study to them and we recruited those who consented to participate. We used the questionnaire to record data on the sociodemographic data (age, level of education, marital status, occupation), the gestational age, the type of cesarean section, the indication of cesarean section the type of anesthesia, the experience of the surgeon. For the maternal outcomes were recorded: hemorrhagic complications (anaemia, post partum

hemorrhage, blood transfusion), infections (wound infection, endometritis), headache, duration of hospitalization. The data of foetal outcome were also recorded: apgar score, neonatal asphyxia, weight at birth, neonatal infection, and neonatal death. We followed the women during their period of hospitalisation. We recruited 97 cases in emergency CS and 56 cases in elective CS.

Data management and analysis

All the filled questionnaires were verified and validated by the field supervisor. These questionnaires were transferred to the principal investigator (PI) for use. The data capturing or entry sheet was developed using Epi Info version 7.2.0.1. To minimize errors from handling and filling the data sheet, one copy of the data sheet for each patient was filled on hard copy and another was keyed into the EPI info 7.2.0.1 database in the investigator's computer. The data from the validated questionnaires were double-entered, compared, cleaned and analysed with epi info version 7.2.0.1 and SPSS version 20 using a confidence interval (CI) of 95%. Numeric results were presented to the nearest two decimal places. Descriptive statistics (maternal age, gestational age, place of delivery, marital status, type of CS, type of anaesthesia, experience of the surgeon, maternal and foetal outcomes,) were presented using absolute numbers, means and percentages. Proportions of outcome variables within categories of predictor variables were computed and compared using the Chi-square or Fisher's exact statistical tests where

appropriate. Two-tailed p-values < 0.05 was considered statistically significant. The results were presented in figures and tables.

Ethical considerations

This study was carried out strictly for scientific purposes. All information derived from the study was used for research purposes only and not to generate any profit. The study procedure (information to be collected) was explained in detail to each participant and an information sheet given to them (written in the language they understand best, English or French). No material or financial incentives was given to encourage participation in the study. The data collected was confidential and handled in accordance with the privacy of the participants. This was achieved by assigning codes to participants from the beginning of the study.

The protocol, the questionnaire and the informed consent form were submitted to the national ethic committee for ethical evaluation and approval. Administrative approvals were obtained from the YUTH, YGOPH and the YCH. Ethical approval were obtained from the Institutional Review Board of the Faculty of medicine and biomedical sciences (FMBS), University of Yaoundé 1, Cameroon. Written informed consent were obtained from all mothers of the neonates who enrolled in the study. To reduce the inconvenience to neonates, clinical examination of neonates was done using standard sterile and temperature-controlled conditions. All of these to minimize the ethical issues especially confidentiality and autonomy.

RESULTS

Out of 2524 deliveries, we had 592 cesarean section given a prevalence of 19.82%. We included 153 cases who met the inclusion criteria in our study out of which 97 (63.40%) cases were in the test group and 56 (36.60%) were in the control group.

Sociodemographic profile of the study population

The overall mean of ages was 28.62 ± 6.37. The mean age of women in the emergency group was significantly smaller than in the Elective group (26.567 ± 6.088 vs 32.08 ± 5.150, p value < 0.001). The sociodemographic profiles were similar in the 2 groups (table 1)

Table 1: sociodemographic profile of the study population

Variables	Emergency CS n (%)	Elective CS n (%)	Total	P value
Age(Years)				
Mean ± SD	26.567 ± 6.088	31.911 ± 5.150		<0.001
≤20	19 (19.59)	0 (0.00%)	19	0.01
21 – 25	25 (25.77)	5 (8.93%)	30	1.00
26 – 30	28 (28.87)	20 (35.71%)	48	<0.001
31 – 35	16 (16.49)	14 (30.36%)	30	0.05
>35	9 (9.28)	17 (30.36%)	26	0.16
Marital status				
Single	55 (56.70)	20 (35.71)	75	0.05
Married	42 (43.30)	36 (64.29)	77	1.00
Educational level				
Secondary	55(56.70)	24(42.86)	79	0.14
University	42(43.30)	32(57.14)	74	0.25
Occupation				
Unemployed	41(42.27)	8(14.29)	49	<0.001
Housewife	18(18.56)	5(8.93)	23	<0.001
Self-employed	15(15.46)	13(23.71)	28	0.01
Professional	23(23.71)	30(53.57)	53	0.38

Maternal complications

The overall incidence of maternal complications was 36.60% (56 cases on 153) with emergency CS constituting 66.71% (37 cases on 56) and 33.90 % from elective CS(19 cases on 56). Haemorrhage was the main complication in both groups (11.06% vs 25.00% respectively). Infectious complications had an overall incidence of 12.42%. They were statistically more present in the emergency group (17.53% vs 7.14% , RR 4.33. 95% CI 1.03-18.24, p value 0.03) (table2)

Table 2: Maternal complications

Variables	Emergency CS n(%)	Elective CS n(%)	Total	R.R(95% CI)	P value
Haemorrhagic complications	17(17.52)	14(25)	31	0.46(0.19-1.10)	0.12
PPH	4(4.12)	7(12.50)	11	0.33(0.10-1.08)	0.10
Anaemia	7(7.22)	4(7.14)	11	1.01(0.31-3.30)	1.00
Transfusion	6(6.19)	3(5.36)	9	1.15(0.30-4.44)	1.00
Infection	17(17.46)	4(3.57)	21	4.33(1.03-18.24)	0.03
Endometritis	14(14.43)	1(1.79)	15	8.08(1.09-59.831)	0.01
Wound infection	3(3.09)	1(1.79)	4	1.73(0.18-16.26)	1.00
Pain and headaches	2(2.06)	3(5.36)	5	0.38(0.07-2.23)	0.36
Prolonged catheterisation	5(5.15)	0(0.00)	5		0.28
Post operative stay>7days	14(14.43)	5(8.93)	19	1.62(0.61-4.25)	0.45

Fetal complications

Still births were statistically significantly more in the emergency than in elective CS(10.6% vs 4.8%, RR 2.35, 95% CI 1.01-7.98, p value 0.04. Birth asphyxia and neonatal infections being the leading indications and this accounted for significantly more neonatal deaths in emergency than elective CS (15.25% vs 0%, p value 0.04) (table3)

Table 3: Fetal complications

Variables	Emergency CS n(%)	Elective CS n(%)	Total	R.R(96% CI)	P value
Still birth	11(10.6)	3(4.8)	14	2.35(1.01-7.98)	0.04
Birth weight(g)					
<1500	6(5.77)	1(1.61)	7		0.37
1500 – 2499	20(19.23)	10(16.13)	30	1.56(0.47-32.96)	0.18
2500 – 4000	70(63.31)	43(69.35)	113	1.67(0.69-10.36)	0.16
> 4000	8(7.69)	8(12.90)	16	0.88(0.54-4.42)	0.43
Apgar score at 5 minutes					
Mean ± SD	7.67±3.12	8.70±2.25			0.03
< 7	20(19.23)	5(8.16)	25	2.38(0.92-5.86)	0.09
≥7	84(80.77)	57(91.93)	141		
NBU admission	40(38.46)	19(30.65)	49	1.44(0.85-2.44)	0.21
Reason for admission					
Respiratory complications	0(0)	0(0)	0		
Birth asphyxia	19(18.27)	5(8.06)	24	5.20(0.68-39.95)	0.07
Neonatal infection	12(11.54)	5(8.06)	17	1.59(0.53-4.75)	0.57
Prematurity	20(19.23)	7(11.29)	27	2.21(0.81-6.57)	0.12
Macrosomia	8(7.69)	8(12.90)	16	0.58(0.15-2.22)	0.46
Survival in NBU					
Death	9(15.25)	0(0)	9		0.04

Relation between maternofetal complications and type of anesthesia

Women who got general anesthesia had a significant higher risk of haemorrhagic complications, still birth and birth asphyxia, compared to spinal anesthesia (23.53% vs 10.22%, RR 2.30, 95% CI 1.01-6.20, p value 0.04),(23.53% vs 8.03,RR 2.95, 95% CI 1.05-8.98 p value 0.04), and (17.65% vs 5.11%, RR 3.45, 95% CI 1.98-12.11, p value 0.04) respectively.(table 4)

Table 4: Complications associated with the Type of anesthesia and the experience of the surgeon

Variables	General n(%)	Spinal n(%)	R.R(95% CI)	P value
Hemorrhagic complications	4(23.53)	14(10.22)	2.30(1.01-6.20)	0.04
Infections	3(17.65)	14(10.22)	1.97(0.63-6.08)	0.40
Headaches	0(0)	5(3.62)		1.00
Post op stay>7	2(11.76)	17(12.41)	0.95(0.24-3.75)	1.00
Still births	4(23.53)	11(8.03)	2.95(1.05-8.98)	0.04
Birth asphyxia	3(17.65)	7(5.11)	3.45(1.98-12.11)	0.04
Neonatal infection	1(5.88)	14(10.22)	0.58(0.08-4.10)	1.00
NBU admission	5(29.41)	44(32.12)	0.92(0.42-1.99)	1.00
Neonatal death	1(20.00)	8(18.60)	1.07(0.18-6.91)	1.00

Relation between materno-foetal complications and experience of the surgeon

Complications occurred more frequently in cases operated by residents than those operated by obstetricians but there was no significantly statistic difference. (table 5)

Table 5: Complications associated with the experience of the surgeon

Variables	Resident n(%)	Obstetrician n(%)	R.R(95% CI)	P value
Hemorrhagic complications	12(13.19)	6(9.52)	1.38(0.55-3.49)	0.16
Infection	12(13.19)	5(7.94)	1.66(0.62-4.48)	0.43
Headaches	4(4.4)	1(1.59)	2.77(0.31-24.20)	0.64
Post op stay>7	9(14.29)	10(10.99)	1.30(0.56-3.01)	0.62
Birth asphyxia	6(6.59)	4(6.35)	1.04(0.31-3.53)	1.00
Neonatal infection	9(9.89)	6(9.52)	1.04(0.39-2.77)	1.00
NBU admission	31(34.07)	18(28.57)	1.19(0.73-1.93)	0.49
Neonatal death	6(20.69)	3(15.79)	1.31(0.37-4.62)	1.00

DISCUSSION

Social and demographic profile

The overall mean age was 28.62 \pm 6.37, this is similar to the results 28.13 by Ngowa et al in 2015 and 28.25 by Jawad Zahie et al[22,23] with a significant difference in mean of age between the Emergency group and the Elective group(26.567 \pm 6.088 vs 32.08 \pm 5.150, p value <0.001) Rasheed et al, Daniel et al, and Elvedi-Gasparović et al also had a younger age mean in emergency than in elective CS[24,25, 26,].

The age group of 26-30years was the overall most represented group, teenage mothers significantly underwent Emergency CS compared to elective CS (19.50% vs 0%, p value 0.01), this findings are similar to studies done by Daniel et al in Kerala, Benzouina et al, Nkwabong et al and Foumane et al had a similar age group[1, 24, 27,28]. These difference in mean age and teenage mothers between the groups could be explained by the fact mothers <20years of age are at increase risks of having most obstetrical complications like hypertensive disorders in pregnancy, APH, NRFS and also that most women with a scarred uterus are more likely to undergo elective than emergency CS

Unemployed women were significantly more represented in the emergency group than in the elective (42.27% vs 14.29%, p value <0.001). Foumane et al had similar results[28] . This could be explained by the fact employed people have the necessary finances for a better and proper follow up through ANC and better preparations for deliveries and the mode of delivery ahead of time compared to the unemployed counterparts and also even if CS is programmed majority of the unemployed women due to lack of finances come to the hospital only when in labour.

Maternal outcome

The overall incidence of maternal complications in our study population was 36.60% (56cases on 153) . This is similar to 35.6% by Van Ham et al and 40.55% by Diallo et al[29, 30]. This overall incidence is about 2times more than that by Ngowa et al(16.95%)[22]. This increase in incidence could be explained by increasing number of Residents as first operator in CS, insufficient prenatal care and poor referral system.,

With 66.71% of these complications from emergency CS(39 cases on 97) and 33.90 % from elective CS(21 cases on 56). Ghazi A et al, Daniel et al. Rehana et al, Pallasmaa et al and many others also found that maternal complications were more in emergency than in elective CS[6, 24, 31, 32]. This high rate of complications in emergency could be attributed to poor sterilization of equipemets, poor handling of tissues, poor labour septic conditions, vaginal digital exams which predispose to infections and haemorrhage

Haemorrhagic complications were the most common maternal complication (32.14%) followed by infections with an overall incidence of 12.42%. Ghazi A et al, Daniel et al and Ngowa et al, had similar results[22, 24, 32]. Haemorrhage was less common the emergency CS group compare to elective CS groups with no statistical significance(11.06% and 25.00%, RR 0.46, CI 0.19-1.10, p value 0.12 respectively) Suwal et al had similar results[18]. This could be explained by the fact that majority of cases of elective CS were of high parity with increased risk of uterine atony.

Infections were significantly high with a risk at least 4times in emergency compared to elective CS(17.53% vs 7.14%,RR 4.33,CI 1.03-18.24, p value 0.03). Infections found in our study included endometritis(78.95%) and wound infection(21.05%). This finding could be due to increasing rate of referral into the hospitals with aseptic mode of transportation, prolonged labour and vaginal digital examinations

Majority of patients had a post operative stay of >7days in the emergency compared to elective group with no significance (14.43% vs 8.93%, RR 1.62, p value 0.45) This finding is similar to those of previous studies by Ghazi A et al[32]. This could be explained by the fact that women in the emergency CS group had more complications that in the elective CS group

Foetal outcome

still births were significantly more in emergency than elective CS(10.6% vs 4.8%, p value 0.04). This could be explained explain by the fact that labour can lead to NRFS, cord prolapse, obstruction on foetal descend which can lead to foetal demise in utero. Shah et al had similar results.[33]

The means for apgar of babies in the emergency CS group was significantly lower apgar at the 5th minute

compared to the elective group (7.67 vs 8.70, p value 0.03) Elvedi et al, Daniel et al and Suwal et al and Shah et al had similar results [9,18,24,33], 19.23% of children had Apgar scores of <7 at the 5th minute in the emergency compared to 8.16% in the elective CS group with no statistical significance between them (P value 0.09). Neonatal deaths were significantly more in the emergency compared to elective CS (15.25% vs 0%, p value 0.04). Shah et al had similar results. [33]

Birth asphyxia, neonatal infections, admission in NBU were statistically not significant in both groups though majority of cases were in the emergency group. This is similar to findings by Rasheed et al, and Habib et al [25, 34].

Still births, haemorrhage and birth asphyxia were statistically significantly high in general compared to spinal anaesthesia. Martin et al, Jawad et al and Hager et al had similar results. [23, 35, 27] There was no statistical significance on mode of anaesthesia used between the 2 groups though majority of cases of puerperal infections, neonatal deaths, Daniel et al had similar results [24]. Post op headaches were more in spinal than general anaesthesia, Jawa et al and Semagn Mekonen et al had similar results. [23,36]

This could be explained by transient sedation with use of general anaesthesia, slow recovery time from anaesthesia in general compared to spinal anaesthesia.

According to the technique of cesarean section, we performed for all our patients the main techniques used today which is the Misgav-Ladach technique through Pfannenstiel incision of the skin .

There was no statistical significance between maternal and foetal outcomes with respect to who did the surgery (residents versus obstetricians). These findings are similar for those of Benzouina et al [1]. This could be explained by the fact that only senior and skilled residents are allowed to operate.

CONCLUSION

General anesthesia is more associated with poor maternal and fetal adverse than spinal anesthesia. Maternal and fetal outcome is not associated to the experience of the surgeon. We therefore recommended to promote the spinal anesthesia technique for cesarean section.

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