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Original Article

An appraisal of anaesthetic technique for caesarean delivery in a tertiary Institution North Central Nigeria

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ABSTRACT

Background: The rate of caesarean delivery is on the rise globally and our institution is not left out. Therefore we set out to assess the trends, indications and anaesthetic techniques for caesarean delivery in our environment.

Methods: This was a retrospective review of all caesarean deliveries between 1st January 2015 and 31st December 2017 from the anaesthetic chart, anaesthetic theatre records and labour ward record of the University of Ilorin Teaching Hospital (UITH). Patient's demographic data, indication for caesarean section, nature of caesarean section, ASA physical status, anaesthetic technique used, cadre of anaesthetist and the total number of deliveries were recorded. Data were analysed and presented as frequencies and percentages using statistical package for social sciences (SPSS software version 22).

Results: During the study period a total of 7940 patients delivered and 1822 patients had undergone caesarean delivery. The caesarean section rate at the institution is around 22.9%. The commonest indication for caesarean delivery was previous caesarean section (31.6%) followed by hypertensive disorder in pregnancy(14.7%). Most of the caesarean section was performed as emergency (80%). Regional anaesthesia was the most frequently used for both emergency(91.3%) and elective (98.7%) caesarean section, and spinal anaesthesia(88.9%) was the commonest regional anaesthetic technique used.

Conclusion: The rate of caesarean section is high in our institution, with majority being performed under spinal anaesthesia. We need to improve on other regional anaesthetic technique so that our parturients can have the best and safest option.

Key words: Anesthetic technique; cesarean section; spinal anesthesia.

Introduction

Cesarean section (CS) is one of the oldest and most common obstetric surgical procedure that is performed by an obstetrician.[1] CS involves the delivery of the fetus, placenta, and membranes after the age of viability through an abdominal and uterine incision.[1]

The incidence of cesarean section varies globally from about 5% to 25% with a higher rate in the developed countries like the United States of America while most developing countries the rate is still relatively low.[2,3] In Nigeria, the rate of cesarean delivery varies from center to center with 11.3% in Sokoto,[4] 15.5% in Makurdi,[5] 21.4% Gwagwalada,[6] 23% Zaria,[7] and Port Harcourt 30.3%.[8]

Cesarean section can be performed either as an emergency or elective procedure and previously general anesthesia (GA) was the preferred method of anesthesia but presently there

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has been an increasing trend worldwide to the use of regional anesthesia.[9] The reasons for the shift from GA is because of some complications of GA such as difficult intubation, aspiration pneumonitis, and hypoxemia which may lead to major anesthetic mortality.[9] Regional anesthesia for cesarean section is usually spinal anesthesia, epidural anesthesia, or combined spinal-epidural anesthesia (CSE), all these regional anesthetic techniques have the advantage of reduced risk of gastric aspiration, less effect of anesthetic drugs on the fetus, excellent analgesia, and no respiratory depressant effects.[9] Another significant advantage is that both parents can be present and conscious during the cesarean delivery of their child. Single-shot spinal anesthesia is particularly the most cost-effective and logical option for cesarean section in the developing counties. Earlier studies done in obstetric tertiary institutions in Nigeria showed that regional anesthetic technique was infrequently used for cesarean delivery, despite the rise in cesarean section rate in Nigeria.[9] Recently, a few studies have shown a change in pattern with the majority of cesarean delivery been done under subarachnoid block while a few were performed under the epidural or combined spinal-epidural block.[7,8]

The aim of this study was to review the changing trend in obstetric anesthesia for cesarean delivery in a tertiary institution in Nigeria.

Materials and Method

This was a retrospective review of all cesarean deliveries between 1st January 2015 and 31st December 2017 derived from the anesthetic chart, anesthetic theatre records, and labor ward record of the University of Ilorin Teaching Hospital (UITH).

Patient's demographic data, parity, gestational age, indication for cesarean section, nature of cesarean section, ASA physical status, the anesthetic technique used, a cadre of an anesthetist, and a total number of deliveries were recorded.

Data were analyzed and presented as frequencies and percentages using statistical package for social sciences (IBM SPSS Statistics for Windows, Version 22.0, Armonk, NY. IBM Corp).

Result

A total of 7940 parturients delivered during the study period out of which 1822 patients were delivered by cesarean section. The annual distribution of deliveries through the cesarean section from 2015 to 2017 is shown in Table 1. The cesarean section rate of our institution from this present study is 22.9% [Table 1].

The demographic analysis showed that the highest age range of parturients that had cesarean section was between ages 21–30 years (53.7%). While those below 20 years were 4% and those above 40 years were 2.1% [Table 2].

Most of the parturients that had a cesarean section were American society of anesthesiologist (ASA) II (71.2%) out of which 80% were done as emergency cases. All ASA IV (100%) were performed as emergency cesarean section [Table 3].

Table 1: Annual distribution of deliveries and cesarean section

Year	Number of deliveries *n*	Total C/S *n* (%)	Emergency C/S *n* (%)	Elective C/S *n* (%)
2015	2865	715 (24.9)	596 (40.9)	119 (32.5)
2016	2522	563 (22.3)	473 (32.5)	90 (24.6)
2017	2553	544 (21.3)	387 (26.6)	157 (42.9)
Total	7940	1822 (22.9)	1456	366

n=Number, C/S=Cesarean section

Table 2: Distribution of cesarean section cases according to age

Age range	Number of cases	Percentage %
<20	73	4
21-30	979	53.7
31-40	731	40.1
>40	39	2.1
Total	1822	100

n=Number

Table 3: American Society of anesthesiologist (ASA) physical status with nature of the cesarean section

ASA	Emergency *n* (%)	Elective *n* (%)	Total *n* (%)
I	117 (56.8)	89 (43.2)	206 (11.3)
II	1038 (80)	260 (20)	1298 (71.2)
III	279 (94.3)	17 (5.7)	296 (16.3)
IV	22 (100)	0 (0)	22 (1.2)
Total	1456	366	1822 (100)

Table 4: Indication for cesarean section

Indication	Frequency	Percentage %
Previous C/S	575	31.6
Hypertensive disorder in pregnancy	268	14.7
CPD	187	10.3
Abnormal presentation/lie	187	10.3
Other maternal indication	152	8.3
Antepartum hemorrhage	112	6.1
Obstructed labor	86	4.7
Fetal distress	83	4.6
Other fetal indication	78	4.2
Multiple pregnancy	49	2.7
Failed induction	31	1.7
Cord prolapse	14	0.8
Total	1822	100

C/S=Cesarean section, CPD=Cephalopelvic disproportion

Previous cesarean delivery (31.6%) accounted for the commonest indication for cesarean section, followed by hypertensive disorder in pregnancy (14.7%) [Table 4].

Majority of the cesarean section was done as an emergency procedure (80%) and regional anesthetic technique was the most frequently used method for both emergency (91.3%) and elective (98.7%) cesarean section [Table 5].

The annual distribution of the anesthetic technique used in cesarean deliveries during the study period is presented in Table 6. It can be observed that the rate of spinal anesthesia for cesarean section dropped from 91.3% in 2015 to 86% and 88.6% in 2016 and 2017, respectively this was due to an increase in the use of epidural and combined spinal-epidural anesthesia as an anesthetic option for cesarean section. The overall rate of regional anesthetic technique for cesarean section is 92.8% [Table 5] with spinal anesthesia accounting for the most common technique 88.9% while epidural and combined spinal-epidural accounted for 3.2% and 0.7%, respectively [Table 6].

The most indication for the use of the general anesthetic technique was cord prolapse in which 78.6% of the cases recorded were performed under GA followed by antepartum hemorrhage in which 44.6% of the recorded cases were done under GA [Table 7].

Table 8 shows that all the 1822 parturients that had a cesarean section under various anesthetic techniques were anesthetized by the physician anesthetist. It also shows that the senior registrar performed most of the anesthesia 54.8%.

Table 5: Type of anesthesia used in emergency and elective cesarean section

Nature of c/s	General anesthesia *n* (%)	Regional anesthesia *n* (%)	Total *n* (%)
Emergency	127 (8.7)	1329 (91.3)	1456 (80)
Elective	5 (1.3)	361 (98.7)	366 (20)
Total	132 (7.2)	1690 (92.8)	1822 (100)

C/S=cesarean section, *n*=Number

Table 6: Types of the anesthetic technique used for cesarean section

Year	General anesthesia *n* (%)	Spinal anesthesia *n* (%)	Epidural anesthesia *n* (%)	Combined spinal-epidural *n* (%)	Total *n* (%)
2015	60 (8.4)	653 (91.3)	2 (0.3)	0 (0)	715 (100)
2016	39 (6.9)	484 (86)	30 (5.3)	10 (1.8)	563 (100)
2017	33 (6)	482 (88.6)	26 (4.8)	3 (0.6)	544 (100)
Total *n* (%)	132 (7.2)	1619 (88.9)	58 (3.2)	13 (0.7)	1822 (100)

n=Number

Table 7: Indication for cesarean section and anesthetic technique used

Indication for cesarean section	General anesthesia *n* (%)	Spinal anesthesia *n* (%)	Epidural anesthesia *n* (%)	Combined spinal-epidural anesthesia *n* (%)	Total
CPD	1 (0.3)	186 (99.7)	0 (0)	0 (0)	187
Fetal distress	7 (8.4)	74 (89.2)	1 (1.2)	1 (1.2)	83
Previous cesarean section	8 (1.4)	524 (91.1)	35 (6.1)	8 (1.4)	575
Hypertensive disorder in pregnancy	26 (9.6)	241 (89.8)	1 (0.6)	0 (0)	268
Antepartum hemorrhage	50 (44.6)	62 (55.4)	0 (0)	0 (0)	112
Obstructed labor	8 (9.3)	78 (90.7)	0 (0)	0 (0)	86
Cord prolapse	11 (78.6)	3 (21.4)	0 (0)	0 (0)	14
Abnormal presentation/lie	6 (3.2)	170 (91)	10 (5.3)	1 (0.5)	187
Failed induction	0 (0)	30 (96.8)	1 (3.2)	0	31
Multiple pregnancy	5 (10.2)	44 (89.8)	0 (0)	0	49
Other maternal indications	7 (4.6)	139 (91.4)	5 (3.3)	1 (0.7)	152
Other fetal indications	3 (4)	68 (87.1)	5 (6.4)	2 (2.5)	78
Total *n*	132	1619	58	13	1822

n=Number, CPD=Cephalopelvic disproportion

Table 8: The anesthetic technique used and a cadre of an anesthetist who administered the anesthesia

Cadre of anesthetist	General anesthesia *n* (%)	Spinal anesthesia *n* (%)	Epidural anesthesia *n* (%)	Combined spinal epidural *n* (%)	Total *n* (%)
Consultant	8 (6)	214 (13.2)	16 (27.6)	1 (7.7)	239 (13.1)
Senior registrar	115 (87.2)	831 (51.3)	41 (70.7)	12 (92.3)	999 (54.8)
Registrar	9 (6.8)	507 (31.3)	0 (0)	0 (0)	516 (28.4)
Diplomat	0 (0)	67 (4.2)	1 (1.7)	(0)	68 (3.7)
Total	132	1619	58	13	1822

Discussion

Worldwide there has been an increasing trend in the rate of cesarean section deliveries.[1,7,8] In this study, the cesarean section rate was 22.9% which is higher than the previously reported rate of 9.1% in 1999 from this institution.[10] The cesarean section rate in this present study is much lower than that of the southern region of Nigeria, Igberase *et al.*[11] in Eku, Delta state and Deniel *et al.*[12] in Osogbo south-west Nigeria, who reported 34.5% and 35.9%, respectively. However, the cesarean section rate still falls within the range (6.4%-33.2%) documented in Nigeria by various studies.[4,5,7] In the united states of America, the proportion of cesarean birth to total birth increased from 20.7% in 1996 to 31.1% in 2006.[13] Also in India, Banerjee *et al.*[14] reported an increase in the cesarean section from 27.5% in 2010 to 39.6% in 2017. There is generally a wide variation in the incidence of the cesarean section from region to region within a country and also from one country to another.[15] In 1985, the World Health Organization (WHO) stated: "There is no justification for any region to have cesarean section rates higher than 10–15%",[16] and that new studies reveal that when cesarean section rates rise towards 10% across population, the number of maternal newborn deaths decreases but when the rate goes above 10%, there is no evidence that mortality rate improves and that countries with cesarean section rate <10% are considered to show underuse, while those with rates from 10% to 15% are considered to have adequate use of cesarean section.[13] The real cause for the rise in cesarean section rate is because of rapid socioeconomic changes, altered family structure, changing the role of women in the society and the biological urge to have good off-springs in this competitive world.[17] Therefore, the current rate of cesarean section in many developed and developing country as Nigeria has far exceeded the tolerable limit specified by WHO thus indicating unnecessary use of this intervention.[15] The cesarean section rate in our institution is high because it is a referral tertiary institution with a large proportion of high-risk parturients attending our facility.

In this study, the highest cesarean section rate of 53.7% was recorded among the age group 21–30 years which is consistent with the findings of Deniel *et al.*[12] and Geidam *et al.*[18] in Nigeria who reported 50.3% and 52.8%, respectively but lower than 73.2% reported in India.[14] This age group has the highest cesarean section rate probably because the age group represents the most active reproductive age group.

The commonest indication for cesarean delivery in this study is previous cesarean delivery (31.6%) this differs from what was previously documented in this institution in 1999 as cephalopelvic disproportion (30.8%) by Ijaiya and Aboyeji.[10] This may be due to increasing rates of cesarean section over the years thus reversing the pattern of cephalopelvic disproportion as the commonest indication in the previous study. Our present finding is in accordance with studies conducted by Ogboli-Nwasor and Yannus,[7] and Saxena *et al.*[19] which were 34.1% and 33%, respectively. Some other studies[6,20] have however reported cephalopelvic disproportion (CPD) as the commonest indication for cesarean section.

Most of our cesarean section was done as emergency (80%) cases this finding is comparable with that of Isah *et al*.,[6] Saxena *et al.*[19] and Banerjee *et al*.[14] which were 80.2%, 84.4% and 75.6%, respectively. However, Sari *et al.*[20] in their study had more cases of elective (59.2%) cesarean section than emergency (40.8%) cesarean section. Majority of the emergency cesarean section in this study was done under regional anesthesia. Thus, the rate of regional anesthesia for emergency cesarean section increased from 90.3% in 2015 to 92.2% in 2017 while the rate of GA administration for emergency cesarean section decreased from 9.7% in 2015 to 7.8% in 2017. This is similar to the pattern seen in developed countries in which regional anesthesia for emergency cesarean section was 49.3% in 1992 and increased to 86.6% in 2002.[21] In our institution, a regional anesthetic technique for elective cesarean delivery is 98.7% which is higher than that reported by Banerjee *et al.*[14] and Sari *et al.*[20] which was 84.2% and 82%, respectively. Today, GA is preferred in emergency obstetric situations such as cord prolapse, in which there is a need for swift and reliable induction and also in antepartum hemorrhage and uterus inversion.[22] This is in agreement with our study, where most of the indication for GA for cesarean section were in cases of cord prolapse (78.6%) and antepartum hemorrhage (44%).

We found that there was a yearly increase in the use of regional anesthesia for all our cesarean deliveries in 2015 (91.6%), 2016 (93.1%) and in 2017 (94%), making the regional anesthesia rate within the study period to be 92.8%. Okafor *et al.*[23] in Enugu, Eastern Nigeria also reported a yearly increase in the use of regional anesthesia for their cesarean deliveries from 18% in2003 to 48% in 2004 and 72.6% in 2005 but fell to 71% in 2006. Ogboli-Nwasor and Yannus[7] in Zaria North-Central Nigeria conducted a retrospective study from January 2006 to December 2009 and reported that even though the majority of their cesarean section were done under regional anesthesia (54%) there was still a large number of cases performed under GA (48%). The use of regional anesthesia for cesarean section has increased globally over the years because of increased knowledge and skills of the anesthetist to the

use of different regional anesthetic techniques.[24] Rukewe *et al.*[25] in a study to investigate potential trends and rate of maternal complications associated with general or regional anesthesia in a Nigerian teaching hospital from 1st January 2008 to 31st December 2010 showed that 34.5% of parturients who had GA in contrast to 6.7% who had regional anesthesia had anesthesia-related complications, postoperative intensive care admission rather than recovery room care and they concluded that GA was a significant risk factor for maternal complications during cesarean section. In Germany after 2002, it was reported that the most frequently used anesthetic method for cesarean section was spinal anesthesia with a rate of 90.8%[26] which is in accordance to our spinal anesthesia rate of 88.9% in this study. While in Spain 98%[14] of the cesarean section was done under regional anesthesia which is slightly higher than our own finding of 92.8%.

The use of epidural for cesarean section in our center was 3.2% which is higher than that reported by Okafor *et al.*[23] (1.1%) and Benergee *et al.*[14] (0.87%). Combined spinal-epidural anesthesia (CSEA) for cesarean section was not used at all in any of our cesarean in 2015. The highest rate for the use of CSEA for our cesarean section was in 2016 which was 1.8%, however, the overall rate of CSEA for cesarean section during the study period was 0.7% which is similar to that reported by Benergee, *et al.*[21] (0.68%). Blandsheard and colleagues[27] reported a high rate of CSEA (65%) for cesarean section in their institution. Studies done has demonstrated that the use of CSEA for cesarean section has increased worldwide because it provides better maternal hemodynamic stability, provides sufficient anesthesia in prolonged surgeries and safe postoperative analgesia in comparison to spinal anesthesia, however, it is not superior to spinal anesthesia in terms of intraoperative anesthesia quality.[27]

Finally, in a previous study conducted in our institution by Ijaiya and Aboyeji,[18] they attributed the high mortality rate in their study to the use of GA for all cases of cesarean section irrespective of the indication and that 89.2% of the patients were anesthetized by nurse anesthetist and that the high mortality recorded were preventable in skilled hands by using alternative forms of anesthesia such as regional anesthesia. Our present study shows that 100% of our cesarean section were anesthetized by physician anesthetist using the predominantly regional anesthetic technique with a highly skilled hand such as the senior registrar performing 54.8% of the anesthesia for cesarean delivery in our institution.

Conclusion

The rate of cesarean section is high in our institution, with the majority being performed under single-shot spinal anesthesia. However, we need to improve on other regional anesthetic techniques so that our parturients can have the best and safest option of anesthesia to choose from. A follow-up review is also needed to compare the maternal and fetal outcomes for the various anesthetic techniques used for cesarean section.

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Conflicts of interest

There are no conflicts of interest.

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