AUDIT OF OBSTETRIC ANAESTHESIA SERVICES IN A NIGERIAN TERTIARY HOSPITAL

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ABSTRACT

Background: **Obstetric anaesthesia is an important anaesthesia subspecialty. The challenges presented by parturients requiring anaesthesia, analgesia, or both make the role of the obstetric anaesthetist both challenging and rewarding. This audit was undertaken to review obstetric anaesthesia services at the University College Hospital, Ibadan, over 2 years and thus identify areas for improvement.**

Methods: **This was a two-year retrospective, cross-sectional study of obstetric anaesthesia services at University College Hospital, Ibadan. Data were collected from the anaesthesia record and entered into an Excel spreadsheet. The collected data included age, American Society of Anesthesiology (ASA) class, type and urgency of surgery, anaesthetic technique, outcomes, and critical incidents. Data was analysed using the Python programming language within the Jupyter Notebook environment.**

Results: **One thousand eight hundred and seventy anaesthetics were administered at the labour ward complex during this period, with 93.3% being for caesarean deliveries. The majority of patients were classified as ASA II. Previous caesarean delivery was the most common indication for surgery, accounting for approximately a quarter of the reasons. Of these procedures, 92.4% were performed under subarachnoid block (SAB), while 6.7% were conducted under general anaesthesia. Only four patients received labour epidural analgesia (LEA). The immediate post-operative outcome was satisfactory in nearly all cases. Hypotension was the most frequently reported intraoperative critical incident.**

Conclusion: **Subarachnoid block remains the major anaesthetic technique in obstetric anaesthesia. However, minimal labour epidural analgesia is being provided.**

Keywords: Audit; Caesarean delivery; Labour; Labour analgesia; Obstetric anaesthesia.

INTRODUCTION

Obstetric anaesthesia refers to peripartum anaesthetic and analgesic activities performed during labour and vaginal delivery, caesarean delivery (CD), removal of retained placenta, and postpartum tubal ligation.[1] The challenges presented by a parturient (the anatomical and physiological changes of pregnancy and the growing fetus) requiring anaesthesia or analgesia, or both, make the role of the obstetric anaesthetist both challenging and rewarding.[2] It is a crucial anaesthesia subspecialty whose activities are vital in minimising maternal morbidity and mortality.[1,3,4]

Audits drive change and, hopefully, improvements that continue to make labour anaesthesia safer and more satisfying for the mother and child.[4] It plays a pivotal role in clinical governance and is the basis for quality improvement projects.[5] It is necessary that clinical audits are undertaken within a continuous, cyclical framework.[6]

A previous audit by Rukewe et al. between 2008 and 2010 in our facility reported that 86.2% of caesarean deliveries were done under neuraxial anaesthesia, and 83.8% were emergencies.[7] Haemodynamic fluctuation was the most common anaesthesia-related complication and was more common in those who had their surgery done under general anaesthesia (GA). This was the last published audit in our facility. Hence, this retrospective study was undertaken to review obstetric anaesthesia services at the University College Hospital (UCH), Ibadan, Nigeria. Our objectives were to identify the commonest indications for surgery, determine the anaesthetic techniques employed, the incidence of critical incidents, and maternal outcomes.

MATERIALS AND METHODS

Study location

This study included patients who received anaesthesia at the labour ward complex of the University College Hospital, Ibadan. The hospital's labour ward complex comprises 2 operating theatres, a recovery room, a high dependency unit (HDU), and delivery suites. The facility has 24-hour anaesthesia coverage.

Study design

This was a retrospective, cross-sectional study of obstetric anaesthesia services.

Ethical considerations

The hospital's Ethical Review Committee approved the study, and the Institutional Review Board number was UI/EC/23/0124.

Study population

The study population included all patients who received an anaesthetic between 1 October 2020 and 31 December 2022. Due to recurrent industrial action in 2021, which lasted roughly three months, anaesthetics administered in the last three months of 2020 were included in this 24-month review.

Data collection procedure

Data was collected from the anaesthesia record books and entered Microsoft Excel spreadsheet. The variables extracted were patients' age, indication for surgery, ASA physical status, critical incidents (such as hypotension, high or failed subarachnoid block, primary postpartum haemorrhage (PPH)) and maternal outcome.

Data analysis

Data was analysed using Python programming language (v 3.10) within the Jupyter Notebook environment. Qualitative variables were represented using frequencies and percentages, whereas quantitative variables were represented using mean ± standard deviation. The data are presented in tables or graphs, as appropriate.

RESULTS

A total of 1870 anaesthetics were administered during this period: 594 in 2021, 1036 in 2022, and 240 cases in the last three months of 2020. The mean age was

Table 1: Indications for surgery

Indication	Frequency (%)
Previous CD[a]	566 (24.2)
Labor complications	331 (14.2)
Hypertensive disorder	295 (12.6)
Foetal distress	192 (8.2)
Malpresentation	132 (5.6)
Maternal request	108 (4.6)
Antepartum haemorrhage	88 (3.8)
Multiple gestation	80 (3.4)
Postpartum haemorrhage	60 (2.6)
Suspected foetal macrosomia	55 (2.4)
Previous gynaecological surgery	53 (2.3)
IVF[b] pregnancy	45 (1.9)
Cervical incompetence	43 (1.8)
Post-datism	29 (1.2)
Bad obstetric history	28 (1.2)
Hydramnios	28 (1.2)
PROM[c]	27 (1.2)
Short stature	20 (0.9)
Co-existing uterine fibroid	19 (0.8)
Placental insufficiency	19 (0.8)
Previous surgery (non O&G)[d]	2 (0.09)
Others	117(5)

[a]CD- Caesarean delivery, [b]IVF- Invitro fertilization, [c]PROM- Prolonged rupture of membrane, [d]O&G- Obstetrics and Gynaecology.

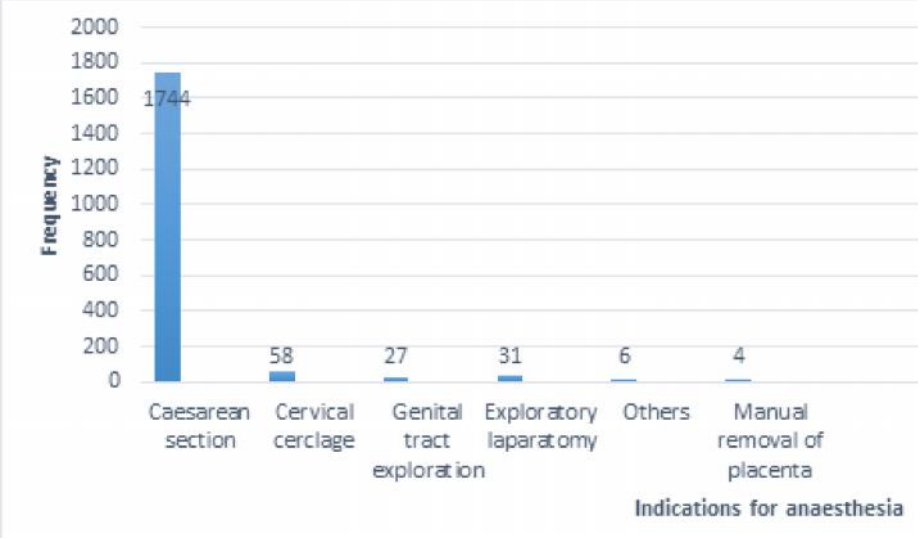

Fig. 1: Indications for anaesthesia

32.28 ± 5.62 years (age range 17-60 years). The majority of patients (71.7%) were classified as ASA II, 24.8% as ASA III, 3% as ASA IV and only one patient (0.05%) was ASA V. The ASA grade was not recorded in 9 patients (0.5%).

A significant proportion (93.3%) of the anaesthetics were for CD, 59.2% of these were emergencies, 32.5% were elective, and the rest were urgent cases. The indications for anaesthesia are highlighted in Fig. 1. The indications for surgery were numerous, with many patients having multiple indications. Previous CD was the commonest indication for surgery, accounting for about a quarter of the reasons. Other common indications were labour complications (14.2%), hypertensive disorder (12.6%), and foetal distress (8.2%). The indications for surgery are summarised in Table 1.

Table 2: Anaesthetic technique

Anaesthetic technique	Frequency (%)
Subarachnoid block	1728 (92.4)
General anaesthesia with ETT[a]	116 (6.2)
General anaesthesia with facemask	6 (0.3)
General anaesthesia with LMA[b]	3 (0.2)
Monitored anaesthesia care	10 (0.5)
Epidural anaesthesia	4 (0.2)
Combined spinal epidural	2 (0.1)
SAB[c] and GA[d]	1 (0.05)

[a]ETT- Endotracheal tube, [b]LMA- Laryngeal mask airway, [c]SAB- Subarachnoid block, [d]GA- General anaesthesia.

Table 3: Outcome and critical incidents

Outcome	Frequency (%)
Satisfactory	1852 (99.04)
Transferred to ICU[a]	10 (0.53)
Transferred to HDU[b]	7 (0.37)
Died on table	1 (0.05)
Critical incidents	
Hypotension	53 (2.83)
Primary PPH[c]	12 (0.64)
High spinal	6 (0.32)
Failed spinal	5 (0.27)
Convulsion	2 (0.11)
Cardiac arrest with ROSC[d]	2 (0.11)
Bradycardia	1 (0.05)
Reaction to metoclopramide	1 (0.05)
Respiratory distress	1 (0.05)
Death on table	1 (0.05)
Delayed recovery	1 (0.05)
Oliguria	1 (0.05)
Humeral fracture of the baby	1 (0.05)
Twin babies as against triplet gestation predicted by USS[e]	1 (0.05)

[a]ICU-Intensive care unit, [b]HDU- High dependency unit, [c]ROSC- Return of spontaneous circulation, [d]USS- Ultrasound.

Regarding the anaesthetic technique, most procedures were done under SAB (92.4%), while only 6.7% of cases were done under GA. Only four patients had LEA, and three of these eventually had CD. Table 2 summarises the various anaesthetic techniques employed, while Table 3 highlights outcomes and critical incidents. The commonly reported critical incidents were hypotension (2.83%), PPH (0.64%), high SAB (0.32%), and failed SAB (0.27%).

The immediate post-operative outcome was satisfactory in almost all patients (99.04%), and they were transferred to the recovery room. One patient died on the table, while two patients suffered cardiac arrest with return of spontaneous circulation. The mortality was a 31-year-old, ASA VE female with PPH and eclampsia who had genital tract exploration under monitored anaesthesia care. Seventeen patients (0.91%) were admitted into the HDU/ICU post-operatively. Of these, 16 had an emergency surgery done, most of which were due to either eclampsia (52.9%) or obstetric haemorrhage (29.4%). Fourteen of these cases (82.4%) were done under GA.

DISCUSSION

Caesarean delivery was the most common surgical procedure in this audit. Approximately one-third of these were elective cases. This stands in sharp contrast to previous findings by Rukewe *et al.* in 2014 at our facility and Ige *et al.* in Ilorin in 2019, where less than 25% of CDs were elective.[7,8] This may be attributed to the slight difference in indications and a possible growing acceptance of CD among Nigerians. Surveys conducted among groups of pregnant women in Nigeria suggest that over 80% would accept CD as a method of delivery.[9,10] A systematic review and meta-analysis by Osayande *et al.* also reported an increase in the global prevalence rate of CDs, though it is less pronounced in low-income countries compared to high-income countries.[11] Previous CD was the most common indication for surgery, accounting for about a quarter of the reasons. In the studies by Ige *et al.* and Osayande *et al.*, previous CD and hypertensive disorders were the most common indications for CD.[8,11]

There is an increasing use of neuraxial anaesthesia in our facility compared to the previous study by Rukewe et al. in 2014, where 86.2% of CDs were done under neuraxial anaesthesia and 13.8% under GA.[7] Our result is comparable to the finding of the 5-year retrospective survey of CDs at the University of Ilorin Teaching Hospital, Ilorin, by Ige *et al.*, where 92.1% of cases were done under neuraxial anaesthesia.[8] Kassa *et al.*, in Botswana, even reported a slightly higher figure in which 95.2% of CDs were done under SAB.[12] Similarly,

this is consistent with global trends and predictions (6% of CD will still require GA).[13] A review of the National Obstetric Anaesthesia Database in the UK, between 2009 and 2014 by Bamber *et al.*, revealed that 8.75% of CD was performed under GA while the rest were done under neuraxial anaesthesia.[14]

We noted a low rate of LEA in our audit. This might be due to the low awareness and poor acceptance of labour analgesia by Nigerian women, as attested to by Oladokun *et al.*[15] The low prevalence of labour analgesia appears to be an African problem.[12,15–17] Imarengiaye *et al.*[18] and Olateju *et al.*[19] in Nigeria reported rates of less than 0.1% and 1.92%, respectively, while van Zyl and Burke reported a rate of 5.16% in South Africa.[20] In the review by Bamber *et al.*, 21% of women had neuraxial labour analgesia in the UK,[14] meanwhile, in the US, it is reported to be as high as 70%.[21] Factors thought to contribute to this low prevalence of labour analgesia, in addition to the low awareness and misconceptions, include the absence of an established labour analgesia service, shortage of trained personnel to monitor labour analgesia, added cost, late presentation, previous negative experience, etc.[12,15–17]

A critical incident is an event that can be potentially harmful to a patient during anaesthesia management.[22] Obstetric anaesthesia is a litigious aspect of anaesthesia, given that expectations are high and most procedures are performed as emergencies, usually outside regular working hours, when cognitive capabilities are often impaired, and resources are limited due to organisational factors.[23,24] The anatomical and physiological changes during pregnancy increase the frequency of complications or critical incidents.[2,23,24] The commonly reported critical incidents in this audit were hypotension, primary PPH, high SAB, and failed SAB. Ige *et al.* reported an incidence of 15.8% for hypotension and 1% for failed SAB.[8] The low incidences in this study may be due to its retrospective nature and the possibility of incomplete documentation. Moreover, only complications occurring intraoperatively were documented. Delayed complications such as post-dural puncture headache, nerve injuries, vertebral canal hematoma, or abscess were not recorded.

Abbasi, in a study of critical incidents and near misses in an obstetric unit of a tertiary hospital in Pakistan over a two-year period, reported 33 cases of critical incidents, with 28% involving the cardiovascular system, and hypotension being the most common (56%).[22] Human errors accounted for 57% of cases, with the failure to check equipment as the main contributor. D'Angelo et al. in a five-year quality assurance survey across thirty institutions noted that the most frequent serious complication following neuraxial anaesthesia was a high neuraxial block, which occurred in 1 of every 4,336 anaesthetics.[25] Interestingly, they also identified metoclopramide as an important cause of anaphylaxis.

As noted in the literature, hypertensive disorders of pregnancy (particularly eclampsia) and obstetric haemorrhage were the main reasons for postoperative HDU/ICU care.[26,27] It is essential to anticipate critical care admission early while managing this high-risk obstetric group.

Limitations

This was a retrospective study, and incomplete or inadequate documentation is possible. Similarly, it is a single-centre audit, and the findings may not represent national or regional practice. We did not collect data on the outcome of the babies or the patients post-anaesthesia.

CONCLUSION

In this audit, subarachnoid block was the primary anaesthetic technique used in obstetric anaesthesia, with hypotension being the most commonly documented critical incident. Unfortunately, the use of LEA is quite low. Every member of the obstetric team, especially the obstetric anaesthetist, must make concerted efforts to raise awareness and correct misconceptions.

Declarations of interest: none

Authors contributions

T A. Adigun: Conceptualisation, Methodology, Writing- Review and Editing.
T C. Okonkwo: Conceptualisation, Methodology, Writing- Original draft, Review and Editing.
V M. Adeleye: Formal analysis, Writing- Review and Editing.

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REFERENCES

1. Practice Guidelines for Obstetric Anesthesia: An Updated Report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and the Society for Obstetric Anesthesia and Perinatology. Anesthesiology. 2016;124(2):270-300.
2. **Miller RD.** Miller's Anesthesia. Vol 1. 7th edition. Churchill Livingstone/Elsevier; 2009.
3. **Walls A,** Plaat F, Delgado AM. Maternal death: lessons for anaesthesia and critical care. BJA Educ. 2022;22(4):146-153.

4. **Paech M,** Sinha A. Obstetric audit and its implications for obstetric anaesthesia. Best Pract Res Clin Obstet Gynaecol. 2010;24(3):413-425.
5. **Acharya SP,** Bhattarai A, Bhattarai B. An Audit of An Intensive Care Unit of A Tertiary Care Hospital. J Nepal Med Assoc. 2018;56(212):759-762.
6. **Ullman AJ,** Ray-Barruel G, Rickard CM, Cooke M. Clinical audits to improve critical care: Part 1 Prepare and collect data. Aust Crit Care. 2018;31(2):101-105.
7. **Rukewe A,** Fatiregun A, Adebayo K. Anaesthesia for caesarean deliveries and maternal complications in a Nigerian teaching hospital. Afr J Med Med Sci. 2014;43(1):5-10.
8. **Ige OA,** Oyedepo OO, Adesina KT, Enaworu II. Anesthesia for cesarean section in the University of Ilorin Teaching Hospital, Ilorin, Nigeria: A 5-year review. J Med Trop. 2019;21(1):10-13.
9. **Awoyinka BS,** Ayinde OA, Omigbodun AO. Acceptability of caesarean delivery to antenatal patients in a tertiary health facility in south-west Nigeria. J Obstet Gynaecol. 2006;26(3):208-210.
10. **Omobolanle OA,** Adekemi OE, Tolulope AE, *et al.* Acceptance of caesarean section among pregnant women in Nigeria. Afr J Midwifery Womens Health. 2018;12(1):14-20.
11. **Osayande I,** Ogunyemi O, Gwacham-Anisiobi U, *et al.* Prevalence, indications, and complications of caesarean section in health facilities across Nigeria: a systematic review and meta-analysis. Reprod Health. 2023;20(1):81.
12. **Kassa MW,** Mkubwa JJ, Shifa JZ, Agizew TB. Type of anaesthesia for caesarean section and failure rate in Princess Marina Hospital, Botswana's largest referral hospital. Afr Health Sci. 2020;20(3):1229-1236.
13. **Delgado C,** Ring L, Mushambi MC. General anaesthesia in obstetrics. BJA Educ. 2020;20(6): 201-207.
14. **Bamber JH,** Lucas DN, Plaat F, Russell R. Obstetric anaesthetic practice in the UK: a descriptive analysis of the National Obstetric Anaesthetic Database 2009–14. Br J Anaesth. 2020; 125(4):580-587.
15. **Oladokun A,** Eyelade O, Morhason-Bello I, *et al.* Awareness and desirability of labor epidural analgesia: a survey of Nigerian women. Int J Obstet Anesth. 2009;18(1):38-42.
16. **Lawani LO,** Eze JN, Anozie OB, *et al.* Obstetric analgesia for vaginal birth in contemporary obstetrics: a survey of the practice of obstetricians in Nigeria. BMC Pregnancy Childbirth. 2014;14 (1):140.
17. **Nabukenya MT,** Kintu A, Wabule A, *et al.* Knowledge, attitudes and use of labour analgesia among women at a low-income country antenatal clinic. BMC Anesthesiol. 2015;15:98.
18. **Imarengiaye CO,** Olagbuji BN, Ezeanochie MC, Akhideno II. Clinical correlates of women requesting labour epidural analgesia in a tertiary hospital in Nigeria. Niger Postgrad Med J. 2013;20(3):214-217.
19. **Olateju SO,** Adetoye AO, Aaron OI, *et al.* A preliminary experience of maternal request for epidural labour analgesia and outcome in a Nigerian Tertiary Hospital. Trop J Obstet Gynaecol. 2022;39(2):65-73.
20. **van Zyl SF,** Burke JL. Increasing the labour epidural rate in a state hospital in South Africa: challenges and opportunities. South Afr J Anaesth Analg. 2017;23(6):156-161.
21. **Guglielminotti J,** Landau R, Daw J, *et al.* Use of Labor Neuraxial Analgesia for Vaginal Delivery and Severe Maternal Morbidity. JAMA Netw Open. 2022;5(2):e220137.
22. **Abbasi S.** Critical incident reported in an obstetric unit of a tertiary care hospital of a developing country, over a period of two years. Open J Obstet Gynecol. 2017;7(12):1228-1238.
23. **Maronge L,** Bogod D. Complications in obstetric anaesthesia. Anaesthesia. 2018;73(S1):61-66.
24. **Jadon A.** Complications of regional and general anaesthesia in obstetric practice. Indian J Anaesth. 2010;54(5):415-420.
25. **D'Angelo R,** Smiley RM, Riley ET, Segal S. Serious complications related to obstetric anesthesia: The serious complication repository project of the society for obstetric anesthesia and perinatology. Anesthesiology. 2014;120(6): 1505-1512.
26. **Padilla CR,** Shamshirsaz A. Critical care in obstetrics. Best Pract Res, Clin Anaesthesiol. 2022;36(1):209-225.
27. **Rathod AT,** Malini KV. Study of obstetric admissions to the intensive care unit of a tertiary care hospital. J Obstet Gynaecol India. 2016;66(Suppl 1):12-17.