

Trends in Obstetric Anaesthesia in a Tertiary Hospital in Nigeria: A Four-Year Review

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Abstract:

Background: Obstetric anaesthesia has a vital role in the outcome of obstetric surgeries and in the past three decades, the pattern has changed from predominantly general anaesthesia to regional, mostly spinal, anaesthesia. The objective of this study was to investigate the trends in obstetric anaesthesia practice in a Federal Medical Centre and offer explanation for any change observed.

Materials And Methods: This was a retrospective study of the obstetric anaesthesia unit of the department of anaesthesia and the labour ward of the hospital from 1st January 2010 to 31st December, 2013. Data extracted from the records included the age of the parturients, indications for surgery, types of Caesarean section, types of anaesthesia, the grade of anaesthetists, total deliveries and Caesarean section rates.

Results: The total delivery for the period was 11,003 and the Caesarean section rate was 15.5%. In 2010 and 2011, general anaesthesia was the main type of anaesthesia accounting for 76.2% and 76.7% respectively. However, in 2012 there was a drastic reduction in the use of general anaesthesia to 33.5% while spinal rose from 23.3% in 2011 to 66.5% in 2012. By 2013, 70.9% of the cases were done under spinal while 29.1% were done under general anaesthesia. There was no mortality in 2010 and 2012. In 2011, there was 1 (0.2%) mortality and 3 (0.6%) in 2013.

Conclusion: The first two years of the study revealed that most of the obstetric procedures were done under general anaesthesia and was predominantly practiced by Nurse Anaesthetists. The last two years showed predominant use of spinal anaesthesia. This was as a result of the arrival of a Consultant Anaesthetist. Training and retention of qualified physician practitioners is recommended.

Keywords: Trends, obstetric anaesthesia, spinal anaesthesia, Caesarean section

I. Introduction

Over the last triennium, the pattern of obstetric anaesthesia has been moving from general anaesthesia towards regional anaesthesia¹. Regional obstetric anaesthesia can be done under spinal or epidural². Spinal anaesthesia has become predominant method of inducing anaesthesia for obstetric procedures³. Spinal anaesthesia has lots of advantages over general anaesthesia. A meta-analysis of studies in the literature has shown that spinal anaesthesia is 16 times safer than general anaesthesia for obstetric procedures⁴. In a review of ASA closed claims report over a ten year period, Hawkins found that spinal anaesthesia was associated with decrease in high-severity injury claims than general anaesthesia^{1,4}. Compared to general anaesthesia, regional anaesthesia is associated with less maternal mortality^{4,5}. The fewer drugs used in regional anaesthesia results in fewer drug reactions. It allows for a more direct experience of childbirth by the parturients and faster neonatal-maternal bonding. It causes decreased blood loss thus reducing the need for blood transfusions⁵. The addition of neuraxial opioids provides for excellent postoperative pain control⁶. Despite the numerous advantages of regional anaesthesia, some resource-poor settings still show preponderance toward the use of general anaesthesia⁷.

The objective of the study was to investigate the trend of anaesthesia administered for obstetric procedures in the hospital under review and proffer explanation for any change in trend observed.

II. Materials And Methods

Setting

The study was conducted at the department of anaesthesia of the Federal Medical Centre, Makurdi, Benue State, Northcentral of Nigeria. With a bed space of 500, the hospital offers specialist medical and surgical care to a population of 5 million people⁸. This is a tertiary hospital involved in the Residency Training programme with accreditations in obstetrics and gynaecology, surgery, family medicine amongst others. It also receives referrals from the neighbouring states of Taraba, Kogi, Nasarawa and Cross River.

Study design

This was a retrospective descriptive study of all the parturients who had Caesarean section in the Federal Medical Centre, Makurdi, from January 2010 to December 2013. The anaesthetic and maternity records of the hospital were reviewed. All those who had Caesarean sections in the hospital were included in the study. Those who had spontaneous vaginal or assisted delivery in the operating room were excluded from the study.

Data Analysis

Data extracted from the records included the Caesarean section rate and total deliveries. Information extracted from those who had Caesarean section were the age of the parturients, the indication for surgery, type of Caesarean section based on timing, type of anaesthesia and the grade of anaesthetists, and total yearly deliveries. The data was analysed using descriptive statistics.

III. Results

The total delivery was 2338 in 2010, 3144 in 2011, 2577 in 2012 and 2944 in 2013. The Caesarean rate was 14.2% in 2010, 14.6% in 2011, 16.8% in 2012 and 16.2% in 2013. The mean Caesarean rate was 15.5%. A total of 1701 anaesthetics were administered for the four-year period under review. Of these, 332 were done in 2010, 459 in 2011, 433 in 2012 and 477 in 2013. Fifty four per cent of the cases were done on parturients within the age range of 20-29 years whereas 2.2% of the procedure was done on those forty years or older. (Table 1).

Table 1: Shows the age distribution of the parturients

| Age of parturients | frequency | Percentage (%) |
|--------------------|-----------|----------------|
| 10-19 | 64 | 3.8 |
| 20-29 | 919 | 54.0 |
| 30-39 | 574 | 33.7 |
| ≥40 | 37 | 2.2 |
| Not indicated | 107 | 6.3 |
| Total | 1701 | 100 |

The commonest indication for Caesarean section was one or more previous sections as shown in table 2.

Table 2: showing the indications for Caesarean section

| Indication for Operation | Frequency | Percentage (%) |
|-------------------------------------|-----------|----------------|
| Cephalopelvic disproportion | 132 | 7.8 |
| Fetal distress | 140 | 8.2 |
| One or more previous C/S | 236 | 13.9 |
| Hypertensive disorders of pregnancy | 160 | 9.4 |
| Antepartum haemorrhage | 142 | 8.3 |
| Obstructed labour | 116 | 6.8 |
| Cord prolapse | 27 | 1.6 |
| Abnormal presentations/lie | 167 | 9.8 |
| Others | 581 | 34.2 |
| Total | 1701 | 100 |

Majority of the Caesarean sections were done as emergency as shown in table 3

Table 3 showing the type of Caesarean section based on timing

| Type | Frequency | Percentage (%) |
|-----------|-----------|----------------|
| Elective | 266 | 15.6 |
| Emergency | 1435 | 84.4 |
| Total | 1701 | 100 |

In 2010 and 2011, general anaesthesia was the main type of anaesthesia given for Caesarean section accounting for 76.2 and 76.7% respectively. However, in 2012 there was a drastic reduction in the use of general anaesthesia to 33.5% while spinal rose from 23.3% in 2011 to 66.5% in 2012. By 2013, 70.9% of the cases were done under spinal while 29.1% were done under general anaesthesia. See figure 1. In 2010 and 2011, most of the cases were done by nurse anaesthetists. In 2012, most of the cases were done by the Consultant anaesthetist and Resident doctors. In 2013, the nurse anaesthetists did more of the cases. See table 5.

Table 5: Depicts the grade of Anaesthetists

| Year | Grade of anaesthetist | Number of cases done |
|------|-----------------------|----------------------|
| 2010 | Nurse Anaesthetist | 317 |
| | Resident | 15 |
| | Consultant | 0 |
| 2011 | Nurse Anaesthetist | 435 |
| | Resident | 22 |

| | | |
|------|--------------------|-----|
| 2012 | Consultant | 2 |
| | Nurse Anaesthetist | 191 |
| | Resident | 159 |
| 2013 | Consultant | 83 |
| | Nurse Anaesthetist | 269 |
| | Resident | 143 |
| | Consultant | 65 |

In 2010, intra-operative maternal mortality was zero while in 2011, there was one mortality (0.2%). In 2012, mortality was zero and in 2013 there were three mortalities (0.6%).

IV. Limitations

The data were manually extracted as there is no computerised record keeping at the centre. In the first two years of the study, the entire operations in the theatre were lumped into one record thus making the retrieval of obstetric cases cumbersome. The record for 2010 and major part of 2011 did not differentiate the type of general anaesthesia given. So both total intravenous anaesthesia and general anaesthesia with endotracheal intubation were counted as general anaesthesia for the purpose of the review.

V. Discussion

The commonest indication for elective Caesarean section in this study was one or more previous sections which agree with most studies done in Nigeria⁹. Most of the Caesarean sections in the study were emergencies. By 2010 and 2011, there was a predominance of general anaesthesia use for Caesarean section at the centre under review with 76.2% and 76.6% of the cases being done under general anaesthesia respectively. Spinal anaesthesia accounted for 23.8% and 23.4% of the cases respectively. This is in contrast with findings from the surveys conducted in 1981 and 1992 by Hawkins et al that revealed that in the United States, a significant proportion of Caesarean sections were performed under regional anaesthesia and there was a corresponding decrease in those performed under general anaesthesia³. In a tertiary hospital in Boston, United States, Palanisamy reported that only 0.5-1% of Caesarean section were done under general anaesthesia indicating that almost all were done under regional anaesthesia¹⁰. That study further revealed that in half of the very few who received general anaesthesia, a perceived lack of time to institute neuraxial block was the reason for the institution of general anaesthesia. In a Singaporean maternity hospital in 2004, Kan reported a general anaesthesia use of 20.4% for Caesarean delivery with close to 80% done under regional anaesthesia¹¹.

Studies coming out of the developing world tend to show a trend that was more of general anaesthesia. In Malawi, Fenton reported that the trend of obstetric anaesthesia that was towards general anaesthesia was associated with increased maternal and perinatal mortality⁷. In the University of Nigeria Teaching Hospital in Eastern Nigeria, Okafor reported that by 2004, only 18% of the Caesarean deliveries were done under spinal anaesthesia¹². We found that the finding of a predominantly general anaesthesia-based obstetric delivery system seemed to be common in most resource-poor settings. This is in spite of the fact that spinal anaesthesia has become the gold standard for obstetric anaesthesia worldwide¹³. The finding of a mostly general as against regional technique was due to a lack of skilled manpower to teach and sustain the practice of regional anaesthesia technique at the centre. A related regional technique, the epidural, was found to have been used in 0.7% of cases in a district hospital in Nigeria out of a total of 2878 anaesthetics delivered over a two-year period².

In the hospital under review, there was no Consultant Anaesthetist on the employment of the hospital as at 2010 and 2011. This accounted for the low percentage of cases done under spinal. The one or two nurse anaesthetists who attempted to do the few spinals were discouraged by the complication of severe hypotension that often followed the procedure.

During the years 2010 and 2011, the anaesthesia workforce was few and mostly Nurse Anaesthetists in the centre under review. This accounted for the predominantly general anaesthesia that was entirely total intravenous anaesthesia without any form of airway protection for the parturients. This again brings to the fore the intractable problem of manpower development in anaesthesia. Okafor¹⁴ observed that the ratio of anaesthetists to the population in parts of the developing world is 1:300000 as compared to 1:10000 in the Western world. As at the time of the study, there was only one Consultant Anaesthetist practicing in the entire state with a population of about 5million⁸. The problem of the dearth of manpower in anaesthesia is at the root of poor development in anaesthesia and obstetric anaesthesia practice in particular in sub-Saharan Africa¹⁴. In a related study about the dearth of epidural anaesthesia skill in a district hospital in Abuja, Nigeria, Edem et al observed that it was directly a result of the unavailability of physician anaesthetists to practice and teach the skill to the few nurse anaesthetists who formed the bedrock of anaesthesia service delivery there².

That over 70% of obstetric procedures were still done under general anaesthesia ten years into the third millennium is a cause for concern. To bring the standard of care at the Centre to a global minimum, there was an urgent need to appoint and retain a Consultant Anaesthetist for the Centre.

The trend in 2012 started to show a reversal of the general anaesthesia based obstetrics procedures towards a more spinal based delivery system. **See figure 1.** Spinal anaesthesia use rose from 23.3% in 2011 to 66.5% of all anaesthetics given for Caesarean sections in 2012 in the Centre. This meant that general anaesthesia decreased to 33.5% in that year down from 76.7% in 2011. This was a 286% increase. This finding is in agreement with that of Okafor¹² in a teaching hospital in Eastern Nigeria where the rate of spinal use for caesarean section rose from 18% in 2003 to 48% in 2004. However, while Okafor found 267% increase in the rate of utilisation of spinal as against general anaesthesia, our study revealed 286% increase in use. The reversal in the trend of obstetric anaesthesia was as a result of the arrival of a Consultant Anaesthetist by December 2011 at the Centre. A massive training programme for the Nurse Anaesthetists by the Consultant and posting of Resident doctors to the department led to a change in the type of anaesthesia given to the parturients. The last decade has witnessed the trend turning towards the use of spinal anaesthesia in many places in the Sub-region. However, the rate of the use of general anaesthesia for Caesarean section, though greatly reduced at the Centre, is still high compared to the United States and European rates. However, the rate seems to agree with the findings in the study from Kan in Singapore¹¹ and Chan in Malaysia¹⁵. In view of the international goal that 80-90% of all Caesarean deliveries be done under spinal anaesthesia for the protection of future mothers⁵, there is need to sustain the practice of spinal anaesthesia at the Centre.

In 2013, the trend towards spinal anaesthesia continued to increase with a total of 70.9% of the cases done under spinal anaesthesia in the centre under review. This figure tallies with the finding of Okafor who reported a 71% use of spinal on the fourth year of their review in 2006.

The number of obstetric procedures handled by the nurses in 2010 was 317 out of the total 332 cases handled in that year. A Resident doctor handled 15 of the cases. Since most of the nurses did not have the skill at performing spinal anaesthesia, most of the cases were carried out under general anaesthesia. This accounted for the low rate of spinal anaesthesia found in the study. There was no qualified Physician Anaesthetist to train and supervise the Nurses. The same finding continued in 2011 with the Nurses handling most of the cases and the spinal rate still low. However, by 2012, the number of cases handled by the nurses dropped. This was a direct result of the arrival of a Consultant Anaesthetist who embarked on training of the Nurses in regional anaesthetic techniques. Residents were also posted to the department who joined in receiving the training. The result was the rapid increase in the use of spinal anaesthesia for obstetric procedures from 23% in 2010 to 66.5% in 2012. As the nurses learned and perfected the skill in regional technique, the number of cases handled by them again rose in 2012 as well as the rate of use of spinal anaesthesia.

The findings in this study show that the trend of obstetric anaesthesia in the Centre under review is rapidly moving towards the global standards of a regional - driven obstetric anaesthesia service. This has been as a result of the sourcing of appropriately trained physician anaesthesia manpower who worked hard to train the others to conform to the global standards. There is therefore the need to train enough physicians to continue to insist on standards of care to improve safety to both the parturients and the new-borns.

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References

- [1]. Davies JM. Obstetric Anesthesia Closed Claims — Trends Over Last Three Decades. *ASA Newsletter* 2004; 68: 12-14.
- [2]. Edem BE, Anzaku SA, Agan TU, Oku OO. Audit of epidural anaesthesia service at a district hospital in Nigeria. *Highland Med Res J* 2014; 14: 35-38.
- [3]. Hawkins JL, Gibbs CP, Orleans M, et al. Obstetric anesthesia workforcesurvey, 1981 versus 1992. *Anesthesiology* 1997; 87:135-143.
- [4]. Hawkins JL, Koonin LM, et al. Anesthesia –related deaths during obstetric delivery in the United States, 1979-1990. *Anesthesiology* 1997; 86: 277-284.
- [5]. Fyनेface-Ogan S. Anesthesia for Cesarean Section. In: Salim R (ed) *Cesarean Delivery*. InTech, Available from <http://www.intechopen.com/books/cesareandelivery>. Accessed on 23/10/14.
- [6]. Eldridge J. Obstetric anaesthesia and analgesia. In: Allman KG, Wilson IH (eds). *Oxford Handbook of Anaesthesia*, 2 ed. Oxford, Oxford University Press, 2007, 695-756.
- [7]. Fenton PM, Whitty CJM, Reynolds F. Caesarean section in Malawi: Prospective study of early maternal and perinatal mortality. *Br Med J* 2003; 327:337.
- [8]. Population of Benue State of Nigeria 2006, National Population Commission, <http://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA007>. Accessed 23/10/14, 19:07hours.
- [9]. Chama CM, El-Nafaty AU, Idrisa A. Caesarean morbidity and mortality of Maiduguri, Nigeria. *J ObstetGynaecol* 2000; 20: 45-48.
- [10]. Palanisamy A, Mitani AA, Tsen LC. General anesthesia for cesarean delivery at a tertiary care hospital from 2000 to 2005: a retrospective analysis and 10-year update. *Int J ObstetAnesth* 2011; 20: 10-16.

- [11]. Kan RK, Lew E, Yeo SW, Thomas E. General anaesthesia for cesarean section in a Singapore maternity hospital: a retrospective survey. *Int J Obstet Anesth* 2004; 13: 221-226.
- [12]. Okafor UV, Ezegwui HU, Ekwazi K. Trends of different forms of anaesthesia for caesarean section in South-eastern Nigeria. *J Obstet Gynaecol* 2009; 29: 392-395.
- [13]. Dyer RA, Reed AR, James MF. Obstetric anaesthesia in low-resource setting. *Best Practice & Research Clinical Obstetrics and Gynaecology* 2010; 24: 401-412.
- [14]. Okafor UV. Evolution of obstetric anaesthesia in West Africa: current trends. *Int J Obstet Anesth* 2006; 15: 175.
- [15]. Chan YK, Ng KP, Chiu CL. Trends in obstetric anaesthesia and analgesia over a ten year period in the University Malaya Medical Centre, Kuala Lumpur. *Int J Obstet Anesth* 2002; 11: 176-179.

Figure 1: Bar Chart Showing Trend Of Obstetric Anaesthesia 2010-2013

