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WHERE THERE IS NO ANAESTHETIST: THE ROLE OF OBSTETRICIAN-ADMINISTERED SPINAL ANAESTHESIA FOR EMERGENCY CAESAREAN SECTION

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ABSTRACT

Context: Shortage of anaesthetic manpower is a stark reality in developing countries like Nigeria where "waiting for the anaesthetist" has been repeatedly identified as a cause of phase 3 delays. This has led to widespread abuse of ketamine anaesthesia for emergency caesarean section in private hospital settings.

Objectives: To determine the effect of single handed obstetrician-anesthetist administered spinal anesthesia for caesarean section on Decision-Delivery Interval (DDI), postoperative hospital stay, fetal and maternal outcome.

Materials and Methods: A prospective analytical study comparing caesarean DDI between 42 consecutive emergency caesarean sections (CS) under Obstetrician-administered Spinal anesthesia (OASA) versus 42 women who had locum anesthetist administered spinal anesthesia (LAASA) and an equal number who had ketamine anesthesia.

Results: The DDI was about 2.5 fold shorter in the OASA (59.67 ± 9.40 minutes) compared with the LAASA (144.54 ± 28.00 minutes) group ($p<0.001$). The postoperative hospital stay was similarly shorter in the OASA (3.74 ± 0.66 days) than the LAASA (5.14 ± 0.75) group ($p<0.001$). There was no significant difference in the incidence of postdural puncture headache. Compared with OASA, ketamine anesthesia was associated with significantly lower Apgar scores at 1 and 5 minutes ($p<0.001$) and longer postoperative hospital stay ($p<0.001$). The DDI was also longer in the Ketamine (67.38 ± 12.27 minutes) group ($p=0.002$).

Conclusion: Obstetrician-administered Spinal Anesthesia for emergency caesarean section reduces Decision-Delivery Interval and postoperative hospital stay. It is therefore judicious where there is no anesthetist. Moreover, it is superior to ketamine anesthesia for caesarean section.

Keywords: Obstetric anaesthesia, Spinal anaesthesia, Caesarean section, Bupivacaine, Ketamine

INTRODUCTION

Historically, advances in anaesthesia and surgery are very closely linked. Unfortunately however, there have always been huge disparities in the ratio of anaesthetists to surgeons, with a deficiency of anaesthetists in both the advanced and the resource-constrained countries of the world. This disparity is particularly critical in the under-developed countries with the ratio of anaesthetists to the general population being as low as 1:300,000 compared to 1:10,000 in developed countries.[1]

Nigeria for example as at 1965 (five years after independence) had a population of fifty five million and only about fifteen (15) qualified anaesthesiologists.[2] The country's population has since roughly trebled[3], but although the number of trained anaesthesiologists has also increased; the anaesthesiologist/surgeon ratio remains highly disproportionate. Between April 1992 and October 1996 the West African Postgraduate Medical College produced 292 Fellows with only six in anesthesia, giving a ratio of 1 anaesthesiologist to 49 surgeons.[1] During this five-year period the Faculty of Obstetrics and Gynecology produced 16 to 40 Fellows per year and the Faculty of Surgery 16 to 39 Fellows per year. Anaesthesia on the other hand produced zero to 2 Fellows per year.[1]

Of these few anesthesiologists produced yearly, some are attracted and migrate to the advanced countries for work, while those who choose to stay back in the country are usually employed in the Teaching Hospitals and other Tertiary Centers. This leaves many surgeons and obstetricians working in the secondary health facilities and private hospitals without anaesthetic personnel. Quite often, the private hospitals have to rely on visiting anaesthesiologists (primarily employed in the Tertiary Hospitals) to provide locum services during their free time. This often results in delays in commencement of emergency surgeries, most commonly caesarean section.

Provision of safe anaesthesia in under-doctored environments is a huge concern. In a 1961 article, Rigg reported that surgeon-administered spinal or general anaesthesia was widely used in Nigeria, with the maintenance of anaesthesia usually delegated to a lower level health personnel with no formal training, while the surgeon/obstetrician-anaesthetist proceeded with the surgery.[4] With the introduction of Ketamine into the Nigerian medical landscape in 1964 came an easier option which was undemanding of lumbar puncture or endotracheal intubation skills.[5] Ketamine anaesthesia for caesarean section quickly became widespread in Nigeria and has remained so, due to lack of anaesthetic personnel especially in rural areas.[6]

Best available evidence has however established spinal anaesthesia as the preferred anaesthetic option for caesarean section unless there are contraindications to its use.[7,8] Its advantages over general anaesthesia include cost savings, improved patient satisfaction, avoidance of airway problems, less bleeding and lower rates of maternal and perinatal morbidity and mortality. In particular, ketamine anaesthesia for caesarean section has been shown to be associated with a significant rate of maternal and perinatal morbidity and mortality in Nigeria.[6]

The Obstetrics and Gynecology Residency training program in the West African sub-region includes a mandatory two-month posting in anesthesia for the attainment of proficiency in vital skills including spinal anaesthesia. The anaesthetic capabilities of the obstetrician can therefore be unlocked where there is no anaesthetist, to reduce the delays caused by waiting for a locum anaesthetist before an emergency or urgent caesarean section. Obstetrician-administered spinal anaesthesia has the potential to eliminate these delays, while also avoiding the morbidity and mortality associated with the popular alternative - ketamine anaesthesia.

This paper presents the analysis of forty-two consecutive cases of obstetrician-administered spinal anaesthesia for emergency caesarean section in a private hospital located in a semi-urban area of Lagos, Nigeria between June 2010 and April 2011. After experiencing a three-hour delay waiting for a locum anaesthetist (who had been caught up in traffic) before the commencement of his first emergency caesarean section in the hospital, closely followed by the delivery of a moderately asphyxiated baby under ketamine anaesthesia in the second patient; the author decided to utilize obstetrician-administered spinal anaesthesia for subsequent emergency/urgent caesarean sections.

MATERIALS AND METHODS

This was a prospective analytical study conducted in Doren Specialist Hospital, located in Ajah, a semi-urban area of Lagos, Nigeria from June 2010 to April 2011. The hospital provides specialist obstetric and gynaecological services and records an average of 250 deliveries per year with a caesarean section rate of 24.8% in 2010. The study was conducted on a pragmatic basis in a private hospital setting. All the study procedures conform to the standards established in the declaration of Helsinki.[9]

Every consecutive parturient requiring emergency caesarean section without contraindications to spinal anaesthesia during the study period was eligible. Women with antepartum hemorrhage, local sepsis or bleeding disorder were excluded. The procedure of obstetrician-administered spinal anaesthesia was explained to eligible women and their informed consent obtained. Preloading was done with 1,000 to 1,500mL of Normal Saline over 15 to 30 minutes, followed by the performance of an aseptic lumbar puncture at the L3/4 or L2/3 interspace using a size 26 Quincke-Backok pencil tip spinal needle with the woman in the sitting position, after which 3.0 to 3.6mls of 0.5% bupivacaine hydrochloride in 8% glucose monohydrate (Marcain heavy 0.5%; Astra Zeneca AB, S-151 85 Soderealje, Sweden) was injected and the woman was immediately repositioned supine with a 15^0 left tilt and a pillow placed under her head.

The patient's blood pressure was monitored by a Registered Nurse every two minutes for the first 15minutes after the block and every 10 minutes thereafter until conclusion of surgery. The height of block was also determined by pinprick by the obstetrician before the commencement of surgery. Hypotension was managed by increasing the saline infusion rate and administering intranasal oxygen.

A specifically designed study proforma was used to collect each patient's data including the time of the following: caesarean section decision, commencement and conclusion of spinal anaesthesia, commencement of caesarean section, delivery of the baby and the appearance of postoperative pain. Similar data was obtained from the case records of an equal number of controls made up of women who had had caesarean section under spinal anaesthesia administered by a locum anaesthetist prior to the study and the results were compared with respect to the decision-delivery interval, neonatal Apgar scores and the incidence of post dural puncture headache. Similar data was also obtained from the case records of women who had had caesarean section under ketamine anaesthesia and compared likewise.

Data analysis was done using SPSS version 15. Means were generated for continuous variables and compared using the independent sample t-test, while proportions were generated for categorical variables and compared using Chi square. Using the decision-delivery interval as the primary outcome variable with a 5% Type 1 error margin and forty two women in each of the study and control groups, a power of 100% was obtained for this study.

RESULTS

Forty two consecutive emergency caesarean sections were performed under obstetrician-administered subarachnoid block in Doren Specialist Hospital, Lagos, Nigeria from June 2010 to April 2011. The ages of the women ranged from 24 to 40 years with a mean of 27.8 ± 3.4 years and their parity ranged from 0 to 2 with a median of 0. Table I shows the comparison of baseline characteristics between the obstetrician-administered and the locum-anaesthetist-administered spinal anaesthesia groups; there was no statistically significant difference. The height of block obtained ranged between T4 and T8 in both groups.

Insert Tables 1 and 2

Table II shows the comparison of the outcome variables between the two groups. The caesarean Decision-Delivery Interval among the controls (144.54 ± 28.00 minutes) was more than double that of the study group (59.67 ± 9.40 minutes), a difference which was statistically significant ($p<0.001$). An approximately four-fold reduction was also observed in the interval between caesarean Decision and Commencement of Spinal anaesthesia and this was equally highly significant ($p<0.001$). The Spinal Commencement-Incision Interval was however significantly shorter in the control group ($p<0.001$), while the study group maintained a significantly shorter Incision-Delivery Interval (3.17 ± 1.36 min vs. 5.69 ± 1.49; $p<0.001$).

The fetal outcome was comparable between the two groups as there was no statistically significant difference in the mean Apgar scores at one minute and at five minutes. There was no perinatal death in either group. Two babies in each group had Apgar scores of <7 at 1 minute, but they all responded well to resuscitation with five-minute Apgar scores ≥7 and none required special care.

The duration of the block was similar in both groups, as was the incidence of post dural puncture headache. In all the five women who had post dural puncture headache in the study group, the symptom appeared on the first or second postoperative day and resolved within two to three days of analgesics and bed rest. Mean postoperative hospital stay was significantly shorter ($p<0.001$) in the study group (3.74 ± 0.66 days) compared to the controls (5.14 ± 0.75).

The caesarean Decision-Delivery Interval was also significantly shorter ($p=0.002$) in the study group (59.67 ± 9.40 minutes) when compared with an equal number of women who had ketamine anaesthesia for emergency caesarean section (67.38 ± 12.27 minutes) in the same centre prior to this study. The mean duration of postoperative hospital stay was significantly longer ($p<0.001$) in the ketamine group (4.95 ±

0.99 days) than in the study group (3.74 ± 0.66 days). Comparison of Apgar scores between the two groups revealed significantly lower mean Apgar scores at one and five minutes in the ketamine group ($p<0.001$). Significantly more babies ($p<0.001$) had Apgar score <7 at one minute in the ketamine group (n=13) than in the study group (n=1). A similar relationship was observed at five minutes (ketamine=3; spinal=0) but the difference was not statistically significant. There was no perinatal mortality in either group.

DISCUSSION

The result of this study shows a two and half fold reduction in the caesarean Decision-Delivery interval with the use of obstetrician-administered spinal anaesthesia for emergency CS. This substantial reduction was contributed mainly by the nearly four-fold shortening of the delay from caesarean Decision to Commencement of Spinal anaesthesia with the introduction of obstetrician administered spinal anaesthesia. There was also a significant reduction in postoperative hospital stay.

Delay in the provision of required treatment at the healthcare facility (Phase 3 delay)[10] has been identified as one of the major contributors to maternal and prenatal morbidity and mortality in underdeveloped countries especially in sub-Saharan Africa. Such delays are usually due to lack of infrastructure and equipments, lack of essential drugs and supplies, as well as lack of skilled personnel. In particular, unacceptably long caesarean Decision-Delivery Intervals have been reported in studies from various Tertiary Hospitals in Nigeria.[11-14] Onwudiegwu et al[11] in 1999 reported a mean caesarean Decision-Delivery Interval of 4.4 hours with a range of 0.5 to 26 hours in Ile-Ife, Nigeria. Six years later, Orji et al[12] reported phase 3 delays in forty six out of fifty (92%) caesarean deliveries in the same centre and demonstrated the causal role of these delays in one maternal death.

All these studies identified "Waiting for Anaesthetists" as one of the major contributors to this delay. With such a grim scenario in the tertiary hospitals (where most anaesthetists are employed) an even worse situation might rightly be expected in the private hospitals. The mean caesarean Decision-Delivery Interval of approximately 2.5 hours in the control group of this study though unacceptable still compares favorably. Obstetrician administered Spinal anaesthesia reduced this interval to less than one hour with a concomitant reduction in postoperative hospital stay. There was no significant morbidity associated with it except for post dural puncture headache, the incidence of which was not significantly different from that of the controls. Unfortunately our study was not adequately powered to compare maternal or prenatal mortality in the two groups.

Ketamine anaesthesia was associated with lower one-minute Apgar scores and longer postoperative hospital stay. It was also associated with a longer Decision-Delivery interval than obstetrician administered spinal anaesthesia. These observations support earlier reports about ketamine anaesthesia for caesarean section.[6,15] This finding again underscores the need to scale up the use of spinal anaesthesia thereby reducing the use and misuse of ketamine anaesthesia for caesarean section considering the various disadvantages and risks it presents.

In 1977, Ajao et al[16] described 95 surgical cases including gastrectomy; cholecystectomy, vagectomy, pyloroplasty and splenectomy performed by the "single handed surgeon-anaesthetist". They strongly recommended that any medical officer or surgeon who intends to practice in tropical or young developing countries must be proficient in the use of local and spinal anaesthesia, because of severe shortage of anesthaetists and anaesthetic machines. Thirty four years after, this aphorism remains bona-fide in Nigeria, especially regarding provision of anesthesia for emergency caesarean section.

Table 1: Comparison of baseline characteristics of women who had obstetrician administered-spinal anaesthesia with those who had locum anaesthetist-administered anaesthesia for emergency caesarean section

Patients baseline characteristics	Obstetrician - administered spinal anaesthesia	Locum anaesthetist - administered spinal anesthesia	p-value
Age			
Mean ± SD	27.8 ± 3.4	27.7 ± 3.0	0.89
Range	24 - 40	24 - 41	
Parity (n (%))			
Para 0	26 (61.9)	25 (59.5)	0.88
Para 1	11 (26.2)	12 (28.6)	
Para 2	5 (11.9)	5 (11.9)	
Median Parity	0	0	
Gestational Age (Mean ± SD)	38.8 ± 1.5	38.6 ± 1.4	0.55
Previous CS [Number (%)]	38 (90.5)	36 (85.7)	0.76
No Previous CS	3 (7.1)	5 (11.9)	
1 Previous CS	1 (2.4)	1 (2.4)	
2 Previous CS's			

CS: caesarean section; SD: Standard Deviation

Table 2: Comparison of outcome measures among women who had obstetrician-administered spinal anaesthesia and those who had locum anesthetist-administered spinal anaesthesia for emergency caesarean section

Outcome	Obstetrician - administered spinal anaesthesia	Locum anaesthetist - administered spinal anaesthesia	p-value
Caesarean Decision - Commencement of Spinal (Mean ± SD Minutes)	33.90 ± 7.15	122.57 ± 28.69	<0.001
Commencement of Spinal - Incision Interval (Mean ± SD Minutes)	22.12 ± 4.52	15.79 ± 1.75	<0.001
Incision - Delivery Interval (Mean ± SD Minutes)	3.17 ± 1.36	5.69 ± 1.49	<0.001
Caesarean Decision - Delivery Interval (Mean ± SD Minutes)	59.67 ± 9.40	144.54 ± 28.00	<0.001
Apgar scores			
1 minute	9.20 ± 1.24	9.12 ± 1.21	0.86
5 minutes	9.90 ± 0.37	9.90 ± 0.37	1.00
Duration of block (Mean ± SD Minutes)	166.19 ± 19.25	164.52 ± 16.99	0.68
Post Dural Puncture Headache (n (%))	5	4	0.72
Duration of postoperative hospital stay (Mean ± SD Days)	3.74 ± 0.66	5.14 ± 0.75	<0.001

SD: Standard Deviation

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