

# Maternal Deaths During Caesarean Delivery In A Developing Country-Perspective From Nigeria

U Okafor, H Ezegwui

## Citation

U Okafor, H Ezegwui. *Maternal Deaths During Caesarean Delivery In A Developing Country-Perspective From Nigeria*. The Internet Journal of Third World Medicine. 2008 Volume 8 Number 1.

## Abstract

**OBJECTIVE:** To examine the changing trend in maternal deaths during caesarean delivery in a tertiary care hospital in Nigeria over an 8 year period. **MATERIALS/ METHODS:** An observational retrospective study was carried out at the University of Nigeria Teaching Hospital (UNTH), Nigeria to determine the causes and risk factors for maternal deaths during caesarean delivery from July 1998 to June 2006. **RESULTS:** A total of 6798 women delivered during the study period. There were 1579 caesarean sections (23% caesarean section rate). There were nine documented deaths during the course of anaesthesia and surgery to given an incidence of 5.6/1000 anesthetics.

Six deaths were directly attributable to anaesthesia, three were indirectly attributable.

**CONCLUSION:** The number of maternal deaths in this study was initially high. Since the increased use of spinal anaesthesia and employment of more doctors, the rates have dropped drastically.

## INTRODUCTION

Professor Aitkenhead noted that “the focus of training in anaesthesia is concerned with the avoidance of disasters, rather than the management of their aftermath”.<sup>1</sup> This statement may be reflected in the scarcity of anesthetic literature concerning intraoperative deaths.<sup>2</sup> It is estimated that virtually all anaesthetists are likely to experience at least one intraoperative death during their careers and this can be quite traumatic to the medical personell involved. Defining anaesthetic deaths varies between studies. One view holds that deaths can be directly related to anaesthesia if the mishap occurs between the time of induction and the onset of surgery, but it is been reported that only 5 – 10% of the deaths attributed to anaesthesia occurred during that period<sup>3</sup>

This view precludes postoperative deaths occurring after intraoperative anaesthetic mishaps that follow human error or equipment failure. In some cases however, the cause of death may be purely speculative as it is difficult to ascertain the contribution of surgical insult, patient disease and anaesthesia to the outcome.

While perioperative deaths solely due to anaesthetic error in the general operating theatre are extremely uncommon in the advanced world with an estimated prevalence of 0.5 – 0.8/100,000 anaesthetics<sup>4,5</sup>, it is estimated to be much higher in the developing countries due to inadequate manpower and

materials.

Deaths are more in patients undergoing caesarean section with an estimated death rate of 1:10,000 (in the developed world) due mainly to difficult/failed endotracheal intubation.<sup>6</sup> However, the widespread use of regional anaesthesia in the developed world has been associated with a reduction in maternal mortality directly attributable to anaesthesia. Emergency caesarean section is the commonest major surgical procedure in Africa.<sup>7</sup> A few reports put the perioperative mortality at 1-2%, with a third of the deaths directly attributable to anaesthesia.<sup>8-11</sup>

While there have been studies dealing with anaesthetic related maternal deaths during and after caesarean section, few have been done on intraoperative deaths or ‘death on the table’ in this population. This study was undertaken to determine the causes and risk factors for maternal deaths during caesarean section in the University of Nigeria Teaching Hospital, (UNTH), Ituku Ozalla/Enugu, Nigeria.

## MATERIALS/METHODS

An observational retrospective study was carried out at the UNTH, Enugu, Nigeria to determine the causes and risk factors for maternal deaths during caesarean delivery from July 1998 to June 2006. The obstetric theater records were reviewed for deaths during anaesthesia for caesarean section

and their hospital records examined for demographics, obstetric/anaesthetic records and cause of death. There was an assessment of general anaesthesia rates over the study period for caesarean section and an assessment of changes in staffing and equipment over time. Obstetric anaesthesia in the hospital is predominantly provided by senior trainees known as Senior Registrars (trainees who have completed more than 24 months posting including a pass in the part one fellowship examination of either the National Postgraduate Medical College of Nigeria or the regional West African Postgraduate Medical College). Anaesthesia for patients with severe co-morbidity is usually provided by consultants or the most senior trainee specialists. The anaesthesia department presently has five consultants.

### RESULTS

A total of 6798 women delivered in our centre during the study period.

The total number of births was 7085, with 6485 live births. There were 1579 caesarean sections (23% caesarean section rate).

There were nine documented deaths during the course of anaesthesia and surgery to given an incidence of 56/10000 anaesthetics.

There were six deaths in patients with preeclampsia, two in patients with obstructed labour and one death in a patient with previous caesarean section and postdatism. All patients had received general anaesthesia. Six deaths were directly attributable to anaesthesia and three were indirectly attributable. Eight of the deaths occurred during the first four years of the study when the regional anaesthesia rate was 1.3%.

Failure to intubate/ventilate and pulmonary aspiration were the direct anaesthetic causes to give a maternal mortality of 37/10,000 anaesthetics. Cerebrovascular accident, pulmonary oedema and massive intraoperative haemorrhage (following failure to achieve haemostasis) were considered causes of death indirectly related to anaesthesia, being complications of severe preeclampsia and placenta praevia. There were two still births in these patients. The nine deaths represented about 5.6% of maternal deaths in our centre from 1998 to 2006 (160 maternal deaths).

### DISCUSSION

The death rate in this study at 56/10,000 caesarean deliveries is very high compared to the reported 1:10,000 in caesarean

sections in the developed world<sup>6</sup>. But calculated based on deaths considered directly caused by anaesthesia, the death rate becomes 37/10,000 caesarean section (and about 3.75% of maternal deaths from 1998 to 2006). It is still higher than that from a study in Benin, Nigeria at 26/10,000 caesarean sections<sup>12</sup>.

A study reported from Togo, also in West Africa – reported a anaesthesia associated death rate of 377/10,000 caesarean sections.<sup>13</sup>

In a recent South African maternal mortality report, anaesthesia was the cause of 5% of direct maternal deaths<sup>14</sup>. There is no known national database on the causes of maternal mortality in Nigeria and estimates are bound to be imprecise.

Another study in the sub-Saharan African country of Zimbabwe put the avoidable maternal mortality rate in their hospital at 21/10,000 caesarean deliveries/anaesthetics.<sup>15</sup>

All the deaths in this study occurred during the first five years of the study period, from 1998 to 2003. From 2003 to the end of this study period, there were no maternal deaths during anaesthesia for caesarean section. This coincided with the rise in the number of doctors that entered the specialty (with better remuneration and shorter working hours), closer supervision of trainee specialists, increased use of pulse oximetry and regional anaesthesia in caesarean delivery. From a figure of 1.3% for the preceding four years (during which there were maternal 8 deaths), use of regional anaesthesia rose to 18% in 2003 (one maternal death), 48% in 2004, 72.6% in 2005 and 71% in 2006 (with no maternal deaths during anaesthesia).

This is consistent with studies that have shown a reduction in anaesthesia related maternal deaths in this group with the increased use of regional techniques<sup>9, 10, 16-20</sup>.

The presumed risk factors for the high maternal death rate in this study were the following: severe pre-eclampsia, inadequate monitors, poor airway management, general anaesthesia and management by trainee specialists working long shifts. Two of the risk factors mentioned above have to do with acquisition of special skills for safe obstetric anaesthesia and has been improved upon with closer supervision of the junior doctors.

The incidence of failed intubation in obstetric patients is reportedly 1:280 while the incidence of failed intubation in the general operating theatre is 1:2,320.<sup>21, 22</sup> This is due to a

difficult airway caused by enlarged tongue, breasts, vascular engorgement and oedema of nasal, oral pharynx, larynx and trachea.

Skilled providers of anaesthesia will always be important in our setting for the following anaesthetic and obstetric considerations; most caesarean sections often present as emergencies in patients who may be compromised; recognizing the importance of pre-anaesthetic visits and premedication with antacids and H<sub>2</sub> receptor antagonists as the aspiration of gastric content is leading cause of death in obstetric anaesthesia<sup>23</sup>, provision of safe regional anaesthesia as there have been reports of anaesthesia related maternal mortality with regional anaesthesia performed by poorly trained providers of anaesthesia.<sup>24,25</sup>

Importantly, there should be safe delivery of general anaesthesia especially in patients with contraindications to a regional technique.

Since most of the women with pregnancy related complications that may necessitate caesarean delivery are often the poorer rural women who may present first at a health care centre (primary), there needs to be some policy changes.

This includes promoting the training of health personnel, good referral systems, and adequate materials and equipment to ensure patient safety. There should be guidelines on the best practice protocols for emergency procedures and the attendant equipment required.<sup>26</sup>

It has been reported that most surgical deaths occur postoperatively with cardiovascular complications playing a major role<sup>27</sup>. In resource poor settings, where inadequate supply of agents for intraoperative therapeutic intervention like blood products/or potent drugs can lead to deaths, anaesthesia should not be held culpable. Because human errors have been mostly indicted<sup>27</sup>, experienced doctor/nurse anaesthetists skilled in safe delivery of anaesthesia should be encouraged to serve in rural areas with rural duty allowances where their services can be invaluable. Less experienced nurses should be taught airway management since most of them tend to give general anaesthesia without endotracheal intubation. A versatile monitor like the pulse oximeter should be provided in health centres with operative capabilities.

These solutions are not simple, and require political will on the part of the leaders to ensure safe motherhood for future generations.

## CONCLUSION

The number of maternal deaths in this study is high. This may be partly due to a paucity of anaesthetists during the early years of this study when most of the deaths occurred. Most of the patients had co-morbidity which is associated with more perioperative complications. Since the increased use of spinal anaesthesia and employment of more doctors, the rates have dropped drastically. However, a policy change is required for this improvement to be extended to primary and secondary tier hospitals where the poorer patients usually present. Experienced nurse anaesthetists skilled in safe delivery of anaesthesia should be posted to rural areas with incentive allowances where their services can be invaluable.

## ACKNOWLEDGEMENT

Thanks to the obstetric theatre and hospital records department for their assistance, and also to Miss Mercy Nwodo who graciously typed the manuscript.

## References

1. Aitkenhead AR. Anaesthetic disasters: handling the aftermath. *Anaesthesia* 1997; 52: 447 – 482.
2. White SM. “Death on the table” *Anaesthesia*, Editorial 2003; 58; 515-518.
3. Maran NJ, Spence AA. Epidemiological aspects of anaesthesia. In: Prys-Roberts C, Brown BR. *International Practice of Anaesthesia*. Butterworth-Heinemann; Oxford; 1996: 2/165/1-18.
4. Lunn JN, Devlin HB. Lessons from the confidential enquiry into perioperative deaths in three NHS regions. *Lancet* 1987; ii: 1384-1386.
5. Pedersen T. Mortality associated anaesthesia. *Balliere’s Clinical Anesthesiology* 1996;10:237-50.
6. Baker B, Jenkins IK. Consent and anesthetic risk. In: Allman K.G, Wilson IH. (eds) *Oxford Handbook of Anaesthesia* 2nd edition, Oxford University press, Oxford; 2006:15 – 37.
7. Nordberg E. Surgical operation in Eastern African: a review with conclusions regarding the need for further research. *East Afri Med J* 1990; 67 (suppl): 1-28.
8. Hansen D, Gausi SC. Anaesthesia in Malawi: complications and deaths. *Trop Doc* 2000; 30:146 – 149.
9. Fenton PF, Whitty CJW, Reynolds F. Caesarean section in Malawi: Prospective study of maternal and perinatal mortality. *BMJ* 2003; 327: 587 - 590.
10. McKenzie AG. Operative mortality at Harare Central Hospital 1992 – 1994: an anesthetic view; *Int J Obstet Anaesth*. 1998; 7:237-41.
11. Tomta K. Ouro – Bang’na Maran AF, Ahouaangbevi S, Chobli M. Deaths associated with anaesthesia in Togo, West Africa. *Trop Doc* 2005; 35: 220-3.
12. Enohumah KO, Imarengiaye CO. Factors associated with anaesthesia – related maternal mortality in a tertiary hospital in Nigeria. *Acta Anaesthesiol Scand* 2006; 50:206-210.
13. Tomta K, Maman FO, Agbeta N, Baeta S, Ahouaangbevi S, Chobli M. Mortalite’ Maternelle: Implication anaesthesique au CHU de LOME (TOGO). *Santé* 2003; 13:77-80.
14. Clyburn P. Morris S, Hall J. Anaesthesia and safe

motherhood Anaesthesia. 2007; 62: 21 – 25.

15. Glenshaw M, Madzimbamuto FD. Anaesthesia related mortality in a district hospital in Zimbabwe: 1994 – 2001. *Cent. Afr J Med* 2005; 51:39-44.

16. McClure J, Cooper G. Fifty year of confidential enquires into maternal deaths in the United Kingdom: should anaesthesia celebrate or not? *Int J Obstet Anaesth* 2005; 87 – 89.

17. Clyburn PA. Early thoughts on “why mothers die 2000 – 2002. *Anaesthesia* 2004; 59:1157-1159.

18. Saravanakumar K, Rao SG, Cooper GM. Obesity and obstetric anaesthesia. *Anaesthesia* 2006; 61: 36-48.

19. Cyna AM, Dodd J. Clinical update: obstetric anaesthesia. *www.thelancet.com* Vol 370, August 25, 2007.

20. Interim Report on the Confidential Enquiry into Maternal Deaths in South Africa, March 1998, 1999 by the National Committee for the Confidential Enquiry into Maternal Deaths (NCCEMD).

21. Lyons G. Failed Intubation. *Anaesthesia* 1985; 40: 759-762.

22. Samsoon GLT, Young JRB. Difficult tracheal intubation: a retrospective study. *Anaesthesia* 1987; 42: 487 – 490.

23. Hawkins JL, Gibbs CP, Orleans M. et al. Obstetric anaesthesia work force survey, 1981 versus 1992. *Anesthesiology* 1997; 87: 135 – 143.

24. Mhyre JM, Riesner MN, Polley LS, Naughto NN. A series of anaesthesia – related deaths in Michigan 1985 – 2003. *Anesthesiology* 2007; 106: 1096 – 1104.

25. Rout C. Maternal mortality and anaesthesia in African: a South African perspective. *Int J. Obstet Anaesth.* 2002; 11: 77 – 80.

26. Cherian MN. Obstetric analgesia and anaesthesia; Clinical Procedures. Department of Essential Health Technologies, WHO, GENEVA, Switzerland.

27. Arbous MS, Grobbee DE, van Kleef JW, de Lange JJ, Spoormans HH, Touw P, Werner FM, Meursing AE. Mortality associated with anaesthesia: a qualitative analysis to identify risk factors. *Anaesthesia.* 2001; 56:1141-53.

**Author Information**

**Ugochukwu Okafor, FMCA**

Department Of Anaesthesia, University Of Nigeria Teaching Hospital

**Hyginus Ezegwui, FWACS**

Department Of Anaesthesia, University Of Nigeria Teaching Hospital