

## Mothers of Africa – an anaesthesia charity

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### Summary

An anaesthetic charity 'Mothers of Africa' has been established as a link between the academic departments of anaesthesia in Togo and Benin and the University Hospital of Wales. Visits by UK consultant anaesthetists have identified a number of clinical areas where collaborative working in both classroom and theatre has the potential to improve outcomes in maternal mortality and morbidity.

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A presentation by Professor Martin Chobli, Head of Department of Anaesthesia at the University Hospital in Cotonou, Benin, at the World Congress of Anaesthesia in Paris 2004 alerted us to the appalling maternal mortality rate in sub-Saharan Africa. We have since established the charity 'Mothers of Africa', a link between the academic departments in Togo and Benin and the academic and NHS departments of the University Hospital of Wales. We have completed two educational visits to Benin and Togo, providing a mixture of seminars, lectures, workshops and in-theatre teaching to the nurse anaesthetists of these two countries. The following report is an amalgamation of our experiences on these two trips.

### Togo and Benin

Togo and Benin are neighbouring French-speaking republics with many similarities in the provision of anaesthesia between them.

Togo has a population of about 6 million, with about 1 million people living in and around the capital, Lomé. The maternity services are based in the University Hospital, with about 2000 procedures per annum, of which 50% are Caesarean sections. There are only three medically qualified anaesthetists in the whole country, all of whom work in the University Hospital. The remainder of the anaesthesia service is provided by 70 nurse anaesthetists working unsupervised in 14 hospitals or health centres, with very variable access to drugs and equipment. Entry into nursing requires a leaving quali-

fication from school, followed by 2 years of training. Training to become a nurse anaesthetist takes a further 3 years, but there is little opportunity for additional or refresher training after qualification.

There are two hospitals that provide maternity services to Cotonou, the capital of Benin; the University Hospital (CNHU) and a specialist maternity and paediatric hospital (HOMEL). In HOMEL there are 7500 deliveries per annum with a 30% Caesarean section rate, of which about 65% are conducted under spinal anaesthesia. The University runs a 4-year postgraduate anaesthetic course for physicians of which 1 year is spent abroad, usually in Europe. Anaesthetists from other French-speaking West African countries are trained in Benin. There are about 12 medically qualified anaesthetists and approximately 70 nurse anaesthetists for a population of about 7.5 million. There is a co-operative arrangement with a Belgian University for continuing postgraduate education of medical anaesthetists, but no such arrangement exists for the nurses.

In both countries, the patients pay for their drugs and investigations, whether in the public or private sectors. For emergency treatment, this often involves borrowing money from members of the family, who move in and set up camp in the grounds of the hospital. The grounds are virtually spotless, as early each morning the women can be seen brushing the dusty red soil. Anaesthetic drugs are purchased in a pack from pharmacy, and any left over may be used to treat patients who present as emergencies or without the ability to pay. The cost of a

Caesarean section in Lomé is about UK£60, which is more than half the monthly salary of a nurse anaesthetist. Blood, when available, costs between UK£5 and UK£8 and patients are sometimes charged for postoperative oxygen.

Reliable figures for maternal mortality rates are hard to obtain. The official maternal mortality in Benin is about 498 per 100 000 live births, although a more realistic estimate may be closer to 850 per 100 000 [1]. At HOMEL in 2004, there were 92 deaths from 7500 deliveries. In Abomey, a town of 130 000 inhabitants 65 miles to the north of Cotonou, there were 58 deaths in 2600 deliveries, giving a maternal mortality of between 1 and 2% of those mothers who reached hospital. Many mothers present very late in labour, having had no antenatal care, after a journey of many hours; some arrive sitting on the back of motor scooters. The leading causes of death are haemorrhage (and postpartum anaemia), infection, uterine rupture, eclampsia and anaesthesia.

For cases involving maternal haemorrhage, ketamine is the anaesthetic of choice. There is no suxamethonium, primarily because of lack of reliable refrigeration. Pancuronium is the only muscle relaxant available, but unfortunately there is no neostigmine for reversal of muscle relaxation. Manual ventilation is used through a variety of circuits.

Dr Ouro-Bang'na, one of the medically qualified anaesthetists in Togo, has performed a prospective study on the incidence of awareness in elective cases under general anaesthesia. Of 342 consecutive cases, there were six instances of awareness (1.7%), with half of these occurring in elective gynaecological cases and half in elective Caesarean sections. The rate of awareness for emergency Caesareans is not known, although if volatile anaesthetic agents are not available, thiopental or ketamine is supplemented by intravenous diazepam, which may reduce the incidence of awareness.

### Our teaching programme

As Benin and Togo are French-speaking countries, the trainers need to have either access to a professional translator or a reasonably good grasp of French. The importance of using intrathecal morphine 'sans préservatif' was met with blank looks followed by hysterical laughter. There is, after all, no reason to use a condom during spinal anaesthesia; it should of course have been 'sans conservateur'!

The format of the teaching for the two visits was similar. Three experienced consultant obstetric anaesthetists spent a week in each country. In addition, a fourth consultant travelled to Benin to gather information on the maternal deaths and attempt a root cause

**Table 1** Topics taught in the seminars.

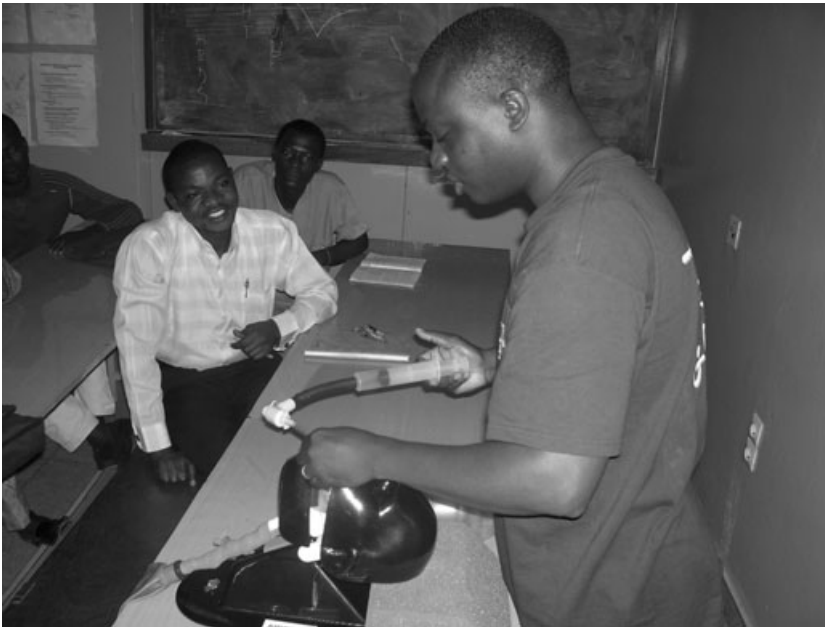
General anaesthesia for Caesarean section
Airway management
Assessment
Difficult and failed intubation
Extubation
Spinal anaesthesia
Management of obstetric haemorrhage
Management of pre-eclampsia/eclampsia
Recognition of sick parturients
ALERT™ style training
Neonatal resuscitation

analysis. Each group of anaesthetic nurses, between 15 and 28, attended for 2 days, with two groups being taught on each visit. Some had travelled as far as 500 km to attend, although the nurse working in the northernmost hospital in Togo was unable to attend because he was the only anaesthetist in the area and provided round-the-clock cover.

The topics presented are shown in Table 1. Interaction was encouraged and the questions from the delegates showed that there was a broad spectrum of theoretical knowledge, from the newly qualified nurses working in the University Hospital to the older, almost self-trained, nurses working totally unsupervised in the rural areas. In Benin, there was a mixture of nurses and a few medical anaesthetists, in Togo nurses only.

For the workshops, we used manikins to teach difficult and failed intubation drills, adapted to local conditions. With no suxamethonium or cricothyroidotomy devices and rules precluding nurses from performing tracheostomies, the emphasis was even more strongly on getting it right first time. We showed how to construct and use a Wee oesophageal detector device (Fig. 1), so that each nurse could do the same after returning to their hospitals. Stylets were available, but intubation over a bougie was a new technique that was practised with enthusiasm (Fig. 2). Every anaesthetist in Cotonou had a tin box containing their equipment: laryngoscope, tracheal tubes, airway, suction catheter, most of it washed and re-used between cases. Each anaesthetist in Benin now has a re-useable bougie to add to their box, which hopefully will be of the correct dimensions to keep the bougie at its optimum curvature. All attendants knew of laryngeal mask airways, but the majority did not have access to them. We managed to provide a supply of laryngeal mask airways and described their use in airway rescue.

Until recently in the UK, extubation was a phase of anaesthesia that had received little attention, and not surprisingly the same is true in Africa. With no neostigmine or nerve stimulators, we felt it important to discuss the clinical assessment of recovery of neuromuscular junction prior to tracheal extubation.



**Figure 1** Wee oesophageal detector device.

Discussion about eclampsia was a learning experience for us all given the high incidence of severe cases locally. Blood pressure and fluid management in pre-eclampsia and eclampsia were fairly conventional with more use of regular furosemide than in the UK. Both countries have a similar intramuscular magnesium protocol but the striking difference is that, in Benin, it is controlled by the anaesthetists (Table 2), and in Togo by the obstetricians. Patients who have had, or are at risk of having, seizures are secured to their beds with wrist and ankle straps. One-to-one midwifery care is a luxury. Although eclamptic patients usually have intravenous access, the shortage of nurses makes intravenous infusions of magnesium haz-

**Table 2** Magnesium sulphate protocol in HOMEL, Benin (with thanks to Dr Eugene Zoumenou).

Initially
4 g slowly intravenously over 15 min
At the same time as intravenous injection, 5 g intramuscularly into each buttock
Total initial dose 14 g (4 g intravenous and 2 × 5 g intramuscular)
Then
5 g intramuscular every 4 h for 24 h alternating left and right buttock
Monitoring
Urine output, tendon reflexes, respiratory frequency
Stop or delay injections if problems with monitoring



**Figure 2** Intubation over a bougie.

ardous. With between one and two eclamptic patients per week, and four times that number with severe pre-eclampsia, the sporadic supply of magnesium is a problem. Our seemingly generous donation of 100 ampoules of 50% magnesium sulphate only lasted a couple of weeks. This reinforced the point that long-lasting change is more likely to result from education and training than donations of equipment and drugs.

### Theatre teaching

Teaching in theatre was undertaken in small groups with about five delegates to each consultant. Although perhaps the most valuable environment in which to train, it was inevitably dependent on suitable cases. As in the UK, the majority of the emergencies seem to happen out of hours. Observing practice in theatre, major barriers between theoretical knowledge and its practical application were apparent.



**Figure 3** Positioning of women for spinal anaesthesia.

There were no pillows for intubation, and even a folded towel under the occiput was viewed with scepticism by some who felt that it might make intubation more difficult. Two grade 3 laryngoscopies proved timely in allowing demonstration of the use of a bougie. The tilting mechanisms on the majority of the operating tables were seized up. Despite knowledge of aortocaval compression, there was reluctance to place any sort of wedge under the mothers' right hip, as this was not favoured by the obstetricians.

The use of spinal anaesthesia has been increasing over the last few years, particularly in the University Hospitals. We discussed positioning of women for spinal anaesthesia,

as there was a tendency to attempt insertion with the mother sitting lengthways rather than across the table, with her legs straight out in front (Fig. 3). This was so that general anaesthesia could be started more quickly if the spinal insertion was unsuccessful. Plain isobaric bupivacaine was more readily available than hyperbaric, and opioids were not added routinely, although preservative-free morphine and fentanyl were available. One of the greatest concerns of the nurses working solo was the risk of a total spinal. We demonstrated assessment of the level of anaesthesia using light touch and pinprick, as ice was in short supply, and also reassured delegates that if the mother can squeeze your hands, her diaphragm would

### Obstetric anaesthesia

The mother is placed supine and naked in a crucifix position and pre-oxygenation is commenced with the facemask secured by a Clausen harness. The air conditioning is working today so the theatre temperature is 19 °C. An 18G intravenous cannula is sited and an infusion of Hartmann's solution is started from a glass bottle. The table doesn't tilt because the mechanism is broken and there is no pillow either for the head or to provide lateral tilt. Administration of thiopental 500 mg and pancuronium 4 mg are followed by the only witnessed word of communication between the obstetrician and the anaesthetists, 'incision', shortly followed by the rapid delivery of the baby. Only then is the trachea intubated and intermittent manual ventilation started with 100% oxygen. Drug times and doses are accurately recorded, along with records every 5 min of pulse rate and blood pressure, measured using a manual sphygmomanometer. There is no ECG, pulse oximetry or capnography. The halothane vaporiser on the old Boyle's machine is empty and even if it could be turned on, the obstetricians do not allow volatile agents during Caesarean section because of the relaxant effects on the uterine muscle. Surgery is slick and efficient but, after closure of the uterus, the mother starts moving and has to be restrained. Intravenous paracetamol and fentanyl are given along with another bolus of thiopental. On completion of surgery, the trachea is extubated with the patient still supine but without any assessment of motor function or reversal with neostigmine (not available). The mother is then transferred to the recovery ward. On review later that day, she is relieved and thankful that her baby has survived, describes no intra-operative awareness and has no pain.

also be functioning, irrespective of the height of the sensory block. One limiting factor with spinal anaesthesia is that some of the rural centres do not have access to a laboratory for a platelet count, so it was difficult to encourage more widespread use of spinal anaesthesia for urgent or emergency cases such as in women with pre-eclampsia.

As part of the ALERT<sup>TM</sup>-type teaching, we conducted ward rounds on the postoperative ward/‘high dependency unit’ (HDU) to encourage and re-emphasise a structured approach to the assessment of sick patients. In Benin, there was a conservative attitude towards postoperative feeding, even in uncomplicated cases. Mothers tended to be ‘nil by mouth’ for the first postoperative day with a gradual increase in solid intake over the next 2 days. Meals are provided by the patient’s families.

### Conclusions

It will take a continued commitment to the education of anaesthetists in these two countries to effect change, but it is immensely rewarding to have the opportunity to teach a group of people who are so eager to learn. Anaesthesia is still very underdeveloped in West Africa, and anaesthetists are poorly paid and not held in very high regard by their surgical colleagues. It is clear that political, social and economic changes would bring about more rapid improvements than we are able to introduce, but these are some way off and beyond our control.

The teaching and training provided on the second trip was much better than on the first because of a greater understanding of the needs of the participants: the next trip will be even better. For the teachers, it is a challenge to adapt your teaching to a different environment and to treat patients so far out of your comfort zone. It is a timely reminder of the importance of basic clinical skills and acumen. We are grateful to the clinical directors who authorised the professional leave. We believe that there are significant benefits to the National Health Service in terms of professional development, and no one who has worked in Africa quite views wastefulness in the same way when they return.

### Conflict of Interest

Mothers of Africa has received a donation from the Association of Anaesthetists of Great Britain and Ireland.

### Reference

- 1 Department of Reproductive Health and Research, World Health Organization. *Maternal Mortality in 2000. Estimates developed by WHO, UNICEF, UNFPA*. Geneva: Department of Reproductive Health and Research World Health Organization, 2004. [http://www.who.int/reproductive-health/publications/maternal\\_mortality\\_2000/mme.pdf](http://www.who.int/reproductive-health/publications/maternal_mortality_2000/mme.pdf) [accessed 3 June 2007].