ORIGINAL ARTICLE

Active management of third stage of labor: evidence versus practice

OLUFEMI T. OLADAPO¹, OLUWAROTIMI I. AKINOLA², ADENIRAN O. FAWOLE³, ADEWALE S. ADEYEMI⁴, OMOLOLU ADEGBOLA⁵, OLABISI M. LOTO⁶, ADETOKUNBO O. FABAMWO², MOSES O. ALAO⁷ & JOHN O. SOTUNSA¹ for the Nigerian AMTSL Group

¹Maternal and Fetal Health Research Unit, Department of Obstetrics & Gynecology, Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria, ²Department of Obstetrics & Gynecology, Lagos State University Teaching Hospital, Ikeja, Lagos State, Nigeria, ³Department of Obstetrics & Gynecology, University College Hospital, Ibadan, Oyo State, Nigeria, ⁴Department of Obstetrics & Gynecology, LAUTECH Teaching Hospital, Osogbo, Osun State, Nigeria, ⁵Department of Obstetrics & Gynecology, Lagos University Teaching Hospital, Ido-Araba, Lagos State, Nigeria, ⁶Department of Obstetrics, Gynecology and Perinatology, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun State, Nigeria, and ⁷Department of Obstetrics & Gynecology, Federal Medical Centre, Abeokuta, Ogun State, Nigeria

Abstract

Objective. To determine the correct use of active management of third stage of labor (AMTSL) (using the full complement of existing standard definitions) and compare the outcomes of third stage of labor in women who received AMTSL (according to these definitions) with those who did not. Design. Observational, cross-sectional survey. Setting. Seven tertiary centers in southwest Nigeria. Population. Women undergoing non-instrumental vaginal deliveries. Methods. Prospective direct observations of childbirth procedures. AMTSL was defined according to Cochrane review, ICM/FIGO (International Confederation of Midwives/International Federation of Gynecology and Obstetrics), and WHO (World Health Organization) recommendations. Main outcome measures. Use of AMTSL and its components and outcome of third stage of labor. Results. There was a high rate of compliance with most of the individual components of AMTSL. The use of AMTSL varied widely with the definition applied and tended to decrease with increasing strictness of the criteria (Cochrane review: 88.9%; ICM/FIGO: 42%; WHO: 1.8%). The frequencies of adverse labor outcomes were generally low (postpartum hemorrhage (PPH): 4.9%; severe PPH: 0.8%; retained placenta: 1.9%; uterine inversion: 0.0%). Frequencies of PPH, postpartum anemia, and mean blood loss among women who received AMTSL according to the Cochrane review definition were significantly lower than for those who did not (p < 0.05). There was no significant difference between any of the outcomes for women who received AMTSL according to the ICM/FIGO definition and those who did not. Conclusions. The survey reveals substantial definition-dependent variation in the providers’ adherence to recommended AMTSL practices. The clinical implications of the current practice in this population suggest the need for randomized comparison of various AMTSL packages to determine their comparative effectiveness in the prevention of PPH.

Key words: Postpartum hemorrhage, active management, evidence-based medicine

Introduction

Postpartum hemorrhage (PPH) is an important cause of maternal mortality, accounting for about a quarter of maternal deaths worldwide (1). The burden of this childbirth complication is further compounded by the non-availability of safe blood and blood products for the management of women in dire need and the unfavorable premorbid hemoglobin profile of women in resource-poor settings. Of the various causes of
PPH, uterine atony is the most common and the leading cause of maternal death resulting from this complication. Because of the inability to predict women who may develop this complication, interventions to prevent postpartum bleeding from uterine atony (atonic PPH) are directed at all women during childbirth.

An evidence-based intervention for the prevention of atonic PPH is the active management of third stage of labor (AMTSL), which has been promoted globally as part of efforts to reduce maternal mortality especially in developing countries (2). AMTSL as a preventive intervention greatly reduces the need for additional interventions and expensive and frequently unavailable resources needed to manage hemorrhage (3). While there is general agreement on the beneficial effects of AMTSL, its components and their definitions are less clear. This is reflected in the rapid evolution of internationally recommended guidelines on AMTSL over the last few years. A Cochrane review described the intervention as a package comprising of administration of prophylactic uterotonics after birth, early cord clamping and cutting, and placental delivery by controlled cord traction (4). Recent joint recommendations by the International Confederation of Midwives/International Federation of Gynecology and Obstetrics (ICM/FIGO) include the following components: administration of uteronic agent within one minute following delivery of the baby, controlled cord traction, and uterine massage after placental delivery (5,6); while in the ‘WHO recommendations for the prevention of postpartum hemorrhage’ (7), delayed cord clamping was added to the components recommended by ICM/FIGO to accommodate recent evidence suggesting beneficial effects of delayed cord clamping to the baby.

In spite of the efforts to standardize, update, and disseminate AMTSL practices worldwide, the extent of practice in areas where they are most needed is unclear. In Nigeria, for instance, the adoption and proper practice of this intervention at all levels of healthcare delivery is doubtful in view of the contribution of PPH to the national maternal mortality figures (8). Although a survey of Nigerian obstetricians reported a high adoption and practice rate of AMTSL (9), it is uncertain whether the same rate would be recorded through direct observation on their labor wards and to what extent the recommended components are adhered to. Objective assessment of the prevailing AMTSL practices in the light of current evidence and recommendations would guide health professionals and policy makers in their review of evidence-based strategies for reduction of maternal mortality due to PPH in this setting. In view of the challenges faced in translating research evidence into clinical practice in low resource settings, it is also imperative to examine the clinical consequences of current AMTSL practices in order to justify the advocated changes in related policies and regulations. It is within this framework that we conducted a multicenter study of providers’ practices in the third stage of labor in tertiary Obstetric centers in southwest Nigeria.

The aim of this study was to specifically examine the proportion of deliveries where AMTSL (using the full complement of existing standard definitions) was correctly used in the tertiary institutions in this region, assess how frequently the individual components of AMTSL were used, identify practices in third stage of labor that did not conform to existing definitions of AMTSL, and compare the outcomes of third stage of labor of women who received the full complement of AMTSL (according to different definitions) with those who did not.

Material and methods

Study setting

The study was an observational, cross-sectional survey in the obstetric units of all public tertiary care institutions in southwest Nigeria. These institutions were Olabisi Onabanjo University Teaching Hospital (OOUTH), Sagamu; University College Hospital (UCH), Ibadan; Lagos University Teaching Hospital (LUTH), Lagos; Ladoke Akintola University of Technology Teaching Hospital (LAUTECHTH), Osogbo; Lagos State University Teaching Hospital (LASUTH), Lagos; Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ilesa; and Federal Medical Centre (FMC), Abeokuta. These hospitals serve as referral centers for private, primary, and secondary health care facilities within the region. Obstetric services are provided to both high- and low-risk pregnant women by nurse/midwives, postgraduate resident doctors undergoing specialist obstetric training, and consultant obstetricians.

The investigation was conducted by prospective direct observations of childbirth procedures at individual centers by assigned and trained clinicians who are familiar with the existing and current standard definitions of AMTSL. The processes of the management of third stage of labor among non-instrumental vaginal deliveries conducted over a period of 14 hours per day (7 a.m. to 9 p.m.) were documented. Using a standardized data capture sheet, demographic characteristics such as age, parity, gestational age at...
delivery, booking status, hemoglobin concentration in labor or at the last antenatal visit, and previous history of PPH were obtained through a review of the parturients’ case files. Data on labor characteristics such as its nature of onset and duration, use of oxytocin for augmentation during the course of labor, time of birth, and fetal birth-weight were recorded. The components of AMTSL were observed and any practice(s) at variance with the existing definitions were noted. The outcome of third stage of labor with respect to estimated postpartum blood loss, use of additional uterotonics to stop or prevent further bleeding (in the form of either infusion or bolus injection), placenta retention, and postpartum hemoglobin concentration were also documented. No personal identifier of parturients or labor attendants was recorded. Written informed consent was obtained from the parturients in the admission room of the labor ward. Institutional approval was obtained from the ethical review boards of all participating institutions.

Sample size determination

The minimum sample size required for the study was estimated to be 384 using the formula: $n = \frac{N \cdot \left(1 - p \right)}{Z^2 \cdot d^2}$, where $n$ is the sample size, $Z$ is the standard normal deviate (set at 1.96 for 95% confidence level), $d$ is the desired degree of accuracy (taken as 0.05), and $p$ is the estimate of the rate of correct use of AMTSL among the target population (which was assumed to be 50% in the absence of a pre-existing estimate) (10). Adjustment for a 10% rate of invalid/erroneous entries yielded a final sample size of 427.

All women undergoing non-instrumental vaginal deliveries at the designated tertiary care centers during the period of the study were eligible for the study. Using the available statistics at each center, the average number of non-instrumental vaginal deliveries during each month at each center was estimated a priori. To achieve the desired sample size for the study, the number of deliveries to be observed at each center was determined by the proportional allocation ratio method (i.e. the total number of deliveries observed at each center was in accordance with the relative proportion of its monthly non-instrumental vaginal deliveries). Deliveries that were observed were selected by the systematic random sampling method (every third eligible parturient) during the period of the study until the estimated sample size for the center was achieved. Observations of deliveries were carried out concurrently at all the centers over a period of three months.

Definitions of AMTSL

Three definitions of AMTSL were considered in this study. The definitions are as described in the Cochrane review (4), the joint statement by ICM/FIGO on the prevention of PPH (5), and ‘WHO recommendations for the prevention of postpartum hemorrhage’ (7).

1. The definition of AMTSL as described by the Cochrane review includes the following interlocking interventions:

   a. Administration of prophylactic uterotonic (defined as the administration of any uterotonic concurrently with the delivery of the anterior shoulder of the baby or immediately after the delivery of the fetus but before the delivery of the placenta).

   b. Early cord clamping and cutting.

   c. Controlled cord traction for delivery of the placenta.

2. The definition of AMTSL as promoted by ICM/FIGO includes the following components:

   a. Administration of uterotonic agent (preferably 10 IU of oxytocin via intramuscular injection) within one minute following the delivery of the fetus.

   b. Controlled cord traction (defined as the gentle pulling of the clamped umbilical cord, with upward, manual support of the uterus) as a means of delivering the placenta.

   c. Immediate uterine massage following delivery of the placenta and palpation of the uterus to assess the need for continued massage every 15 minutes over the next 2 hours. For the purpose of this study, assessment of this component was limited to observation of immediate uterine massage following delivery of the placenta.

3. The definition of AMTSL as recommended by WHO includes the three components above plus delayed cord clamping (regarded as cord clamping after three minutes of birth).

Data management and analysis

Completed data forms were reviewed by the investigator at each center and later sent to a central collating center for analysis. Centrally collated data was coded and analyzed using the Epi Info 2002 statistical software (11). The frequency distribution and summary statistics (where applicable) of parturients observed
was computed. The proportion of women for whom AMTSL was correctly used according to the above definitions was calculated. Similarly, the proportion of women who received individual components of AMTSL was determined. The outcomes of third stage of labor were compared between parturients who had the full complement of AMTSL (according to each definition) and those who did not. Categorical variables were compared with the $\chi^2$ or Fisher’s exact test while continuous variables were compared with the t-test. Differences were considered statistically significant when $p < 0.05$.

Results

Characteristics of observed deliveries

Using the pre-specified selection criteria, a total of 486 non-instrumental vaginal deliveries were observed between April and June 2008 at the seven sites. Table I shows the characteristics of the observed deliveries and those of the parturients. The volume of deliveries in these facilities varied considerably, ranging from low-volume facilities with less than 1,000 deliveries a year to high-volume facilities with a volume of more than 5,000 deliveries a year. The providers who managed the deliveries included midwives, interns, and resident doctors. The majority of the parturients were between the ages of 20 and 34 years (mean 29.9 years, SD 4.8), received antenatal care at the respective study site, and delivered their babies at term. About two-fifths of them were having their first delivery and only 2.1% were grandmultiparae. A small fraction of the women had experienced PPH in their previous delivery.

Use of uterotonic drugs

Among the observed deliveries, a majority (475: 97.7%) of the women received an uterotonic drug at some point during their birth (i.e. during labor, delivery, or immediately postpartum). Labor was induced in 81 (16.7%) women and spontaneous in 405 (83.3%) women. A total of 273 (56.2%) women had oxytocin augmentation at some time during labor. Overall, 402 (82.7%) women observed received oxytocin, about a quarter (120: 24.5%) received ergometrine, and 42 (8.6%) received both. Two (0.4%) women received misoprostol while no one received the combination drug syntometrine. Figure 1 shows the timing for uterotonic administration among the observed deliveries. Among women who received oxytocin at some time during their birth, its administration was most frequent before the delivery (as part of the labor augmentation process) and after delivery of the fetus (as part of the AMTSL procedures). For those who received ergometrine, 105 (87.5%) women received it after the delivery of the baby, 3 (2.5%) received it during delivery of the placenta, and 4 (3.3%) after the delivery of the placenta.
Components and use of AMTSL by different definitions

In Figure 2, the findings and observations of the components and use of AMTSL according to recommended definitions are summarized. Except for immediate uterine massage after placental delivery and delayed cord clamping, the individual components of AMTSL were performed for a large proportion of the deliveries. The use of stricter criteria (within one minute of birth) for definition of prophylactic uterotonic technically reduced the practice by 13.3% (from 89.9% to 76.6%). The cord was clamped at less than one minute in a majority of the deliveries and delayed for more than three minutes only in 13 (2.7%) women. The use of the AMTSL package among the observed deliveries varied by the definition applied and tends to decrease with increasing strictness of the definition. Using the flexible definition described in the Cochrane review indicates that AMTSL was correctly used for the majority (88.9%) of the parturients, while according to the ICM/FIGO definition, AMTSL was correctly used in 204 (42.0%) women. The disparity between the practice of AMTSL as described by the Cochrane review and ICM/FIGO was essentially due to variation in the timing of administration of uterotonic and the use of uterine massage after placental delivery. Of the three definitions considered, AMTSL according to the WHO recommendation was the least practiced (1.8%). The providers’ practice did not meet the WHO recommendation largely due to the timing of cord clamping which was less than one minute after the delivery of the fetus in 94.4% of cases.

Potentially harmful practices

Three potentially harmful practices that can increase the risk of PPH or cause complications such as uterine inversion were also identified. These practices included application of fundal pressure while awaiting the placenta (17.1%) and application of cord
traction without manual support (9.1%) and without having administered any uterotonic drug (2.3%).

Use of AMTSL according to different definitions and outcome of third stage of labor

Of all the observed deliveries, 24 (4.9%) were complicated by blood loss in excess of 500 ml (PPH) and 4 (0.8%) by blood loss in excess of 1,000 ml (severe PPH). Estimated blood loss ranged between 100 ml and 2 liters with a mean of 209.4 ml. Thirty-three women (6.8%) had postpartum anemia (Hb < 9 g/dl). Twenty-nine women (13.6%) required additional uterotonic in addition to the prophylactic uterotonic to prevent or stop excessive blood loss. Nine cases (1.9%) of retained placenta and no case of uterine inversion were recorded.

Table II shows the comparison of the outcomes of third stage of labor between women who received AMTSL (according to different definitions) and those who did not. The mean blood loss and frequencies of PPH and postpartum anemia (Hb < 9 g/dl) were significantly lower among those who received the full complement of AMTSL as described by the Cochrane review than those who did not (p < 0.05). In the comparison of the outcomes of women who received the full complement of AMTSL according to the ICM/FIGO definition and those who did not, no significant difference was found between any of the parameters (p > 0.05). Comparison of outcomes of those who received the full complement of AMTSL according to the WHO definition with those who did not could not be made due to the small numbers.

Discussion

This survey describes the rates of use of an inexpensive and simple intervention in a region where enforcement of clinical policies is flexible and adherence to recommended guidelines is sometimes guided by factors other than providers’ knowledge of what works. The findings show a high rate of compliance...
with most of the individual components of AMTSL, although substantial variation exists in the adherence to current recommendations on the practice of AMTSL as an entity. The use of AMTSL for the surveyed population can be described as high, medium, or extremely low depending on the definition of AMTSL applied. A number of potentially harmful practices that need to be discouraged were also identified. Nevertheless, the current practice has a considerable positive impact on the outcome of third stage of labor as the frequencies of adverse events were generally low.

One advantage of this survey was that it utilized an appropriate methodology to capture labor ward practices as against medical record audit and interview of providers, which are subject to documentation and reporting biases, respectively. The documentation of the outcome of third stage of labor was deliberate as previous studies failed to explore the practical implications of reported AMTSL practices on the grounds of disparity in the methods of outcome measurement and incomplete data collection (12).

Our finding on the overall use of any uterotonic drug during some stage of labor is consistent with the observation of a similar survey conducted in Tanzania (13), although the main choice of uterotonic differs. As evident from its frequent use during labor management, oxytocin was generally available at these institutions, yet ergometrine was administered to a substantial proportion of the parturients. The use of ergometrine where oxytocin is available is not evidence based and needs to be discouraged in view of the possible consequences of its adverse effects in this setting.

The implications of the use of individual components of AMTSL among this obstetric population need to be considered in the light of the overall outcome of third stage of labor. Based on the available evidence on the relative benefits of oxytocin in the AMTSL package, it is reasonable to attribute the low incidence of PPH to the high percentage of deliveries for which a prophylactic oxytocin, especially oxytocin, was used. Compared to other components, administration of oxytocin appears to be the most important step in AMTSL. A Cochrane systematic review shows that the use of oxytocin halves the risk of PPH compared with placebo or no uterotonics (14). These results are consistent even if oxytocin is used as part of the active management approach or on its own without other components of active management. Although early cord clamping and cutting and controlled cord traction were also frequently practiced in this population, available evidence does not permit attributing the recorded incidence of PPH to these procedures. Presently, there is no evidence to suggest that the timing of cord clamping and placental delivery by controlled cord traction has any impact on the incidence of PPH (7).

The differing percentage of use of AMTSL based on the definition employed is attributable to practice variation in the timing of uterotonic administration (during or after the delivery of the baby versus within one minute of birth), timing of cord clamping (immediately after or within one minute of delivery versus more than three minutes after the delivery of the baby), and use of uterine massage after placental delivery. Although the overall frequencies of adverse outcomes of third stage were generally low, the proven benefits of AMTSL in the prevention of PPH were mainly observed in the comparison between deliveries that met the less rigid criteria for AMTSL.

Table II. Use of AMTSL according to different definitions and outcome of third stage of labor.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>AMTSL (Cochrane review)</th>
<th>AMTSL (ICM/FIGO)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, n = 432</td>
<td>No, n = 54</td>
</tr>
<tr>
<td>Mean estimated blood loss (ml)</td>
<td>198.7</td>
<td>294.3</td>
</tr>
<tr>
<td>Blood loss &gt; 500 ml (n = 24)</td>
<td>17 (3.9)</td>
<td>7 (13.0)</td>
</tr>
<tr>
<td>Blood loss &gt; 1,000 ml (n = 4)</td>
<td>2 (0.5)</td>
<td>2 (3.7)</td>
</tr>
<tr>
<td>Use of additional uterotonic (n = 29)</td>
<td>26 (6.0)</td>
<td>3 (5.5)</td>
</tr>
<tr>
<td>Retained placenta (n = 9)</td>
<td>6 (1.3)</td>
<td>3 (8.6)</td>
</tr>
<tr>
<td>Uterine inversion (n = 0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Mean fall in Hb concentration (g/dl)</td>
<td>0.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Postpartum anemia (&lt;27%) (n = 33)</td>
<td>25 (5.8)</td>
<td>8 (14.8)</td>
</tr>
</tbody>
</table>

*p-value not calculated.

Note: Hb, hemoglobin; AMTSL, active management of third stage of labor; ICM/FIGO: International Confederation of Midwives/International Federation of Gynecology and Obstetrics.
with those that did not. The lack of significant differences in the recorded outcomes between deliveries in which AMTSL was practiced according to ICM/FIGO recommendations compared to others suggests minimal contribution of uterine massage to the effectiveness of AMTSL as an intervention. This deduction is supported by the lack of strong evidence for the reduction of PPH by inclusion of uterine massage to AMTSL. In a Cochrane review, Hofmeyr et al. showed that the frequency of PPH was generally low regardless of whether uterine massage was performed after AMTSL or not (15). Although a relatively simple procedure, uterine massage at quarter hourly intervals for two hours, as recommended by ICM/FIGO, may be inconvenient to both women and labor attendants. Its benefits therefore need to be demonstrated to outweigh this shortcoming in large randomized trials that evaluate priority outcomes of third stage of labor. Although the impact of AMTSL practice in this population according to the WHO recommendation could not be assessed due to its low frequency, it is unlikely to be different from that of ICM/FIGO because the main difference (delayed cord clamping) between the two recommendations has not been shown to influence the incidence of PPH.

The limitations of this survey include its descriptive nature, which limits the inferences derivable from comparisons, the confinement of data collection to a certain period of the day (thus excluding practices in the early morning hours when labor attendants are unlikely to strictly adhere to protocol), and the method used for estimating postpartum blood loss. Data collection was restricted to a feasible period that permitted observation by the same observer in order to maintain the internal validity of the study. Although it may be argued that blood loss is often underestimated by the method employed, it is important to realize that interventions for combating hemorrhage by labor attendants in this setting and other similar settings are dependent on this method of assessment of blood loss.

In conclusion, the survey reveals substantial definition-dependent variation in the adherence of providers to the AMTSL practices recommended by international health bodies. The current practices in these institutions mostly conform to the earliest and least stringent recommendation on AMTSL and are at wide variance with the most recent guideline. The gap between current guideline and practice may reflect the time it takes for the adaptation, adoption, and dissemination of internationally recommended guidelines by the Nigerian health ministry to the various health institutions. This gap can be bridged by making available resources such as the Cochrane Library and WHO Reproductive Health Library to all providers involved in managing pregnant women at these institutions. However, the clinical implications of the use of AMTSL according to different definitions question the stringency of AMTSL criteria and call for randomized comparison of various AMTSL packages in order to determine their comparative effectiveness in the prevention of PPH. The findings of such a study would provide the basis for introduction of new guidelines for prevention of PPH and justify the resources that would be expended in translating current evidence into clinical practice in low resource settings.

Acknowledgements

The contributions of Drs. A. Akadri, O. Ayoola-Sotubo (OOUTH), B.A. Olofinbiyi, A. Adewumi (OAUTHC), Y. Oshodi, A. Adegboyega (LASUTH), O. Atanda (LAUTECHTH), O. Bamgbopa (FMCH), O.M. Akindele, and A.A. Okunowo (OAUTHC) with respect to data collection are acknowledged.

Disclosure of interest: No conflict of interest declared.

References