Solving the problem of post partum hemorrhage: A truly global effort

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"Women are not dying because of a disease we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving."

Mamoud Fathalla
President of the International Federation of Gynecology and Obstetrics
Copenhagen, 1997

Introduction

Post partum hemorrhage (PPH) is a condition that is virtually unique to humans. When bleeding occurs in subhuman primates, it is almost always associated with traumatic parturition [1]. The underlying cause of the tendency for bleeding to occur in humans compared to other animal species has not been subjected to vigorous investigation, but recently Abrams and Rutherford postulated it was a legacy of our evolutionary past with two specific changes occurring over the millennia: first, the transition to bipedalism was associated with a narrowing of the bony pelvis; and second, the marked enlargement of the human brain was associated with placental growth that had to be more invasive than those of other species to provide the enlarging fetus with sufficient nourishment for brain development [1].

Although not widely acknowledged, many statistics relating to maternal health are derived from estimates or counting procedures that are not precise. Even when a prestigious organization such as the World Bank publishes a fact sheet stating that 500,000 women die annually from pregnancy related issues [2], this number may represent a gross undercount, because accurate assessment of maternal deaths (or births, for that matter) is not possible in many areas of the world. Assuming, however, that 500,000 is factual, it would be equivalent to one fully loaded 747 crashing on a daily basis or, stated another way, one woman dying every minute of every hour of every day.

Perhaps more important than a verifiable number of deaths are those women who survive, either as “near misses” or as women who bear the stigmata of surviving a severe hemorrhage for years because of prolonged and persistent anemia or an inability to carry on with their routine activities of daily living. This latter number is far greater but totally speculative, because the true incidence of PPH is unknown and often is stated as a range of 1-5% of deliveries [3]. The enormity of the problem is best exemplified by the statement, “PPH is an equal opportunity killer.” That is not to say that textbooks and references in the literature do not provide risk factors aplenty for PPH. Rather, it is to emphasize that 50% or more of those who develop the condition have no risk factors, and that many women with one or more risk factors do not experience excessive bleeding. As if this point alone were an insufficient indication of the gravity of the situation worldwide, one also must consider that the current PPH definition, i.e. > 500 cc of blood loss for a vaginal delivery or >1000 of loss at the time of cesarean section, is hardly evidence-based, unless one wants to rely on a 1964 study of 64 patients with no controls and no randomization as “evidence.” Despite such uncertainties, two things are clear: first, more deaths (hospital and community) occur in developing as opposed to developed countries; and second, death is more likely to occur in the absence of trained birth attendants or when those in attendance lack the necessary training or equipment to prevent and/or manage PPH [4].

Signs of Change

It is not possible to state with certainty what event(s) brought about substantive changes in this picture during the first decade of the 21st Century, but interest in PPH increased enormously in terms of conferences, publications, involvement of academic
organizations, and by no means least, on the part of practicing physicians who were willing to attend special courses and lectures. Perhaps it was the certain knowledge that if circumstances did not change, it would be impossible to achieve the Millennium Development Goal 5 (MDG5) of a reduction in maternal mortality by a factor of 75% for the year 2015, because at least 50% of deaths in the immediate post partum period followed hemorrhage.

One of the most important steps in changing medical practice is to increase “awareness levels” on a local and an international basis. This can be accomplished using a variety of educational techniques, including lectures, publications, dissemination of guidelines from learned societies, and establishing hands-on workshops to teach specific technical skills. All were used extensively in the past decade in many areas of the world and involved multiple teaching modalities. In terms of lectures, the senior author (LK) alone presented lectures in 16 countries between 2004 and 2009. In terms of major conferences, the First International Conference on PPH (funded by the NIH in collaboration with a consortium of international agencies and NGOs) was held in Goa, India, in July 2006. It attracted several hundred participants from 22 countries, and the proceedings were published as a special edition of the International Journal of Gynecology and Obstetrics (FIGO) with 24 reports from these nations. Since then, several of the major international obstetrics conferences have devoted at least a half day to the topic that in the past had never appeared on programs.

The flagship PPH publication, A Textbook of Postpartum Hemorrhage (www.sapienspublishing.com), appeared in late 2006 at an official launch at the Royal Society of Medicine in London under the patronage of HRH Anne, the Princess Royal. According to David Bloomer who, along with his wife Paula, underwrote the publication costs, it is the only text in the history of British medical publishing with a royal imprimatur. The book was distributed without cost to more than 15,000 physicians internationally, received countless free downloads on www.glowm.com where it is still available, and, in the opinion of its publisher, has had a greater and more remarkable impact than any other of the thousands of books he has published in a career lasting more than three decades (David Bloomer, Personal Communication, February 2, 2011). The editors and authors of this landmark text, emanating from 19 countries, performed their editorial chores without remuneration. So far this book has been translated into Chinese and Turkish, and reprinting has been authorized to several agencies. A second edition will be brought forth at the 2012 FIGO Congress in Rome, Italy.

As evidence of the remarkable impact of A Textbook of Postpartum Hemorrhage and the growing recognition of the importance of increasing medical awareness of the perils of PPH and potential means to avert unnecessary deaths, learned societies have developed and distributed their own guidelines, starting with the WHO [5], the RCOG [6], the ACOG [7], and the SOGC [8].

On another front, hands-on courses are appearing, often under the sponsorship of local or medical organizations. These range from study days organized by hospitals, massive postpartum hemorrhage hands on skills workshops (Milton Keynes, United Kingdom; Cardiff, Wales; Bangalore, India), to courses co-sponsored by local societies (Bangalore chapter of the Federation of Obstetrics and Gynecologic Societies of India, FOGSI) with governmental support (the Egyptian Representative Committee of the Royal College of Obstetricians and Gynecologists with the support of FIGO and the Susanne Mubarak Regional Center for Women’s Health and Development).

Major International Milestones

B-Lynch Suture (United Kingdom)

In 1997, Christopher B-Lynch et al., publishing in the British Journal of Obstetrics and Gynecology, described a simple surgical technique that saved the uteruses of a small series of seven patients who might have otherwise undergone hysterectomy for severe PPH or even might have died [9]. The operation almost immediately caught the attention of the obstetric community because here, for the first time, was a reproducible intervention for uterine atony. In Lynch’s words, it combines the action of “braces” (the British term for trouser suspenders) with that of a belt to hold the uterus in a contracted position (Fig. 1). Since the original publication, more than 2000 cases have been reported on the Lynch website and infinitely more have been performed but not reported.

Oral Misoprostol Administered by Paramedical Workers (India)

In 2006, Derman et al., writing in Lancet, reported on the successful use of oral misoprostol by 25 trained village health workers in successfully reducing PPH [10].
In a trial undertaken between September 2002 and December 2005, 1620 women in rural India were randomized to receive oral misoprostol ($n = 812$) or placebo ($n = 808$) after delivery. Oral misoprostol was associated with a significant reduction in the rate of acute postpartum hemorrhage (12.0% to 6.4%, $p < 0.0001$; relative risk 0.53 [95% CI 0.39–0.74]) and acute severe postpartum hemorrhage (1.2% to 0.2%, $p < 0.0001$; 0.20 (0.04–0.91)). This was the first time that misoprostol had been used in such a large comparative trial and in which the results underwent such rigorous statistical evaluation. Subsequent to this report, the acceptance of misoprostol, especially in areas of the world where other uterotonic agents were scarce or unavailable to lack of refrigeration, increased markedly.

**Non-pneumatic Anti-Shock Garment (United States, Nigeria, Egypt)**

Unlike its predecessors, the pneumatic anti-shock trousers (PAST) or the medical anti-shock trousers (MAST), Non-pneumatic Anti-Shock Garment (NASG) has no pumps, tubing, or gauges to add to the complexity of usage or the likelihood of malfunction [11]. The NASG is a lightweight, relatively inexpensive (US$160), washable, and reusable neoprene garment (Fig. 2) proposed as an immediate first aid treatment for reversing hypovolemic shock and decreasing blood loss application of lower body counter pressure that shifts blood from the lower extremities into the general circulation (Fig. 3).
Fig. 3. Non-pneumatic Anti-Shock Garment (NASG).

It has been tested and continues to be tested in Nigeria and Egypt where frequently it is required during the transfer of a patient from a low resource center to a hospital with a greater complement of therapies. Use of the garment has no side effects, and its application can be accomplished by health workers with minimal training, as each segment of the garment is numbered to ensure a proper application.

Balloon Tamponade (Bangladesh)

Several devices have been used to achieve an internal tamponade when atony is present by applying pressure to the 20 cm diameter wound left at the placental base at the time of its expulsion. Among these are the Bakri balloon, the Sengstacken-Blakemore tube, and the Rausch hydrostatic balloon catheter. It is unfortunate that all are expensive and may not be available when required, even in delivery rooms and operating theaters in well-resourced countries. Because necessity is invariably the mother of invention, Akhter et al. realized that the same tamponade effect could be achieved with a simple condom that was inserted into the uterine cavity over a straight urinary catheter, filled with saline or some other handy sterile physiologic solution, and tied with silk or catgut as the catheter is withdrawn [12]. Because a normal condom can be filled with as much as 1000 ml of fluid, the tamponade effect is equal to that of the more expensive devices ($1 vs. $100 or more).

Advanced Surgical Techniques (Argentina)

Other than hysterectomy, most obstetricians are not familiar with other surgical techniques to control post partum hemorrhage. Both authors have been present in large teaching sessions when positive responses to questions regarding past performance of the B-Lynch suture of ligation of the internal iliac artery were not only disappointing but somewhat alarming, considering the audience members represented the most senior members of the community. As disappointing as this is, knowledge of performance of more advanced surgical techniques for placenta percreta, placenta increta, and other rare and difficult causes of PPH lies in the hands of few surgeons worldwide. One of these individuals is Jose-Antonio Palacios-Jarquemada of Buenos Aires, Argentina, whose writings, YouTube videos, and lectures with videos have helped raise consciousness of what is possible with adequate training [13-15].

The Team Concept (United States)

Virtually every obstetrician queried will remember the case(s) of PPH in which he/she attended and death was present. All tend to remember their personal involvement. Early in the last decade, Daniel Skupski, working at the Jamaica hospital in Flushing, New York USA, postulated that the recent deaths at his hospital were not attributable to a lack of efforts on the part of the personnel involved but rather a breakdown in the systems that supported the medical team [16]. Stated another way, the proverbial right hand did not know what was being done by the left. Taking a cue from the investigations carried out in the event of an airline crash, he and his colleagues looked at every supportive system from the blood bank, to the anesthesia service, and even secretarial and nursing support. What they found caused them to implement a system so, when a PPH occurred, certain key individuals (heads of the transfusion service, anesthesia, interventional radiology, operating theater) were notified immediately, and these individuals began to see that proper support procedures were either made available or put into place. The effect was immediate and dramatic. Whereas there had been two deaths from PPH in the year before implementation of the new system, the number of hemorrhages increased in the succeeding year, but there were no deaths. The state health authorities in New York USA were so impressed that they mandated hospital-wide changes and training in every hospital with an obstetric service shortly thereafter, and this program has been adopted by Illinois and other states. Inasmuch as these programs are funded by public funds, they are available through the health department to anyone who wants...
to use them. To the authors’ knowledge, the Illinois program is being used in the state of Tamil Nadu in India.

Lessons from Trauma Surgery

Surgeons and field workers writing in the last 5 years about war experiences have brought a new perspective to the literature on massive transfusion needs [17]. Simply put, these articles state unequivocally that the early use of fibrinogen as part of the therapy for massive transfusion is associated with declines in mortality and morbidity. This change represents a departure from the standard convention for treatment of massive hemorrhage that initially used crystalloid and colloid as a means for volume expansion, followed with red cells to correct anemia, and finally turned to fibrinogen in an effort to correct clotting deficiencies. By that time, patients may have become acidic and hypothermic, and resuscitation entered into a phase far more difficult to treat and for which prognosis was less than optimal. The basis of the changed proposed by army surgeons is simple. When one loses large amounts of blood rapidly, as would be the case with a soldier who suffered blast amputations of both lower extremities, bleeding is massive and occurs instantaneously. As both femoral arteries ultimately back-connect to the aorta via the external and common iliac arteries, respectively, such bleeding is aortic in nature and, if not treated rapidly, will lead to death in a short time. Army surgeons were quick to recognize that fibrinogen was being depleted along with the blood at the time of such hemorrhage, and that it made no therapeutic sense to delay administering it. When outcomes of mortality were examined, it became apparent that early fibrinogen therapy was associated with less mortality and less morbidity. Another important innovation from the military sector comes from the United Kingdom.

The similarity of the type and rapidity of battlefield hemorrhage was not lost on a few obstetricians who noted that (1) sex was irrelevant in the face of aortic bleeding and (2) bleeding from the placental bed also was aortic in that the arteries that fed the placenta also back-connected to the aorta. These opinion leaders suggested that fibrinogen be used early in the treatment of massive hemorrhage from the uterus in a manner similar to that used in field campaigns. Although it sometimes takes two decades or more for changes to become widespread in obstetric practice (the adoption of the Pap smear, as an example), adopting this suggested change has been much more rapid, and many hospitals have developed massive transfusion protocols for obstetric practice.

Spreading the Word

The global efforts to eliminate deaths from PPH have been aided and abetted by four educational efforts in addition to recognizing the need to provide training to people who provide obstetric care at the local level.

The success of A Textbook of Postpartum Hemorrhage has been described above. In addition to this monograph, written primarily for individuals with medical training, Sapiens Publishing has made a wall chart for use by nurses and allied health personnel. Written and collated by the junior author of this editorial (MK), the chart emphasizes 8 steps in the treatment of patients with PPH. To date, it has been translated into 8 languages and distributed to thousands of healthcare workers.

With the knowledge that cell phones have provided many nurses and field personnel working in isolated areas with direct and instantaneous contact with more experienced healthcare workers, efforts are now progressing through Sapiens Publishing and the Global Library of Workmen’s Medicine to make phone applications of several items directly related to therapy of PPH. Field tests will take place late in 2011 with the idea of a launch in Africa in 2012.

Finally, conference-seminar related educational efforts have recognized that lectures alone will not suffice to increase PPH awareness unless they are supplemented with hands-on workshops that allow attendees personal experience with application of B-lynch sutures, estimation of blood loss, ligation of internal iliac arteries, etc. Courses given to date have validated this impression, and more are planned on an international basis.

References


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