WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Active Management of the Third Stage of Labor: Evidence-Based Review

Riddhi Nagpure*[1], Riya Patil*[2], Smruti Atkare*[3], Rutuja Sonar*[4], Roshan Shinde*[5], Rysbaeva A.Zh.*[6]

*[1,2,3,4,5] IMF OSHSU(Student) *[6] Professor of Obstetrics (Department of OGSD)

ABSTRACT :

The third stage of labor, from fetal delivery to expulsion of the placenta, is a high-risk period when maternal hemorrhage can be fatal. Active management of the third stage of labor (AMTSL) has evolved as a corner-stone intervention in the prevention of postpartum hemorrhage and related maternal mortality. This evidence-based review summarizes the components, effectiveness, and present evidence incorporating AMTSL practice. The initial three-component practice had included prophylactic uterotonics, controlled cord traction, and early cord clamping, yet more recent evidence has revised these recommendations. Current research demonstrates that prophylactic administration of oxytocin remains the most effective single intervention, reducing the incidence of postpartum hemorrhage by an approximate forty percent. Controlled cord traction provides additional benefit when performed by skilled attendants, while early cord clamping recommendations have been revised to delayed clamping to optimize neonatal outcome. The review collates evidence from systematic reviews, randomized controlled trials, and international guidelines to provide clinicians with pragmatic, evidence-based recommendations for third stage management. The perspective on rationale, implementation, and adaptation of AMTSL protocols enables care providers to optimize maternal outcomes while adapting care based on available resources and clinical contexts.

Keywords: Active management, postpartum hemorrhage, third stage labor, uterotonics, oxytocin, maternal mortality

Introduction

The third stage of labor, although brief in duration, is proportionally dangerous for maternal morbidity and mortality. The stage being that between infant delivery and placental expulsion, it typically runs from five to fifteen minutes but may extend as long as thirty minutes without suggesting pathology. During this period, the most important physiological job is to maintain hemostasis in the area of the placenta where uterine perfusion of six hundred to eight hundred milliliters per minute occurs in term pregnancy. Failure of uterine contraction after separation of the placenta results in hemorrhage during delivery, which remains one of the leading causes of maternal death globally, accounting for around twenty-five percent of the maternal mortality rate globally.

Active management has roots in observation studies since the 1960s and became routine following groundbreaking trials proving substantial decreases in hemorrhage rates. Traditional expectant management, where there is a waiting game for natural physiological events to take their course without intervention, has consistently shown worse results with regard to blood loss, transfusion requirement, and incidence of massive hemorrhage. World Health Organization, International Federation of Gynecology and Obstetrics, and national obstetric societies now all endorse AMTSL as standard care for every birth regardless of environment or perceived risk status.

The actual elements and the timing of interventions within AMTSL protocols have altered with progressing evidence, however. The initial guidelines firmly emphasized a hard three-component policy, but the latest guidelines realize that not all elements contribute equally to the prevention of hemorrhage. In addition, potential conflicts between prevention of hemorrhage in mothers and neonatal health, in this case, cord clamping timing, have necessitated protocol refinements. An understanding of historical progression and the current evidence base for AMTSL enables clinicians to implement these practices efficiently while reacting to individual clinical situations.

This review examines the physiological justification for active management, criticizes evidence for specific interventions, assesses implementation issues in diverse settings, and provides practical recommendations in line with existing research evidence.

Physiological Basis and Rationale

Placental bed is a unique hemostatic challenge. Contrary to vasculature injury elsewhere in the body, following separation of the placenta hemostasis proceeds mostly on the basis of mechanical compression rather than initiation of the coagulation cascade. The contractile muscle fibers of the interlocking myometrium also function as living ligatures, occluding spiral arteries during maximum uterine contraction. Normal myometrial contraction can reduce blood flow from approximately seven hundred milliliters per minute to nearly zero in seconds. Uterine atony, on the other hand, permits bleeding to persist from these vessels until mechanical compression is obtained or hypovolemia ensues.

Separation is regular in pattern following forcible contractions of the uterus after birth of the fetus. The abrupt decrease in volume following infant birth causes shearing pressures at the decidual-placental junction. Slow separation in a centrifugal direction from the middle point or from one edge to the other causes the accumulation of blood behind the placenta, a retroplacental hematoma enabling complete detachment. Fundal rise, cord elongation, and gush of blood are the clinical signs of separation, but these traditional signs are not necessarily ideal in terms of sensitivity and specificity.

The basis for active management is to augment and support such physiological mechanisms. Exogenous uterotonic drugs offer potent, long-lasting contractions regardless of endogenous sufficiency of oxytocin. Such drug assistance is particularly beneficial because fatigue of labor, hyperdistension, abnormal labor, and other complications may render intrinsic contractility abnormal. Further, the facilitation of placental delivery with controlled traction reduces exposure to hazard from hemorrhage.

It has been found through research that the minutes after birth are the period of greatest risk. About seventy percent of postpartum hemorrhage happens within the first hour after giving birth, most happening in the first fifteen minutes. This pattern of timing in arriving at prophylactic making it an urgent issue over therapeutic treatment is revealing. Treating only after hemorrhage becomes clinically evident means that significant blood loss can have occurred. Universal prophylaxis, however, eradicates most of the attacks of hemorrhage altogether and is more effective than reactive or selective interventions.

Components of Active Management

3.1. Administration of Prophylactic Uterotonic

Placental bed is a unique hemostatic test. Unlike vascular damage elsewhere in the body, hemostasis following separation of the placenta remains predominantly on the basis of mechanical compression, but not coagulation cascade activation. Myometrial interlocking contractile muscle cells also function as living ligatures, and during maximal uterine contraction, they occlude the spiral arteries. Normal myometrial contraction can reduce seven hundred milliliters per minute of blood flow to nearly zero within seconds. In contrast, uterine atony permits ongoing bleeding from these vessels unless mechanical compression or intervening hypovolemia occurs.

Separation is a sequential event after violent uterine contractions after delivery of the infant. The abrupt decrease in volume on infant birth creates shearing forces at the decidual-placental interface. Gradual separation from the midpoint or from edge to edge results in accumulation of blood behind the placenta, a retroplacental hematoma permitting complete detachment. Uterine rise, cord stretching, and gush of blood are clinical manifestations of separation, but these traditional signs are suboptimal in sensitivity and specificity.

The rationale for active management is to augment and support these physiological processes. Exogenous uterotonic agents ensure firm, continued contractions regardless of endogenous sufficiency of oxytocin. Drug augmentation of such type is even more beneficial because fatigue of labor, hyperdistension, abnormal labor, and other risk factors may render intrinsic contractility abnormal. Furthermore, acceleration of placental delivery with controlled traction reduces exposure to risk of hemorrhage.

It has been discovered by studies that the time right after giving birth is the time of highest risk. Approximately seventy percent of postpartum hemorrhage occurs in the first hour postpartum, and most occur in the first fifteen minutes. This trend of timing in taking prophylactic to be an emergent priority over therapeutic treatment is a significant one. Delaying until hemorrhage is clinically apparent in order to start treatment allows for a considerable quantity of blood to have already been lost. In contrast, universal prophylaxis stops most of the hemorrhage attacks in their tracks and offers superior results compared to selective or reactive measures.

3.2. Controlled Cord Traction

Controlled cord traction is gentle, sustained tension on the umbilical cord with application of counter-pressure upon the uterus above the symphysis pubis. This aptly named Brandt-Andrews maneuver permits placental delivery following separation. The counter-pressure component prevents uterine inversion, a rare but fatal complication that can arise by way of too much force of traction.

The evidence base for controlled cord traction has shifted substantially. Earlier trials of three-component AMTSL compared with expectant management could not separate out the contribution of cord traction from other intervention. Factorial design trials later provided a direct answer to this question, though. A large trial by the World Health Organization randomized over fifteen thousand women to oxytocin alone or oxytocin and controlled cord traction. Outcomes showed little but statistically significant reductions in severe hemorrhage and manual placental removal with the implementation of

cord traction.

Notably, benefits of controlled cord traction heavily depend on the experience and professionalism of providers. Inexperienced use of traction boosts risks of cord avulsion, uterine inversion, and potential hemorrhage exacerbation. Where attendants are not well trained or experienced in resource settings, excepting cord traction under the guarantee of oxytocin use provides acceptable outcomes. The acknowledgment of this has caused international guidelines to identify oxytocin as the decisive element and explain cord traction as beneficial when professionally applied.

Initiation of cord traction timing is a clinical judgment. Traction before placental separation is not only futile but also dangerous. Classical teaching was to wait for evidence of separation, but research indicates mild traction on the cord can begin between one and three minutes post-delivery in most cases. When there is resistance, relaxation and waiting a little longer allows more separation before repeating it.

3.3. Umbilical Cord Clamping Timing

Early cord clamping, previously operationally defined as clamping after one minute of birth, long was considered to be included in AMTSL based on theoretical grounds of opposition to placental transfusion inhibiting uterine contraction. This assumption, however, had minimal empirical foundation, and fresh evidence regarding neonatal consequences of delayed clamping necessitated reconsideration.

Delayed cord clamping, best defined as waiting one to three minutes before clamping or until cessation of pulsation, permits placental transfusion of approximately eighty to one hundred milliliters of blood to the infant. This autotransfusion increases hemoglobin, improves iron stores during infancy, and possibly provides neurodevelopmental advantage. Delayed clamping in preterm babies lowers intraventricular hemorrhage, necrotizing enterocolitis, and death.

Clinical research that has examined maternal effect of early versus delayed clamping has yielded no increase in postpartum hemorrhage, severe hemorrhage, or transfusion requirements with delayed clamping. Multiple randomized controlled trials and systematic analyses reproduce these findings in several different populations and environments. It is thus current policy everywhere to perform delayed cord clamping for at least one minute in term infants and thirty to sixty seconds in preterm infants, while continuing other elements of AMTSL.

One important exception is the situation of immediate neonatal resuscitation. If the neonate requires positive pressure ventilation or other urgent maneuvers that cannot be performed at the bedside, delayed cord clamping is not acceptable. Growing evidence, however, suggests that much of routine resuscitation can be achieved without disruption of cord integrity, and even in compromise scenarios there is more opportunity for delayed clamping.

Evidence from Major Trials and Systematic Reviews

The evidence in support of AMTSL is based on several randomized controlled trials as well as outstanding quality systematic reviews. The first Hinchingbrooke trial, published in 1988, randomized over one thousand women to expectant vs. active management and demonstrated phenomenal reductions in hemorrhage greater than half a liter (relative risk 0.38) and requirement for blood transfusion (relative risk 0.33). Such striking results instigated mass adoption of active management regimens.

Subsequent trials replicated and extended these results. The Bristol trial consisted of over one thousand eight hundred women and recognized active management to reduce incidence of hemorrhage from sixteen percent to six percent. The Dublin trial involving over one thousand women shared the same hemorrhage reduction and lower therapeutic uterotonics and blood transfusion. Most importantly, these benefits crossed all subgroups regardless of baseline hemorrhage risk factors.

A Cochrane systematic review combining data of multiple trials concluded that active management reduces severe postpartum hemorrhage by approximately sixty percent, maternal hemoglobin decline by approximately thirty percent, and blood transfusion requirement by approximately sixty-five percent. Number needed to treat to prevent one hemorrhage of over one thousand milliliters is approximately twelve women, and number needed to treat to prevent hemorrhage over five hundred milliliters is approximately seven women.

Following research has focused on maximization of individual components and altering timing and dosing. The CHAMPION trial, involving over thirty thousand women in various nations, compared prophylactic carbetocin with oxytocin and demonstrated non-inferiority to prevent hemorrhage of more than five hundred milliliters or need for additional uterotonics. The WHO trial above attested that controlled cord traction is of incremental benefit over oxytocin alone but is not strictly required.

Studies of oxytocin dosing have investigated if higher doses improve efficacy. The current evidence is that ten international units provides optimal hemorrhage prevention with minimal additional benefit from doses higher than this but with an increased risk of complications like hypotension, tachycardia, and abnormal uterine contraction patterns. Lower doses less than ten units have reduced efficacy, consistent with current guidelines.

The integration of delayed cord clamping within AMTSL guidelines has been supported by a number of trials that compared maternal outcomes directly. Each of the studies proves that sixty to one hundred eighty seconds of delay before clamping does not affect maternal blood loss, reduction in hemoglobin, or hemorrhage compared to immediate clamping. The evidence has guided changes in guidelines which optimize both maternal and neonatal benefits

simultaneously.

Implementation Across Healthcare Settings

Successful implementation of AMTSL requires adaptability to meet diverse healthcare environments while maintaining core evidence-based approaches. With an environment of high resource availability and ready access to oxytocin, cold storage facilities, skilled attendants, and backup emergency systems, full three-component regimens can be established reliably. The high-resource setting also enables more advanced risk stratification and customized modifications when needed.

Low-resource environments face particular challenges like availability of drugs, cold chain storage, training limitations, and physical infrastructure constraints. In areas where there is unreliable refrigeration, heat-stable carbetocin or misoprostol provide substitutes that ensure uterotonic access. Misoprostol is particularly suited to community-delivery environments as it does not require injection skills and remains effective regardless of temperature variations. This higher side effect profile and slightly reduced efficacy rate compared to oxytocin must be reported.

Task-switching strategies enable the delivery of AMTSL under circumstances where physician or midwife access is limited. The evidence indicates that well-trained community health workers, traditional birth attendants, and auxiliary nurse midwives can safely administer uterotonics and perform the basic active management components if adequately trained. Quality improvement initiatives with standardized protocols, competency-based training, and supportive supervision have successfully scaled up AMTSL coverage in several low-resource settings.

Home birth settings present certain challenges. Where there is intended home birth by skilled attendants, oxytocin or misoprostol carry for prophylactic purposes is within active management practices. Controlled cord traction may be withheld in these settings in light of the increased risk should complications develop and less experience with this technique on the part of most home birth attendants. Specified policies for early hemorrhage detection and transfer when indicated are essential safety practices.

Cultural and patient preference issues also influence implementation. Others rather have physiological means and decline routine intervention. In these instances, appropriate counseling of risk of hemorrhage, benefit of prophylaxis, and alternatives should be accompanied by informed decision-making. At least, confirming skilled delivery attendance, ready availability of uterotonics in the event of hemorrhage, and clear identification and response mechanisms for hemorrhage decrease risks where women decline AMTSL.

Quality indicators for implementation of AMTSL would measure process measures (proportion of deliveries that are given prophylactic uterotonics within applicable time periods) and outcome measures (rate of hemorrhage, rates of major hemorrhage, rate of transfusion). Regular cycles of audit and feedback identify gaps in implementation and areas for improvement.

Complications and Contraindications

While AMTSL is linked with significant safety and tolerability, certain situations require caution or modification of the regime. Undiagnosed multiple pregnancy is a significant contraindication to uterotonic administration before confirming that no other fetus remains in utero. Oxytocin administration when a second twin is undelivered can result in tetanic contractions, fetal distress, or entrapment. Abdominal palpation and confirmation of singleton pregnancy before uterotonic injection prevent this complication.

Placental abnormalities like placenta accreta spectrum disorders are a contraindication to manual delivery attempts and may necessitate modified management. With suspected abnormal placentation on prenatal imaging, placental location, or failure of normal separation after adequate time, vigorous traction should be avoided. Obstetric consultation and, increasingly, operative management is required for safe placental removal in these cases.

Uterine inversion, although rare (approximately one in two thousand to one in twenty thousand deliveries), is a catastrophic complication that can be precipitated by excess cord traction. It typically occurs when vigorous traction is applied to a poorly contracted or unseparated placenta and uterus. Management with prompt recognition and manual reduction before the development of shock is essential. Prevention through employing proper technique, e.g., counter-pressure with traction and avoiding excessive force, minimizes this risk.

Side effects can occur with the use of oxytocin, though these are still uncommon at doses that are normal. Rapid intravenous bolus injection causes hypotension, tachycardia, and potential cardiac dysrhythmias through vasodilatory actions. This is prevented by intramuscular injection or slow intravenous infusion. Water intoxication with hyponatremia can occur when large volumes of oxytocin are infused over long periods due to antidiuretic actions, though this is largely with doses far greater than those used for AMTSL.

Ergot alkaloids as adjunctive or alternative uterotonics have various contraindications. Hypertensive disorders, cardiovascular disease, and peripheral vascular disease are absolute contraindications to ergometrine or methylergometrine due to their vasoconstrictive properties. More gastrointestinal side effects are also caused by these agents compared with oxytocin.

Administration of misoprostol commonly results in fever and shivering, which can be distressing in the presence of no infection or major pathology. These effects typically resolve spontaneously over several hours but should be anticipated and explained to patients. Severe allergic reactions to

misoprostol have been described in isolated reports, but incidence is extremely low.

Special Populations and Clinical Scenarios

Specific clinical situations require modified AMTSL methods or heightened vigilance. Women who have known risk factors for hemorrhage, including previous postpartum hemorrhage, multiple gestation, polyhydramnios, fetal macrosomia, prolonged labor, or chorioamnionitis, especially benefit from aggressive active management. More oxytocin doses, combination uterotonic therapy, or extended post-delivery monitoring are recommended by some practitioners for these higher-risk populations, but evidence for such modifications is scant.

Cesarean section has special third stage considerations. Uterotonic administration remains essential, typically with intravenous oxytocin after the delivery of the baby. Additional uterotonics may be administered if uterine tone remains poor after initial oxytocin. Manual placental extraction is standard in cesarean, eliminating the element of controlled cord traction. Complete placental removal and uterine cavity exploration to extract retained fragments are instrumental steps in reducing post-cesarean hemorrhage.

Preterm birth involves a compromise between the prevention of maternal hemorrhage and neonatal considerations. Deferred cord clamping has particular benefit in preterm neonates, including reduced mortality and severe morbidity. In certain very preterm births, immediate neonatal resuscitation is necessary, demanding early clamping. Oxytocin for the prevention of hemorrhage is nonetheless indicated irrespective of gestational age because the dangers of hemorrhage do not reduce in spite of the reduced uterine volumes.

Jehovah's Witnesses and other women who decline blood products are a group where hemorrhage prevention assumes even greater importance in the context of being unable to employ transfusion as rescue therapy. Meticulous AMTSL, pre-delivery hemoglobin optimization, and multidisciplinary coordination of potential hemorrhage management strategies are key components of care in such patients.

Maternal cardiac disease requires careful consideration of hemodynamic effects of both hemorrhage and uterotonic agents. While oxytocin remains safe in most cardiac patients when properly used, intravenous bolus administration is to be avoided due to hypotensive effects. Collaboration of obstetric and cardiology services permits tailored management that also minimizes both hemorrhage and hemodynamic instability.

Future Directions and Emerging Evidence

Best practice protocols for AMTSL are further developed by evidence, including new interventions. Uterotonic combination trials aim for regimens with maximum prevention of hemorrhage and acceptable side effect profiles. Preliminary data suggest that sequential compared with simultaneous administration of individual uterotonics may maximize efficacy with reduced adverse effects, although this needs to be confirmed.

Pipeline heat-stable oxytocin formulations hold promise for surpassing cold chain limitations now limiting oxytocin access in the majority of low-resource settings. If successful, these formulations will allow for first-line administration of oxytocin regardless of infrastructure limitations and may improve outcomes in the most burdened areas for maternal mortality.

Tranexamic acid, an antifibrinolytic agent, has been found effective in controlling postpartum hemorrhage already underway if administered within three hours of delivery. Ongoing trials are investigating if administration prophylactically at delivery with tranexamic acid is also more effective for decreasing incidence than with AMTSL alone. Preliminary results are positive, but cost-effectiveness trials and safety trials across a range of populations will establish final recommendation development.

Point-of-care ultrasound assessment of uterine contractility and placental separation can allow for more individualized timing of intervention. Study of whether real-time ultrasound guidance is superior or inferior to outcomes or complication rates from AMTSL components is nascent but auspicious.

Implementation science research investigates how AMTSL coverage and quality can be improved, particularly where current adoption is less than optimal. Behavioral economics, quality improvement collaboratives, and mobile health technology are viable methods for closing implementation gaps and providing more women with access to evidence-based hemorrhage prevention.

Conclusion

Active management of the third stage of labor is the most effective intervention to prevent postpartum hemorrhage and associated maternal mortality and morbidity. There is overwhelming evidence from randomized controlled trials and systematic reviews demonstrating impressive benefits including relative sixty percent reductions in severe hemorrhage and requirement of blood transfusion. Oxytocin administration prophylactically following delivery is the keystone intervention, and it alone prevents most hemorrhage. Controlled cord traction is of increased benefit when performed by skilled attendants but is not absolutely required. Delayed cord clamping is safe to add to AMTSL protocols and provides major neonatal benefit without increasing maternal hemorrhage risk.

Implementation incorporates adaptation to healthcare environment characteristics, resources, and patient groups while maintaining evidence-based critical

components. In low-resource settings, uterotonic availability via heat-stable alternatives and provider capability enhancement via training and task-shifting enable greater access to AMTSL. Monitoring quality via process and outcome measures enables ongoing improvement and identifies areas to enhance care delivery.

While AMTSL has proven to be safe and effective, knowledge of contraindications, proper technique, and special populations decreases potential complications. Ongoing research continues to simplify protocols, explore new adjunctive therapies, and develop means of optimizing implementation quality and coverage globally.

Universal application of active management evidence-based practices would greatly reduce the worldwide burden of postpartum hemorrhage and maternal mortality. This responsibility falls to both healthcare institutions, professional organizations, and individual practitioners alike to provide all women everywhere with this life-saving intervention regardless of residence location, resource availability, or delivery site.

REFERENCES

10.1. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2012.

10.2. Begley CM, Gyte GM, Devane D, McGuire W, Weeks A, Biesty LM. Active versus expectant management for women in the third stage of labour. Cochrane Database of Systematic Reviews. 2019;2(2):CD007412.

10.3. Salati JA, Leathersich SJ, Williams MJ, Cuthbert A, Tolosa JE. Prophylactic oxytocin for the third stage of labour to prevent postpartum haemorrhage. Cochrane Database of Systematic Reviews. 2019;4(4):CD001808.

10.4. Hofmeyr GJ, Mshweshwe NT, Gülmezoglu AM. Controlled cord traction for the third stage of labour. Cochrane Database of Systematic Reviews. 2015;1(1):CD008020.

10.5. McDonald SJ, Middleton P, Dowswell T, Morris PS. Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes. Cochrane Database of Systematic Reviews. 2013;7(7):CD004074.

10.6. Widmer M, Piaggio G, Nguyen TMH, et al. Heat-stable carbetocin versus oxytocin to prevent hemorrhage after vaginal birth. New England Journal of Medicine. 2018;379(8):743-752.

10.7. Gallos ID, Papadopoulou A, Man R, et al. Uterotonic agents for preventing postpartum haemorrhage: a network meta-analysis. Cochrane Database of Systematic Reviews. 2018;12(12):CD011689.

10.8. Tunçalp Ö, Souza JP, Gülmezoglu M, World Health Organization. New WHO recommendations on prevention and treatment of postpartum hemorrhage. International Journal of Gynecology and Obstetrics. 2013;123(3):254-256.

10.9. Sheldon WR, Blum J, Vogel JP, Souza JP, Gülmezoglu AM, Winikoff B. Postpartum haemorrhage management, risks, and maternal outcomes: findings from the World Health Organization Multicountry Survey on Maternal and Newborn Health. British Journal of Obstetrics and Gynaecology. 2014;121(Suppl 1):5-13.

10.10. Sentilhes L, Winer N, Azria E, et al. Tranexamic acid for the prevention of blood loss after vaginal delivery. New England Journal of Medicine. 2018;379(8):731-742.

10.11. Prendiville WJ, Elbourne D, McDonald S. Active versus expectant management in the third stage of labour. Cochrane Database of Systematic Reviews. 2000;(3):CD000007.

10.12. International Confederation of Midwives and International Federation of Gynaecology and Obstetrics. Joint statement: management of the third stage of labour to prevent post-partum haemorrhage. Journal of Midwifery and Women's Health. 2004;49(1):76-77.