

## Conference paper

### Intrauterine balloon tamponade in the management of postpartum hemorrhage

Saikal Osmonova<sup>1,2</sup>, Saltanat Nazaralieva<sup>1,2</sup>

<sup>1</sup>National Center of Maternity and Childhood Care; <sup>2</sup>Department of Pediatrics, Obstetrics and Gynecology of International School of Medicine; Bishkek, Kyrgyzstan.

#### Abstract

**Objective:** According to WHO, the maternal mortality ratio in Kyrgyz Republic is 76 cases per 100.000 live births and is the highest among the Central Asian and Eastern European countries. It is necessary to study and implement minimally invasive postpartum hemorrhage treatment methods to prevent massive obstetric hemorrhage.

**Methods:** A prospective study of 35 cases of the use of intrauterine balloon tamponade (UBT) for the treatment of hypotonic postpartum hemorrhage was conducted. The indicators were assessed to evaluate the effectiveness of UBT.

**Results:** Hemostatic effect after UBT was achieved in 30 cases (85.7%), the average total blood loss was 664.57 (117.83) ml; reduced need for blood products, high doses of prostaglandins, large volume of fluid maintenance was observed. Breastfeeding started within the first 30 – 60 minutes after birth in 88.6% of cases.

**Conclusion:** UBT fully complies with the strategy for preservation of the reproductive potential in women, allows to improve medical and economic indicators.

**Key words:** Uterine balloon tamponade, hypotonic postpartum hemorrhage

(Heart Vess Transplant 2019; 3: doi: 10.24969/hvt.2019.148)

#### Introduction

The main obstetric problem around the world is, and remains, maternal mortality. According to an official report of World Health Organization (WHO) for the period from 1990 to 2015, the maternal mortality (MM) rate worldwide had been reduced by almost 44%, whereas the Kyrgyz Republic demonstrated only a 5% reduction, amounting to 76 cases per 100,000 live births. Thus, the MM ratio in the Kyrgyz Republic is the highest among the Central Asian and Eastern European countries (1, 2). The vast majority of maternal deaths could have been prevented with timely diagnosis and access to quality emergency obstetric care (2-4).

Postpartum hemorrhage (PPH) takes a leading position among the well-known “top five” causes of maternal mortality (5, 6). According to the first and second reports following the confidential investigation of MM cases in the Kyrgyz Republic, in relation to

direct causes of MM, i.e., diseases that only occur as a result of pregnancy, the leading cause is obstetric hemorrhage - 15.8 cases per 100,000 live births; and in 49% of cases of obstetric hemorrhage, a woman's death occurred from the postpartum hemorrhage (7, 8).

Postpartum hemorrhage is defined as bleeding, more than 500.0 ml after a vaginal delivery or exceeding than 1000.0 ml after a cesarean section (4, 14). Uterine atony, or loss of myometrium contraction ability after childbirth, is a leading cause of postpartum hemorrhage, and is also one of the main causes of MM in developing countries (9). According to international recommendations, the treatment of uterine hypo- and atony begins with catheterization of the bladder, uterine massage, manual examination of the uterine cavity and the prescription of uterotonic drugs (4).

**Address for Correspondence:** Saikal Osmonova Department of Pediatrics, Obstetrics and Gynecology of International School of Medicine; Bishkek, Kyrgyzstan, Email: [saikal.osmonova@gmail.com](mailto:saikal.osmonova@gmail.com), Mobile: +996550506650

Copyright © 2019 Heart, Vessels and Transplantation

If there is no effect from the first stage of therapy, aortic compression is performed, the intravenous administration of tranexamic acid (10) is recommended, a uterine balloon tamponade (UBT) is used, a uterine artery embolization procedure is performed, and infusion-transfusion therapy (4) is prescribed. Surgical treatment methods for uncontrolled postpartum hemorrhage include bilateral ligation of uterine arteries, internal iliac artery ligation, uterine compression sutures, as well as a hysterectomy (11). To date, according to various authors, the effectiveness of the uterine balloon tamponade ranges from 85% to 99.4% and compares favorably as the least invasive, safest, most effective, simplest and fastest procedure in cases where postpartum hemorrhage cannot be treated with uterotonic drugs (12 -19).

Therefore, all of the above suggests the need for further research and introduction of effective minimally invasive PPH treatment methods to prevent massive obstetric hemorrhage, to reduce the number of surgical methods of hemostasis, which ultimately will preserve the reproductive potential of women and increase patient satisfaction with the treatment they receive.

### Methods

A prospective analysis of cases of the use of uterine balloon tamponade for the period from January 2015 to January 2017 was conducted at the National Center for Maternity and Childhood Care.

The study included 35 postpartum hemorrhage cases. Inclusion criteria: vaginal delivery, full term, singleton; early postpartum period complicated by hypotonic bleeding of 500 ml or more. Exclusion criteria: uterine ruptures, coagulation system pathology, cesarean section, operative delivery.

According to the law on the protection of the health of citizens in the Kyrgyz Republic, all patients gave written informed consent to the use of the UBT methodology.

For conducting UBT, the set registered in the Kyrgyz Republic was used, which consists of: a resilient axial conductor with an attached elastic silicone balloon at the end; fluid container with connecting tube, as well as a terminal for controlling fluid flow.

Method of use: after connecting all parts and preparing the set, the fluid container was suspended at a height of 45-50 cm from the perineum and filled with warm (38° C) solution of sodium chloride; the

terminal on the connecting tube was closed. Then, holding the conductor behind the axial end, the balloon was inserted into the uterine cavity, the terminal on the connecting tube was opened and fluid from the container flowed freely into the silicone balloon. The terminal was left open. The principle of "interconnecting vessels" between the silicone balloon and the fluid container is a crucial and distinctive feature of this set. Because the terminal on the connecting tube does not close, as its contractility is restored, the uterus "squeezes" the liquid from the balloon back into the container. Thus, an increase in fluid level in the container is one of the first signs of myometrium tone restoration. As the level of the fluid in the container rose, the excess fluid merged and at the same time reduced the height of the container. After restoration of the myometrium tone and the bleeding stopped, the balloon is removed. The duration of the exposure of the balloon averaged from 2 to 2.5 hours.

The following indicators were assessed to evaluate the effectiveness of uterine balloon tamponade: blood loss, the need for transfusion of blood products, the use of large doses of prostaglandins, the use of antibiotic therapy, anesthetics, infusion therapy with a volume of more than 1,500.0 ml, the need for surgical hemostasis, breastfeeding start time, hemoglobin level at hospital discharge.

### Results and Discussion

The average age of the patients was 24.7(3.9) years, anemia was diagnosed in 16 (46%) cases, primiparous amounted to 15 (43%), multiparous - 20 (57%). All 35 puerperas received active management of the third stage of labor: oxytocin 10 IU dose intramuscularly after the birth of a newborn, uterine massage, delayed contraction of the umbilical cord and controlled traction of the umbilical cord. This protocol of management of the third period of labor leads to a significant reduction in the number of PPH (20).

After the diagnosis of "Hypotonic Postpartum Hemorrhage", all 35 puerperas received emergency obstetric care according to the clinical protocol approved in the Kyrgyz Republic, which includes conservative treatment methods: prescribing uterotonic therapy, infusion therapy, uterine massage, bimanual compression of the uterus, uterine balloon tamponade, and also surgical methods of hemostasis.

Hemostatic effect after UBT was achieved in 30 cases (85.7%) and in 5 cases (14.3%) surgical hemostasis was performed - bilateral ligation of uterine arteries. The average total blood loss was 664.57 (117.83) ml, while blood loss equal to 500.0 to 1000.0 ml was in 33 cases (94.3%), in 2 cases (5.7%) the blood loss was more 1000.0 ml.

40 IU total dose of oxytocin was used in 100% of cases, and the need for misoprostol (PGE1) dose of 800-1000 µg amounted to 40% (14). Infusion-transfusion therapy was carried out in order to rapid recover capillary perfusion, which allowed the prevention of the breakdown of compensatory mechanisms leading to the development of shock changes. An indicator of the need for infusion therapy of more than 1,500.0 ml was 20% (7).

In order to recover the oxygen transport function of blood and achieve the minimum permissible RBC count (minimum of 70 g/L Hb, and minimum 30% hematocrit), transfusion of erythrocyte concentrates was carried out in 4 cases (11.4 %).

Manifestations of the hemostatic system disorders were in 4 cases (11.4%), which was an indication to perform a transfusion of fresh frozen plasma. According to WHO recommendations, the initiation of breastfeeding should be within the first 30 – 60 minutes after birth, 30 newborns (85.7%) were placed on the mother's breast in accordance with the recommendations. UBT allowed to prevent the development of a severe post-hemorrhagic anemia; the average hemoglobin level was 95.4 g/L at discharge from the hospital.

**Conclusion:** The uterine balloon tamponade is fully consistent with the strategy for maintaining the reproductive potential of women. Besides, it helps drastically improve medical and economic means, to increase the overall satisfaction and quality of women's lives.

**Conflict of interests:** None to declare

**Authorship:** S.O. and S.N. equally contributed to the study and preparation of manuscript

**Acknowledgements and funding:** This study was supported by the National Center of Maternity and Childhood Care, Kyrgyz Republic.

## References

1. Black RE, Laxminarayan R, Temmerman M, Walker N. Reproductive, maternal, newborn and child health: disease control priorities, vol. 2. 3<sup>rd</sup> ed. Washington DC: The International Bank

for Reconstruction and Development/The World Bank; 2016.

2. Trends in Maternal Mortality 1990–2015: Estimates by WHO, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division. WHO, UNICEF, UNFPA, World Bank Group, United Nations.

<http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2015/en/>. Published November 2015.

3. Royal College of Obstetricians and Gynecologists. Prevention and Management of Postpartum Hemorrhage, 1st ed. London: RCOG; 2009.

4. World Health Organization. WHO recommendations for the prevention and treatment of postpartum hemorrhage: evidence base. Geneva: World Health Organization; 2012. [http://apps.who.int/iris/bitstream/10665/75411/1/9789241548502\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/75411/1/9789241548502_eng.pdf).

5. Say L, Chou D, Gemmill A, Tunçalp O, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health* 2014; 2: e323-33. doi: 10.1016/S2214-109X(14)70227-X.

6. Kassebaum NJ, Bertozzi-Villa A, Coggeshall MS, Shackelford KA, Steiner C, Heuton KR, et al. Global, regional, and national levels and causes of maternal mortality during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014; 384: 980-1004.

7. Ministry of Health of the Kyrgyz Republic 2014. 'Inception Report on Confidential Enquiry into Maternal Deaths in the Kyrgyz Republic for 2011-2012.' National Committee on Confidential Enquiry into Maternal Deaths [https://kyrgyzstan.unfpa.org/sites/default/files/pub-pdf/CEMD-report\\_-13\\_03.pdf](https://kyrgyzstan.unfpa.org/sites/default/files/pub-pdf/CEMD-report_-13_03.pdf)

8. Ministry of Health of the Kyrgyz Republic 2017. 'Second Report on Confidential Enquiry into Maternal Deaths in the Kyrgyz Republic for 2014-2015.' National Committee on Confidential Enquiry into Maternal Deaths [https://kyrgyzstan.unfpa.org/sites/default/files/pub-pdf/KRMS\\_RU\\_1.pdf](https://kyrgyzstan.unfpa.org/sites/default/files/pub-pdf/KRMS_RU_1.pdf)

9. Lalonde A. FIGO Safe Motherhood and Newborn Health (SMNH) Committee. Prevention and treatment of postpartum hemorrhage in low-resource settings. *Int J Gynecol Obstet* 2012; 117: 108-18.

10. Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in woman with postpartum hemorrhage (WOMAN): an international, randomized, double-blind, placebo-controlled trial. WOMAN Trial Collaborators. *Lancet* 2017; 389: 2015-116.

11. El Senoun GA, Singh M, Mousa HA, Alfircvic Z. Update on the new modalities on the prevention and management of postpartum hemorrhage. *Fetal Matern Med Rev* 2011; 22: 247-64.

12. Tindell K, Garfinkel R, Abu-Haydar E, Ahn R, Burke TF, Conn K, et al. Uterine balloon tamponade for the treatment of postpartum hemorrhage in resource-poor settings: a systematic review. *BJOG* 2013; 120: 5-14. doi:10.1111/j.1471-0528.2012.03454.x.

13. Georgiou C. Balloon tamponade in the management of postpartum hemorrhage: a review. *BJOG* 2009; 116: 748-57. doi:10.1111/j.1471-0528.2009.02113.x.

14. Doumouchtsis SK, Papageorghiou AT, Arulkumaran S. Systematic review of conservative management of postpartum hemorrhage: what to do when medical treatment fails. *Obstet Gynecol Surv* 2007; 62: 540-7.

15. Martin E, Legendre G, Bouet PE, Cheve MT, Multon O, Sentilhes L. Maternal outcomes after uterine balloon tamponade for postpartum hemorrhage. *Acta Obstet Gynecol Scand* 2015; 94: 399-404.

16. Burke TF, Ahn R, Nelson BD, Hines R, Kamara J, Oguttu M, et al. A postpartum hemorrhage package with condom uterine balloon tamponade: a prospective multi-centre case series in Kenya, Sierra Leone, Senegal, and Nepal. *BJOG* 2015; <https://doi.org/10.1111/1471-0528.13550>.

17. Laas E, Bui C, Popowski T, Mbaku OM, Rozenberg P. Trends in the rate of invasive procedures after the addition of the intrauterine tamponade test to a protocol for management of severe postpartum hemorrhage. *Am J Obstet Gynecol* 2012; 207: 281-e1-7.

18. Burke TF, Danso-Bamfo S, Guha M, Oguttu M, Tarimo V, Nelson BD. Shock progression and survival after use of a condom uterine balloon tamponade package in women with uncontrolled postpartum hemorrhage. *Int J Gynecol Obstet* 2017; 139: 34-8.

19. Pendleton AA, Natarajan A, Ahn R, Nelson BD, Eckardt MJ, Burke TF. A qualitative

assessment of the impact of a uterine balloon tamponade package on decisions regarding the role of emergency hysterectomy in women with uncontrolled postpartum hemorrhage in Kenya and Senegal. *BMJ Open* 2016; 6: e010083.

20. Begley CM, Gyte GM, Devane D, McGuire W, Weeks A. Active versus expectant management for women in the third stage of labor. *Cochrane Database Syst Rev* 2011; 11: CD007412.