

Modified JH balloon for Uterine Tamponade: A boon in the management of atonic Postpartum Haemorrhage

¹Dr. Neelam Nalini, Associate Professor, Obs and Gynae Dept., FICS, FICOG, FICMCH [MBBS (Hons.); MD; Gold Medalist]

²Dr. Aditya Vardhan Singh, MBBS, MD, Gold Medalist, Consultant

³Dr. Bijeta, MBBS, MS, DNB, FICS, Consultant

⁴Dr. Shreshtha Singh, MBBS, MD

⁵Dr. Harsh Vardhan Singh, MBBS, MS

⁶Dr. Iva Rani Kalita, MBBS, MS

⁷Dr. Jitendra Kumar Singh, MBBS; MD (Radiodiagnosis) Consultant Radiologist

Corresponding Author: Dr. Neelam Nalini, Associate Professor, Obs and Gynae Dept., FICS, FICOG, FICMCH [MBBS (Hons.); MD; Gold Medalist]

Citation this Article: Dr. Neelam Nalini, Dr. Aditya Vardhan Singh, Dr. Bijeta, Dr. Shreshtha Singh, Dr. Harsh Vardhan Singh, Dr. Iva Rani Kalita, Dr. Jitendra Kumar Singh, “ Modified JH balloon for Uterine Tamponade: A boon in the management of atonic Postpartum Haemorrhage”, IJMSIR- May - 2020, Vol – 5, Issue -3, P. No. 178 – 184.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objective: to know the effectiveness of “modified JH(Jharkhand) balloon” to control atonic postpartum haemorrhage.

Study design and observation: This prospective study was done over 90 patients of atonic PPH. Exclusion criteria were: a) traumatic PPH, b) retained bits of placenta & membranes, c) congenital anomaly of uterus. Balloon tamponade was done when uterus fail to contract with oxytocics and bimanual compression. It was applied 76.67% cases of atonic PPH following vaginal delivery and in 15.56% after LSCS. In 7.77% of cases, it was applied intraoperative (during LSCS). Prolonged/obstructed labour was most common cause (23.3%) of atonic PPH.

Result: Because of effective tamponade and haemostatic action of “modified JH balloon”,

laparotomy was required in only 8 cases (out Of 90). So, failure rate was 8.89%. Mean blood loss (before application of balloon) was 1486 ml following LSCS (measured from suction bottle and calibrated blood drape) and 1050 ml following vaginal delivery (measured by calibrated blood drape). Average amount of blood collected in drainage bag of modified JH balloon was 142.8ml.

Conclusion: Modified JH balloon is made of easily available, very cheap, sterilized material and very effective in controlling atonic PPH. It is a very good life saving and fertility preserving method.

Keywords: Modified JH Balloon, Bimanual Compression, Atonic Postpartum Haemorrhage, B-Lynch Suture.

Introduction

Today place of uterine balloon tamponade has been well established with the success rate similar to embolization, B-Lynch suture or stepwise uterine devascularisation(1). Postpartum haemorrhage is one of the most leading cause of maternal death throughout the world(2,3). And we all know that to a large extent morbidity due to PPH can be reduced by rapid and proper management.

To avoid mortality and morbidity due to PPH, rapid diagnosis and to follow stepwise rapid management protocol, is required. Uterine balloon tamponade is now recommended by World Health Organization, the International Federation of Gynecology and Obstetrics and the Royal College of Obstetricians and Gynecologist if uterotonics and uterine massage fail to control bleeding(4,5). This study is about a special type of balloon which is made up of simple latex glove. Here JH stands for Jharkhand which is a state in India.

Materials and Methods

This study was conducted between 2016 December to 2018 January. Informed consents taken from all the patients and proper ethical guidelines were followed. Total number of cases studied during this period was 90. All 90 cases included in study had atonic PPH.

Exclusion criteria.

1. Traumatic PPH cases.
2. Retained bits of placenta and membranes.
3. Congenital anomaly of uterus.

We considered following investigations:

ABO, RH, Hb%, HIV, HbsAg, anti HCV, SGPT, SGOT, Serum creatinine, TC,DC,BT, CT, PT, INR, serum calcium, platelet count.

“Active management of third stage of labour” protocol was followed in all cases. When uterus failed to contract with following doses of Oxytocics/ecbolics

and bimanual compression, we proceeded for uterine balloon tamponade.

1. 20 units of oxytocin in 500 ml of ringer lactate @40 to 60 drops/minute.
2. 1 amp (0.2 mg) of methylergometrine (if not contraindicated).
3. 250 ugm of carboprost (i.m) (after exclusion of contraindications).

When atonic PPH diagnosed (after excluding cases of traumatic PPH) supportive measures (wide bore i.v line, blood for grouping & cross matching) and bimanual compression were started simultaneously. By the time one person was involved in bimanual compression, another assistant started making “Modified JH Balloon”. Uterine balloon tamponade was done if above doses of oxytocics and bimanual compression of uterus for 5 - 7 minutes failed and uterine atonicity persist.

Steps of making “modified JH balloon”

1. Take a number 7 or 7.5 simple sterilized latex glove (Materials required to make modified JH balloon-figure 1; step a).
2. All four finger projections of latex gloves except the middle finger projection were tied firmly with sterilized simple cotton thread (figure -1; step b)
3. Tip of the middle finger projection of latex glove was cut and through it simple suction catheter No.- 10 (sterilized) was inserted up to about 1.5 cm length beyond the proximal end of middle finger projection in to free palmer space of glove. At two places suction catheter (both at the proximal and distal end of middle finger projection) was tied firmly with thread (figure-1; step c).
4. Then latex glove was turned inside out (figure-1; step d).

5. Urobag tube (proximal end about 4-5 cm length) and suction catheter (which was inserted through middle finger projection) was firmly tied (with wrapping movement, not in a purse-string manner) with the wrist end of latex glove (Figure-1; step e).
6. Suction catheter no. -16 (orange color code) was connected with the urobag tube (purpose was to make this end compatible with nozzle of 50 ml syringe/any syringe) (Fig. -1; step f).
7. Balloon inflated by connecting 50 ml syringe with No. 16 suction catheter through which warm saline was injected, about 500ml in most of the cases. (Figure – 1; step g).Feracrylum was injected about – 50 ml through No. – 10 suction catheter which was inserted through middle finger projections. This Feracrylum formed a thin film of haemostatic and antiseptic solution between balloon and uterine wall.
8. Urobag was connected with no. -10 suction catheter half an hour after injecting feracrylum so as to give time for its action. Any amount of bleeding from uterine cavity was allowed to collect in the urobag and thus it gives an idea about efficacy of this balloon tamponade. (Figure 1; step h)

Demonstration of “Making of modified JH balloon” is available on youtube link. <https://youtu.be/VBIN5aSOWJ0>

In all cases balloon was applied after exploration of uterovaginal canal to exclude traumatic PPH or retained placental bits. Following balloon tamponade Oxytocin drip (10 units in 500 ml NS) was continued for 6 hours after balloon insertion. Antibiotics (ceftriaxone + Sulbactam) started and continued for 48 hours. “Modified JH balloon” was removed after 24 hours. Methyl ergometrine (0.2 mg i.m) was given 7 minutes before balloon removal. Those patients in whom

methylergometrine was contraindicated oxytocin drip (10 units in 500 ml of NS) started and continued for 2 hours. Patients were kept under observation for 12 hours after removing balloon (2 hourly pulse B. P. and bleeding P/V were recovered)

We kept arbitrary limit of 500ml warm saline to inject but fundal height was also marked with marker before applying balloon. We kept two criteria to stop injecting further warm saline :-

- (a) Fundal height of uterus should not rise beyond 1.5 cm above the marker and should be firm in palpation.
- (b) While injecting saline significance resistance felt. If any one of the above two criteria encountered first, we stopped injecting further saline.

Estimation of amount of blood loss in PPH was measured by calibrated blood drape (Figure -2). Blood drape is a plastic sheet that is placed under the women’s buttock and blood is collected into a calibrated measuring pocket on the sheet.

Statistical Analysis

Descriptive statistics like mean and percentage were used to interpret data with the help of Microsoft Office 2019.

Result

In our study maximum patients (56.67%) were in the age group 20 - 30 years (table I) and maximum patients (44%) were between the parity P₅₋₆ (table-II). Maximum gestational week among study group was 41.3 weeks and mean gestational week was 38.2 weeks. Table- III shows cause of atonic PPH in our study group. Prolonged or obstructed labour was most common (23.3%) cause of atonic PPH. Mean hemoglobin percentage (blood sample taken before balloon application) was 8.8 gm%. One unit of blood was required in 62 case, two units were transfused in 12

cases and three units in 2 cases. Mean time required for making modified JH balloon was 4.3 minutes.

Maximum amount of saline infused was 530 ml which was required in the case of twin pregnancy. Uterine balloon tamponade was done following vaginal delivery in 76.67% cases and following LSCS (PPH due to atonicity diagnosed during vaginal swabbing) in 15.56% cases. Intraoperative (during LSCS) balloon tamponade was done in 7.77% cases. Out of these 7.77% cases, 3 cases were of jaundice; one was of emergency LSCS in a case of heart disease and patient on anticoagulant and three cases of eclampsia with disturbed clotting profile. In all these 3 cases FFP and platelet transfusion was given. Three units FFP was transfused in heart disease (on anticoagulant therapy) patient and 2 units each in other cases. Mean blood loss (before application of balloon) was 1486 ml following LSCS (measured from suction bottle and calibrated blood drape) and 1050 ml following vaginal delivery (measured by calibrated blood drape). Average amount of blood collected in drainage bag of modified JH balloon was 142.8ml.

In 34 cases there were cervical tear which were repaired first followed by balloon application. In 12 cases there was extensive vaginal laceration along with atonicity, which was repaired first, followed by balloon tamponade.

In our study out of 90 cases laparotomy was required in 8 cases, out of these 8 cases 6 cases were managed by B- Lynch suture combined with uterine artery ligation and uteroovarian ligation. In 2 cases it was refractory atonicity and at last hysterectomy was performed.

Discussion

“Modified JH balloon” is improved version of “special JH balloon”. In special JH balloon we used nasogastric tube (NGT) instead of suction catheter (No.-10) to

inject Feracrylum But we noticed the in some of the cases on tight tying with thread either lumen of NGT was occluded or for pushing feracrylum, a 10x of force was required. Further unlike Bakri balloon there was no drainage port in special JH balloon. So in “modified JH balloon” we replaced nasogastric tube (No.- 6) with suction catheter (No.-10) or any no. upto 16. Suction catheter is made of more firm plastic so problem of lumen occlusion on tight tying with thread is overcome. Further distal end of suction catheter is attached to urobag. (Ends of both are compatible).

Now it acts as a very efficient drainage port. Lumen of suction catheter is of sufficient caliber, so it is not occluded with blood clot. In case of foley’s condom balloon tamponade very frequent we encountered this problem of occlusion of very narrow lumen of Foley’s catheter by blood clot.

In our study, we first inflated the balloon with warm saline as per the need of the case. Then we tied the cervix (portio vaginalis) with catgut No.- 1 (free tie to avoid spillage of Feracrylum). Then we injected 50 ml Feracrylum with suction catheter No.-10 (which was passed through middle finger projection) This Feracrylum which is iron salt of polyacrylic acid is very good haemostatic and antiseptic agent. It has action against both gram positive and gram negative bacteria. It has antifungal effect also. Then we clamp this suction catheter with artery forcep for 30 minutes. This time was given for haemostatic solution to act. After 30 minutes, artery forcep was released and urobag tube was connected. It acts as an efficient drainage port.

After separation of placenta in third stage of labour, contraction of middle criss-cross layer of muscles, acts as a ‘living ligature’ and completely occlude the blood vessels which passes at right angle to muscle fibers. This is physiological mechanism of haemostasis after

separation of placenta. But in case of atonic PPH, where uterus fails to contract, these blood vessels pour blood torrentially inside big hollow uterine cavity. For hemostasis first line management here is oxytocics and bimanual compression. If these methods fail, next step is surgical intervention in the form of different type of compression suture (eg. B-Lynch suture, Isthmic cervical apposition suture and cho-square suture) and stepwise devascularization of uterus. Here is the role of uterine balloon tamponade, when oxytocics and bimanual comparison fail. The success rate of the balloon tamponade varies between 77.5– 88.8%(6,7,8). This means that approximately among five PPH cases, four can be treated by balloon without undergoing a surgical intervention.

This balloon “Modified JH balloon” acts as a “4 prong approach” to combat PPH

- (i) Mechanical compression by saline filled balloon.
- (ii) Effect of warm saline.
- (iii) Haemostatic effect of Feracrylum.
- (iv) Additional antiseptic effect of Feracrylum

In our study we used this balloon during intraoperative period in only 7.33% of cases. Because when abdomen remained open, we have so many options to control PPH like stepwise devascularisation (uterine artery and/or uteroovarian ligation) and compression suture. Following vaginal delivery when PPH starts Obstetricians usually takes time to take decision for laparotomy. So here is the place of “Modified JH Balloon” before taking the decision for surgical intervention. Also it gives time for arrangement of blood and preparation for laparotomy. By the time arrangement was made, laparotomy was avoided in most of the cases in our study because bleeding was already controlled. We find it very efficient and life saving in a case of severely jaundiced patient, patients

of heart disease on anticoagulant, eclampsia patient and IUD cases. In all above cases in our study clotting profile (BT, CT, PT, INR, platelet count) was completely deranged. We had no option for laparotomy. So here balloon tamponade was lifesaving. Also it is made of easily available simplest, cost-effective, readymade sterilized material. It is very easy and quick method to apply. So it should be advertised on wide scale for use at Primary Health Centres. With balloon tamponade patients can be transferred to higher Centre. Also tamponade will give time for the arrangement of blood and laparotomy (if required). Demonstration of making of “Modified JH balloon” is available on you tube.

Many commercial balloons are also available in market but problem is their high cost and availability (eg Bakri catheter, Sengstaken Blakemore tube).

This “ Modified JH Balloon” is very efficient and at the same time vary cheap (hardly costs Rs. 75 whereas Bakri Balloon cost Rs. 8000) made of easily available. Sterilized, simplest thing, very easy to make and provided with facility to form a layer of haemostatic and antiseptic solution between uterine wall and balloon. Last but not the least, provided with an effective drainage port, so that we can keep eye over blood loss and effectiveness of balloon tamponade. When Feracrylum is not available we can use tranexamic acid or botroclot (diluted) as haemostatic agent.



Step a: Materials required for modified JH balloon



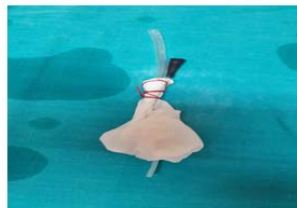
Step b: Tying of finger projection except mid



Step c: No. 10 Suction catheter inserted through Middle finger projection



Step d: Glove is turned inside out



Step e: Urobag tube and suction catheter tied



Step f: No. 16 suction catheter attached to urobag tube



Step g: Balloon inflated with normal saline



Step h: Urobag connected to no. 10 suction catheter

Figure 1: Steps of making modified JH balloon



Figure 2: Calibrated blood drape

Table I: Age distribution (N=90)

Age	No.	Percentage (%)
20-30	51	56.67%
31-40	39	43.33%

Table II: Parity distribution

Parity	No. of patients	Percentage (%)
Primi	6	7%
P2-P4	29	32%
P5-P6	40	44%
P7 and above	15	17%

Table III: Causes of atonic PPH

Causes of atonic PPH	No. of patients	Percentage (%)
Prolonged/obstructed labour	21	23.3%
Twin pregnancy	3	3.33%
Polyhydramnios	2	2.22%
Intrauterine death	15	16.67%
Preeclampsia	11	12.22%
Eclampsia	15	16.67%
Placenta previa(minor degree)	7	7.78%
Premature rupture of membranes	3	3.33%
Abruptio Placentae	3	3.33%
Multiple fibroid	2	2.22%
Jaundice	3	3.33%
Heart disease on anticoagulant	2	2.22%
Following manual removal of placenta	3	3.33%

Table IV: Mode of delivery

Mode of delivery	No. of patients	Percentage (%)
Vaginal	69	76.67%
LSCS	21	23.33%

Table V: Indication of LSCS

Indication of LSCS	No. of patients	Percentage (%)
Obstructed Labour	12	57.14%
Previous two LSCS	5	23.81%
Eclampsia with fetal distress	4	19.05%
Total	21	100%

Conclusion

This is very effective, fast, fertility saving and life saving method to control atonic PPH. So there is increasing opinion in favour of uterine balloon tamponade before switching over to surgical interventions but still more studies are required to make an ideal balloon for uterine tamponade. Also more and more studies are required to know the effect of this uterine tamponade on future fertility. Till now only few number of studies are done to know effect of tamponade on future fertility outcomes (9,10).

References

1. Georgiou C. A review of current practice in using Balloon tamponade Technology in the management of postpartum haemorrhage. *Hypertens Risk Pgnancy*.2014; 2:1-10
2. Countdown to 2015: maternal newborn and child survival [Internet]. WHO and UNICEF; 2012 <http://www.countdown2015mnch.org/documents/2012Report/2012-completepdf>.
3. Trends in maternal mortality 1990 to 2010. WHO, UNICEF, UNFPA and the World bank estimates Geneva. WHO; 2012 http://whalibdoc.who.in/publications/2012/9789241503631_eng.pdf.

4. World Health Organisation, WHO Recommendations for the Prevention and Treatment of Postpartum Heamorrhage, 2012, http://apps.who.in.iris/bitstream/10665/75411/1/978924/548502_eng.pdf.
5. FIGO safe Motherhood and Newborn Health Committee, “FIGO guidelines: Prevention and treatment of postpartum haemorrhage in low resource settings”, *International journal of Gynecology & Obstetrics*. 2012;117:108-118.
6. Gronvall M, Tikkanen M, Tallberg E, Paavonen J, stefanovie V, Use of Bakri balloon tamponade in the treatment of post-partum haemogrrhage: a series of 50 cases from a tertiary teaching hospital. *Acta obstet Gynecol Scand* 2013;92:433-438.
7. Alouini S, Bedouct I, Ramos A, Cecaldi C, Evrard MI, Khadre K. Bakri balloon tamponade for severe post-partum haemorrhage: efficiency and fertility outcomes. *J Gynecol Obstct Biol Reprod (Paris)*. 2015;44:171-5.
8. Laas E, Bui C, Popowski T, Mbaku OM, Rozenbeg P. Trends in the rate of invasive procedures after the addition of the intrauterine tamponade test to a protocol for management of service postpartum haemorrhage. *AM J Obstet Gynecol*. 2012;207:281e1-7
9. Georgiou C. Menses, fertility and pregnancy following the use of balloon tamponade technology in the management of post partum haemorrhage. *Aust N Z J Obstet Gynaecol*. 2014;54:287-90.
10. Nalini N, Singh Aditya, Uterine balloon tamponade by JH balloon : A simple efficient and cost effective method. *International J of contemp Med. Res*. Vol. 4, issue 3, Mar. 2017.