Uterine Balloon Tamponade by JH Balloon: A Simple, Efficient and **Cost Effective Method**

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ABSTRACT

Introduction: JH balloon (simple and special) is effective, cheap, fast and "easy to made" method to control atonic PPH, especially in low resource setting. Study was done with the objective to study the effectiveness of "JH uterine balloon tamponade" to control atonic postpartum haemorrhage and to know the effect of this tamponade on uterofallopian anatomy three months after delivery

Material and Methods: JH balloon tamponade was applied in 83 cases. It was applied when oxytocics and bimanual compression of uterus failed. Contraindications were chorioamnionitis, congenital anomaly of uterus and traumatic PPH. "Simple JH balloon" was applied in 60 (70.328%) cases "Special JH balloon" was applied in 23 (27.17%) cases. It was applied in 69 (83.13%) cases of atonic PPH following vaginal delivery and 14 (16.86%) cases following LSCS (post-operative).

Result: Failure rate was 3.61%. Laparotomy was required in three cases. In one case only hysterectomy was required. No mortality was there

Conclusion: JH balloon is effective, cheap, fast and "easy to made" method to control atonic PPH.

Keywords: JH balloon, post-partum haemorrhage, Bimanual compression.

INTRODUCTION

Postpartum haemorrhage (PPH) is leading cause of maternal death throughout the world especially in developing country.^{1,2} A large portion of these deaths can be avoided by proper prevention, very rapid diagnosis and by following a quick management protocol. Incidence of PPH has been decreased considerably due to universal acceptance of "active management of third stage of labour". Many reviewers3 worldwide consider that this uterine balloon tamponade (UBT) is simplest, least invasive and most rapid approach for PPH management, with success rates similar to embolization, B-Lynch suture, or stepwise uterine devascularisation.

World Health Organization, the international Federation of Gynecology and Obstetrics and the Royal college of Obstetricians and Gynaecologists all recommended a uterine balloon tamponade (UBT) if uterotonics and uterine massage fail to control bleeding.4,5

We made this JH balloon with easily available, cheap and readymade sterilized things. So that this can be easily made even in resource poor peripheral health center without wastage of time. And if required, patient can be transferred to higher center. This is a very effective and simple step to decrease maternal mortality and preserve women's fertility. We have named this balloon JH (JH stands for Jharkhand) to pay respect to our state. Maternal mortality in our state is high (219/2010-12) and per capita income is low. There are a number of commercially available balloon like Sengstaken-Blakemore

tube, Bakri catheter etc.^{6,7} But their price and non availability is the issue. Also foley catheter, Rusch catheter and simple Foley condom have been used in the last decades to control PPH with different success rate.

Study was done with the objective to study the effectiveness of "JH uterine balloon tamponade" to control atonic postpartum haemorrhage and to know the effect of this tamponade on uterofallopian anatomy three months after delivery.

MATERIAL AND METHODS

This study was conducted between 2014 Nov. to 2016 Oct. Total number of deliveries cases which were enrolled in this study over a period of two years were 83. These all 83 patients had atonic PPH. Out of these 83, in 69 cases atonic PPH was following vaginal deliveries and in 14 cases, it was following LSCS(postoperative). Out of these 83 deliveries, 74 were registered and 9 were unregistered. Contraindications are (i) clinical evidence of chorioamnionitis, (ii) congenital anomaly of uterus, (iii) traumatic PPH, (iv) retained bits of placenta & membrane.

Special JH balloon was used in those cases only where clotting profile was abnormal. For clotting profile, we considered following investigations:-

Bleeding time, clotting time, platelet count, prothrombin time and INR.

In all cases "active management of third stage of labour" was performed. Uterine atony was declared when uterus failed to contract after giving following doses of ecbolics.

- 20 unit of oxytocin in 500 ml of ringer lactate 40-60 1. drops/min.
- One amp. of methyl ergometrine i.m. (if not contraindicated) 2.

3. 250 microgram of carboprost i.m. (if not contraindicated) Bimanual compression of uterus, supportive measures and

"making of JH balloon" all were started simultaneously. After using above dose of uterine ecbolics and continuous (uninterrupted) bimanual uterine compression for 5-7 minutes (depending upon amount of bleeding), if atonicity and bleeding persisted, we proceeded for UBT by JH balloon.

Steps of making JH balloon (figure-1):-

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Simple JH balloon

- 1. Take a No. 7 simple latex glove (sterilized) (step 1: materials required to make simple JH balloon)
- All five fingers projections of latex glove were tied firmly with simple thread and glove was turned inside out. About 4-5 cm of proximal end of urotube (tube attached to any simple urobag) was cut and taken (step:2 & 3).
- 3. Proximal end of tube is inserted about 2-3 cm. inside the wrist end of latex glove and tied firmly with thread. (step:4)
- 4. Distal cut end of urotube was connected to distal end simple suction catheter (No.-8) (step:5).
- 5. 50 ml syringe with loaded warm normal saline was attached to the above free end of suction catheter. (step:6)

Special JH balloon(figure 2)

- 1. Materials required to make special JH balloon. (step:a)
- 2. In above simple JH balloon middle finger projection was not tied with thread. (step:b)
- 3. An infant feeding tube (IFT) No. 5 (proximal end) was inserted (through a small needle prick hole) through the tip of middle finger up to about 1.5 cm length beyond the proximal end of finger projection in to free palmer space of glove. At two places IFT was tied to middle finger (both at proximal and distal end of middle finger projection) with thread. (step:c)
- 4. Now latex glove was turned inside out. (step:d)
- 5. Proximal end of urobag tube (4-5 cm length) as well as IFT



Step-1



Step-3



Step-2

Step-4



Figure-1: making of simple JH balloon (details given in text)

(distal end) was firmly tied to wrist end of glove. (step:e)

- Distal end of urobag tube was attached to No. 8 suction catheter and 50 ml syringe (as in simple JH balloon). (step:f)
- 7. IFT (distal end) was attached to 10 ml, Feracrylum loaded syringe. (step:g)

50 ml of feracrylum was injected through IFT to uterine cavity. So that it formed a thin layer of feracrylum along inner side of uterine cavity (or outer side of balloon). Then vagina was packed with rollergauze (to avoid even remote possibility of slippage of balloon). In "simple JH balloon", only warm saline was injected to inflate the balloon. No feracrylum was used.

In all cases of PPH before applying UBT, uterovaginal canal



Step-a

Step-b







Step-d



Step-e

Step-f



Figure-2: making of special JH balloon (details given in text)

was explored to rule out traumatic causes of PPH. Oxytocin drip (10 units in 500 ml of ringer lactate – 20 drops/min) continued for 6 hrs following UBT application. Broad spectrum antibiotics (ceftriaxone plus suboctum, metrogyl) started and continued till 48 hrs. JH balloon was removed after 24 hrs. Before removing the balloon methylergometrine was given intramuscular (if not contraindicated). In those patients in whom methylergometrine was contraindicated, oxytocin drip (10 units in 500 ml of ringer lactate) started and continued for 2 hrs. All patients were kept under observation for 12 hrs (after removal of balloon) by recording pulse, B. P. and bleeding per vaginum, 2 hourly.

After applying UBT, in all cases we waited for 15 minutes to observe any bleeding through os and then ultrasonography was performed to rule out any collection of blood between balloon wall and uterine wall, which were not found in any cases and balloon was found closely applied to uterine wall. (Figure-3)

In our study, in all 14 LSCS cases (16.8%), we used JH balloon not intra-operative but post operative. When we diagnosed atonic PPH during vaginal swabbing after LSCS and cases had already received the above doses of ecoloics.

We marked the fundal height with marker before applying UBT. We kept arbitrary limit of 500 ml warm saline to inject. But also kept two criteria to stop injecting further saline.

- (a). Fundal height of uterus should not rise beyond 1.5 cm above the marker and on palpation must be of firm feel.
- (b). Significance resistance felt while injecting saline.

Out of above 2 criteria, if any one encountered first, we stopped injecting further warm saline.

Out of 83 patients, only 60 (72.28%) patients turned up for follow up 3 months after delivery. In all MRI and HSG was performed.

STATISTICAL ANALYSIS

Descriptive statistics like mean and percentages were used to interpret data with the help of Microsoft office 2007.

RESULTS

In our study maximum patients were in the age group 25-30 years (58%). Maximum age was 39.5 years and minimum age was 18 years. In our study minimum gestational age was 20 weeks, maximum was 42 weeks and mean was 38.2 weeks. Maximum parity was P₈ and number of primi patients were 29. Parity distribution of patient is shown in Table – 1. Table - 2 shows no. of cases in which simple JH balloon and number in which special JH balloon were used. Two units of blood transfusion were required in 24 cases (28.91%), one unit in 51 cases (61.44%). FFP 2 units in 11 cases (13.25%) and three units in 12 cases (14.45%) were required. Mean time in making, insertion and inflation of simple JH balloon was 5.2 minutes and of special balloon was 7.00 minutes. Out of 69 cases (83.13%) of vaginal delivery, laparotomy was required in 3 cases (3.61%). In one case (placenta accreta) hysterectomy was required. Mean time taken to stop bleeding following maximum inflation of balloon was 8.4 minutes. Maximum amount of saline inflated was 620 ml (in case of twin pregnancy) and minimum amount was 280 ml (in case following 20 weeks missed abortion expulsion). Tables 3 and 4 shows causes of PPH in cases where simple JH balloons and where special JH balloons were used. Table- 5, shows mode of delivery. Table - 6 shows indications



Figure-3: Ultrasonography showing simple JH balloon & special JH balloon creating uterine tamponade.

| Parity | Number | Percentage |
|------------------------------|--------|------------|
| Primi | 29 | 34.93% |
| P2-P4 | 39 | 46.98% |
| P5-P6 | 10 | 12.04% |
| P7 & above | 5 | 6.02% |
| Table-1: Parity distribution | | |

| Type of balloon | Number | Percentage |
|--------------------------------|--------|------------|
| Simple JH balloon | 60 | 72.29% |
| Special JH balloon | 23 | 27.71% |
| Table-2: Type of balloons used | | |

| Cause of atonic PPH | Number of | Percentage |
|--|-----------|------------|
| | cases | |
| Prolonged/obstructed labour | 11 | 18.34% |
| Twin Pregnancy | 4 | 6.66% |
| Preeclampsia | 12 | 20% |
| Eclampsia | 5 | 8.34% |
| Placenta Praevia(minor degree) | 6 | 10% |
| Premature rupture of membranes | 6 | 10% |
| Abrubtio placentae | 3 | 5% |
| Polyhydramnios | 2 | 3.33% |
| Intrauterine death | 3 | 5% |
| Missed abortion | 1 | 1.66% |
| Multiple fibroids | 2 | 3.33% |
| Unexplained | 5 | 8.34% |
| Table-3: Causes of atonic PPH where simple JH balloon was used | | |

| Cause of atonic PPH | Number | Percentage |
|---|----------|------------|
| | of cases | |
| Severe preeclampsia | 6 | 26.08% |
| Eclampsia | 4 | 17.39% |
| Jaundice | 4 | 17.39% |
| Intrauterine death | 3 | 13.05% |
| Heart disease on anticoagulant | 2 | 8.69% |
| Abruptio placentae | 1 | 4.35% |
| Following manual removal of placenta | 3 | 13.05% |
| Table-4: Causes of atonic PPH where special JH balloon was used | | |

of LSCS.

Mean blood loss was 1028 ml following vaginal delivery and 1726 ml following LSCS cases. Out of 83 cases, only 60 cases (72.28%) turned up for follow-up, after 3 months. All had normal MRI and HSG report.

DISCUSSION

Haemostasis achieved following separation of placenta in 3rd stage of labour is due to contraction of middle cris-cross layer of myometrium which literally clamped the blood vessels passing through them at right angle. But when uterine atony

occur, these blood vessels bleed torrentially and pour blood inside big, hollow uterine cavity. To control this PPH, first step is to use oxytocics and perform bimanual compression. Next step of management is surgical in the form of compression sutures and stepwise devascularisation. During LSCS, it is very easy to take the decision of B lynch suture, isthmic-cervical suture, cho square suture or stepwise devascularisation. But when PPH starts following vaginal delivery, in most of the cases, obstetricians take time to take decision for laparotomy. Therefore there is increasing opinion to use UBT before taking the decision for surgical interventions.⁸

We chose latex gloves because in comparison to Foley catheter balloon and condom, latex glove is more durable for warm saline (didn't rupture even after inflation of 4 liter of fluid) do not slip (due to absence of lubricant) in vagina, very easy to handle and acquire more pyriform shape on inflation. We had tried many things (like plane rubber catheter, Foley's catheter) to inflate the latex glove with saline. But tight tying of these tube with glove, resulted in occlusion of lumen of these soft tubes. So finally we chose proximal firm-grooved-plastic end of urobag tube.

In our study there were prediagnosed many high risk cases with abnormal clotting profile. So we involved a physician also to look after all systemic parameters.

In our both type of balloon, there is no drainage port. Because unless the drainage port is wide bore, it is very easily occluded by blood clot and become functionless.

In 12 cases, there were cervical tear, which were repaired first before UBT. In our study in 3 cases only, there was failure haemostasis by JH balloon. All were cases of vaginal delivery. One case was of PROM of 36 hrs and other was a case of sever preeclamptic toxaemia.

In these two cases laparotomy was done and B-lynch suture, isthmic cervical apposition suture, uterine artery and uteroovarian artery ligation performed with satisfactory result. The third case was a case of manual removal of placenta. In this case placenta could not be removed completely. At few places placenta was morbidly adherent with uterine wall (placenta accreta). Here JH balloon (special) failed. So hysterectomy was performed. In our study, we didn't use balloon tamponade during LSCS. Because during intraoperative period, there remain so many options in the form of compression suture and arterial ligation with good result.

The success rate of the balloon tamponade varies between 77.5% - 88.8%. This means that approximately among five PPH cases, four can be treated by balloons without undergoing a surgical intervention that has a high morbidity rate.

In our study high success rate is probably due to fast decision to use UBT. When atonic PPH was diagnosed, we used oxytocics and bimanual compression simultaneously and waited only for 5-7 minutes. Because, we all know that late decision causes significant blood loss and a vicious cycle set up in clotting cascade which progress towards DIC. Besides this, in all cases of prediagnosed abnormal clotting profiles, we used "3 prongs approach" to combat PPH by using "special JH balloon".

1. Uterine tamponade by warm saline.

- 2. Haemostatic effect created by feracrylum.
- 3. Additional antiseptic effect of feracrylum.

Feracrylum is ferrous salt of polyacrylic acid which has a very

good haemostatic property & antibacterial activity against gram positive, gram negative & antifungal activity.

These all factors probably resulted in good outcome.

We could follow only 60 cases (72.28%) after 3 month of delivery and found normal uterofallopian anatomy in HSG and MRI report (Figures – 4 & 5). Till date, only few studies have assessed results for fertility outcomes for women who have undergone balloon tamponade for severe PPH.⁹

In one case of atonic PPH following manual removal of placenta, we used double simple JH balloon (Figures- 6). It was a case of "hour glass contraction" which reappear when effect of anesthesia was over. So when simple JH balloon was inflated with 380 ml of warm saline, it was found that it created the tamponade in upper part of uterus and spared the entire cervix as well as lower part of uterine body below contraction ring

| Mode of delivery | Number | Percentage |
|---------------------------|--------|------------|
| Vaginal | 69 | 83.13% |
| LSCS | 14 | 16.87% |
| Table-5: Mode of delivery | | |

| Indication | Number | Percentage | |
|-----------------------------|--------|------------|--|
| Prolonged/obstructed labour | 8 | 57.14% | |
| Severe preeclampsia | 3 | 21.43% | |
| Eclampsia 3 21.43% | | | |
| Table-6: Indication of LSCS | | | |

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Figure-4: Hysterosalpingography - normal finding (3 month post delivery); Figure-5: MRI of pelvic organ- normal finding (3 month post LSCS)



Figure-6: Ultrasonography showing uterine balloon tamponade by double simple JH balloon in case of recurrence of "contraction ring".

and bleeding was coming from there. So we inflated one more simple JH balloon to create tamponade in this lower part and result was satisfactory.

CONCLUSION

By sharing the experiences (about UBT) all over the world, ideal balloon should be designed and a standard protocol should be released regarding the best (ideal) volume of saline which should be inflated to create tamponade, the most appropriate duration of application and the type of balloon for different indications. For this further studies must be made with a large number of cases. And also more studies are required to determine the predictors of tamponade failure and impact of tamponade on subsequent fertility outcomes. So this cost effective, efficient, uterine sparing procedure should be improved and promoted by more and more studies.

REFERENCES

- Trends in maternal mortality: 1990 to 2010. WHO, UNICEF, UNFPA and the world bank estimates. Geneva: WHO; 2012. http://whqlibdoc.who.int/ publications/2012/9789241503631_eng.pdf. Last accessed 1 Sept 2012.
- Countdown to 2015: maternal newborn and child survival [Internet]. WHO and UNICEF; 2012 http://www. countdown 2015 mnch.org/documents/2012 Report/2012complete.pdf. last accessed 1 Sept 2012
- Georgiou C. A review of current practice in using Balloon tamponade Technology in the management of postpartum haemorrhage. Hypertens Res pregnancy. 2014;2:1-10.
- World Health Organization, WHO Recommendations for the Prevention and Treatment of Postpartum Haemorrhage, 2012, http://apps.who.in.iris/bitstream/10665/75411/1/978924/ 548502_eng.pdf.
- 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.
- Gronvall M, Tikkanen M, Tallberg E, Paavonen J, stefanovie V. Use of Bakri balloon tamponade in the treatment of post-partum haemorrhage: a series of 50 cases from a tertiary teaching hospital. Acta obstet Gynecol Scand 2013;92:433-438.
- Alouini S, Bedouet I, Ramos A, Ceccaldi C, Evrard MI, Khadre K. Bakri balloon tamponade for severe post-partum haemorrhage: efficiency and fertility outcomes. J Gynecol Obstet Biol Reprod (Paris). 2015;44:171-5.
- Laas E, Bui C, Popowski T, Mbaku OM, Rozenbeg P. Trends in the rate of invasive procedures after the addition of the intrauterine tampnade test to a protocol for management of severe postpartum haemorrhage. AM J Obstet Gynecol. 2012;207:281el-7
- 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.

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