

Effectiveness of Bakri balloon for management of postpartum haemorrhage: A two-year retrospective cohort study

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Abstract

Introduction: Postpartum haemorrhage (PPH) is a preventable cause of maternal mortality and Active management of the third stage of laborious considered a gold standard for the management and prevention of PPH. Oxytocics like Oxytocin, Carbetocin, Methergin and Misoprostol are the mainstays of the management of PPH. When medical methods fail intrauterine balloon, tamponade has been suggested as an effective uterine conserving procedure, minimally invasive and requires less skill. The purpose of this study was to determine the indications, complications and effectiveness of Bakri balloon insertion performed at the tertiary care teaching hospital.

Patients and Methods: All cases of Bakri balloon insertion done between 1-01-2020 to 31-12-2021 at the Department of Gynecology and Obstetrics were retrospectively collected. The study group included women for whom the balloon was inserted vaginally and after caesarean delivery when medical methods fail to control PPH and PPH following Placenta previa. Demographic data, clinical characteristics, indications of Bakri balloon, amount of normal saline used, duration of Bakri balloon inside uterus, complications and effectiveness of Bakri balloon were studied.

Results: There were 24 patients who underwent Bakri balloon insertion. 14 patients were delivered by Cesarean section and 10 patients were delivered by vaginal delivery. 16 were multigravida and the majority were from the rural population. The most common indication for a Bakri balloon in our study is the Atonic uterus. The Bakri balloon was effective in 83.33%. (20/24). Out of 4 women, two women required emergency peripartum hysterectomy and 2 women expired.

Conclusion: The Bakri balloon was highly effect vein our study and can be used when medical management fails. It reduces the need for peripartum hysterectomy and saves woman reproductive function. It avoid sun necessary blood product transfusion and reduces the duration of hospital stay.

Keywords: Bakri balloon, postpartum haemorrhage, Cesarean section, vaginal delivery

Introduction

According to LAQSHYA guidelines, Postpartum haemorrhage (PPH) is defined as blood loss of more than 500 ml in vaginal delivery and 1000ml in Cesarean section or one pad soaked in 5 minutes or any bleeding sufficient to cause signs of hypovolemic shock. PPH is an obstetric emergency that can complicate vaginal or cesarean deliveries and accounts for 25% of all maternal deaths worldwide ^[1]. PPH is a preventable cause of maternal mortality and Active management of the third stage of labour is considered a gold standard for the management and prevention of PPH. Oxytocics are the mainstay of the management of PPH. The most effective oxytocic used for medical management are Oxytocin, Carbetocin, Methergine, Misoprostol and Carboprost. Failed medical management define as PPH failure to respond to the medical management and requires second-line treatment in the form of balloon tamponade, compression sutures, step-wise devascularization of uterine artery and peripartum hysterectomy ^[2].

Intrauterine balloon tamponade has been suggested as an effective uterine conserving procedure, minimally invasive and requires less skill. It can save the patient from surgical intervention and may temporarily stop the bleeding while transferring the patient to a tertiary hospital ^[3]. LAQSHYA guidelines for the management of PPH also recommend the use of Intrauterine balloon tamponade for atonic PPH or refractory PPH when medical management fails ^[4]. In India there is a smaller number of studies on the Bakri balloon because of its cost. The purpose of this study was to determine the indications, complications and effectiveness of Bakri balloon insertion performed at the tertiary teaching hospital and to compare the results with literature data.

Patients and Methods

All cases of Bakri balloon insertion done between 1-01-2020 to 31-12-2021 at Department of OBG, at our center were retrospectively collected. Our hospital is a tertiary facility that serves as a reference centre for obstetric complications. We have got institutional ethical clearance. The study group included women for whom the balloon was inserted vaginally and after caesarean delivery.

Inclusion criteria

All patients having atonic PPH with failed medical management and PPH following placenta previa.

Exclusion criteria

1. Traumatic PPH
2. Coagulation disorder
3. Uterine anomaly
4. Infection of the genital tract.

If it is a vaginal delivery balloon that was inserted into the uterine cavity with a sponge holding forceps after the introduction of Sim's speculum into the vagina and holding the anterior lip of the cervix with sponge holding forceps. Vaginal packing was done and Normal saline 250 to 500 ml was inserted till bleeding was arrested. During the cesarean section, the balloon was inserted through the uterine incision, uterine closure was done and then normal saline was inserted 200ml to 400 ml after packing the vagina. The balloon drainage end was connected to a fluid bag to monitor blood loss. The procedure was successful if the bleeding

is stopped after the balloon was inflated. After 12 to 24 hours Bakri's balloon slowly deflated and was removed. The balloon was deflated slowly at a rate of 50 ml in 30 minutes. After deflating completely Bakri balloon and vaginal packing were removed. Antibiotic coverage is given to all women. Blood transfusion was given whenever there is a requirement. All patients were kept in a high dependency unit or Obstetric intensive care depending on the condition. All patients were catheterized with Foley's catheters. Demographic data, clinical characteristics, indications for Bakri balloon, amount of normal saline used, duration of Bakri balloon inside uterus, complications and effectiveness of Bakri balloon were studied. The data were entered into Microsoft Excel and statistical analysis was done using SPSS software version 20.0 Chicago, Armonk, NY, USA.

Results

Table 1: Demographic characteristics

Characteristics	No of Patients	% of Patients
Age group		
< 20 yrs.	02	8.33
20-24 yrs.	11	45.83
25-29 yrs.	09	37.5
30+ yrs.	02	8.33
Parity		
Primigravida	08	33.33
Multigravida	16	66.66
Location		
Rural	15	62.5
Urban	09	37.5

Table 2: Indications for Bakri balloon

Indication	No of Patients	% of Patients
Atonic uterus	20	83.33
Placenta previa	3	12.5
Inversion of uterus	1	4.16

Table 3: Risk factors for PPH

Risk factors	No of Patients	% of Patients
Abruption	06	25
Pregnancy-induced hypertension	05	20.83
Prolonged labour	05	20.83
Previous LSCS	03	12.5
Placenta previa	03	12.5
Instrumental delivery	01	4.16
Inversion of uterus	01	4.16

Table 4: Mode of delivery

Mode of delivery	No of Patients	% of Patients
Cesarean section	14	58.33
Vaginal delivery	10	41.66

Table 5: Demographic of the subjects

Parameters	Vaginal delivery	Cesarean section
Amount of Normal saline inserted	375-ml (range 250 ml to 500 ml)	314.28 ml (Range 200 ml to 400 ml)
Duration of Bakri balloon inside uterus	21.1 hrs. (Range 12 hrs. to 24 hrs.)	20.8 hrs. (Range 14 hrs. to 24 hrs.)
Duration of hospital stay	4 (3-7Day)	7 (7-14Day)
Mean Hb	8.2 gm/dl	7.3 gm/dl

In the study period from 1-01-2020 to 31-12-2021, there were a total of 8419 deliveries. There were 24 patients who underwent Bakri balloon insertion. The mean age of the patient was 23.83 (range 19 to 35 years) 16 were multigravida and the majority were from the rural population. The mean gestational age was 37.6 weeks (range from 36 weeks to 41 weeks). The demographic profile is shown in Table 1. The most common indication for a Bakri balloon in our study is the Atonic uterus. Table 3 shows Risk factors for PPH. The most common risk factors were Abruptio, Pregnancy-induced hypertension and prolonged labour. Table 4 shows the mode of delivery. 14 patients were delivered by Cesarean section and 10 patients were delivered by vaginal delivery.

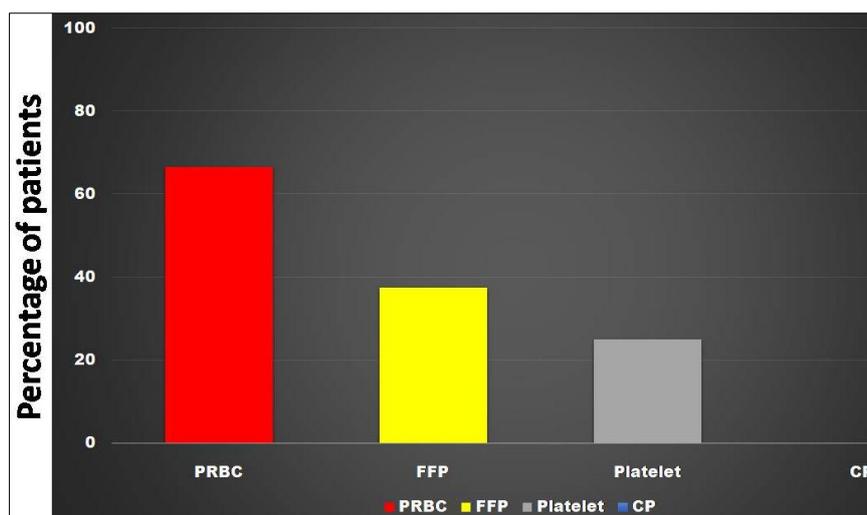
**Fig 1:** Transfusion of blood products

Figure 1 shows the transfusion of blood products. 16 patients received PRBC and 8 patients did not require any blood products. Table 5, the mean normal saline used in our study is 344.64 ml. The mean volume of normal saline used in vaginal delivery-375-ml (range 250 ml to 500 ml) and in the Cesarean section is 314.28 ml (range 200ml to 400 ml). Duration of Bakri balloon in vaginal delivery 21.1 hrs. (Range 12 hrs. to 24 hrs.) And in Cesarean section 20.84 hrs. (Range 14 hrs. to 24 hrs.). The duration of hospital stays is less in vaginal deliveries. Complications associated with the Bakri balloon were spontaneous expulsion in one patient and sepsis in two patients. Outcome- According to our definition effectiveness is defined as the control of PPH not requiring any further surgical intervention. The Bakri balloon was effective in 83.33%. (20/24). Out of 4 women, two women required emergency peripartum hysterectomy and 2 women expired. One woman died due to Hypovolemic shock with multi-organ failure and the other woman died because of disseminated intravascular coagulation.

Discussion

In our study, a Bakri balloon was inserted by a trained obstetrician and all women were treated with a Bakri balloon donated by the jivadaya foundation (Cook medical company, USA).

The majority of women who had Bakri balloon insertion was less than 25 years and the mean age is 23.83 (range 19 to 35 years) This was similar to a study done by Rajat Sharma *et al.* [5] The mean gestational age in our study was 37.6 weeks whereas the study done by Rajat Sharma *et al.* Mean gestational age was 35.3 weeks [5]. The common indication for Bakri balloon insertion in our study is uterine atony (83.33%) and uterine atony was the underlying cause of PPH in 75% (9/12) of studies in the review study done by Cara. E. Wright Ms *et al.* [6]. It is different from a study done by Laura *et al.* where from placental implantation site and bleeding from lower segment were common indications [7].

The mean volume of normal saline is 344.64 ml (range from 200 ml to 500 ml) which is similar to the study done by Rajat Sharma *et al.* and Alouini *et al.* [5, 8]. In our study majority of cases were after the caesarian section (14/24) and it was observed similarly in a study done by Laura *et al.* where it was observed in 19 cases [7]. In a review study done by Ahmed Said Ali *et al.* they have given a Bakri balloon a less effective tool for the management of PPH either after normal or caesarian delivery [3]. In our study it was highly effective (83.33%) which is different from Yoong *et al.* and Nelson *et al.* where it is 100% when they have used uterine compression sutures with Bakri balloon [9, 10]. 8.33% Required surgical intervention in the form of peripartum hysterectomy (in both cases blood loss of more than 500ml in the drainage bag) which was different from the study done by Rajat Sharma *et al.* where it was 15.38% and required surgical intervention like uterine devascularization and compression sutures [5]. Maternal mortalities in our study were 8.33% where as it is Nil in a study done by Yoong *et al.* and Nelson *et al.* [9, 10] The intrauterine balloon is less invasive, faster and more straightforward to perform; all of these features make this method a useful option as a first step in the conservative management of PPH [7]. Limitations of our study are it was a retrospective study and includes small sample size.

Conclusion

The Bakri balloon was highly effective and can be used when medical management fails. Along with Bakri balloon insertion, blood product transfusion and intensive care monitoring were associated with good maternal outcomes. It reduces the need for peripartum hysterectomy and saves woman reproductive function. It avoids unnecessary blood product transfusion and reduces the duration of hospital stay. It can be inserted by nursing officers after vaginal delivery after training and can be used as a temporary method while shifting patients from the periphery to the higher centre. Regular practice training for Bakri balloon insertion should be undertaken in order to prevent PPH-related maternal mortality. Hence it is a life-saving procedure.

Compliance with ethical standards

Conflict of interest

The authors declare a conflict of interest as none.

References

1. World Health Organization. Attending to 136 million births, every year: make every mother and child count: The World Report 2005. Geneva, Switzerland: WHO. 2005;3:62.

2. WHO recommendations for the prevention and treatment of post-partum hemorrhage. 2012. Available from <http://apps.who.int/iris/bitstream/handle/10665/75411/9789241548502-eng.pdf;jsessionid=F644CEAFE698307A56B913BBDB23EE9/sequence=1>
3. Said Ali A, Faraag E, Mohammed M, Elmarghany Z, Helaly M, Gadallah A, *et al.* The safety and effectiveness of Bakri balloon in the management of postpartum haemorrhage: A systematic review. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2021 Jan;34(2):300-7.
4. Guidance note on prevention & management of postpartum hemorrhage pdf. 2021. Available from http://nhm.gov.in/images/pdf/programmes/maternal-health/guidelines/guidance_note_on_prevention_&_management_of_postpartum_hemorrhage
5. Sharma R, Sirsam SS, Koranne PS, Wahane AR. Balloon Tamponade: A Novel Innovation in the Management of Refractory Postpartum Hemorrhage at Tertiary Care Center: A Study from Central India. *Journal of South Asian Federation of Obstetrics and Gynaecology*. 2021 Jul;13(4):222.
6. Wright CE, Chauhan SP, Abuhamad AZ. Bakri balloon in the management of postpartum hemorrhage: A review. *American journal of perinatology*. 2014 Nov;31(11):957-64.
7. Aibar L, Aguilar MT, Puertas A, Valverde M. Bakri balloon for the management of postpartum hemorrhage. *Acta Obstetrica et Gynecologica Scandinavica*. 2013 Apr;92(4):465-7.
8. Alouini S, Bedouet L, Ramos A, Ceccaldi C, Evrard ML, Khadre K. Bakri balloon tamponade for severe post-partum haemorrhage: efficiency and fertility outcomes. *Journal de Gynecologie, Obstetrique et Biologie de la Reproduction*. 2014 Jun;44(2):171-5.
9. Yoong W, Ridout A, Memtsa M, Stavroulis A, AREF-ADIB ME, RAMSAY-MARCELLE ZE, *et al.* Application of uterine compression suture in association with intrauterine balloon tamponade ('uterine sandwich') for postpartum hemorrhage. *Acta obstetrica et gynecologica Scandinavica*. 2012 Jan;91(1):147-51.
10. Nelson WL, O'Brien JM. The uterine sandwich for persistent uterine atony: combining the B-Lynch compression suture and an intrauterine Bakri balloon. *American journal of obstetrics and gynecology*. 2007 May;196(5):e9-10.

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