International Journal of Reproduction, Contraception, Obstetrics and Gynecology
*Bahuguna G et al. Int J Reprod Contracept Obstet Gynecol. 2024 Mar;13(3):729-732*
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20240486

**Case Report**

# Uterine perforation by Bakri balloon following management of secondary postpartum haemorrhage: a case report and review of literature

**Gunjan Bahuguna*, Anjali Kalaskar, Radhika Viswanatha**

Department of Obstetrics and Gynecology, Epsom and St. Helier Hospital NHS Trust, UK

**Received:** 01 January 2024
**Accepted:** 30 January 2024

***Correspondence:**
Dr. Gunjan Bahuguna,
E-mail: drgunjanuk@gmail.com



## ABSTRACT

The objective of this study was to decipher the efficacy and safety of the Bakri balloon as a tamponading device for managing secondary postpartum haemorrhage. A 37-year-old lady presented to us with a secondary postpartum haemorrhage after 17 days of vaginal birth. Due to ongoing heavy bleeding per vaginum, she underwent an examination under anaesthesia, and manual removal of placental tissue along with the insertion of a Bakri balloon under ultrasound guidance. However, after 6 hours of the procedure, she deteriorated and the bedside ultrasound showed rupture of the uterus at the fundus with the Bakri balloon in situ. She was resuscitated and had an emergency laparotomy with repair of the uterine perforation following which she recovered completely and was discharged home on day 6. Uterine rupture following balloon tamponade is a rare but life-threatening complication, especially when placed during the management of secondary PPH in a septic postpartum uterus. This occurred despite placing the balloon under ultrasound guidance in an unscarred uterus. Keeping a low threshold of suspicion of uterine rupture and prompt treatment can save the uterus. The safety of the use of the Bakri balloon in secondary PPH needs to be reviewed in a larger population as the uterus is more likely to rupture because of underlying infection.

**Keywords:** Uterine rupture, Secondary postpartum haemorrhage, Bakri balloon

## INTRODUCTION

Looking into the global causes of maternal death, PPH is a leading contributor, especially in low-income countries.[1] However, recently the developed world is seeing a drift from obstetric causes to cardiovascular and chronic causes as a major cause of maternal mortality.[2] The causes of PPH are described by '4T'; uterine atony (tone) which accounts for 70% of the causes, genital tract trauma, retained tissue of conception and coagulopathy which is described as thrombin by Escobar et al.[3]

Management of PPH involves prompt recognition of its cause. We start with conservative management as the first line which involves massaging the uterus along with uterotonic medications to arrest bleeding because of uterine atony, removal of retained tissue from the uterus to help the uterus to contract; prompt repair of genital trauma and replenishment of coagulation factors in case of coagulopathy.[4]

Wedmer et al found about 10-20% of patients were unresponsive to the first-line conservative methods to stop bleeding and therefore 'efractory', requiring further surgical means to cease bleeding.[5] Here the definition of refractory PPH was used if a lady did not respond to three or more uterotonics and required further surgical measures to stop haemorrhage. Moving then to intrauterine balloon tamponade as the first-line surgical means to control uterine atonicity.[4] Various intrauterine devices ranging

from the most commonly found Foley catheter to condom catheter, Sengstaken Blakemore tube, Rusch catheter, or the Bakri balloon have been used previously for PPH.[6]

Even though only one case is reported in literature where the successful use of the Bakri balloon in secondary PPH, this is the last resort in the management of severe secondary PPH and is occasionally used in clinical practice.[7]

This case report demonstrates we should keep a low threshold for suspicion of a uterine rupture after intrauterine tamponade with Bakri balloon for managing secondary postpartum haemorrhage (PPH).

## CASE REPORT

A 37-year-old lady had a spontaneous vaginal birth at term in a different trust. She suffered a primary postpartum haemorrhage of about 1700 ml secondary to a second-degree perineal tear and a cervical tear. She had previous 2 vaginal birth and the last one required forceps. She received one dose of injection Ferrinject (Ferrouscarboxymaltose 1000mg) and was discharged home and presented to our trust on day 12 postpartum with secondary postpartum haemorrhage with an estimated blood loss at home of about 750 ml. On examination, she looked unwell, with moderate pallor, and a soft abdomen, uterus about 16 weeks size with tenderness over the uterus. A speculum examination showed a repaired cervical tear (3 to 4 stitches seen at the 6 O' clock position), with clots protruding through the cervix.

Bedside ultrasound showed a possible 7cm retained placental tissue inside the uterine cavity. She was stabilized with IV fluids, crossmatched blood and started on IV antibiotics. Due to continued bleeding per vaginum (PV) she was offered examination under general anaesthesia (EUA) and removal of the retained placental tissue. EUA, removal of the cervical suture of the external ostea was done which opened up the cervix and it was possible to digitally explore the uterine cavity along with manual removal of the placental tissue in a piecemeal manner from the posterior uterine wall. Due to uterine atony insertion of the Bakri balloon under ultrasound guidance was performed with the balloon being inflated by 150 ml of saline, along with the placement of a vaginal pack to secure the balloon. She was transfused with 2 units of blood intraoperatively and continued on IV antibiotics. Total estimated blood loss was about 1700 ml in this episode of bleeding, and she had about 1700 ml of blood loss during her delivery.

During the immediate postoperative period, the balloon was deflated to 100 ml as she complained of pain lower abdomen, following which the pain resolved. After 6 to 8 hrs of recovery, she complained of new-onset pain under the rib and lower abdomen, along with nausea. She was hypotensive with a blood pressure of 82/46, a pulse of 63 per min, and a saturation of 97% on 21% of Oxygen. On examination, the uterus was 20 weeks in size, the vaginal pad was dry. Bedside ultrasound confirmed a uterine rupture in the fundus of the uterus with free fluid in the pelvis and abdomen. Though the balloon was still seen inside the uterine cavity, there was a breach in the uterine myometrium at the fundus. She was resuscitated with iv fluids and blood products and planned for an immediate return to the theatre for an emergency laparotomy. Venous blood gas showed an Hb of 63 and a lactate of 1.6. She was started on blood, and fresh frozen plasma and cryoprecipitate were also ordered.

Intra-operatively a hemoperitoneum of 1500 ml with 4 cm full-length fundal uterine perforation was noted with active bleeding from both the angles of perforation. The rest of the uterus, tubes, ovaries and broad ligament were found to be normal. The uterine cavity was explored, and a repair of the defect was performed in 2 layers with vicyrl no. 1, as the tissue was very friable, an additional three haemostatic stitches were taken. The uterus was soft and compression sutures were taken after reflecting the bladder down. A thorough saline wash was given and a surgical was applied at the uterine suture line along with the placement of an abdominal drain (Robinson no 18); the abdomen was closed after confirming hemostasis. Intra-operative Hb was 68, and she was then transferred to the high dependency unit for post-operative monitoring. She received 9 units of RBC, 4 FFP and 2 cryoprecipitates in total; recovering completely. The abdominal drain was taken off the next day and was discharged on day 6 with an Hb of 106. Oral antibiotics were given for 5 days, along with Dalteparin for 2 weeks on discharge. She was advised early-term delivery by elective section due to the risk of uterine rupture.

## DISCUSSION

There are very few case reports published with similar complications.

### *Risk factors for PPH*

In a recent work by Labarta et al risk factors associated with PPH that were found were induction of labour (47.2%), twin pregnancies in 22% and 12% had a previous caesarean section.[8] However, the main cause of PPH was uterine atony in 69%, with retained tissue in 11%. To arrest bleeding, 65% of women required a uterine curettage before insertion of the Bakri balloon.

### *Mechanism of action of uterine balloon devices*

Labarta et al used 255ml as the mean volume of saline to fill in the Bakri balloon in their study of 123 patients.[8] The proposed mechanism of the working of uterine balloon devices was thought to be through the stimulation of receptors in the uterus to cause uterine contraction and hydrostatic pressure created by the tamponade to close the bleeding uterine sinuses. However, Escobar et al further research was needed to establish the true mechanism of

their action.[3] They are believed to work on the low-pressure, high-volume principle which means that as soon as the uterus contracts it expels the device out from the upper uterine segment where it is supposed to sit.

### *Insertion timeframe of uterine balloon devices in the management of PPH*

Unfortunately, there is no specific time frame for BBT use in PPH. Nevertheless, most of the studies say that early recognition of PPH and prompt actual placement of the device, without falling out are associated with high success.[3] Grange et al found blood loss of more than 1500 ml before the insertion of IUBT was a risk factor for failure of IUBT in a study of 108 patients.[9] Similarly, Howard et al demonstrated lower morbidity if IUBT was performed earlier at lower blood losses.[10] A higher blood loss poses a risk of coagulopathy which in turn was a risk factor for failure. In a case report, successful use of a Bakri balloon in secondary PPH is reported.[7]

### *Success rate of uterine balloon devices*

Labarta et al found that BBT had a success rate of 81.3% (100/123) of patients.[8] The overall success rate found by the systematic review of 551 patients, was 79.55%.[8] Similarly, observation studies have found a success rate of 83% to 95% and a 100% survival rate with uterine balloon tamponade before the onset of advanced shock.[3]

### *Complications of uterine balloon devices*

Prolonged use of tamponade can cause ulceration as a pressure effect. Perforation of the uterus can occur while inserting the balloon or due to overdistension.[6] A secondary post-partum uterus is soft and inflamed which may contribute to the cause of a ruptured uterus.[11] This was similar to our case and was an attributing factor for the rupture of the uterus. Ultrasound guidance has been used for the safe placement of the balloon and to diagnose an early rupture of the uterus and was undertaken in our case as well.[12] However, Rocher et al described a case of rupture of the uterus along with lacerations of the broad ligament which possibly occurred during the inflation of the balloon despite being placed under ultrasound guidance.[13] Spencer et al also described a similar case where the Bakri balloon had perforated into the broad ligament.[14] Here a conspicuous feature of sudden onset abdominal pain which would denote uterine rupture was described similarly to our case before the patient was found in shock.[13,14]

The use of uterine tamponading devices in PPH has been seen to avert invasive procedures like uterine compression sutures, uterine artery embolisation and hysterectomy.[3] In our case, we avoided a hysterectomy by prompt management which resulted in a good recovery of our woman. However, a peripartum hysterectomy is at times performed as a last resort to save a patient and the most common causes implicated have been abnormal placentation, ruptured uterus and uterine atony.[3] Nonetheless, a high risk of scar rupture in future pregnancy remains.

### *Factors associated with failure of uterine balloon devices*

In a recent systematic review of the factors associated with the failure of BBT in PPH, by Labarta et al it was found that the age of the patient (younger), delivery by caesarean section, curettage prior to BBT and having been transfused ≥7 RBC units had been independent and significant risk factors associated with BBT failure.[8] Along with coagulopathy, blood loss prior to insertion, long operation time, placenta acreta/anterior, and pre-pregnancy weight as additional risk factors for failure.[9] Escober et al also highlighted the misplacement of the device as a cause of failure, because when it was not placed in the upper uterine cavity, there were chances of slipping out and being ineffective.[3] Wright et al found slippage of the balloon into the vagina in about 10% (14/136) of patients.[15] As a result, 5% (10/189) of women required vessel ligation and about 6% (4-10%) needed a hysterectomy to arrest bleeding. Labarta et al had 16 cases that required pelvic arterial embolization, 2 needed vascular ligations and 8 puerperal hysterectomies in 23/123 BBT failure cases in their study.[8]

## CONCLUSION

Uterine tamponade devices are a conservative means to arrest a PPH with a success rate ranging from 75% to 90% according to literature. The safety of the use of the Bakri balloon in secondary PPH needs to be reviewed in a larger study as uterine rupture can happen in a septic postpartum uterus when a uterine tamponade device is inserted for PPH. Careful monitoring of the patient and prompt recognition of uterine rupture can save the patient.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: Not required*

## REFERENCES

1. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, Fat DM, et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. Lancet. 2016;387(10017):462-74.
2. Wang S, Rexrode KM, Florio AA, Rich-Edwards JW, Chavarro JE. Maternal Mortality in the United States: Trends and Opportunities for Prevention. Annu Rev Med. 2023;74:199-216.
3. Escobar MF, Nassar AH, Theron G, Barnea ER, Nicholson W, Ramasauskaite D, et al. FIGO recommendations on the management of postpartum

hemorrhage 2022. Int J Gynaecol Obstet. 2022;157:3-50.
4. Anderson JM, Etches D. Prevention and management of postpartum hemorrhage. Am Fam Physician. 2007;75(6):875-82.
5. Widmer M, Piaggio G, Hofmeyr GJ, Carroli G, Coomarasamy A, et al. Maternal characteristics and causes associated with refractory postpartum haemorrhage after vaginal birth: a secondary analysis of the WHO CHAMPION trial data. BJOG. 2020;127(5):628-34.
6. Georgiou C. Balloon tamponade in the management of postpartum haemorrhage: a review. BJOG. 2009;116(6):748-57.
7. Agrawal R, Legge F, Pollard K, Al-Inizi S. Massive secondarypostpartum haemorrhage managed with insertion of a Bakriballoon catheter after surgical evacuation of the uterus. S Afr J Obstet Gynaecol. 2011;17:36-7.
8. Labarta FJ, Pintado Recarte MP, Joigneau Prieto L, Bravo Arribas C, Bujan J, Ortega MA, et al. Factors Associated with Failure of Bakri Balloon Tamponade for the Management of Postpartum Haemorrhage. Case Series Study and Systematic Review. Healthcare (Basel). 2021;9(3):295.
9. Grange J, Chatellier M, Chevé MT, Paumier A, Launay-Bourillon C, Legendre G, et al. Predictors of failed intrauterine balloon tamponade for persistent postpartum hemorrhage after vaginal delivery. PLoS One. 2018;13(10):e0206663.
10. Howard TF, Grobman WA. The relationship between timing of postpartum hemorrhage interventions and adverse outcomes. Am J Obstet Gynecol. 2015;213(2):239.
11. Ajayi OA, Sant M, Ikhena S, Bako A. Uterine rupture complicating sequential curettage and Bakri balloon tamponade to control secondary PPH. BMJ Case Rep. 2013;2013:bcr2012007709.
12. Cho Y, Rizvi C, Uppal T, Condous G. Ultrasonographic visualization of balloon placement for uterine tamponade in massive primary postpartum hemorrhage. Ultrasound Obstet Gynecol. 2008;32(5):711-3.
13. Rocher G, Panel P, Rollin I, Wormser A, Souiai-Hidoussi A, Raynal P, et al. Massive hemoperitoneum due to uterine perforation by the Bakri Balloon, during the treatment of postpartum hemorrhage. J Gynecol Obstet Hum Reprod. 2019;48(1):75-6.
14. Spencer NR, Saad A. Perforation with Bakri balloon into broad ligament during management of postpartum hemorrhage. Am J Obstet Gynecol. 2021;224(2):227.
15. Wright CE, Chauhan SP, Abuhamad AZ. Bakri balloon in the management of postpartum hemorrhage: a review. Am J Perinatol. 2014;31(11):957-64.

**Cite this article as:** Bahuguna G, Kalaskar A, Viswanatha R. Uterine perforation by Bakri balloon following management of secondary postpartum haemorrhage: a case report and review of literature. Int J Reprod Contracept Obstet Gynecol 2024;13:729-32.