# Intrauterine Balloon Tamponade in the Management of Postpartum Hemorrhage: Experience at the Royal Medical Services in Jordan

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## ABSTRACT

**Objective:** To describe the practice and efficacy of intrauterine balloon tamponade catheter in two obstetric units and to highlight uterine tamponade as an integral part of the management options of severe post partum hemorrhage in labour ward.

**Methods:** Fourteen cases of severe post partum hemorrhage had persistent bleeding despite the available conservative measures. At this point, the Bakri balloon (Cook Medical) was inserted into the uterine cavity. The balloon was inflated with 300-500 ml of normal saline and left for a maximum of 24 hours, when it was gradually deflated. The procedure was covered by cefoxitin (Mefoxin) 1g three times daily for 48 hours. Simple descriptive statistics (mean, frequency and percentage) were used to describe the study variables.

**Results:** The mean age was 28 (21-35) years. Six patients were primigravidas (43%). The causes of post partum hemorrhage were as follows: Six cases of uterine atony, six cases of placenta praevia accreta and two cases of fibroids. Eight cases followed cesarean section and six cases followed vaginal delivery. The average blood loss was 1.9 L (1.5-3.5 L). In total, 59 units of whole blood, 45 units of FFP and 22 units of platelets were given. On average each patient received 4.2 units of blood, 3.2 units of Fresh frozen plasma and 1.6 units of platelets. Two cases had evidence of disseminated intravascular coagulation and received Factor VII (two doses each). The balloon was inflated to an average of 420 ml of Normal Saline (300-500 ml) according to uterine capacity. In 12 cases (86%), the trial was successful and no further surgery was required. In two cases (14%) the trial failed and both of these women underwent hysterectomy. No cases of endometritis were reported in hospitalized patients or on follow up one week after discharge.

**Conclusion:** Intrauterine balloon tamponade is a valid alternative to less conservative surgical procedures in managing women with post partum hemorrhage. It is easy, safe, and effective and preserves fertility. It should be an integral part of labour ward protocols for management of post partum hemorrhage. Suitable catheters should be available on the labour ward theatres.

**Key words:** Intrauterine balloon tamponade, Post partum haemorrhage

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## Introduction

Post partum haemorrhage (PPH) is one of the leading causes of maternal deaths worldwide.[1] Management includes resuscitation, oxytocic drugs and other appropriate surgical interventions. It is important to manage this life threatening condition promptly and effectively, and without time wasting. Life saving surgery should be performed if needed. Reluctance to perform hysterectomy occasionally put

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the woman at risk of serious morbidity and occasionally death.

The increasing cesarean section (C/S) rate worldwide has led to higher incidence of placenta praevia, accreta, percreta and severe PPH and these are associated with significant morbidity and mortality. The confidential enquiry into maternal deaths (CEMD) points to avoidable deaths and to the phenomenon "too *little too late*" due to delay in blood transfusion and major surgery.[2]

Different methods to preserve the uterus include Internal Iliac artery ligation,[3] uterine artery ligation and embolization, B-Lynch compression sutures[4] and intrauterine tamponade. The earliest form of uterine tamponade was uterine packing with roller gauze.[5] Balloon tamponade in the form of inflated Foley's catheter,[6,7] Sengstaken-Blakemore tube,[8,9] Inflated condom catheter,[10] and Rusch urology catheter [11] were later introduced. All of these catheters were initially designed to stop bleeding from sites other than the uterus. However, case reports and cases series have been published where these catheters have been used successfully in management of PPH.

The first balloon, specifically designed for use inside the uterus in cases of PPH was described by Bakri *et al*.[12] It was used in five cases of obstetric bleeding. Since then, a small number of case series ranging from two to 15 cases were published in the literature. A review of management of PPH[13] and another of different methods of uterine tamponade were published recently.[14] Intrauterine balloon tamponade is easy to apply, takes short time and does not require laparatomy. This technique is used in an attempt to avoid major surgery in cases of PPH.

Although this procedure was described in the literature as case series, it was only recently introduced in our practice. This is the first study in Jordan describing and reporting the use of Bakri Balloon Intrauterine tamponade catheter in the management of severe PPH. The Bakri Intrauterine Balloon Catheter was used in 14 cases of severe PPH to arrest bleeding and avoid hysterectomy. Our objective is to describe and highlight intrauterine balloon tamponade as an integral part of the management protocol for PPH.

## Methods

The study was conducted at King Hussein Medical Centre and Queen Alia Hospital over three years (January 2007- January 2010). Data regarding 14 cases of severe post partum hemorrhage were prospectively documented and collected.

Severe PPH was defined as estimated blood loss of more than 1.5 L. In all of these cases, initial management included uterine massage, intravenous oxytocin injection (10 units, followed by infusion of 40 units in 500 ml of normal saline over four hours, Ergometrine (intramuscularly 0.5-1.0 mg) and Misoprostol 0.8 mg rectally. Carboprost (Haemabate) is not available in our unit. Despite these treatments and after exclusion of genital tract trauma and retained products of conception, the bleeding persisted. At this point, when further surgical intervention was contemplated, the balloon catheter was inserted in an attempt to arrest bleeding.

Data included age, parity, and gestational age, mode of delivery, cause of PPH, estimated blood loss, blood transfusion, Fresh frozen plasma (FFP) and platelet transfusion. The procedure was considered successful if bleeding was arrested, and failed if the bleeding persisted and the patient required further surgical intervention. Simple descriptive statistics (mean, frequency and percentage) were used to describe the study variables.

The Bakri catheter (Cook medical) was inserted in the uterine cavity either after vaginal delivery or at the time of C/S. After vaginal delivery, the Bakri balloon was inserted digitally. If this was difficult, ring forceps were used to hold the cervix and the balloon was inserted with a sponge holder forceps. During C/S, the balloon was placed in the uterine cavity and the proximal part was passed through the cervix and vagina and uterine incision was closed over it. The balloon was inflated with normal saline (a maximum of 500 ml) **(**See Fig. 1). Gentle traction was applied to the shaft of the balloon, by attaching the shaft to the inner thigh. This technique is similar to that used by Bakri *et al*,[12] except that, we did not use a vaginal pack.

The catheter was left in utero for 24 hours, and then gradually deflated, 100 ml every two hours. Antibiotic prophylaxis, Cefoxitin (Mefoxin) was given, 1 g IV 8 hourly for 48 hours.

## Results

The mean age of women was 28 years (21-35). Six women (43%) were primiparous. Eight cases followed C/S and six cases followed vaginal delivery. The causes of PPH were as follows:

**Fig. 1:** Inflated Bakri ballon in utero

**Fig. 2:** Inflated Bakri ballon

**Table I:** Characteristics of various catheters used in post partum hemorrhage

| Type of catheter | No. of cases | Volume inflated | Success rate |
|---|---|---|---|
| Rusch urology cath. | 2 | 450 | 100% |
| Bakri catheter | 6 | 500 | 100% |
| Sengstaken tube | 16 | 167 | 87% |
| Condom catheter | 23 | 250 | 100% |
| Foley catheter | 3 | 60 | 100% |
| Our series | **14** | **425** | **84%** |

six cases of uterine atony, six cases of abnormal placentation and two cases of fibroids (Table I). Fibroids can cause uterine atony. However, in both of these cases, the uterus was contracted, the first was an emergency C/S due to fetal compromise in a primiparous woman and the second was an elective in a woman with previous C/S with high head at term.

Average blood loss was 1.9 liter per patient (1.5-3.5 L). A total of 59 units of whole blood were transfused. Each patient received 4.2 units (2-10) of whole blood and 3.2 units of fresh frozen plasma (FFP) average. Three patients received a total of 22 units of platelet transfusion. Two of them had disseminated intravascular coagulation (DIC) and both received recombinant factor VII (two doses each). Both of these cases developed after insertion of the Balloon, as it is contraindicated to insert the balloon when DIC is present. The balloon was inflated with an average of 420 ml (300-500ml).

In 12 cases (86%), bleeding stopped and no further surgery was needed. The balloon was kept in utero for a period 24 hours, then gradually deflated. In two cases (case no. 10 and 13), the trial failed and both of these women underwent hysterectomy (Table I). The first was an elective C/S due to placenta previa, the placenta was morbidly adherent and despite initial control of bleeding with the balloon, bleeding recurred and hysterectomy was performed. In the second case, a multiparous woman developed atonic PPH after vaginal delivery. The balloon was inserted and inflated with 500 ml of normal saline. However, bleeding continued heavily and hysterectomy was performed. In this case, B-Lynch suture or Internal Iliac artery ligation were not attempted, because it was felt the hysterectomy is a life saving procedure, and the woman already had four children. In both of these cases DIC developed, but was managed successfully with FFP, recombinant Factor VII and platelet infusions.

No cases of endometritis were reported either in hospitalized patients or on follow up one week after discharge.

## Discussion

Management of PPH is centered on attempts at stopping the bleeding. This usually starts by conservative measures: uterine massage, uterotonic agents and exclusion of genital tract laceration and retained placental tissue. If these measures are unsuccessful, laparotomy, if the woman is not already having a C/S, is considered. During laparotomy, various surgical interventions may be used. These include internal iliac artery ligation, uterine artery ligation, uterine compression sutures and peripartum hysterectomy to control the life threatening haemorrhage.

Other procedures that aim to preserve the uterus and do not require a laparotomy includes uterine tamponade and uterine artery embolization.

The earliest form of uterine tamponade was uterine packing with roller gauze.[5] This method was widely practiced before the introduction of effective uterotonics, it is difficult to apply and bleeding may persist through the pack. Subsequently, intrauterine

**Table II:** Baseline characteristics and intrapartum events

| Case no. | Age (yrs) | Parity | Gestational age | Mode of delivery | Cause of PPH | EBL(L) | Blood Tx (Units) |
|---|---|---|---|---|---|---|---|
| **1** | 35 | 5 | 37 | C/S | PP | 1.5 | 4 |
| **2** | 32 | 4 | 36 | C/S | PP | 1.5 | 3 |
| **3** | 28 | 0 | 39 | C/S | Fibroid | 1.5 | 4 |
| **4** | 30 | 3 | 37 | C/S | PP | 1.5 | 3 |
| **5** | 23 | 0 | 39 | NVD | Atony | 2.0 | 4 |
| **6** | 29 | 2 | 38 | C/S | Accreta | 2.3 | 5 |
| **7** | 34 | 2 | 39 | C/S | Fibroid | 1.5 | 3 |
| **8** | 26 | 0 | 41 | NVD | Atony | 1.6 | 3 |
| **9** | 27 | 2 | 40 | NVD | Atony | 1.5 | 3 |
| **10** | 33 | 3 | 37 | C/S | Accreta | 3.5 | 10 |
| **11** | 25 | 0 | 41 | NVD | Atony | 1.5 | 3 |
| **12** | 28 | 0 | 39 | C/S | PP | 2.0 | 4 |
| **13** | 34 | 3 | 40 | NVD | Atony | 3.0 | 8 |
| **14** | 21 | 0 | 40 | NVD | Atony | 1.5 | 2 |

tamponade has been introduced into the PPH management protocol. Few case series described the use of Foley catheter, Rusch urology balloon catheter[11] and Sengstaken-Blakemore esophageal catheter[15] in an attempt to avoid major surgery in cases of PPH. All these catheters were designed to stop bleeding from sites other than the uterus, however, case reports and series showed these catheters to be successful in the management of PPH with success rates reaching 80%. The volume of the balloon, the drainage facility and individual success rates of these catheters are illustrated in Table II.

Foley's catheter balloon, for example, was inflated with 60 ml of normal saline,[16] and in another study by 90ml;[7] however, the volume of the Foley's catheter balloon is a small for the immediate post delivery uterine cavity. To overcome this, multiple (five) Foley's catheter balloons were used successfully to increase the tamponade effect and achieve haemostasis.[17] However, the tamponade is not uniform and the total volume is still small.

The Bakri balloon is a silicone balloon filled with a maximum of 500 ml normal saline and withstands pressure of 300 mm Hg. (see Fig. 2) Unlike the Rusch urological catheter and the condom catheter, it has the advantage of a drainage part, allowing the uterine blood to drain and assess blood loss while the balloon is in utero (Fig. 1). It also conforms to the shape of the uterine cavity. Uterine tamponade may also be used in combination with B-Lynch suture, the so called "Sandwich technique".[18,19]

Since the first description of its use by Bakri *et al.* in five cases of PPH due to placenta praevia,[12] few case series ranging from three cases to 15 cases have been published where this balloon was used to arrest bleeding from uterine atony as well as abnormal placentation. In one series of 15 cases the commonest cause of PPH was uterine atony. The rest of the cases were due to placenta praevia. They reported 80% success rate.[20]

In our series, as well as uterine atony and placenta praevia and accrete; two cases of PPH were due to bleeding from areas overlying uterine fibroid at the time of C/S. The balloon was inflated with 350 ml of normal saline as the uterine cavity was somewhat smaller than in cases of uterine atony. In both these cases the bleeding was controlled. This seems to be another indication for uterine tamponade. In our series the estimated blood loss and average amount of blood transfused were 1.9 L (1.5-3.5) and 3.2(2-8) units respectively. This is less than the series reported by Vitthala *et al.*[20] where EBL was 1-10 L and blood transfused 2-30 units. This is due to early insertion of the Balloon in our series. Fresh Frozen Plasma (FFP) was used in all our patients, despite normal clotting screen. It is our policy in the hospital to administer FFP routinely when blood loss exceeds 1.5 L. The balloon was inserted easily by both junior and senior staff. No difficulty was encountered with insertion and no cases of infection were recorded, during hospital stay or on outpatients follow up one week after discharge.

The two failed cases, case no. 10 and 13 (Table II) did not undergo other uterine saving interventions because of the following reasons. In case no. 10 the bleeding was very severe due to morbidly adherent placenta that hysterectomy was a life saving procedure. Uterine artery embolization is not available in our hospital. Had it been available it would have reduced blood loss markedly and possibly avoided hysterectomy. In the second case, a multiparous woman developed atonic PPH after vaginal delivery. The balloon was inserted and inflated with 500 ml of normal saline. However,

bleeding continued heavily and hysterectomy was performed. It was not justified to delay hysterectomy in this patient, as she already received eight units of blood and developed signs of DIC. She already has four children. In both of these cases DIC was successfully managed with FFP, recombinant Factor VII and platelet transfusions.

## Conclusion

Intrauterine tamponade is a valid alternative to less conservative surgical procedures in managing women with PPH. It is easy, safe, effective, and preserves fertility. It does not require laparotomy or trained senior staff for insertion. It should be an early part of the PPH protocol and suitable catheters should be available on labour ward theatres.

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