Intrauterine Bakri Balloon and Vaginal Tamponade Combined with Abdominal Compression for the Management of Postpartum Hemorrhage

Yuna Guo, MD;[1] Renyi Hua, MD, PhD;[1] Shoufang Bian, MD;[1] Xianjing Xie, MD;[1] Jue Ma, MD;[1] Yanqin Cai, MD;[1] Suren R. Sooranna, PhD;[2] Weiwei Cheng, MD, PhD[1]

[1]International Peace Maternity and Child Health Hospital of China Welfare Institution (IPMCH), Shanghai, China

[2]Imperial College Parturition Research Group, Academic Department of Obstetrics & Gynaecology, Imperial College School of Medicine, Chelsea and Westminster Hospital, London, UK

Abstract

Objective: This study sought to investigate the effect of Bakri balloon use and vaginal tamponade combined with abdominal compression for the management of postpartum hemorrhage (PPH).

Methods: This retrospective study reviewed cases of PPH in the International Peace Maternal and Child Health Hospital of China Welfare Institution in Shanghai, China from January 1, 2010 to December 31, 2015. A single use of the intrauterine Bakri balloon was applied in some cases, and additional vaginal tamponade combined with abdominal compression (double compression) was applied in other cases. The authors evaluated the effect of these two methods in the management of PPH.

Results: The Bakri balloon was used in 305 cases of intrauterine PPH, and the clinical efficacy was 93.26%. One group of study patients underwent double compression, and these patients had a better clinical efficacy rate of 96.3% (157 of 163), whereas the efficacy in cases using the Bakri balloon alone (control group) was 87.3% (124 of 142). The postoperative complication rates of these two groups were 9.4% and 8.7%, respectively. Uterine arterial embolization was performed in patients in whom Bakri balloon use failed. None of the cases resulted in a hysterectomy.

Conclusion: Intrauterine Bakri balloon use combined with vaginal tamponade and abdominal compression is more effective in the treatment of PPH compared with Bakri balloon use alone. This method does not increase postoperative complications. Uterine atony with placenta previa or implantation may be possible reasons for noneffectiveness of Bakri balloon use.

Key Words: Intrauterine, Bakri balloon, vaginal tamponade, compression, postpartum hemorrhage

Corresponding Author: Dr. Weiwei Cheng, International Peace Maternity and Child Health Hospital of China Welfare Institution (IPMCH), Shanghai, China. julietsubmit@163.com

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INTRODUCTION

Postpartum hemorrhage (PPH), defined as the loss of 500–1000 mL of blood after the third stage of labour (for both vaginal delivery and CS),[1] causes approximately 27.1% of maternal deaths worldwide,[2,3] and it is the main cause of maternal deaths in developing countries. Uterine atony, placental factors, injury to soft tissues associated with the birth canal, or coagulation abnormalities are the most common reasons for PPH. Uterine atony causes about 70% of PPH cases and is the most common cause. Uterine massage and use of a uterotonic may help to reduce bleeding. If this fails, a surgeon normally needs to perform a further procedure, such as uterine tamponade, B-Lynch or uterine artery embolization, uterine artery ligation, and even hysterectomy. The uterine cavity balloon has the double effect of compression and tamponade, and it is widely used for treating PPH. In 1992, Bakri[4] first reported on the use of a balloon for the treatment of PPH secondary to placenta previa.

However, Bakri balloon tamponade is not 100% successful in PPH. Vitthala et al.[5] found the success rate of Bakri balloon tamponade to be 80%. This finding is consistent with results reported by Gronvall et al.,[6] who found the success rate to be 86% (43 of 60 cases). Other investigators reported that the success rate was around 75.5% to 90%.[5,7–9] Vaginal tamponade is one method of treating PPH

that has been commonly used clinically. In this study, we combined those two methods to evaluate the success rate of Bakri balloon tamponade in treating PPH.

MATERIALS AND METHODS

We reviewed 78 708 deliveries, among which 35 120 were CS procedures, from January 1, 2010 to December 31, 2015 in the International Peace Maternal and Child Health Hospital (IPMCH), Shanghai, China. The Ethics Committee of the IPMCH approved this study. A single use of an intrauterine Bakri balloon was applied in some cases, and additional vaginal tamponade combined with abdominal compression was applied in other cases. We compared the outcomes of these two methods in the management of PPH.

Diagnosis of Postpartum Hemorrhage and Postoperative Morbidity: the Procedure before Use of Tamponade

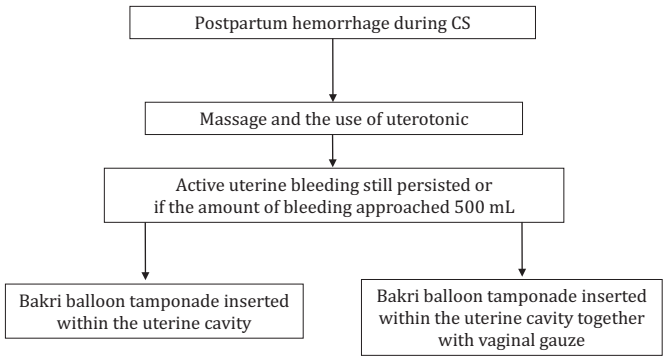
The Bakri uterine balloon (also called SOS Bakri) was purchased from Cook Medical (Bloomington, IN). The criterion for use of uterine tamponade was, during CS and after massage and use of a uterotonic (e.g., oxytocin and tromethamine), the presence of persistent active uterine bleeding or an amount of bleeding that reached a volume of 500 mL. PPH after CS is defined as an amount of bleeding during CS in excess of 1000 mL. Treatment of PPH includes intraoperative uterine massage and use of uterotonics, including oxytocin and carboprost tromethamine, which are the two most commonly used medications in our hospital. If balloon tamponade fails to control the bleeding, a uterine artery embolization or hysterectomy is normally performed.

After the first 24 hours of the operation, the patient's temperature was measured every 4 hours and four times daily for up to 3 days. Postoperative fever is diagnosed when the patient's temperature reaches 38°C on two occasions on the same day.

Protocol for Uterine and Vaginal Tamponade

Patients were randomly divided into two groups on the basis of individual doctors' experience and practices. The control group was treated with Bakri balloon tamponade within the uterine cavity. If PPH was in progress during CS and the bleeding could not be controlled by uterine massage or uterotonics, a Bakri balloon was placed in the bottom of the uterus, distally through the cervix and indwelling in the vagina. Then the balloon was filled with 250 to 350 mL of saline. A catheter in the Bakri balloon allows the blood in the uterus to be released. Therefore, the amount of vaginal bleeding after placement of the balloon could be noted. If there was still active bleeding, then this raised the possibility of failure of the balloon, and the other methods (e.g., uterine artery embolization or hysterectomy) were implemented. If the bleeding was controlled, then the Bakri balloon was left in the uterine cavity for 24 hours before it was taken out. In the study group, we used the method of "double compression": the Bakri balloon was filled in the uterine cavity, with vaginal gauze packing. The balloon and vaginal tampons were removed within 24 hours. The protocol used is summarized diagrammatically in the Figure.

Figure. Protocol for uterine and vaginal tamponade.



The dimensions of the vaginal tampon used were about 200 × 40 mm. The tampon was placed in the vagina for 24 hours together with the balloon. Intravenous antibiotics (e.g., cephalosporins or clindamycin) were routinely used to prevent infection during all these procedures.

Statistical Analysis

All statistical analyses were performed with SPSS V.20.0 for Windows (IBM, Armonk, NY). A value of $P < 0.05$ was considered statistically significant.

RESULTS

The amount of blood loss in the control group was 805.63 ± 459.52 mL, and it was 863.21 ± 467.15 mL in the double compression group (Table 1). In the double compression group, 96.3% cases of PPH were successfully treated, a higher number than in the control group (87.3%; $P < 0.05$). There were no differences in patients' ages, GAs, or the rates of CS between the two groups (Table 1). There was no difference in the percentage of patients with uterine atony with or without placenta previa or placenta accreta, nor was there any difference in the incidence of postoperative fever in either of the two groups.

There was no difference in the success rate of controlling uterine atony caused by PPH in both groups (Table 2). In PPH caused by placental effects and uterine atony, double