INTRAUTERINE BALLOON TAMPONADE-A NOVEL TECHNIQUE TO PREVENT AND MANAGE PLACENTAL SITE HAEMORRHAGE

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ABSTRACT

Objective: This study was conducted to determine the effectiveness of Foley catheter balloon tamponade in postpartum haemorrhage at Combined Military Hospital (CMH) Abbottabad.

Study Design: Descriptive study.

Place and Duration of Study: Obstetrics & Gynaecology Department CMH Abbottabad, from Sep 2016 to Mar 2017.

Material and Methods: Patients who developed postpartum haemorrhage after caesarean section (CS) and were treated with intrauterine balloon tamponade (IUBT) using a Foley catheter were identified by review of medical records. Patient's demographic data, obstetric history, type of CS, cause of haemorrhage and transfusion history were extracted. Data was entered, coded and analyzed in IBM SPSS Statistics software. Descriptive statistics were produced.

Results: A total of 26 patients were included with mean age of 29.2 ± 5.23 years. More than two-thirds of the patients were multi-gravida and around three-quarters were at full term. The most frequent cause for postpartum haemorrhage (PPH) was placenta previa major. In 25 of the 26 (96.1%) patients the procedure was successful in stopping bleeding. There were no adverse effects related to the procedure.

Conclusion: We found that IUBT with an inexpensive Foley catheter is likely to be effective in most cases of PPH associated with caesarean section, without causing additional adverse events.

Keywords: Foley catheter, Intrauterine balloon tamponade, Postpartum haemorrhage.

INTRODUCTION

Postpartum haemorrhage (PPH), defined as more than 500mL of blood loss within 24 hours of vaginal delivery or more than 1000mL after a caesarean section, is the leading direct cause of maternal mortality in the world[1]. The World Health Organization (WHO) estimates that around a quarter of all maternal deaths are caused by PPH[1]. PPH occurs in around 10% of all births but appropriate and timely management prevents death in most cases[2]. The outcome, however, is worse in low-resource settings and PPH still has a significant negative impact in poor economies[3]. Around 31% of maternal deaths in Asia are due to PPH[4] and it remains a significant health issue in Pakistan as well, where incidence is estimated to be 34%[5]. In comparison, the incidence of PPH in England is 13.8%[6] and in the U.S. it is estimated to be between 2% and 3%[7].

Major risk factors for PPH include retained placenta or membranes, failure to progress during the second stage of labor, morbidly adherent placenta, lacerations, instrumental delivery, large for gestational age newborn, and hypertensive disorders[7]. For caesarean deliveries, general anesthesia, amnionitis, preeclampsia and prolonged active phase of labor have been reported to be significantly associated with PPH[8]. Most cases of PPH are primarily caused by uterine atony and the risk of death is dependent on general physical health of the mother especially the presence or absence of anemia. In addition, most deaths resulting from PPH occur during the first 24 hours after birth. Timely management is therefore extremely critical in terms of reducing mortality. Goals of treatment are to restore or maintain adequate circulatory volume to prevent hypoperfusion of vital organs, to restore or maintain adequate tissue

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oxygenation, to reverse or prevent coagulopathy, and to eliminate the obstetric cause of PPH[9].

Management options for PPH range from medical treatment and minimally invasive procedures to surgical interventions via laparotomy[9,10]. Effective management of PPH usually requires a combination of interventions but options are limited for health facilities in low-resource settings. Intrauterine balloon tamponade (IUBT) has emerged as a promising option. If the balloon tamponade is effective in stopping the haemorrhage, the patient is less likely to require surgical intervention and blood transfusions, thereby decreasing the associated risks and cost[10].

WHO has recognized IUBT as a significantly effective method for management of PPH, especially in low-resource areas, for both vaginal and caesarean deliveries[2]. IUBT involves inserting a balloon device into the uterus and then incrementally filling the balloon with distilled water, which applies pressure to the uterus until the bleeding stops. Early use of IUBT can limit ongoing uterine blood loss and it is a simple procedure which can be readily implemented by providers with minimal training. Various types of IUBT devices are used including the Bakri Uterine Balloon, the Sengstaken-Blakemore Esophageal Tube, the Rusch Balloon, condom catheter and a Foley catheter[11]. Balloon catheters specifically designed for uterine tamponade are most widely used in developed countries. The high cost of these IUBT devices puts them out of reach for most low resource health systems or at least limits their use to a few selected hospitals in each country. Lower cost IUBT devices are therefore crucial for preventing mortality in these settings. This study was conducted to evaluate the efficacy of IUBT performed with the inexpensive 2-way Foley catheter in PPH occurring after caesarean delivery.

MATERIAL AND METHODS

This descriptive study was conducted as an internal evaluation at the department of Obstetrics & Gynecology of the Combined Military Hospital (CMH) Abbottabad. The objective of the study was to compare our IUBT results with those reported in the literature and to share our results with other similar centres in the country. The study comprised of all patients who underwent a caesarean section between September 2016 and March 2017, developed PPH, and were treated with IUBT. The IUBT procedure involved using 2-way Foley catheter inflated with 80 to 100 mL of normal saline and retained for 24 hours. Non-probability convenience sampling was used. Total 26 patients were selected. The small sample size is due to

Table-I: Obstetric characteristics of patients.

		Frequency	Percentage (%)
Gravidity	Primigravida	4	15.4
	Multigravida	18	69.2
	Grand multigravida	4	15.3
Parity	0	4	15.4
	1	3	11.5
	2	8	30.8
	3	7	26.9
	4	4	15.4
Term	Pre-term	7	26.9
	Full term	19	73.1
	Post term	0	0.0
Labor	None	23	88.5
	Failed induction	3	11.5

infrequent observation of uncontrolled PPH associated with caesarean section and therefore infrequent need for employing IUBT. Eligible patients were identified by review of medical charts of all patients admitted to the department during the study period and study data were extracted from the charts of eligible patients. Data extracted included patients' demographic data, obstetric history, type of caesarean section, ultrasono-graphic findings, cause of PPH, trans-fusions for PPH, and patient outcome. Data were entered, coded and analyzed in IBM SPSS Statistics software. Descriptive statistics were produced. Frequency and percentages were calculated for key study variables.

RESULTS

A total of 26 patients were included in the study who were between 21 and 36 years of age (mean age=29.2 years ± 5.23). Of the 26 caesarean sections, 19 (73.1%) were elective while 7 (26.9%) were emergency. Fourteen (53.8%) of the caesarean sections were performed under general anesthesia and 12 (46.2%) under spinal anesthesia. More than two-thirds of the patients were multi-gravida. Table-I presents the obstetric characteristics of the patients.

APGAR score after 1 minute for babies delivered via these caesarean sections ranged between 5 and 9, and the mean was 7.54 (± 0.86) whereas APGAR score after 5 minutes ranged between 8 and 10, mean being 9.54 (± 0.65).

The most frequently observed ultrasono-graphic finding as well as the cause for PPH was placenta previa major. For all subjects with a normal situated placenta, uterine atony was determined to be the cause of PPH. Table-II presents the ultrasonographic findings and PPH cause.

Of the 26 patients treated, IUBT with 2-way Foley catheter inflated with 80 to 100 mL of normal saline and retained for up to 24 hours was successful in stopping PPH in 25 patients, a success rate of 96.2%. The patients in whom this intervention was not successful in cessation of haemorrhage, hysterectomy was performed. No mortality was observed among the patient group.

On average 2 (± 1.096) units of red blood cell concentrate (range 0 to 4) and 4.3 (± 2.290) units of fresh frozen plasma (range 0 to 9) were transfused. Mean blood hemoglobin concent-ration before IUBT ranged from 8.5 to 13.6 mg/dL, mean being 11.1 mg/dL (± 1.39), whereas the mean blood hemoglobin concentration after treatment ranged from 7.6 to 12.6 mg/dL, mean being 10.1 mg/dL (± 1.32).

None of our patients suffered any adverse effects due to the IUBT procedure.

Table-II: Ultrasonographic findings and cause of PPH.

		Frequency	Percentage (%)
Ultrasonographic Findings	Placenta previa major	14	53.8
	Placenta accreta	2	7.7
	Normal situated placenta	7	26.9
	Placenta previa major + increta	1	3.8
	Placenta previa major + accreta	2	7.7
Cause of PPH	Placenta previa major	14	53.8
	Placenta accreta	2	7.7
	Uterine Atony	7	26.9
	Placenta previa major + Increta	1	3.8
	Placenta previa major + accreta	2	7.7

DISCUSSION

Due to the disadvantages like concealment of active bleeding and development of infection, uterine gauze packing is not preferred in the management of PPH. Uterine balloon temponade

was first reported by Goldrath in 1983[12]. Since then balloon tamponade has emerged as a simple and effective intervention in PPH[13,14]. Various different types of balloon catheters with various advantages and disadvantages have been employed for PPH. The Bakri postpartum balloon and the BT-cath balloon tamponade catheter are specifically designed for postpartum intrauterine tamponade however their cost could be prohibitive in low resource settings[15]. Other balloons can be used to achieve a similar effect in such settings. These include Sengstaken-Blakemore tube (used for treatment of bleeding esophageal varices), Rusch urologic balloon (used for stretching the bladder), and condom catheter (a condom is placed over the end of a Foley-type catheter, the base of the condom is tied to the catheter to prevent leakage, and then the condom is filled with up to 500mL fluid via the catheter)[16]. Rusch balloon and the condom catheter do not allow blood drainage from the uterine cavity. A 2-way Foley catheter has the advantage of being inexpensive as well as allowing blood drainage from the uterine cavity[17]. Efficacy of all these methods appears to be comparable. A comparison of IUBT using a condom-loaded Foley catheter with IUBT using Bakri balloon in management of PPH due to uterine atony following vaginal delivery found both of them equally effective in terms of success rates and maternal outcomes however Bakri balloon achieved homeostasis in a significantly shorter time[18].

In a recent study[19] on use of Foley catheter balloon tamponade to control placental site bleeding resulting from placenta previa major during caesarean section, of the 20 patients treated, PPH was successfully stopped in 17 (85%) patients while hysterectomy had to be performed for 3 (15%) patients. Our results are comparable to this study in terms of effectiveness.

A study done at Dow University of Health Sciences and Civil Hospital, Karachi evaluated the effectiveness of intrauterine balloon tamponade with a condom catheter in PPH due to uterine atony following a vaginal delivery, instrumental delivery or caesarean section[20]. Of the 139 patients treated, balloon tamponade was effective in stopping haemorrhage in 126 (90.4%) but was not effective in 13 (9.6%) patients. Our results of 96.2% effectiveness in cessation of PPH with a 2-way Foley catheter were comparable to the findings of this study.

The overall effectiveness rate reported in the literature for IUBT as a method of controlling PPH (regardless of the catheter type used) is between 80% and 100%[21-26]. Our results are consistent with this reported overall rate of IUBT success.

CONCLUSION

We found that IUBT with an inexpensive Foley catheter is likely to be effective in most cases of PPH associated with caesarean section, without causing additional adverse events.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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