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Conservative Management versus Using of Bakri Balloon Catheter with Intrauterine Washing with Misoprostol in Cases of Atonic Postpartum Hemorrhage

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ABSTRACT

Background: post partum hemorrhage is an obstetrical emergency that can follow vaginal or cesarean delivery. It is one of the bleeding causes of maternal mortality, especially in the developing countries. A step-wise approach to management of post partum hemorrhage was recommended. **Aim of the Work:** this study aimed to compare between conservative treatment and using Bakri balloon catheter in cases atonic postpartum hemorrhage. **Patients and methods:** this prospective randomized study was conducted on 100 patients managed by conservative treatment or by using Bakri balloon catheter with intrauterine washing with misoprostol at the Department of Obstetrics and Gynaecology, Aswan General Hospital in the period from 1 October 2017 to 30 September 2018. **Results:** the descriptive of risk factor of all the studied cases indicated that anemia was the major risk factor (34 cases, 34%). The causes of PPH showed that uterine atony was the major cause of PPH (71 case which contributed 71% of the total cases) and the second cause was placenta previa (29%) with 29 cases of the total. Bakri ballone catheter with intrauterine wash with misoprostol decreased significantly ($p<0.001$) the number of patients who need blood transfusion from 50 cases (100%) in **group 1**which received conservative management only to 44 case (88%) in **group 2**. Also, using Bakri ballone catheter with intrauterine wash with misoprostol decreased significantly ($p<0.001$) the amount of blood units needed. **Conclusion:** postpartum hemorrhage (PPH) remains one of the top five causes of maternal mortality worldwide in both the developed and developing countries. The use of tamponade test in a tonic postpartum hemorrhage has a good predictive value in controlling of bleeding. Our study showed that tamponade with Bakri ballone deserved a place in the treatment of post partum hemorrhage. It is simple, readily available, effective and safe procedure. Bakri ballon tamponad (BBT) does not exclude the use of other procedures if necessary. Even if BBT failed, it may provide temporary tamponad and time to prepare for other intervention or transportation from local hospital to tertiary center.

Key words: conservative management, Bakri balloon catheter, intrauterine washing, misoprostol atonic postpartum hemorrhage.

INTRODUCTION

Postpartum hemorrhage (PPH) is a life-threatening complication of delivery.

It occurs after vaginal or cesarean delivery and is a major cause of maternal morbidity and mortality in both developing and developed countries as well [(1)].

The most common cause of PPH is uterine atony; up to 80% of the cases resulted from suboptimal contraction of the myometrium following placental separation After excluding other etiologies of PPH such as retained placenta, uterine rupture, genital tract trauma, uterine inversion, and coagulopathy, the management of uterine atony should be timely and initiated to prevent hemorrhagic, hypovolemic shock, dilution of coagulopathy, tissue hypoxia and acidosis [(2)].

The pituitary gland, the kidneys and the lungs are particularly susceptible organs to damage when perfusion pressure decreases resulting in feared sequelae of postpartum hypovolemic shock such as Sheehan syndrome (ie, postpartum hypopituitarism), renal failure, and acute respiratory distress syndrome [(3)].The repertoires of the management measures can be generally divided into operative and nonoperative interventions. In acute postpartum hemorrhage refractory to medical and other conservative interventions, invasive therapies may include arterial embolization, uterine compression sutures, uterine artery ligation, and, ultimately, hysterectomy [(4)].

However, these measures are highly invasive, require extensive resources, expertise, and are associated with significant morbidities Intrauterine balloon tamponade has been suggested as an effective, easily administered minimally invasive treatment option to control uterine bleeding while preserving the mother's ability to bear additional children [(5)].

The effectiveness of the intrauterine balloon catheter can be assessed by the tamponade test first described by **Condous *et al.***. This test is considered positive when control is achieved following inflation of the balloon patient with a negative (persistent bleeding despite the balloon placement) should be proceed to more invasive therapeutic approaches such as laparotomy or embolization depending on personnel and facilities [(6)].

So we used 200 mcg of misoprostol tablets and intrauterine washing after insertion of Bakri

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balloon catheter for more and rapid control of atonic postpartum hemorrhage.

AIM OF THE WORK

Our study aimed to compare between conservative treatment and using Bakri balloon catheter in cases atonic postpartum hemorrhage. The patients were categorized into 2 groups.

PATIENTS AND METHODS

Study design:

- Type of study: prospective, randomized study
- Site of study: Department of Obstetrics and Gynaecology, Aswan General Hospital in the period from 1 October 2017 to 30 September 2018.
- Size of study: 100 patients the patients were categorized into two groups.

  Group 1: the patients who were managed by conservative treatment

  Group 2: the patients who were managed by using of Bakri balloon catheter with intrauterine washing with misoprostol.

Inclusion criteria:

1. Age 18 – 45.
2. All parities
3. Delivered inside or outside the hospital.
4. Vaginal or caesarean delivery.
5. Suffered atonic post-partum hemorrhage.

Exclusion criteria:

1. There was no genital tract laceration.
2. There was no uterine rupture.
3. There was no retention of placenta.
4. Blood coagulation system was intact.

All patient included in this study were subjected to:

A) - Full history taken

Carful and detailed history included: personal, present, family, past, menstrual, obstetric history.

Risk factors for post-partum haemorrhage:

-Anemia
- Poly hydramnios
- Use of oxytocin
- Previous post partum hemorrhage
- Augmented labor.
- Prolonged labor.
- Fetal macrosomia.

B) - Examination

General examination including:

Blood pressure
Puls
Pallor
Sign of shock
-Low blood pressure. - weak pulse
-Rapid breathing - Pale cold skin
-Sweating, moist skin - Decrease urine output.

Abdominal and local examination

- Palpation of the uterus may reveal bogginess, atony.
- Inspection of cervix and vagina under good light.
- Carful observation for blood loss and subjective estimation of amount of blood.
- Careful digital exploration of the lower uterine segment.

C) - Investigation

1) – Basic laboratory Investigation Including:

- Complete blood picture:
  Haemoglobin, heamatocrite, platelets.
- Coegulation profile:
  Prothrombin time, prothrombin concentration.

2) - Medical management including:

-Use of oxytocic:

- Oxytocin
- Ergometerene
- Prostaglandin

- Message of the uterus.
- Bimanual compression of uterus.
- Exclusion of traumatic causes and coagulopathy.

Indication for use of Bakri balloon:

The Bakri balloon was used for temporary control or reduction of postpartum hemorrhage when conservative management of uterine bleeding is warranted, after bleeding from genital tract lacerations and retained product of conception has been excluded. The 2006 ACOG practice bulletin on postpartum hemorrhage by the American College of Obstetricians and Gynecologists states the following:

"When uterotonics fail to cause sustained uterine contractions and satisfactory control of haemorrhage after vaginal delivery, tamponade of the uterus can be effective in decreasing haemorrhage secondary to uterine atony. Such approaches can be particularly useful as a temporizing measure, but if a prompt response was not seen.

Preparations should be made for exploratory laparotomy

Although the use of intrauterine balloon catheter is often successful and serves as a

definite therapy, it can also be used as a temporary measure to decrease haemorrhage while, waiting and preparing for other definite treatment, such as open abdominal surgery (ie, uterine artery ligation, uterine compression suture, hysterectomy) or uterine artery embolization or while, the patient is being transferred to another unit with more experience and resources.Studies have used intrauterine balloons for bleeding following delivered pregnancies with low-lying placenta and/or placenta previa or invasive or adherent placenta and as an adjunctive treatment of cervical ectopic pregnancy with variable success.

Contraindications:

Few contraindications have been highlighted in the use of the Bakri ballon. They included the following:

1. Pregnancy
2. Heavy arterial bleeding requiring surgical exploration or angiographic embolization
3. Cervical cancer
4. Congenital uterine anomaly
5. Uterine distorting pathology (leiomyoma, uterine rupture, purulent infection of the vagina, cervix or uterus).
6. Allergy to balloon material
7. Disseminated intravascular coagulation(DIC)

Technical Considerations

Best Practices

The authors recommended that all procedures for management of postpartum haemorrhage be performed on the labour and delivery unit with an operating room available if an emergency laparotomy becomes necessary.

Procedure Planning

Prior to the procedure, a bedside ultrasound should be used to help assess the uterine cavity to rule out retained product of conception and to assess the angulation and shape of the uterine cavity to help balloon catheter placement.

Complication Prevention

Complications related to intrauterine balloon placements are very rare but potentially include perforation of uterus during placement or inflation and cervical trauma due to inflation at an incorrect location. However, these complications have not been reported in the postpartum uterus. Infection has been reported, but determining whether it is related to the balloon placement is difficult.

To avoid potential risk of air embolism, the balloon should not be insufflated with air or carbon dioxide.

Intrauterine washing with misoprostol

Preparation of the solution

Four tablets of misoprostol (800 mcg) were dissolved in 10-30 ml of sodium chloride 0.9 %. Low dose intrauterine infusion via a folly catheter has been described[7] using dinoprost in 500 salin at 3-4 m/min for 10 min.

Administration

- At laparotomy
  Irrigation of the solution directly into the uterus and will be repeated 10-15 minute later, if necessary.
- After vaginal delivery
  Irrigation of the uterus with the solution through the drainage part of the Bakri balloon catheter.

Surgical management included:

(A) – Bilateral vessels ligation (uterine, ovaria, internal iliac arteries)

(B) - Uterine compression suture and B-lynch suture.

Clinical outcome measures

(1) Blood transfusion
(2) Time and duration of resuscitation.
(3) Surgical intervention.
(4) ICU adimission.
(5) Morbidity and mortality figures

Statistical analysis

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (x^2) test of significance was used in order to compare proportions between two qualitative parameters.
- Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:
- Probability (P-value)
  - P-value <0.05 was considered significant.
  - P-value <0.001 was considered as highly significant.
  - P-value >0.05 was considered insignificant.

RESULTS

This study included 100 cases. The descriptive of socio-demographic characteristics, knowledge, attitude and practice were presented.

Table 1: description of demographic data all the studied cases

Parameters	Total (N=100)
Age (years)	
Range [Mean±SD]	19-40 [29.74±6.29]
Parity	
Primigravida	
One	22 (22%)
Multigravida	
Two	27 (27%)
Three	22 (22%)
Four	13 (13%)
Grand multigravida	
Five	8 (8%)
Six	6 (6%)
Eight	1 (1%)
Ten	1 (1%)
Gestational age (wks)	
Range [Mean±SD]	24-40 [37.96±3.07]
Mode of delivery	
Vaginal	50 (50%)
CS	50 (50%)

Categorical data are presented in the form of frequency and percent. Quantitative data are presented in the form of mean±SD (range)

Socio demographic characteristics of all cases were summarized in **table 1,** the mean age was 29.74 years. Regarding parity, primigravida cases were 22% of the cases, however multigravida cases were about 62%; while, the grand multigravida (totally) were 16% of all cases. The mean gestational age was 37.96 week and regarding the mode of delivery, 50% of the cases delivered vaginal and the other half delivered caesarian.**Table 2** showed the descriptive of the risk factors of all studied cases and indicated that anemia was the major risk factor 34 cases (34%).

Table 2: description of risk factors of all the studied cases.

Risk factors	Total (N=100)
Post history of PPH	3 (3%)
Anemia (HB Rang from 4 to 9 g/dl)	34 (34%)
Mal presentation	4 (4%)
Multiple pregnancy	1 (1%)
Poly hydraminos	7 (7%)
Placenta previa	1 (1%)
Pre-eclampsia	2 (2%)
Medical disorders (HTN, DM, cardiac dis)	3 (3%)
Anemia & placenta previa	5 (5%)
Anemia & multiple pregnancy	1 (1%)
Post history of PPH & Anemia	14 (14%)
Post history of PPH & anemia & poly hydraminos	3 (3%)
Post history of PPH & poly hydraminos	2 (2%)
Anemia & mal presentation	5 (5%)
Anemia & Pre-eclampsia	4 (4%)
Multiple pregnancy & placenta previa	1 (1%)
Mal presentation & placenta previa	1 (1%)
Post history of PPH & placenta previa	1 (1%)
Anemia & poly hydraminos	8 (8%)

Categorical data are presented in the form of frequency and percent.

Table 3: causes of PPH of all the studied cases

Causes	Total (N=100)
Uterine atony	71 (71%)
Placenta previa	29 (29%)

Categorical data are presented in the form of frequency and percent.

The causes of PPH presented in **table 4** which showed that uterine atony was the major cause of PPH (71 cases which contribute 71% of the total cases) and the second cause was placenta previa (29%) with 29 cases of the total.

Table 4: blood transfusion of all the studied cases

Blood transfusion and its amount (units)	Total (N=100)
0	10 (10%)
1	21 (21%)
2	29 (29%)
3	15 (15%)
4	10 (10%)
5	7 (7%)
6	8 (8%)

Categorical data are presented in the form of frequency and percent.

Data presented in **table 5** revealed that 10 cases (10%) only of all cases did not need blood transfusion. While, 75 cases (75%) had from 1-4 blood units and 15 cases (15%) had massive blood transfusion (5-6) blood units).

Table 5: Hb level and time counsumed to stop bleeding.

Parameters	Total (N=100)
Hb level, Range [Mean±SD]	4-11 [8.06±2.07]
Time consumed to stop bleeding in minutes [mean±SD]	12-47 [29.43±6.97]

Quantitative data are presented in the form of mean±SD (range)

The overall mean of blood hemoglobin level of all studied cases was presented in **table 6**, it was 8.06 (mg/dl), also in the same table, the mean time consumed to stop bleeding was 29.43 minutes.

Table 6: admission to ICU.

Admission to ICU	Total (N=100)
0 No	87 (87%)
2 days	5 (5%)
3 days	8 (8%)

Categorical data are presented in the form of frequency and percent.

Table 7 illustrated that about 87% (87 cases) of the cases did not need to admission to ICU while, 13 cases (13%) need admission between twice or three days.

Table 7: days of hospital stay and hysterectomy

Parameters	Total (N=100)
Days of hospital stay, range [Mean±SD]	2-14 [6.09±2.94]
Hysterectomy Not doe	90 (90%)
Hysterectomy is Done	10 (10%)

Table 8 showed that the mean of the days of hospital stay of all cases was 6.09 days. Also, the table showed that hysterectomy was not done to 90 case (90%) of all cases, however 10 cases (10%) was done.

Table 8: comparison between group according to demographic parameters.

Parameters	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	t/x2#	p-value
Age (years) Range [Mean±SD]	30.37±5.19	29.73±7.52	0.296	0.658 NS
Parity				
Primigravida One	13 (26.0%)	9 (18.0%)	3.174#	0.392 NS
Multigravida Two	16 (32.0%)	11 (22.0%)		
Three	9 (18.0%)	13 (26.0%)		
Four	4 (8.0%)	9 (18.0%)		
Grand multigravida Five	4 (8.0%)	4 (8.0%)		
Six	2 (4.0%)	4 (8.0%)		
Eight	1 (2.0%)	0 (0.0%)		
Ten	1 (2.0%)	0 (0.0%)		
Gestational age (wks) Range [Mean±SD]	37.81±1.84	37.75±1.53	0.196	0.463 NS
Mode of delivery				
Vaginal	19 (38.0%)	27 (54.0%)	1.973#	0.16 NS
CS	31 (62.0%)	23 (46.0%)		

Chi-square test; t- Independent Sample t-test
NS: Non significant

Data in **table 9** showed the comparison among the two studied groups in demographic data. The mean age of the two groups was 30.37 and 29.73, respectively and the difference among group was not statistically significant. Also, the table presented parity which was almost the same and did not differ significantly among the two groups. Gestational age mean was 37.81 and 37.75 for the two comparative groups, respectively and this difference was not statistically significant among groups.Regarding mode of delivery, **table 9** indicated that group 1 38% of the cases were delivered vaginal and 62% were delivered caesarian. While, group 2 almost the same (54% and 46%) for cesarean delivery and also the difference among groups was not significant.

Table 9: comparison between group according to risk factors.

Risk factors	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)
Past history of PPH	1 (2.0%)	2 (4.0%)
Anemia	14 (28.0%)	20 (40.0%)
Mal presentation	3 (6.0%)	1 (2.0%)
Multiple pregnancy	1 (2.0%)	0 (0.0%)
Poly hydraminos	4 (8.0%)	3 (6.0%)
Placenta previa	1 (2.0%)	0 (0.0%)
Pre-eclampsia	1 (2.0%)	1 (2.0%)
Medical disorders (HTN, DM, cardiac dis)	3 (6.0%)	0 (0.0%)
Anemia & placenta previa	2 (4.0%)	3 (6.0%)
Anemia & multiple pregnancy	1 (2.0%)	0 (0.0%)
Past history of PPH & Anemia	6 (12.0%)	8 (16.0%)
Past history of PPH & anemia & poly hydraminos	1 (2.0%)	2 (4.0%)
Past history of PPH & poly hydraminos	2 (4.0%)	0 (0.0%)
Anemia & mal presentation	3 (6.0%)	2 (4.0%)
Anemia & Pre-eclampsia	3 (6.0%)	1 (2.0%)
Multiple pregnancy & placenta previa	1 (2.0%)	0 (0.0%)
Mal presentation & placenta previa	1 (2.0%)	0 (0.0%)
Past history of PPH & placenta previa	1 (2.0%)	0 (0.0%)
Anemia & poly hydraminos	1 (2.0%)	7 (14.0%)
Chi-square test	5.297	
p-value	0.497 NS	

Chi-square test; NS: Non significant

Table 10 showed the comparison among groups in risk factors and indicated that anemia (alone or complicated with other risk factors) was the major risk factor in the two groups with no significant differences among groups.

Table 10: comparison between the groups according to PPH.

Risk factors	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	Chi-square test	p-value
Uterine atony	37 (74.0%)	34 (68.0%)	4.194	0.274
Placenta previa	13 (26.0%)	16 (32.0%)		

Chi-square test; NS: Non significant

Data of **table 11** illustrated that causes of PPH in group (1) were (74%) uterine atony and (26%) placenta previa, however in group 2 were (68%) uterine atony and (32%) placenta previa. The analyzed data showed that there was no significant difference among the groups.

Table 11: comparison between the groups according to blood transfusion.

Blood transfusion and its amount (units)	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	Chi-square test	p-value
No			14.189	<0.001 HS
0	0 (0.0%)	10 (20.0%)		
Blood transfusion				
1	12 (24.0%)	9 (18.0%)		
2	16 (32.0%)	13 (26.0%)		
3	7 (14.0%)	8 (16.0%)		
4	6 (12.0%)	4 (8.0%)		
Massive blood transfusion				
5	1 (2.0%)	6 (12.0%)		
6	8 (16.0%)	0 (0.0%)		

Chi-square test; HS: Highly significant

Table 12 showed highly statistically significant difference between groups according to blood transfusion and its amount (units) (p<0.001).

Table 12: comparison between the groups according to Hb level and time consumed to stop bleeding.

Parameters	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	t-test	p-value
Hb level, Range [Mean±SD]	7.92±1.12	8.84±1.46	4.224	<0.001 HS
Time consumed to stop bleeding in minutes [mean±SD]	35.07±5.99	24.62±7.46	5.275	<0.001 HS

t- Independent Sample t-test; HS: Highly significant

Table 13 showed highly statistically significant difference between groups according to Hb level, with p-value <0.001 HS Also, data in **table 13** showed highly statistically significant difference between the groups according to time consumed to stop bleeding.

Table 13: comparison between the groups according to admission to ICU

Admission to ICU	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	Chi-square test	p-value
0 No	38 (76.0%)	49 (98.0%)	7.441	0.024 S
2 Days	5 (10.0%)	0 (0.0%)		
3 Days	7 (14.0%)	1 (2.0%)		

Chi-square test; S: Significant

Data in **table 14** revealed that treatments affected significantly (p<0.01) in reducing the number of patients who did not need to enter he ICU. The results indicated that 38 cases (76%) in group 1 did not need to enter the ICU. On the other hand, it was 49 cases (98%) in group 2.

Table 14: comparison between the groups according to days of hospital stay and hysterectomy.

	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	t/x2#	p-value
Days of hospital stay, range [Mean±SD]	7.53±3.61	4.77±1.82	3.719	<0.001 HS
Not doe	41 (82.0%)	49 (98.0%)	6.821#	0.039 S
Done	9 (18.0%)	1 (2.0%)		

Chi-square test; t- Independent Sample t-test
S: Significant; HS: Highly significant

Table 15 contained the results of the effect difference between groups according to days of hospital stay with p-value <0.001 HS.

Table 15: comparison between the groups according to infection

Infection	Group I: Conservative management only (50)	Group II: B. B. ballone & intrauterine wash with misopristole (50)	Chi-square test	p-value
Not done	0 (0.0%)	48 (96.0%)	1.692	0.384 NS
Done	0 (0.0%)	2 (4.0%)		

Chi-square test; NS: Non significant

Table 16 presented the results of comparison between group 1 and group 2 in infection. The data revealed that there was no difference between groups.

Table 16: correlation between amount of blood transfusion and Hb

		Hb. Level
Amount of blood transfusion	r	-0.517
	p-value	<0.001 HS

r- Pearson Correlation Coefficient
HS: Highly significant

Table 17 showed correlation between the amount of blood transfusion and hemoglobin level. There was a highly significant negative correlation between the amount of blood transfusion and Hb blood level.

DISCUSSION

Postpartum hemorrhage (PPH) is the bleeding of large amount of blood which may reach 500 mL in case of vaginal birth and 1,000 mL in caesarean delivery and the diagnosis is usually based on imprecise assessments of the amount of blood loss. In addition, the amount of blood bleeding often exceeds 500-1000 mL at birth. Moreover, the syndromes of PPH can be covered by the increased plasma secretion that accompanies pregnancy. PPH can happen early or late after 24 hours or more than 24 hours to 12 weeks after birth respectively and it can be considered as third or fourth stage depending on the time of placenta delivery [8]. Postpartum hemorrhage was considered as one of the leading causes of deaths worldwide and about 25% of deaths in pregnant women were caused by the PPH, which is possible to be prevented by immediate, timely and preventive treatments [9]. The severity of PPH can lead to organ failure, shock, edema, compartment syndrome, transfusion complications, thrombosis, acute respiratory distress syndrome, sepsis, anemia, intensive care, and prolonged hospitalization [10]. Uterine atony was considered the main cause of PPH which may happen in around 80 percent of women and it is related to some circumstances such as bladder distention, infection and placental deformities [11]. Moreover, Primary post-partum hemorrhage (PPH) is the single largest contributor to maternal mortality worldwide [2]. Throughout Africa, Asia, hemorrhage account for 30% or more of all maternal death, most of which is PPH [12]. World Health organization (WHO) estimated that 358,000 women died in pregnancy or child birth in 2008, which declines 34 % in global maternal mortality since1990 [13].

Katsinis [14] reported and defined the Bakri balloons as minimally invasive devices which can be located inside the uterus and filled with saline solution in order to implement exterior pressure for prevent and stop postpartum hemorrhage. This method is different from others, where the sonography is used to detect the location of a Bakri balloon because it is quick and precise in locating the device, does not use ionizing radiation, and is inexpensive. The device used in bakri balloons was approved by FDA for the reduction and controlling of postpartum hemorrhage and it is the most commonly method used in controlling and management of PPH. In the present study, the average of age in the studied cases was 29.74 years and differed in the number of pregnancies, where 22% of the cases were pregnant for the first time (Primigravida), while there were cases of pregnant for two, three and four times (Multigravida) which were 27%, 22% and 13% respectively. In addition, 8 %, 6 %, 1 % and 1 % from the studied cases were pregnant for five, six, eight and ten times (Grand multigravida). On the other hand, the gestational age was 37.96 weeks and 50 % of the studied cases had vaginal delivery and 50 % has caesarean birth. The present results show that demographic and antepartum variables were almost the same among studied groups and that demographic and antepartum variables have little association with development of PPH. **Prata *et al.*** [15] found the same results in a study from Egyptian intervention. In addition, **Dinglas *et al.*** [16] studied the relationship of reported clinical features of pre-eclampsia and postpartum hemorrhage to demographic variables and found non-significant association between the demographic variables and the occurrence of postpartum haemorrhage. **Ononge *et al.*** [2] reported that there was no association between postpartum hemorrhage and the demographic data in studied cases. The parity of the studied cases presented the number of pregnancies in women involved in this study, the equality of the delivery mode between studied cases was 50 % for the vaginal and 50 % for cesarean mode.Our results showed that anemia (alone or complicated with previous history of PPH) was the major risk factor with 34% from the study cases in the two groups with no significant difference among groups followed by anemia and previous history of PPH which scored 14% from the study cases as well. However, multiple pregnancy, placenta previa, anemia, mal presentation and past history of PPH showed only 1% for each of them from all the studied cases. These results agreed with results of **Abou-zahr** [17] who reported that approximately 12% of women who survived PPH had severe anemia. Additionally, **Jaleel and Khan** [18] reported that anemia and previous history of PPH was the major risk factor of PPH, The present result did not match with those of **Keriakos and Mukhopadhyay** [19].

Anderson and Etches [20] figured the risk factors associated to PPH to a prolonged third stage of labor, multiple delivery, episiotomy, fetal macrosomia, and history of PPH. On the other hand, it was reported that PPH can happen without apparent risk factors and much care must be taken to deal with PPH at every delivery. **Frass** [21] revealed that anemia often happens and related to postpartum hemorrhage which associated primarily to uterine atony and the higher blood loss and severity of PPH is related to the severity

of anemia in the studied cases. The present study showed that the overall mean of blood hemoglobin level of all studied cases was 8.06 (mg/dl) and the mean time consumed to stop bleeding was 29.43 minutes. These results explain the importance of the estimation of Hb levels and time consumed to stop bleeding for the management of HPP in studied cases. **Frass** [20] studied the relation between postpartum hemorrhage and the levels of hemoglobin and found that 29.1% of anemic women were developed PPH during cesarean delivery due to uterine atony, and the patients with Hb of 7 or less of having PPH due to uterine atony increases greatly compared to patients with Hb 7.1–10. In addition, the study revealed that there is a reversible correlation between the blood loss and Hb which explain the greater blood loss associated with anemia occurrence in most cases. Results of the present study showed that about 87% (87 cases) of the cases did not need admission to ICU while, 13 cases (13%) need admission between twice or three days. This explains the importance of conservative management in the prevention and dealing with PPH.**Krishna *et al.*** [22] revealed that most of the cases in their study were admitted in the ICU, where 15 cases of 21 were admitted to ICU which depends on the time of arrival to the hospital and the preventive cares must be taken.On the other hand, the mean of the days of hospital stay of all cases was 6.09 days. Also, hysterectomy was not done to 90 cases (90%) of all cases, however 10 cases (10%) was done.**Rossi *et al.*** [23] numbered the causes of the higher risk of emergency hysterectomy in women which were; multiparous, cesarean delivery in either a previous or the present pregnancy and abnormal placentation.Regarding mode of delivery, in group (1) 38% of the cases were delivered vaginal and 62% were delivered caesarian. While, group 2 almost the same (54% and 46%) for cesarean delivery and also the difference among groups was not significant. **Dinglas *et al.*** [16] studied the relationship of reported clinical features of pre-eclampsia and postpartum haemorrhage to demographic variables, and found non-significant association between the demographic variables and the occurrence of postpartum hemorrhage. In addition, **Ononge *et al.*** [2] reported that there was no association between postpartum hemorrhage and the demographic data in studied cases.Results of the current study showed that anemia (alone or complicated with other risk factors) was the major risk factor in the two groups with no significant differences among groups. From the present results, it is observed that anemia is the major risk factor 28 % in group 1 with conservative management, while it was 40 % in group 2 with ballone and intrauterine wash with misopristole which explain the importance and the effectiveness of conservative management for PPH prevention. On the other hand, Past history of PPH & anemia was 12 % in group 1, while it was 16 % in group 2 and anemia and poly hydraminos was 2 % and 14 % for group1 and group 2 respectively.These results agreed with results of **Abou-zahr** [17] **and WHO** [13] who reported that approximately 12% of women who survive PPH have severe anemia. Additionally, **Jaleel and Khan** [18] showed that anemia and previous history of PPH was the major risk factor of PPH, The present result did not match with those of **Keriakos and Mukhopadhyay** [19]**.Anderson and Etches** [20] repoted the risk factors associated to PPH to a prolonged third stage of labor, multiple delivery, episiotomy, fetal macrosomia, and history of PPH. On the other hand, it was reported that PPH can happen without apparent risk factors and much care must be taken to deal with PPH at every delivery. In the present study, causes of PPH in group 1 were 74% uterine atony and 26% placenta previa, while in group 2 were 68% for uterine atony and 32% for placenta previa. The analyzed data showed that there was no significant difference among groups. **Driessen *et al.*** [24] studied the postpartum hemorrhage resulting from uterine atony after the vaginal delivery and reported that the most cause of PPH was the uterine atony. **Montufar-Rueda *et al.*** [25] found the same results and showed that 70 % of PPH was related to uterine atony. In addition, **Anderson and Etches** [20] reported that the most cases of PPH occurred due to the uterine atony. The time consumed to stop bleeding also had the same trend of Hb level results. Group 2 was the better than group 1 with significant difference and this led to decrease the number of cases who admitted to ICU significantly and also reduced days of hospital stay at the same trend among treatment. These results are matched with results of **Barbier** [5] **and Kumru *et al.*** [26]**.**Regarding the admission to ICU, results of the present study showed that treatments affected significantly ($p<0.01$) in reducing the number of patients who did not need to enter the ICU. The results indicated that 38 cases (76%) in group 1 did not need to enter the ICU. On the other hand, it was 49 cases (98%) in group 2.Our results showed a significant difference between the two groups according to days of hospital stay with p-value <0.001. There was a highly significant difference between the two groups regarding the days of staying in hospital, while the need for hysterectomy was significant between the two groups. It was observed that cases in group 1

stayed in hospital 7.53 days in average, while it was 4.77 days in group 2. In addition, 82 % of group 1 cases did not need hysterectomy while 98 % from group 2 cases did not the hysterectomy.The present results indicated that treatment with Bakri balloon catheter with intra uterine washing with misoprostol had a very significant better effect on decreasing cases that had hysterectomy because stopping of postpartum hemorrhage in treated group than the one which take conservative management only. Hysterectomy was commonly performed when medical treatment of PPH fails. These results are in line with those of **Vitthala *et al.*** [(27)] who made a study on fifteen cases of PPH was managed with Bakri balloon insertion. In the present study, the infection was not significant between the two groups. The average was 4 % who had been infected and it was from group 2. The present data revealed that there was no difference between groups. The cases who developed infection were two in group 1 and three in group 2with no difference between groups. These results agree with those of **Aggrawal *et al.*** [(28)] who found positive results of using Bakri balloon catheter and intra uterine wash with misoprostol in controlling infection. On other hand **Frenzel *et al.*** [(29)] did not finding any significant effect of using Bakri balloon catheter in controlling infection. In addition, our results revealed that there was a highly significant negative correlation between the amount of blood transfusion and Hb blood level.The present result illustrated that treatment with Bakri balloon catheter with intra uterine washing with misoprostol had a very significant better effect on reducing hemorrhage and consequent reducing blood transfusion and its amount. In term of mechanism of action, the intra uterine balloon is believed to act by exerting in ward to out ward pressure against uterine wall, resulting in a reduction in persistent capillary and venous bleeding from the endometrium and myometrium [(27)]. These results agree with those of **Vitthala *et al*.** [(27)] **and Bakri *et al.*** [(30)]**.**

CONCLUSION

Postpartum hemorrhage (PPH) remains one of the top five causes of maternal mortality worldwide in both the developed and developing countries. The use of tamponade test in a tonic postpartum hemorrhage has a good predictive value in controlling of bleeding.Our study showed that tamponade with Bakri ballone deserved a place in the treatment of post partum hemorrhage. It is simple, readily available, effective and safe procedure. Bakri ballon tamponad (BBT) does not exclude the use of other procedures if necessary. Evenif BBT failed, it may provide temporary tamponad and time to prepare for other intervention or transportation from local hospital to tertiary center. Using Bakri ballon catheter with intrauterin wash with misoprostol in treatment PPH decreased total blood loss and a lower rate of maternal morbidity in addition to preservation of fertility.We also found that this technique was very helpful of abnormal insertion of the placenta.

REFERENCES

1. **American College of Obstetricians and Gynecologists (ACOG) (2009):** ACOG practice bulletin: clinical management guidelines for obstetrician- gynecologists. Obstetrics and Gynecology, 108(4):1039-1047.
2. **Ononge S, Mirembe F, Wandabwa J and Campbell O M (2016):** Incidence and risk factors for postpartum hemorrhage in Uganda. Reproductive Health, 13(1): 38-44.
3. **Moore JE and Witt WP (2014):** Truven Health Analytics), Elixhauser A (AHRQ). Complicating Conditions associated With Childbirth, by Delivery Method and Payer, HCUP Statistical Brief #173.website
4. **Dabelea V, Schultze PM and McDuffie RS (2007):** Intrauterine balloon tamponade in the management of postpartum hemorrhage. Am. J. Perinatol., 24: 359-364.
5. **Barbieri R (2009):** You should add the Bakri balloon to your treatment of OB bleading. OB Gyn Manage., 21:6-10.
6. **Condous GS, Arulkumaran S, Symonds I, Chapman R, Sinha A, Razvi K (2003):** The ′tamponade test′ in the management of massive postpartum hemorrhage. Obstet Gynecol.,101 :767-772.
7. **Unterscheider J, Breathnach F, Geary M (2012):** Standard Medical Therapy for postpartum hemorrhage. A Comprehensive Textbook of Postpartum Hemorrhage. An Essential Clinical Reference for Effective Management. 2nd ed. London: Sapiens Publishing..
8. **Kim A (2007):** Management of Postpartum Hemorrhage. Journal of the Korean Medical Association, 50(12): 1096-1106.
9. **Dupont C, Occelli P, Deneux-Tharaux C, Touzet SDuclos A, Bouvier-Colle MH, Huissoud C (2014):** Severe postpartum haemorrhage after vaginal delivery: a statistical process control chart to report seven years of continuous quality improvement. European Journal of Obstetrics & Gynecology and Reproductive Biology, 178: 169-175.
10. **Audureau E, Deneux-Tharaux C, Lefevre P, Brucato S, Morello R, Dreyfus M, Bouvier-Colle M H (2009):** Practices for prevention, diagnosis and management of postpartum haemorrhage: impact of a regional multifaceted intervention. BJOG: An International Journal of Obstetrics & Gynaecology, 116(10): 1325-1333.

11. **Kim TH, Lee HH, Kim JM, Ryu AL, Chung SH, Lee WS (2013):** Uterine artery embolization for primary postpartum hemorrhage. Iranian journal of reproductive medicine, 11(6): 511.
12. **Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF (2006):** WHO analysis of causes of maternal death: a systematic review. Lancet, 367(9516):1066-74.
13. **WHO (2012):** WHO recommendations for the prevention of postpartum haemorrhage. See: apps. who. int/iris/ bitstream /10665 /75411 /1/9789241548502_eng.pdf (accessed 22 November 2013).
14. **Katsinis BR (2015):** Bakri Balloon Displacement in the Uterus: Sonographic Demonstration. Journal of Diagnostic Medical Sonography, 31(6): 386-389.
15. **Lalonde A, Daviss BA, Acosta A, Herschderfer K (2006):** Postpartum hemorrhage today: ICM/ FIGO initiative 2004–2006. Int J Gynaecol Obstet., 94(3):243–253.
16. **Prata N, Passano P, Bell S, Rowen T, Potts M (2012):** "New hope: community -based misoprotol use to prevent postpartum hemorrhage". Healthy Policy and Planning 368 (2012 Aug 9.[EPub ahead of print). doi: 10.1093/heapol/czs068.
17. **Dinglas C, Lardner D, Homchaudhuri A, Kelly C, Briggs C, Passafaro M, Cho E (2011).** Relationship of reported clinical features of pre-eclampsia and postpartum haemorrhage to demographic and other variables. West African journal of medicine, 30(2): 84-88.
18. **Abo Zahr C and Royston E (2003):** Maternal mortality: global fact book. Geneva, World Health Organisation. . Available at: https://scholar.google.com/scholar.
19. **Jaleel R, Khan A (2006):** Post-partum hemorrhage-arisk factor analysis. Mymensingh MedJ., 19(2):282-9.
20. **Keriakos R and Mukhopadhyay A (2006):** The use of the Rusch balloon for management of severe postpartum haemorrhage, Journal of obstetrics and gynaecology, the journal of the Institute of Obstetrics and Gynaecology, 26(4): 335-338.
21. **Anderson JM and Etches D (2007):** Prevention and management of postpartum hemorrhage. American Family Physician, 75:6.
22. **Frass KA (2015):** Postpartum hemorrhage is related to the hemoglobin levels at labor: Observational study. Alexandria Journal of Medicine, 51(4): 333-337.
23. **Krishna HM, Chava M, Jasmine N, Shetty N (2011):** Patients with postpartum hemorrhage admitted in intensive care unit: Patient condition, interventions, and outcome. Journal of anaesthesiology, clinical pharmacology, 27(2): 192.
24. **Rossi AC, Lee RH, Chmait RH (2010):** Emergency postpartum hysterectomy for uncontrolled postpartum bleeding: a systematic review. Obstetrics & Gynecology, 115(3): 637-644.
25. **Driessen M, Bouvier-Colle MH, Dupont C, Khoshnood B, Rudigoz RC, Deneux-Tharaux C (2011):** Postpartum hemorrhage resulting from uterine atony after vaginal delivery: factors associated with severity. Obstetrics and gynecology, 117(1), 21.
26. **Montufar-Rueda C, Rodriguez L, Jarquin JD, Barboza A, Bustillo MC, Marin F, Estrada F (2013):** Severe postpartum hemorrhage from uterine atony: a multicentric study. Journal of pregnancy, 233-237.
27. **Kumru P, Demirci O, Erdogdu E (2013):** The Bakri balloon for the management of postpartum hemorrhage in cases with placenta previa. Eur J Obstet Gynecol Reprod Biol.,167(2):167-170.
28. **Vitthala S, Tsoumpou I, Anjum ZK, Aziz NA (2009):** Use of Bakri balloon in postpartum haemorrhage: a series of 15 cases, The Australian & New Zealand Journal of Obstetrics & Gynaecology, 49(2): 191-194.
29. **Aggarwal N (2003):** The "tamponade test" in the management of massive postpartum hemorrhage. Obstet Gynecol., 102(3):641-642.
30. **Frenzel D, Condous GS, Papageorghiou AT, McWhinney NA (2005):** The use of 'tamponade test' to stop massive obstetric haemorrhage in placenta accreta. BJOG., 112:676–7.
31. **Bakri YN (2012):** Use of intrauterine balloon catheters for control of uterin hemorrhage. Up To date, 74:139-42.