Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v6i1.2181
*Biol. Clin. Sci. Res. J., Volume 6(1), **2025**: 2181*
Original Research Article

Comparison of Intrauterine Balloon Tamponade Versus Gauze Packing in The Management of Post-Partum Hemorrhage

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(Received, 14th November 2024, Accepted 15th January 2025, Published 31st January2025)

Abstract: *Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality worldwide. Mechanical interventions such as intrauterine balloon tamponade and uterine gauze packing are commonly used when medical management fails. Comparative evidence is essential to determine the more effective modality.* ***Objective:*** *To compare the efficacy of intrauterine balloon tamponade versus uterine gauze packing in the management of postpartum hemorrhage.* ***Methods:*** *This randomized controlled trial was conducted in the Department of Obstetrics and Gynaecology at Khyber Teaching Hospital, Peshawar. A total of 214 women aged 18–40 years with postpartum hemorrhage following vaginal delivery were enrolled. Participants were randomly allocated into two groups: Group A (intrauterine balloon tamponade, n=107) and Group B (uterine gauze packing, n=107). Efficacy was defined as complete cessation of bleeding within 24 hours post-intervention. Data were analyzed using SPSS version 25.* ***Results:*** *A total of 214 women were included, with 107 participants in each group. The mean age was 29.76 ± 6.49 years in the balloon group and 30.43 ± 6.44 years in the gauze group. Successful control of hemorrhage was achieved in 95 (88.8%) women in the intrauterine balloon tamponade group compared to 84 (78.5%) in the gauze packing group (p = 0.04). The mean blood loss was 564.29 ± 27.35 mL in Group A and 570.05 ± 25.23 mL in Group B.* ***Conclusion:*** *Intrauterine balloon tamponade demonstrated significantly higher efficacy in controlling postpartum hemorrhage compared to uterine gauze packing, supporting its use as the preferred first-line mechanical intervention in refractory cases.*

Keywords: Postpartum Haemorrhage, Intrauterine Balloon Tamponade, Gauze Packing, Efficacy

[***How to Cite:*** Anwar L, Bangash AG, Fatima M, Rabia, Samreen. Comparison of intrauterine balloon tamponade versus gauze packing in the management of post-partum hemorrhage. *Biol. Clin. Sci. Res. J.*, **2025;** 6(1): 190-193. doi: https://doi.org/10.54112/bcsrj.v6i1.2181]

Introduction

Post-partum haemorrhage (PPH) is one of the major global health concerns and remains a leading cause of maternal mortality. Studies reported that many deaths due to PPH could be prevented with the help of early recognition and effective management. The condition is also related to the considerable morbidities, including organ failure, oedema, compartment syndrome, and prolonged hospital stays. A frequent cause for PPH is uterine atony; factors contributing to this include uterine over-distension, infection, and bladder distension. Clinical conditions, including polyhydramnios, high parity, and prolonged labour, are linked with the increased risk of uterine atony. However, many women who experience the PPH have no recognizable risk factors (1-4).

This life-threatening condition can be averted if prompt actions are taken to control the bleeding. One of the commonly used treatments is uterine balloon tamponade, which has shown favourable outcomes in the management of severe haemorrhage. Another extensively available method is uterine gauze packing. However, this method has been criticised due to the risk of infection and ineffective packing. When medical management fails, and prior attempts at surgical procedures have been made, it is rational to use such techniques, as they are minimally invasive and easily accessible (5-8).

Tamponade devices are used to control bleeding in areas, e.g., the bladder and oesophagus, and Foley catheters have also been used to treat post-partum haemorrhage. Such devices have been utilized for decades. Commercially manufactured uterine balloon tamponade systems have used for cases of atonic PPH. However, the high cost sometimes restricts their use in low-resource settings. Data demonstrate that intrauterine balloon tamponade has a success rate of 96%, while gauze packing achieves 84.9% in the treatment of PPH (9-11).

PPH is an obstetric emergency, and for its management, different treatment options exist, including the uterotonic drugs. When these are ineffective, interventional methods are utilized. However, published data comparing such approaches is scarce. The present study aims to examine the effectiveness of intrauterine balloon tamponade compared with the uterine gauze packing for PPH management. Findings of this study may assist in reducing serious complications of PPH, including hypovolaemic shock, renal and liver failure, and respiratory distress, all of which can lead to maternal mortality.

Methodology

This study was conducted in the Obstetrics and Gynecology department, Khyber Teaching Hospital, Peshawar, from 13 February 2024 to 13 October 2024, after obtaining ethical approval from the hospital's ethical review board. A sample of 214 patients was selected using the WHO sample size calculator, taking the assumption of efficacy of intra-uterine balloon tamponade 96% and gauze packing (84.9%) in the management of post-partum hemorrhage, (11) confidence interval 95%, and power 80%. Consecutive non-probability sampling was used.

Patients included in the study were women aged 18 to 40 years with postpartum hemorrhage following normal vaginal delivery. Postpartum hemorrhage was defined as blood loss $\geq$ 500 mL after vaginal birth. To measure blood loss, vaginal sanitary pads were used; they were weighed before and after soaking in blood, and the difference was recorded as 1 g equaling 1ml. Women with a fibroid uterus, genital tract trauma, and perineal, cervical, or vaginal tear were excluded.

Women fulfilling the inclusion criteria were included in this study. The purpose, benefits, and risks of the study were briefly explained to all women. An informed written consent form was acquired from all women. Demographic details, including age, educational status, profession, socioeconomic status, and residence, were recorded. Women were subjected to medical assessment followed by physical examination. Patients diagnosed with post-partum hemorrhage were divided equally into two groups (A & B) by using a blocked randomization technique. Women in Group A were treated with intrauterine balloon tamponade,

i.e., after an aseptic method, a sterile rubber catheter fitted with a condom was introduced within the uterus, and the condom was filled with normal saline (250 – 500 ml). Women in Group B were treated with gauze packing, i.e., sterile gauze approximately 3 cm wide and 2 m long. Intrauterine packing was achieved with sponge holding forceps, starting from the fundus to the cervix, vaginal packing was performed to keep the uterine packing in position. Efficacy was evaluated after 24 hours of the intervention, with success defined as no bleeding observed in both treatment groups. All these evaluations were conducted under the supervision of an experienced consultant with at least 5 years of post-fellowship experience. An allocated pro forma was used to record the details of each patient.

Data entry and analysis were performed using SPSS v.25. Means ± SD were calculated for numerical variables, such as age and blood loss. Frequencies and percentages were calculated for categorical variables, including efficacy (success), booking status, education status, profession, socioeconomic status, and residence. Efficacy was compared using the Chi-square test in both groups, with p-values < 0.05 considered significant. Effect modifiers such as age, booking status, educational status, profession, socioeconomic status, and residence were addressed through stratification. Post-stratification, Chi-square or Fisher's exact test was performed, with p-values < 0.05 considered significant.

Results

The present study was conducted on 214 patients: 107 in Group A, managed with intrauterine balloon tamponade, and 107 in Group B, managed with gauze packing. The mean age of patients in Group A was 29.76±6.49 years, and in Group B, 30.43±6.44 years. The mean body mass index was 22.55±1.77 kg/m² in the balloon tamponade group and 23.06±2.08 kg/m² in the gauze packing group. Regarding intraoperative blood loss, the mean volume in Group A was 564.29±27.35 ml compared to 570.05±25.23 ml in Group B.

Table I presents the patient demographics. The booking status showed that 49 (45.8%) women in the balloon tamponade group were booked cases compared to 47 (43.9%) in the gauze packing group, while 58 (54.2%) and 60 (56.1%) were unbooked in Groups A and B, respectively. (Figure 1)

The efficacy of the intervention, defined as cessation of bleeding, was assessed in Group A. Successful haemorrhage control was achieved in 95 (88.8%) patients, while treatment failure occurred in 12 (11.2%) patients. In Group B, successful outcomes were observed in 84 (78.5%) women, with 23 (21.5%) experiencing failure (p=0.04). (Table II)

Table III presents the stratification of efficacy by demographics and booking status for the two groups.

Figure 1: Booking status.

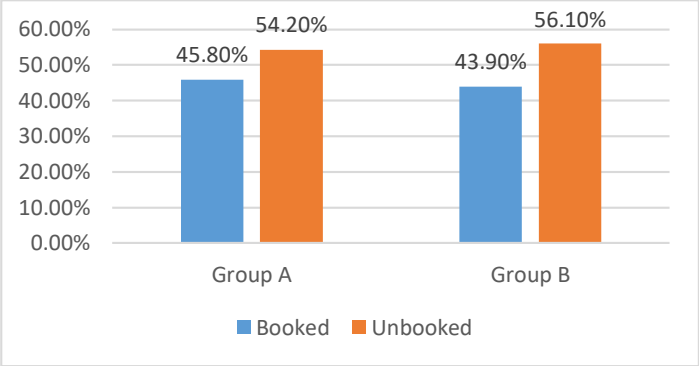

Table 1: Demographics

		Groups			
		Group A (Intrauterine balloon tamponade)		Group B (Gauze packing)	
		n	%	n	%
Education status	Literate	44	41.1%	50	46.7%
	Illiterate	63	58.9%	57	53.3%
Profession	Job	37	34.6%	34	31.8%
	House wife	70	65.4%	73	68.2%
Residence area	Urban	48	44.9%	51	47.7%
	Rural	59	55.1%	56	52.3%
Socioeconomic status	Lower class	42	39.3%	48	44.9%
	Middle class	43	40.2%	36	33.6%
	Upper class	22	20.6%	23	21.5%
Booking status	Booked	49	45.8%	47	43.9%
	Unbooked	58	54.2%	60	56.1%

Table2: Comparison of efficacy between both groups

		Groups				P value
		Group A (Intrauterine balloon tamponade)		Group B (Gauze packing)		
		n	%	n	%	
Efficacy	Yes	95	88.8%	84	78.5%	0.04
	No	12	11.2%	23	21.5%	

Table 3: Stratification of efficacy between both with respect to booking status and demographics

				Groups				P value
				Group A (Intrauterine balloon tamponade)		Group B (Gauze packing)		
				n	%	n	%	
Booking status	Booked	Efficacy	Yes	40	81.6%	41	87.2%	0.45
			No	9	18.4%	6	12.8%	
	Unbooked	Efficacy	Yes	55	94.8%	43	71.7%	0.001
			No	3	5.2%	17	28.3%	
Education status	Literate	Efficacy	Yes	44	100.0%	41	82.0%	0.003

			No	0	0.0%	9	18.0%	
	Illiterate	Efficacy	Yes	51	81.0%	43	75.4%	0.46
			No	12	19.0%	14	24.6%	
Profession	Job	Efficacy	Yes	36	97.3%	29	85.3%	0.06
			No	1	2.7%	5	14.7%	
	House wife	Efficacy	Yes	59	84.3%	55	75.3%	0.18
			No	11	15.7%	18	24.7%	
Residence area	Urban	Efficacy	Yes	42	87.5%	41	80.4%	0.33
			No	6	12.5%	10	19.6%	
	Rural	Efficacy	Yes	53	89.8%	43	76.8%	0.06
			No	6	10.2%	13	23.2%	
Socioeconomic status	Lower class	Efficacy	Yes	40	95.2%	39	81.2%	0.04
			No	2	4.8%	9	18.8%	
	Middle class	Efficacy	Yes	34	79.1%	27	75.0%	0.66
			No	9	20.9%	9	25.0%	
	Upper class	Efficacy	Yes	21	95.5%	18	78.3%	0.09
			No	1	4.5%	5	21.7%	
Age groups (Years)	18 to 30	Efficacy	Yes	53	93.0%	39	81.2%	0.06
			No	4	7.0%	9	18.8%	
	31 to 40	Efficacy	Yes	42	84.0%	45	76.3%	0.31
			No	8	16.0%	14	23.7%	
BMI (Kg/m^2)	18 to 24.9	Efficacy	Yes	86	88.7%	65	79.3%	0.08
			No	11	11.3%	17	20.7%	
	> 24.9	Efficacy	Yes	9	90.0%	19	76.0%	0.35
			No	1	10.0%	6	24.0%	

Discussion

The management of postpartum haemorrhage is a critical challenge in obstetric practice, with the choice between intrauterine balloon tamponade and uterine gauze packing continuing to generate scholarly debate. The present study found that intrauterine balloon tamponade was significantly superior to gauze packing for the management of PPH.

Aligned with the results of the present study, a study by Abul et al. synthesised evidence from five studies involving 821 patients and demonstrated that intrauterine balloon tamponade appeared superior to uterine gauze packing for reducing intraoperative blood loss. This comprehensive analysis also revealed that balloon tamponade was associated with shorter operative time and reduced hospital stay (9). They noted considerable heterogeneity across included studies, particularly in outcomes related to minor and major postpartum haemorrhage, underscoring the need for further randomised controlled trials to strengthen the evidence base.

In another study conducted in Pakistan, Khan et al. examined 168 women with atonic postpartum haemorrhage following vaginal delivery. They reported that uterine balloon tamponade achieved haemostasis in 89.3% of cases, compared with 72.6% with gauze packing (12).

The study by Wei et al. provided valuable insights, particularly regarding placenta previa, comparing the double-balloon catheter with traditional gauze packing in 204 women undergoing caesarean delivery. Their findings showed that while both interventions achieved comparable success rates (> 90%), balloon tamponade was associated with significantly reduced total blood loss within 24 hours postpartum, lower rates of postpartum haemorrhage, and decreased puerperal morbidity. The study also documented lower visual analogue scale pain scores in the balloon group, suggesting better patient comfort during the postoperative period (13).

Suarez et al. examined uterine balloon tamponade in 91 studies involving 4729 women. They reported a pooled success rate of 85.9% for all causes of postpartum haemorrhage. Their analysis showed that success rates varied by aetiology, with uterine atony and placenta previa achieving the highest success rates at 87.1% and 86.8%, respectively. In comparison, placenta accreta spectrum and retained products of conception had lower success rates at 66.7% and 76.8%, respectively. The study also reported that balloon tamponade appeared to be more effective following vaginal delivery than caesarean section and that condom-based devices demonstrated comparable efficacy to commercially manufactured balloons, which is an important consideration for resource-limited settings.

The sociodemographic profile of the present study population revealed important related factors that may influence obstetric outcomes. The majority of patients in both groups were housewives, comprising 65.4% in the balloon tamponade group and 68.2% in the gauze packing group. This represented a setting where such interventions are frequently employed. The residential distribution showed a slight majority of rural patients in both groups, with 55.1% and 52.3% in Groups A and B, respectively, while socioeconomic status showed that most patients belonged to lower or middle socioeconomic classes. The booking status showed that a substantial proportion of women in both groups were unbooked, which may have implications for antenatal risk identification and timely intervention. These demographic findings put the study population in the broader framework of global maternal health concerns as discussed by Suarez et al., who emphasised that the majority of maternal deaths from haemorrhage occurred in low and middle-income countries where access to comprehensive obstetric care remains limited (14).

Conclusion

The study findings presented here revealed that intrauterine balloon tamponade was significantly more effective than gauze packing in controlling postpartum hemorrhage. These findings validate the use of balloon tamponade as the first-line mechanical intervention for managing postpartum haemorrhage.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (592/DME/KMC)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared no conflict of interest.

Author Contribution

LA (Trainee Medical Officer), AGB (Assistant Professor)
Contributed to study design, data collection, and initial manuscript drafting
Assisted in data acquisition, literature review, and manuscript editing
Performed statistical analysis and contributed to the interpretation of results
Helped in methodology development, data organization, and manuscript formatting
Contributed to patient recruitment, data entry, and results compilation
MF (Trainee Medical Officer), R (Trainee Medical Officer), S (Trainee Medical Officer)
Assisted in referencing, proofreading, and final revisions of the manuscript
Guided study execution and critically reviewed the manuscript
Supervised the research, coordinated among authors, finalized the manuscript, and approved the final version

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. Frigo MG, Agostini V, Brizzi A, Ragusa A, Svelato A. Practical approach to transfusion management of post-partum haemorrhage. Transfus Med. 2021;31(1):11-15. https://doi.org/10.1111/tme.12755
2. Obeagu EI, Obeagu GU, Musiimenta E. Postpartum haemorrhage among pregnant women: update on risk factors. Int J Curr Res Med Sci. 2023;9(2):14-17. https://doi.org/10.22192/ijcrms.2023.09.02.003
3. Yunas I, Islam MA, Sindhu KN, Devall AJ, Podesek M, Alam SS, et al. Causes of and risk factors for postpartum haemorrhage: a systematic review and meta-analysis. Lancet. 2025;405(10488):1468-1480. https://doi.org/10.1016/S0140-6736(25)00448-9
4. Brazil V, McLean D, Lowe B, Kordich L, Cullen D, De Araujo V, et al. A relational approach to improving interprofessional teamwork in post-partum haemorrhage (PPH). BMC Health Serv Res. 2022;22(1):1108. https://doi.org/10.1186/s12913-022-08463-8
5. Ashraf N, Ashraf A, Khursheed K. Efficacy and safety of intrauterine balloon tamponade versus uterovaginal roll gauze packing in patients presenting with primary postpartum hemorrhage after normal vaginal delivery. Ann King Edw Med Univ. 2018;24(S):889-892. https://doi.org/10.21649/akemu.v24iS.2581
6. 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. https://doi.org/10.1371/journal.pone.0206663
7. Kong CW. Prognostic factors for the use of intrauterine balloon tamponade in the management of severe postpartum hemorrhage. Int J Gynaecol Obstet. 2018;142(1):48-53. https://doi.org/10.1002/ijgo.12498
8. Makin J, Suarez-Rebling DI, Varma Shivkumar P, Tarimo V, Burke TF. Innovative uses of condom uterine balloon tamponade for postpartum hemorrhage in India and Tanzania. Case Rep Obstet Gynecol. 2018;2018:4952048. https://doi.org/10.1155/2018/4952048
9. Abul A, Al-Naseem A, Althuwaini A, Al-Muhanna A, Clement NS. Safety and efficacy of intrauterine balloon tamponade vs uterine gauze packing in managing postpartum hemorrhage: a systematic review and meta-analysis. AJOG Glob Rep. 2023;3(1):100135. https://doi.org/10.1016/j.xagr.2022.100135
10. Agrawal S, Munir SI. Comparison of efficacy and safety of intrauterine balloon tamponade versus uterovaginal packing in females presenting with postpartum hemorrhage after normal vaginal delivery. Nepal Med Coll J. 2024;26(1):34-38. https://doi.org/10.3126/nmcj.v26i1.63879
11. Naeem S, Memon FP, Najam H, Memon A. Intrauterine balloon tamponade versus gauze packing for treatment of post-partum hemorrhage. J Liaquat Univ Med Health Sci. 2022;21(3):185-189. https://doi.org/10.22442/jlumhs.2021.00829
12. Khan N, Ali K. Efficacy of uterine packing and intrauterine balloon tamponade in atonic postpartum hemorrhage: comparison. Biol Clin Sci Res J. 2023;2023:621. https://doi.org/10.54112/bcsrj.v2023i1.621
13. Wei J, Dai Y, Wang Z, Gu N, Ju H, Xu Y, et al. Intrauterine double-balloon tamponade vs gauze packing in the management of placenta previa: a multicentre randomized controlled trial. Medicine (Baltimore). 2020;99(7):e19221. https://doi.org/10.1097/MD.0000000000019221
14. Suarez S, Conde-Agudelo A, Borovac-Pinheiro A, Suarez-Rebling D, Eckardt M, Theron G, et al. Uterine balloon tamponade for the treatment of postpartum hemorrhage: a systematic review and meta-analysis. Am J Obstet Gynecol. 2020;222(4):293.e1-293.e52. https://doi.org/10.1016/j.ajog.2019.11.1287