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Original Research Article

Panicker's vacuum suction hemostatic device- a novel innovation for the treatment of atonic postpartum hemorrhage

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ABSTRACT

Background: The aim of this study was to evaluate the effectiveness of the Panicker's vacuum suction hemostatic device in treating postpartum hemorrhage refractory to medical treatment.
Methods: A retrospective study including women with atonic postpartum hemorrhage in whom Panicker's vacuum suction hemostatic device was used, since they did not respond to the medical management. The demographic factors, mode of delivery, volume of blood loss, blood transfusion and outcome of the procedure were studied.
Results: The study demonstrated that the device achieved effective hemostasis in both minor and major PPH, helping reduce maternal morbidity and mortality. Early recognition and timely preventive measures in at-risk women could have limited bleeding and reduced the need for transfusions.
Conclusions: Panicker's vacuum suction hemostatic device which works on the principle of vacuum retraction of the uterus was found to be effective in the management of atonic postpartum hemorrhage.

Keywords: Atonic postpartum hemorrhage, Conservative treatment, Hemostatic technique, Panicker's cannula, Vacuum retraction

INTRODUCTION

Postpartum hemorrhage (PPH) is an obstetric emergency complicating 1-10% of all deliveries.[1] Postpartum haemorrhage (PPH) is estimated to cause approximately 20% of global pregnancy-related deaths with these deaths occurring overwhelmingly in low and lower-middle income countries (LMIC).[2] Postpartum hemorrhage due to uterine atony is the primary direct cause of maternal mortality globally.[3] Uterine atony (accounts for 70% of PPH) can be anticipated after prolonged labour particularly with the use of oxytocin, in pregnancies complicated with chorioamnionitis, high parity, general anesthesia, and other factors that lead to uterine overdistension such as multiple fetal gestation, polyhydramnios, and fetal macrosomia.[4,5] The first response PPH bundle comprises of initial fluid resuscitation (isotonic crystalloids), uterotonics, tranexamic acid, and uterine massage.[6] The "response to refractory PPH bundle" comprises of intrauterine balloon tamponade (IBT), compressive measures (aortic or bimanual uterine compression), and the non-pneumatic antishock garment.

Panicker's vacuum suction hemostatic device has been a game changer. It is a safe, simple and sure method for the treatment of atonic PPH, thereby reducing maternal mortality and morbidity. This device consists of a specially made stainless steel or plastic cannula of 12 mm in diameter and 25 cm in length with multiple holes of 4 mm diameter at the distal 12 cm of the cannula. It has to be introduced into the uterine cavity through the vagina to reach the fundus. The cannula has to be connected to a suction apparatus, and a negative pressure of 700 mm mercury has to be produced. A mechanical suction unit of ventouse or MVA syringe can be used, instead of using suction machine.[7] This procedure helps to treat atonic PPH in low-resource and primary care settings where even

trained paramedical personnel can use this method safely and effectively to save the life of the mother.[7] Hence, this device can be used in the labor room as well as operating theatre.

In limited resource settings, the non-availability of competent manpower to perform procedures like B-lynch suturing, stepwise devascularization, internal iliac ligation, and uterine artery embolization is challenging to save a mother's life. Timely use of a vacuum suction device during the golden hour of PPH can be life-saving for mothers.

METHODS

A retrospective study was conducted to investigate the effectiveness of the Panicker's vacuum suction hemostatic device, as a conservative treatment option for PPH in women who delivered at Khoulah Hospital, Oman from January 2022 to December 2024. The hospital is a government tertiary facility that serves as a referral center for the care of high-risk pregnancies.

The demographic and epidemiological data were recorded, risk factors associated with PPH and variables related to the appropriate use of the Panicker's vacuum suction hemostatic device. The study group included women for whom the vacuum suction device was inserted vaginally and after cesarean delivery.

The study included women with atonic postpartum hemorrhage and excluded women who exhibited disseminated intravascular coagulation, had inherited bleeding disorders, or had traumatic postpartum hemorrhage. Those experiencing secondary postpartum hemorrhage due to retained products of conception were excluded.

Women were considered candidates for treatment with a Panicker's vacuum suction hemostatic device, if they had postpartum hemorrhage that did not respond to 'first response PPH bundle' consisting of uterine massage, volume replacement and uterotonic medical treatment. The protocol we followed called for uterotonic treatment initially, i.e. intravenous oxytocin, followed by intramuscular methylergometrine (if not contraindicated) if the bleeding was not controlled. If bleeding persisted, intramuscular prostaglandins (carbopost) were used, and if this did not control the bleeding, misoprostol was given rectally and intravenous tranexamic acid.

The Panicker's suction metal cannula was introduced vaginally into the uterus under ultrasound visualization to ensure correct placement. A negative suction pressure of 650 mmHg was generated within one minute and maintained for 10 to 15 minutes using the suction machine. This led to uterine retraction and effective aspiration of all blood accumulated in the uterine cavity. The cannula was removed once the uterus was well contracted and bleeding had ceased.

RESULTS

The study findings highlight that most cases of postpartum hemorrhage were among women aged 26-30 years, though it occurred across a wide age range. Multiparity, was the most common obstetric profile who were at risk of atonic postpartum hemorrhage (Table 1).

Table 1: Demographic pattern.

	Frequency	Percentage
Age (in years)		
21-25	5	23.8
26-30	7	33.3
31-35	4	19.0
>36	5	23.8
Parity		
0	4	19.0
1	5	23.8
2	6	28.6
3	5	23.8
4	1	4.8
Gestational age		
<36	5	23.8
36-40	14	66.7
>40	2	9.5

Table 2: Obstetric outcome with postpartum hemorrhage.

	Frequency	Percentage
Blood loss		
<250	1	4.8
251-500	1	4.8
501-1000	10	47.6
>1000	9	42.9
Mode of delivery		
CS	2	9.5
Instrumental	3	14.3
SVD	16	76.2
Blood transfusion		
0	8	38.1
1	7	33.3
2	4	19.0
3	2	9.5
Survival		
Survived	21	100.0
Surgical procedures	0	0.0

The majority of women delivered at term, and two patients had significant atonic PPH after abortion. Importantly, there was substantial blood loss, with 48% losing more than 500 ml and 43% had major PPH which was noted before the application of Panicker's hemostatic device (Table 2).

Postpartum hemorrhage is not just limited to operative deliveries; spontaneous vaginal delivery was the predominant mode of delivery. More than half of the patients required blood transfusion, with a significant proportion needing multiple units, which reflects both the clinical burden and the resource implications of managing such cases (Table 2), which reflects the need for early diagnosis and prevention of postpartum hemorrhage.

Although all patients survived, the need for transfusion and the high volumes of blood loss emphasize the potential for morbidity. It is notable to mention none of them proceeded to the other surgical managements like tamponade, compression sutures or hysterectomy (Table 2). Risk factors such as previous cesarean section, precipitate labor, and severe preeclampsia were common, yet more than one-fifth of patients had no identifiable risk factor, highlighting the unpredictable nature of postpartum hemorrhage (Figure 1).

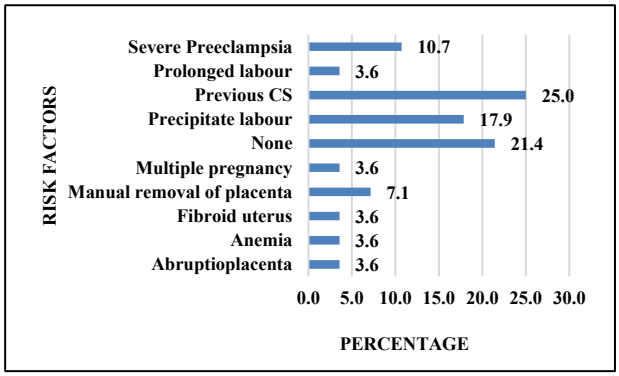

Figure 1: Risk factors.

These results underline the importance of preparedness for postpartum hemorrhage in all deliveries, the need for readily available blood products, and the necessity of vigilance even in women without apparent risk factors. However, the time taken for the bleeding to stop with the use of Panicker's vacuum suction hemostatic device has not been studied.

DISCUSSION

Postpartum hemorrhage (PPH) has a significant impact not only on maternal health but also on the healthcare system and associated costs. It is therefore both rational and essential to develop strategies for the timely, cost-effective prevention, limitation, and management of PPH.[8]

The study shows that there was major PPH in 43% women following which the Panicker's hemostatic device was used to maintain hemostasis. This morbidity could have been avoided by timely diagnosis of postpartum hemorrhage. The device has significantly reduced the mortality and morbidity by avoiding further surgical procedures.

The vacuum suction hemostatic device supports the uterus's natural physiological processes of contraction and retraction. The cannula applies strong negative pressure to the inner surface of the uterus, promoting effective hemostasis by enhancing uterine wall apposition and encouraging retraction.

Balloon tamponade is also being promoted as an affordable option for managing severe atonic postpartum hemorrhage that does not respond to uterotonic therapy.[9] In this technique, a fluid-filled device- such as a condom catheter or Bakri balloon- is inserted into the uterine cavity and inflated to exert hydrostatic pressure. This internal pressure expands the uterine cavity and applies a force greater than the systolic blood pressure on the uterine sinusoids, thereby achieving hemostasis. However, a notable limitation of this approach is that it acts contrary to the uterus's natural physiological mechanisms of contraction and retraction, which are critical for effective postpartum bleeding control.[10]

Comparative studies have shown that bleeding ceases within 20 minutes with the use of uterotonics such as oxytocin and misoprostol, in contrast the Bakri balloon has been reported to control hemorrhage within approximately 9 minutes.[11,12] Notably, inexpensive and easy-to-use suction-based technique can effectively stop bleeding in cases of atonic PPH within 4 minutes which also requires minimal setup time.[13,14]

Makhija et al showed when medical management failed, suction and evacuation of the uterine cavity was done and then the cannula was kept in the uterine cavity maintaining the negative pressure. Hemorrhage was effectively controlled in 8 out of 9 cases (88.9%), thereby avoiding the need for hysterectomy.[15]

Panicker conducted a study to evaluate the effectiveness of the Panicker's vacuum suction hemostatic device in managing atonic postpartum hemorrhage in a cohort of 55 women- 40 following vaginal deliveries and 15 after lower-segment cesarean sections. Following insertion of the cannula and the application of negative pressure maintained at 700 mmHg for 30 minutes, firm uterine retraction was consistently observed. The volume of blood loss in these cases ranged from 50 to 300 ml, indicating effective hemorrhage control.[7]

In a study conducted by Purwosunu et al, the use of a suction-based device demonstrated effective management of postpartum hemorrhage in all 10 cases studied. The device created an immediate seal at the cervical os, led to evacuation of 50-250 ml of residual blood from the uterine cavity. Following this, the uterus collapsed and regained tone within minutes, resulting in rapid control of bleeding. The device remained in place for a minimum of 1 hour, with the longest duration being 6.5 hours in one case. During this time, vaginal and perineal lacerations were easily repaired.[16]

The vacuum suction cannula can be effectively utilized for primary, secondary, and tertiary prevention of atonic postpartum hemorrhage following both vaginal deliveries and lower segment cesarean sections (LSCS). In addition to promoting uterine contraction, the cannula helps evacuate accumulated blood, improving visibility and facilitating accurate clinical assessment and suturing. As the cervical walls are drawn into contact with the cannula, bleeding from cervical tears is often reduced, allowing for repair in a cleaner and more controlled environment.[17]

The drawback of the Panicker's vacuum suction device is that in cases of heavy bleeding the blood clots block the cannula which results in continued bleeding from the vagina even though suction is maintained, and no blood enters into the suction bottle. Hence, extra cannula should be kept ready. This is attributed to the smaller diameter of the cannula and smaller fenestrations in the cannula.[7,18]

Limitation of the study is the sample size was relatively small, the time required to achieve hemostasis was not documented, and the volume of blood collected in the canister was not recorded.

CONCLUSION

The application of negative intrauterine pressure presents a promising approach for the management of atonic postpartum hemorrhage. Its effectiveness, combined with low cost, ease of use, and minimal setup requirements, makes it particularly valuable in low-resource and high-burden settings. This technique holds considerable potential to improve maternal health outcomes globally, by promoting physiological uterine contraction and reducing the need for invasive procedures such as hysterectomy. Broader clinical adoption and further prospective studies are needed to confirm its long-term benefits and integration into standardized care protocols.

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