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ORIGINAL RESEARCH

A Study on Role of Panicker's Vacuum Cannula as A Novel Technique for Atonic PPH Management at A Tertiary Care Center

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ABSTRACT

Background: Atonic postpartum hemorrhage is ceased by creating negative pressure inside the uterine cavity which works by shrinking of uterus. It is similar to the natural physiological process of contraction and retraction to stop atonic postpartum haemorrhage. **Methods:** Forty three women with different risk factors for atonic PPH like obstructed prolonged labour, accidental haemorrhage, PIH, anaemia complicating pregnancy, multifetal pregnancy, and polyhydramnios, either alone or in combination, and who delivered either normally or by caesarean section were included in this study. Age, parity, gestational age at delivery was recorded.In vaginal delivery, if the bleeding did not stop by medical measures, womenwas put in lithotomy position, vaginal exploration was done to exclude genital tract trauma. A specially made stainless steel (PANICKERS PPH 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 was introduced into the uterine cavity through the vagina to reach the fundus. The cannula was connected to a suction apparatus, and a negative pressure of 650 mm mercury produced. The quantity of blood sucked varies from 50–300 ml. The suction was maintained for 30 min. Then the cannula was taken out slowly after releasing the suction. Usually there is was no further bleeding from the uterine cavity, and the uterus gets well contracted and retracted. In case of atonic PPH noted during cesarean section cannula was inserted into uterine cavity through incision site, suction tubings brought out through vagina via cervical os and the negative pressure was created. The blood collected in suction bottle was measured and recorded. **Results:** Complete cessation of bleeding which was associated with contraction and firm retraction of uterus was observed in most women within 4minutes after initiation of procedure. The amount of blood collected in suction bottle ranged from 50ml to 300ml. **Conclusion:** Creating negative pressure inside uterine cavity is a very effective physical method which mimics the natural physiological process of contraction and retraction to stop atonic postpartum hemorrhage. It is easy, cost effective, fertility saving and life-saving technique. It can be made available in any setting, and can become the first defense against atonic PPH.

Keywords – Atonic PPH, Vacuum retraction, suction cannula

INTRODUCTION

Postpartum hemorrhage is a major obstetrical emergency. It is often sudden, frequently unpredictable and catastrophic. If timely action is not initiated maternal death can occur in very short period. In a developing country like India it is the leading cause of maternal death(28%) and 50% of these women die out of atonic PPH. India's MMR is already down to 103, against a global MMR of 211 (2017).[1] According to the American college of Obstetricians , and Gynecologist, PPH is defined as cumulative blood loss of >1000 mL accompanied by signs and symptoms of hypovolemia within 24 hours after the birth process regardless of route of delivery. Therefore, clinical sign and symptoms should be included in assessment of PPH (RCOG-2016).[2]

PPH is classified as primary PPH occurring within 24 hours of birth and secondary PPH or late PPH occurring more than 24 hours post-birth to up to 12 weeks of postpartum. Common causes of PPH are four Ts'; Tone (atonicity), Tissue (retained bits, blood clots), Trauma (genital tract injury) and Thrombin (coagulopathy). In addition, some risk factors like obstructed prolonged labor, accidental hemorrhage,

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hypertension in pregnancy, anemia, polyhydramnios and big babies are known to cause atonic PPH.[3] First 1 hour is called golden hour, when immediate measures should be taken.

Simpler techniques like uterine massage, and uterine packing and balloon tamponade can be practiced in low resource settings. Some women slip into coagulation failure and MODS rapidly. But we need critical care unit for monitoring and arranging blood products is also difficult. Hence the present study concentrates on adoption of an effective new technique **Panicker's suction cannula** when the medical management fails.[4] It is safe, simple and sure technique for preventing and treating PPH, thereby decreasing maternal mortality and morbidity, and also to find a method to treat PPH in low-resource and primary care settings where even paramedical personnel including ANMs can use this method safely and effectively to save the life of the mother.[5] In this study Panickers vacuum cannula was applied to create negative pressure inside the uterine cavity with a specially designed **Panickers PPH cannula**, which is a simple, safe and cost effective technique. Panicker [5] proposed that creating negative pressure within the uterine cavity, using a cannula made of stainless steel or plastic, results in stoppage of bleeding from the postpartum uterus in women with atonic PPH and abnormal uterine bleeding (AUB). A 25 cm long cannula, 12 mm in diameter, with multiple holes of 4 mm diameter over the distal 10 cm of the cannula,is inserted into the uterus, through the vagina, to reach the fundus (Fig. 1), which is then connected to a suction apparatus to produce and maintain negative pressure of 700 mm mercury. This approach was tried in 55 women (40 postnormal vaginal deliveries and 15 post-lower segment cesarean sections [LSCS]) who experienced PPH refractory to uterotonic drugs used as standard of care. Panicker reported his findings and highlighted the need to ensure accurate placement and care of the cannula, as well as to manage cervical and vaginal tears and lacerations concomitantly. The author also mentioned the limitations of the cannula, stating that it is effective only in managing uterine sources of bleeding. He suggested in case a suction machine is not available, mechanical suction unit of ventouse or manual vacuum aspiration (MVA) syringe can be used.[5]

MATERIALS AND METHODS

Source Of Data

Pregnant mothers, delivered vaginally or by cesarean delivery in Chamarajanagar institute of medical sciences with atonic PPH refractory to medical management were taken in this study

Methods of Collection of Data

A. Study Design: Prospective observational study.

B. Study Period: 6 months

C. Place of Study: Department of OBG, CIMS, Chamarajanagar

D. Inclusion Criteria

1. Women willing to participate in the study
2. Parturient with atonic PPH

E. Exclusion Criteria

1. Women not willing to participate in the study.
2. Secondary PPH
3. PPH due to causes other than atonicity like traumatic, mixed, retained bits of placenta or Coagulation abnormalities.

G. Methodology

After obtaining institutional ethical committee's clearance all pregnant women fulfilling inclusion and exclusion criteria were included in the study.

Women with vaginal deliveries and women who underwent caesarean delivery with atonic PPH refractory to uterotonic drugs used according to protocol was included in this study.

Description of uterine vacuum retraction system: Consists of, 1. A specially made stainless steel (PANICKERS PPH CANNULA) uterine retraction cannula. Cannulas are of two different sizes. One measuring 25cm long with 12mm diameter, and the other one measuring 25cm long with 18mm diameter, and they have uterine angle and perforations on uterine portion. The perforations on fundal portion are large and longitudinal, and on cervical portion round and small. Smaller perforations were given on cervical portion to prevent blocking of cannula by cervical tissues when suction applied. 2. Thick walled (not easily collapsible) flexible plastic suction tube with 1.25cm diameters. 3. High vacuum suction machine with single bottle, or vacuum extraction pump which can produce negative pressure up to 650mm Hg. within 1mnt.

In vaginal delivery, if the bleeding did not stop by medical measures, women put in lithotomy position, vaginal exploration done to exclude traumatic PPH. A specially made stainless steel (PANICKERS PPH 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 was introduced into the uterine cavity through the vagina to reach the fundus. The cannula was connected to a suction apparatus, and a negative pressure of 700 mm mercury produced. The negative suction results in aspiration of all the blood collected in the uterine cavity. The quantity of blood sucked varied from 50–300 ml. When the collected blood is completely sucked out, the bleeding ceases. The suction pressure was maintained for 30 min. Then the cannula was taken out slowly after releasing the suction. Usually there was no further bleeding from the uterine cavity, and the uterus was well contracted.

In case of atonic PPH noted during caesarean section cannula was inserted into uterine cavity through incision site, suction tubings brought out through vagina via cervical os and the negative pressure is created.

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RESULTS

A total of 43 women were identified with atonic postpartum haemorrhage, all of whom were treated using Panicker's Suction Cannula at CIMS hospital Chamarajanagar, during the study period.

Table 1: Distribution of study population according to age

Age(Years)	No.of Patients	Percentage	Cumulative Percent
<20	4	9.3	9.3
21-25	19	44.2	53.5
26-30	14	32.6	86.0
31-35	6	14.0	100.0
Total	43	100.0	

Table no 1 was shows that Panicker's cannula application was higher in age group of 21-25 years (44.2%) and age group 26-30 years (32%) followed by age group 31- 35 year (14%), age group < 20 year (04%).

Table 2: Distribution of cases according to parity

Obstetric History	Number of patients	Percentage
P1	21	48.8%
P2	19	44.1%
P3	02	4.6%
P4	01	2.3%
>P5	00	00%
Total	43	100%

Table no 2 shows that 21(48%) cases were para-1 followed by 19(44%) Para-2, 2(4.6%) Para–3, and 1(2.3%) Para–4.

Table 3: Distribution of cases according to gestational age

Gestational age (weeks)	No. of patients	Percentage	Cumulative Percent
36-40 weeks	42	97.7	97.7
>40 weeks	1	2.3	100.0
Total	43	100.0	

Table no 3 was shows that 42 (97.7%) cases were delivered between 36–40 Weeks of gestational age and 1 (02.3%) patients had delivery beyond 40 Weeks of gestation.

Table 4: Distribution of cases according to time taken to stop bleeding

Bleeding time	No. of patients	Percent	Cumulative Percent
1	27	62.8	62.8
2	13	30.2	93.0
3	1	2.3	95.3
4	2	4.7	100.0
Total	43	100.0	

Table no 4 was shows that 27 (63%) cases stopped bleeding within 1 min followed by 13(30%) cases stopped bleeding between 1.1-2 min and 02(4.7%) patients stopped bleeding between 3.1-4 min. cumulatively 93% stopped bleeding with in 2 min, 95% within 3 min and 100% within 4 minutes of application of Panicker's cannula.

Table 5: Distribution of cases according to blood collected in bottle

Amount blood	No. of patients	Percent	Cumulative Percent
100	22	51.2	51.2
200	13	30.2	81.4
300	8	18.6	100.0
Total	43	100.0	

Table no 5 was shows that in 22 (51.2%) cases blood collected in bottle was <100 ml and in 13(30%) patients collected blood ranged between 100-200ml followed by 08(18.6%) cases in whom collected blood ranged between 201-300ml.

Table 6: Distribution of cases according to mode of delivery.

Amount blood	No. of patients	Percent	Cumulative Percent
100	22	51.2	51.2
200	13	30.2	81.4

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300	8	18.6	100.0
Total	43	100.0	

Table no 6 was shows that 20(80%) patients were delivered by vaginal route and 05 (20%) were by caesarean section.

Table 7: Distribution of cases according to number of PRBC transfusions required

Blood transfusion required	No of patients	Percent	Cumulative Percent
1PRBC	10	23.3	23.3
2 PRBC	3	7.0	30.2
NO	30	69.8	100.0
Total	43	100.0	

Table 7 shows that 30 (69%) of the patients did not require transfusion at all, 10(23%) Required 1 pint Prbc transfusion and 3(7%)patients required 2 pint PRBC transfusion.

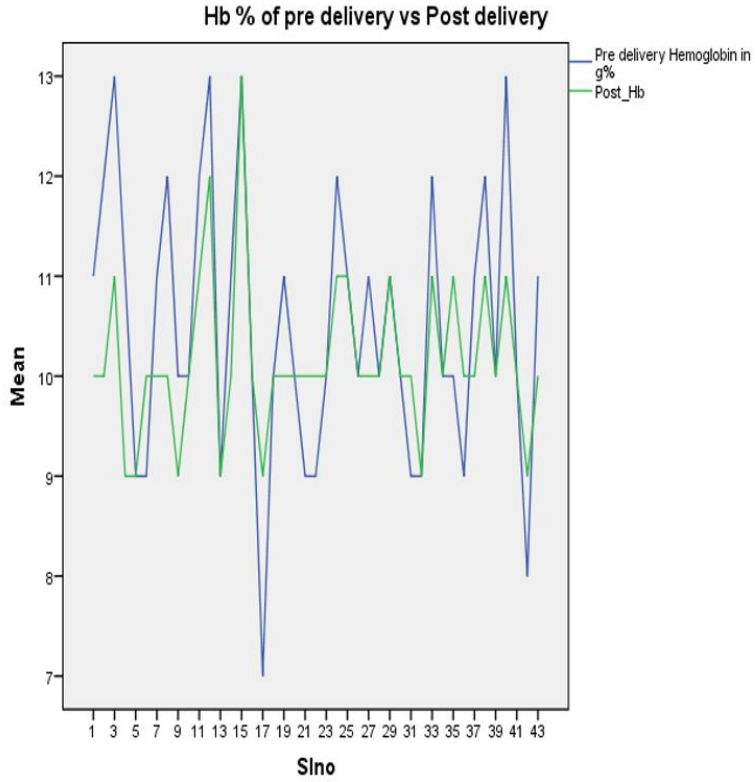

Figure1: The below graph shows the pre delivery and post delivery Hemoglobin values comparision of the study group.

Table 8: Distribution of cases according to risk factors for atonic PPH

Risk factors	Number of patients	Percentage
Poly-hydramnios	05	12%
Prolonged Labor	05	12%
Obstructed Labour	07	16%
Severe Precclampsia	05	12%
Abruption placentae	05	12%
Placenta previa	07	16%
Macrosomia	04	08%
Multifetal pregnancy	03	08%
Pre-Eclampsia	02	04%
Total	25	100%

Table no 8 was shows that obstructed labour 07(16%) and placenta previa and obstructed labour 07(16%) was the commonest indication for use of Panicker's cannula. Next common indication was Polyhydramniose 05(12%), prolonged labour 05(12%), Severe Precclampsia 05(12%), abruption placentae 05(12%) followed by fetal macrosomia 04(08%) and multifetal pregnancy 03(08%).

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Table 9: Panicker's Vaccum Suction Cannula utilization and outcome details

Patients status	Number of cases	Percentage
Survived	43	100%
Died	00	0%
Total	43	100%

In the present study table no 09 shows that none of the patient in whom PPH was managed using Panicker's cannula succumbed to death nor did they require peripartum hysterectomy.

In our department between 2019-2022 as many as 5-6 patients underwent peripartum hysterectomy in view of atonic PPH not controlled with all other measures. Utilization of Panicker's cannula has been a break through in the management of atonic PPH by preventing maternal morbidity and mortality

DISCUSSION

Postpartum hemorrhage is a major obstetrical emergency and is a leading cause of maternal death(28%)in countries like India. It is often sudden, frequently unpredictable and catastrophic. If timely action is not initiated maternal death can occur in very short period.. India's MMR is already down to 103, against a global MMR of 211 (2017).[1]

Simpler techniques like uterine massage, uterotonic drugs, and uterine packing and balloon tamponade can be practiced in low resource settings. Since some women slip into coagulation failure and MODS rapidly. We need easy, less time consuming and cost effective technique which can arrest bleeding or buy time until surgical management. Panicker's suction cannula is one such instrument which can be used for managing atonic PPH management as well as to reduce bleeding that can prevent catastrophic consequences and maternal death.[4]

When medical measures to control atonic PPH fails most of the time we resort to surgical method and may land up doing caesarean hysterectomy in order to save the mother, hence we intend to study the effectiveness of this novel technique of creating negative pressure inside the uterine cavity using this novel instrument – **Panicker's PPH cannula** and save lives of many women.[5]

In our study, vacuum retraction could stop bleeding in 43 women within 4 min of introducing the suction cannula. One of the other effective method used for severe atonic PPH refractory to uterotonic therapy is ballon tamponade.[6] In this technique condom balloon or Bakri balloon is inserted inside uterine cavity and inflated with saline. The balloon exerts constant pressure on underlying sinusoids and stops bleeding.[7] The draw backs with this technique is that it is time consuming, the mechanism of action is against the natural physiological mechanism of contraction and retraction. Organizing tamponade system needs training and takes time.and if there is delay profuse bleeding may result in a catastrophe. Sometimes the balloon gets expelled when the tone in the uterine wall increases if the vagina is not effectively packed with gauge.[7] In contrast the mechanisms involved in vacuum retraction include, the negative pressure created inside the uterine cavity results in physical constriction of uterus, and assists the natural physiological process of contraction and retraction. The soft cervical tissues around the cervical portion of the uterine cannula get sucked in to the perforations resulting in closed uterine cavity. In this technique blood collected in the uterine cavity gets sucked and collected in to the suction bottle and helps to measure the blood loss correctly. As this procedure needs little time and minimal skills, this procedure can be done in labor room settings as a first aid measure. As this is a simple technique, even ANMs at periphery can be trained, and the bleeding can be stopped without any delay. This life saving technique avoids laparotomy and other complex procedures to stop atonic bleeding, and helps to save the mother and her fertility function in low resource settings.

CONCLUSION

Prophylactic application of vacuum suction cannula in high risk women for atonic PPH averts catastrophic bleeding. Vacuum suction cannulas should be made part and parcel of normal delivery tray to facilitate quick application. This simple and cost effective technique, takes very little time to organize and can stop bleeding with in 4 minutes in atonic PPH as shown in this study. This lifesaving technique is useful in all settings especially in low resource settings. Its utilization in cases of inherited coagulopathies of pregnancy and DIC has to be further explored. The long term effects of ischemia on cervix and uterus due to vacuum effect has to be further explored.

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