

A Clinical Study of the Use of SR Vaccum Suction Cannula in the Management of Atonic PPH at Tertiary Care Hospital

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Abstract: **Background:** Creating negative pressure inside the uterine cavity results in shrinking of uterus which can assist the natural physiological process of contraction and retraction to stop atonic postpartum haemorrhage. **Methods:** Twenty five women with different risk factors for atonic PPH like obstructed prolonged labour, accidental haemorrhage, PIH, anaemia complicating pregnancy, multifetal pregnancy, and hydramnios, 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. The uterine portion of the cannula was inserted into the uterine cavity up to the level of fundus immediately after placental delivery in both cases of vaginal and caesarean deliveries. The nipple of the cannula was connected to suction machine with thick walled flexible non collapsible suction tube. A negative pressure of 650 mmHg was created inside the uterine cavity and maintained for 10-15mints. Application of negative pressure was repeated every hour for 10mints for 3hours. The cannula was removed one hour after last suction procedure. 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 mostly women within 4mns after initiation of procedure. The amount of blood collected in suction bottle ranged from 50ml to 350ml. **Conclusion:** Vacuum shrinking of uterus is a very effective physical method which can assist the natural physiological process of contraction and retraction to stop atonic postpartum haemorrhage. This simple, cost effective, life-saving, and fertility saving technique, which can avoid laparotomy can be made available in any setting, and can become the first defence against atonic PPH.

Keywords: Atonic PPH, SR PPH suction Cannula, Prophylactic application

1. Introduction

Globally, as per the WHO estimate, the maternal mortality rate (MMR) fell nearly by 44% over the past 25 years. Developing regions, sub-Saharan Africa and Southern Asia accounted for about 99% of the global burden in the year 2015. This clearly shows that, the MMR is not coming down in low resource countries¹. India accounted for 56 000 (19%) maternal deaths. In India, postpartum haemorrhage was the leading cause of maternal deaths (29.6%), and in majority of women atonic PPH was the cause². Even though some risk factors like obstructed prolonged labour, accidental haemorrhage, and big babies are known to cause atonic PPH, it is not very clear why some women develop atonic PPH and why some women do not^{3, 4}. For the same reason this problem cannot be predictable⁵. In low resource settings unpredictable sudden massive bleeding makes it difficult to organize competent manpower, compatible blood, and transport to higher medical centers⁶. Simpler techniques like uterine massage, uterotonic drugs, and uterine packing and balloon tamponade can be practiced in low resource settings. Techniques like B-Lynch suturing, stepwise devascularization, internal iliac ligation and uterine artery embolization are available at tertiary care centers. These higher techniques are out of the reach to every parturient woman when simpler techniques fail. Sometimes the patients died on the way while being transported to higher centers due to hypovolemic shock. Sometimes women succumb to death just within 1-1.5 hours after the onset of bleeding⁷. The rapidity with which some women slip in to coagulation failure and multi organ dysfunction syndrome from haemorrhagic shock is alarming⁷. Because of these complications the maternal mortality is not coming down in low resource countries⁸. To overcome these complications

SR PPH Cannula was used which is a simple, safe and cost effective technique. SR cannula acts by creating negative pressure inside the uterine cavity.

2. Methods

A prospective observational study was conducted in department of obstetrics and gynaecology at tertiary centre at Pannadhay Zanana Hospital Udaipur from Aug 2019 to Oct 2019. 20 pregnant women who had normal vaginal delivers and 5 women who underwent caesarean sections, and who developed atonic postpartum hemorrhage were included in this study. All the women received 10units of oxytocin IM at the appearance of anterior shoulder, 5units of intra venous oxytocin after the delivery of placenta, and then uterine massage. All uterotonics was given when the bleeding did not stop.

Description of uterine vacuum retraction system:

Consists of, 1. 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 case of vaginal delivery: when the bleeding did not stop by uterotonics, women were kept in lithotomy position, and the bladder was catheterized with an indwelling catheter. Under good source of light with wide blade vaginal speculum application, the genital tract was explored to exclude traumatic PPH, and to confirm uterine atony. Blood clots were removed from uterine cavity by bimanual compression. The anterior lip of cervix was grasped with sponge holding forceps, and the uterine end of the cannula was inserted in to the uterine cavity up to the level of fundus. Sponge holder and speculum were removed. The outer end of the cannula was connected to the suction machine with suction tube. Air leak in the system was prevented by proper fitting. The left palm supporting the fundus on abdomen, right fingers grasp the outer end of the cannula, and push it towards the fundus. Keeping the cannula in this position (to prevent slipping out), suction machine was put on and a negative pressure of 650mmhg was created and maintained for 10mnts. Then the suction machine was put off. This makes the cannula to get fixed in this position due to sucking of soft cervical tissues in to the perforations. This procedure was repeated every hour for 3hrs. After this, the negative pressure was created whenever there was recurrence of bleeding. Twenty units oxytocin drip in 5% dextrose 60drops/mint was run throughout the procedure. The cannula was removed after 6hrs in all women. After the procedure when we tried to pull the cannula, it was not coming out. The temporary adhesions developed due to sucking of soft cervical tissues in to perforations of the cannula were released by gentle finger manipulation. After this the cannula could be easily taken out.

In case of cesarean section: the cannula was inserted through the uterine wound and brought outside through vagina. The outer end of the cannula was connected to the suction machine through tubing. The uterine wound was closed quickly. Cannula fixation (tip at the level of fundus) was done in the similar way as mentioned in vaginal insertion and then negative pressure was applied.

3. Results

A cohort of 25 women was identified with atonic postpartum haemorrhage, all of whom received the SR Vacuum Suction Cannula at PDZH Hospital Udaipur, during the study period.

Table 1: Distribution of study population according to age

Age (Years)	Number of Patients	Percentage
≤ 20	01	04%
21–25	06	24%
26–30	09	36%
31–35	09	36%
Total	25	100%

Table no 1 was showing that SR cannula application was higher in age group of 26-30 years (36%) and age group 31–35 years (36%) followed by age group 21- 25 year (24%), age group < 20 year (04%).

Table 2: Distribution of cases according to parity

Obstetric History	Number of patients	Percentage
P1	06	24%
P2	07	28%
P3	05	20%
P4	02	08%
>P5	05	20%
Total	25	100%

Table no 2 was showing that 7(28%) cases were para-2 followed by 6(24%) Para-1, 5(20%) Para-3, 5(20%) Para-5, and 2 (08%) were para-4.

Table 3: Distribution of cases according to gestational age

Gestational age	Number of patients	Percentage
< 30 Weeks	02	08%
30–35 Weeks	01	04%
36–40 Weeks	21	84%
>40 Weeks	01	04%
Total	25	100%

Table no 3 was showing that 21 (84%) cases were delivered between 36–40 Weeks of gestational age and 2 (08%) patients had delivery between <30 Weeks and 01 (04%) cases presented at 30-35 weeks gestation and 01(04%) patients delivered at >40 week gestation.

Table 4: Distribution of cases according to duration of labour

Duration of labour	Number of patients	Percentage
< 5 hour	07	28%
6-10 hours	14	56%
11-15 hours	04	16%
>15 hours	00	00%
Total	25	100%

Table no 4 was showing that 14 (56%) cases were in labour between 6-10 hours and 07 (28%) cases had duration of labour <5 hours followed by 04 (16%) cases had 11-15hours.

Table 5: Distribution of cases according to time taken to stop bleeding

Time (minutes) taken to stop bleeding	Number of patients	Percentage
< 2 min	06	24%
2.1- 2.9 min	06	24%
3-3.9 min	10	40%
>4 min	03	12%
Total	25	100%

Table no 5 was showing that 10 (40%) cases were stopped bleeding within 3-3.9 min followed by 06(24%) cases were stopped bleeding between 2.1-2.9 min and 06(24%) patients were stopped bleeding <2min. Only 03(12%) cases had stopped bleeding >4min.

Table 6: Distribution of cases according to blood collected in bottle

Blood in bottle (ml)	Number of patients	Percentage
< 100 ml	09	36%
101-200 ml	10	40%
201-300 ml	05	20%
>300 ml	01	04%
Total	25	100%

Table no 6 was showing that 10 (40%) cases were collected blood in bottle ranged from 101-200ml and 09(36%) patients were collected blood <100ml followed by 05(20%) cases collected blood ranged 201-300ml. Only 01(04%) case have collected blood >300ml.

Table 7: Distribution of cases according to blood collected in bottle

Mode of delivery	Number of patients	Percentage
Vaginal	20	80%
Cesarean section	05	20%
Total	25	100%

Table no 7 was showing that 20(80%) patients were delivered by vaginal route and 05 (20%) were by caesarean section.

Table 8: Distribution of cases according to number of time of negative pressure applied

No. of time of negative pressure applied	Number of patients	Percentage
01	17	68%
02	04	16%
03	04	16%
Total	25	100%

Table no 8 was showing that in 17(68%) womens negative pressure was applied only once, in 04(16%) patients two times and in 04(16%) womens 3 times to stop bleeding.

Table 9: Distribution of cases according to risk factors for atonic PPH

Risk factors	Number of patients	Percentage
Poly-hydramniotic	03	12%
Prolonged Labour	03	12%
Obstructed Labour	04	16%
Severe PIH	03	12%
Abruption placentae	03	12%
Placenta previa	04	16%
Macrosomia	02	08%
Multifetal pregnancy	02	08%
Pre-Eclampsia	01	04%
Total	25	100%

Table no 9 was showing that obstructed labour 04(16%) and placenta previa 04(16%) was the commonest indication for use of SR cannula. Next common indication for SR cannula use was polyhydroamniotic 03(12%), prolonged labour 03(12%), severe PIH 03(12%), abruption placentae 03(12%) followed by macrosomia 02(08%) and multifetal pregnancy 02(08%).

Table 10: SR Vacuum Suction Cannula utilization and outcome details

Patients status	Number of cases	Percentage
Survived	23	92%
Died	02	08%
Total	25	100%

In the present study table no 10 was showing that majority of cases 23(92%) survived following use of SR cannula.

4. Discussion

Atonic postpartum hemorrhage is the leading cause for maternal death, especially in developing countries¹. It is the rapid exsanguination of the woman due to uterine atony in low resource settings make it difficult to organize competent manpower and compatible blood and transport to higher medical center. As the techniques available to control bleeding in low resource settings are inadequate, majority of maternal deaths still continue to occur in these settings.

In our present study, vacuum retraction could stop bleeding in 22 women within 4mnts after the initiation of negative pressure inside the uterine cavity. Currently the balloon tamponade is being widely advocated as an affordable alternative to blood loss management in severe atonic postpartum hemorrhage refractory to uterotonic therapy⁸. In this technique the uterine cavity is filled with condom balloon or Bakri balloon, and maintained with hydrostatic pressure. This water filled balloon expands the uterine cavity and applies constant pressure (more than the systolic blood pressure) on sinusoids and stops bleeding⁹.

The draw backs with this technique include, the mechanism of action is against the natural physiological mechanism of contraction and retraction. It requires some time to organize this balloon tamponade system and to perform tamponade test. In a case of profuse bleeding due to adherent cotyledons, delay in organizing tamponade system may result in a catastrophe. Sometimes the balloon may get expelled when the tone in the uterine wall increases if the vagina is not effectively packed with gauze⁹.

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. Further application of suction results in quick development of negative pressure inside the uterine cavity resulting in uniform constriction of uterus. This assists the natural physiological process of contraction and retraction and results in cessation of both arterial bleeding and venous oozing.

In this technique blood collected in the uterine cavity get 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 maternity nurses 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.

As the soft cervical tissues get sucked in to the perforations of the cannula and become adherent, the uterine cannula cannot be removed easily after the completion of the procedure. Cannula can be removed easily after gentle separation of these adhesions with finger manipulation. As

the costs involved are minimal, this technique can be used liberally in all settings.

5. 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 within 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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