

Prophylactic SR PPH Suction Cannula application for High risk Women for Atonic PPH.

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Abstract

Background:

Prophylactic application of SR PPH suction cannula in high risk women for atonic PPH may help to prevent blood loss and avoid catastrophic atonic PPH.

Methods: Twenty two women with different risk factors for atonic PPH like obstructed prolonged labor, accidental hemorrhage, PIH, anemia 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: Contraction and firm retraction of uterus was observed in all women within 2-3mns after initiation of procedure. The amount of blood collected in suction bottle ranged from 50ml to 200ml.

Conclusion: Prophylactic application of SR PPH suction cannula in high risk women for atonic PPH is a very effective physical method, which assists the natural physiological process of contraction and retraction. This technique minimizes blood loss, and avoids catastrophic atonic PPH.

Key words: Atonic PPH, SR PPH suction Cannula, Prophylactic application.

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I. 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% (302 000) of the global burden in the year 2015. This clearly shows that, the MMR is not coming down in low resource countries [1]. In India, postpartum hemorrhage (PPH) was the leading cause (28%). About 50% of these women died due to atonic PPH. In low resource settings unpredictable sudden massive bleeding makes it difficult to organize competent manpower, compatible blood, and transport to higher medical centers [2].

Samartha Ram et.al, Purwosunu Y, and Arulkumar et.al, reported the concept of vacuum suction of uterine cavity to control atonic PPH. They reported the cessation of atonic bleeding within 4min after initiation of negative pressure [2, 3]. Even though atonic PPH cannot be predictable [4, 5], risk factors like PIH, obstructed prolonged labor, and placental abruption, predisposes the women for increased risk for developing atonic PPH. Prophylactic application of SR PPH suction cannula in these women can prevent catastrophic atonic PPH, and maternal death.

II. Methods

Twenty two women, with different risk factors for atonic PPH like obstructed prolonged labor, accidental hemorrhage, PIH, anemia complicating pregnancy, multifetal pregnancy, and hydramnios either alone or in combination, and who delivered either vaginally or by C.S were included in this study (Table.1). Age, parity, and gestational age at delivery was recorded. Women with HELLP syndrome and coagulation dysfunction were excluded.

Uterine vacuum retraction system consists of, **1.Uterine suction cannulas:** Five different sizes of

cannulas, (1) 23cm.L×2.4cm.D, (2) 23cm.L×2cm.D, (3) 23cm.L×1.2cm.D, (4) 14cm.L×2.0cm.D and (5)14cm.L×1.2cm.D are made to match different cervical dilatations (Fig. 1a). The vaginal cannulas are longer and have uterine portion, vaginal portion and uterine angle. The perforations on fundal portion are larger and longitudinal (3mm-W× 2 to 2.5cm-L), and on cervical portion they are small and round (3-4mm-D). The cannulas used for C.S are shorter (4 and 5). Large bore cannula was used when cervix was dilated, and small bore cannulas were used when cervix admits only one finger.

2. High vacuum suction machine or suction pump: These machines should be able to produce a negative pressure of 650mm Hg(Fig.1b) within 1min. When there is no power, Vacuum suction pump which is used for vacuum extraction can be used.

3. Thick walled (not easily collapsible) flexible plastic suction tube: These are disposable suction tubes, measures 2meters long with 1cm diameter(Fig.2c).

Selection of the cannula: Cannulas were selected based on cervical dilatation. After vaginal delivery, usually the medium size (25cm.L×2.0cm.D) cannula was used. In case of heavy atonic bleeding, largest size (25cm.L×2.4cm.D) cannula was used. If there was difficulty for insertion of one size, other sizes were tried.

Prophylactic application during vaginal delivery: The suction cannula system was organized (connecting the suction tube to the cannula and to suction machine) and kept ready before the delivery. After the delivery of the baby and before the delivery of placenta, a wide blade vaginal speculum was applied, and 5cm of anterior cervix was grasped with sponge holder. After the delivery of placenta, the assistant applies mild traction on cervix with sponge holder, and the obstetrician inserts left two fingers in to cervix. The right hand inserts the cannula in to uterus taking the guidance of left fingers. Left palm supporting the fundus per abdomen, bimanually feels the cannula and its position. This helps to avoid perforation. The cannula was held in this position, and a negative pressure of 650mmHg was applied by putting on the suction machine. A bolus of 5units Oxytocin was given intravenously after the delivery of anterior shoulder. After application of negative pressure for 10 minutes, the suction machine was put off, but the suction cannula system was kept undisturbed. Suction was put on for 10min every hour for 3hrs, or whenever there was recurrence of bleeding. The cannula was kept in position even for up to 24hrs if recurrence of bleeding expected. The blood collected in suction bottle was measured and recorded.

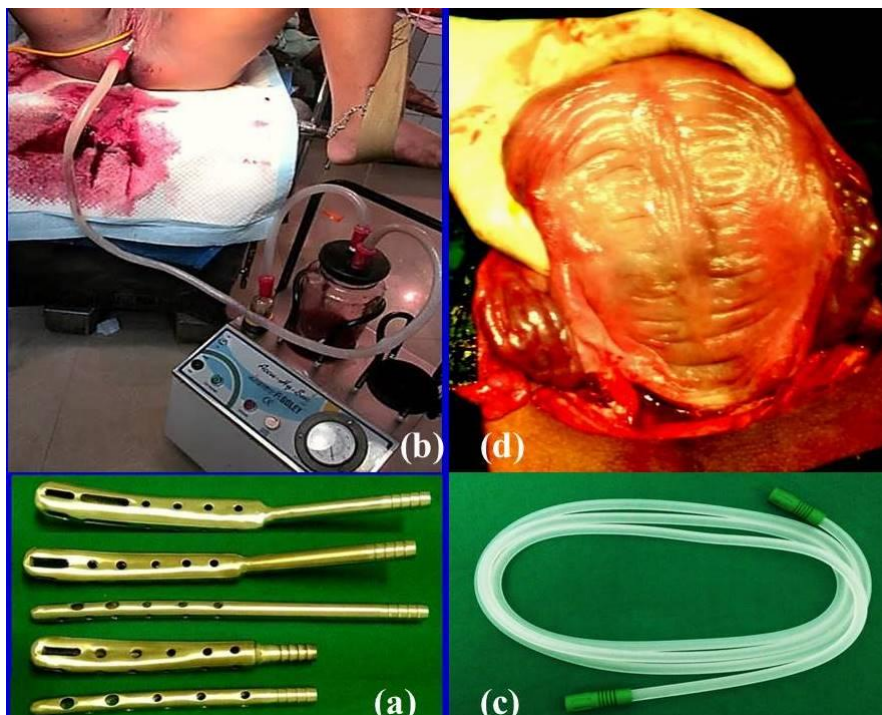


Fig 1: Different sizes of cannulas to match different cervical dilatations and for different application (a), Vacuum suction system (b), Thick walled (not easily collapsible) flexible plastic suction tube (c), Contracted and firmly retracted uterus during C.S (d).

Cannula removal: When negative pressure applied, the soft cervical tissues get sucked into the perforations of cervical portion of the cannula and become adherent. For the same reason the cannula cannot be removed easily after completion of the procedure. The cannula can be removed easily after gentle separation of these adhesions

with finger manipulation. Rough separation of adhesions results in cervical injury and bleeding. The cannula was removed one hour after last suction in all women. Cannula should not be removed immediately after stopping negative pressure.

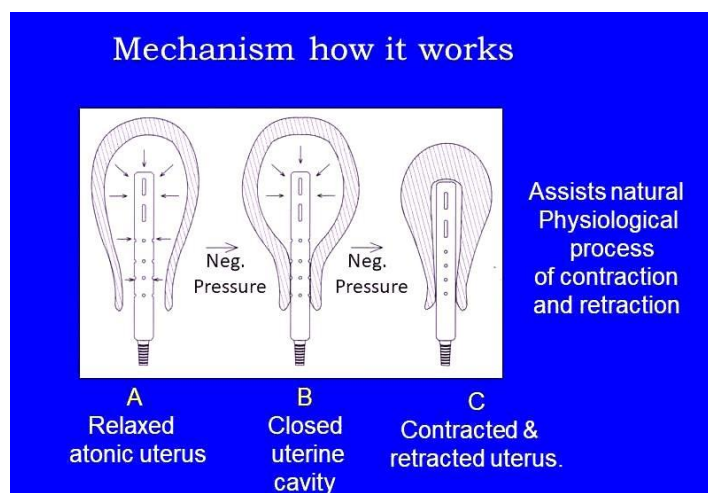


Fig 2: Mechanisms how negative pressure inside the uterine cavity stops atonic bleeding.

Prophylactic application of cannula during C-section: After the delivery of the baby and placenta, fingers were inserted into cervix to assess the cervical dilatation. The size of the cannula was selected based on cervical dilatation. One end of the suction tube was fixed to the nipple of the cannula. The other free end was inserted through the uterine wound, through cervix and then in to the vagina. The assistant inserts fingers in to vagina, catch hold of the suction tube, and pulls it out and then connects to the suction machine. By gentle manipulation, the cannula was put into proper (cervical portion of the cannula should be in the cervical region) position in uterus. The cut edges of the uterine wound were kept together and then the negative pressure was applied. The uterine wound was closed while the suction machine was working.

Informed and written consent was obtained from all the subjects who participated in this study. This study confined to the standards of declarations of Helsinki.

Table 1: Clinical details of high risk women for atonic PPH, who underwent prophylactic application of SR PPH suction cannula.

Case No.	Age	Gra vida	P a r a	Gestation Wks+day s	Duration Of labor (hrs)	Blood collected in bottle(ml)	Mode of Delivery	Risk factors	Times neg pressure applied
1	31	2	1	35+3	5	150	Vaginal	Severe PIH, Anemia	1
2	26	3	1	37+2	6	50	Vaginal	Mild PIH,	1
3	26	2	1	35+4	0	150	Elect. C.S	Severe PIH, Twins	1
4	29	3	2	32+1	3	200	Vaginal	Seve PIH, PL. Abrupt.	1
5	20	1	0	37+2	11	50	Vaginal	Hydramnios.	1
6	27	2	1	37+0	0	200	Elect. C.S	Placenta praevia.	2
7	30	4	2	39+0	5	100	Vaginal	Anemia	1
8	27	1	0	38+1	12	150	Vaginal	Obstructed. Pro. labo	1
9	28	2	1	39+2	7	100	Vaginal	PIH	1
10	26	2	1	38+2	0	100	Elect. C.S	Twins, PIH	1
11	33	3	2	39+3	5	50	Vaginal	Previ. H/O ato. PPH	1
12	22	1	0	38+0	12	150	Vaginal	Mild PIH, prolo. labor	2
13	29	2	1	36+0	0	100	C.S	Seve. PIH, eclampsia	2
14	24	2	1	36+1	0	150	C.S	Placental abruption	3
15	27	1	0	39+0	13	150	Vaginal	Prolonged labor	1
16	32	3	2	35+2	0	200	C.S	PIH, Eclampsia	2
17	27	2	1	36+3	0	100	Vaginal	Hydramnios	1
18	31	2	1	35+2	0	150	C.S	Severe PIH	2
19	28	3	2	36+0	0	200	C.S	Plac. abrupt, Anemia	2
20	22	1	0	38+0	12	150	C.S	Obst. Prolo. Labor	1
21	20	1	0	38+3	12	200	Vaginal	Prolonged labor	1
22	25	2	1	39+0	8	150	Vaginal	Mild PIH	1

III. Results

Complete cessation of bleeding which was associated with firm contraction and retraction of uterus was observed in all women within 2-3mins after initiation negative pressure in both C-sections and vaginal deliveries. In 15 women, negative pressure was applied only once, in 6 women twice and in one woman 3 times to stop bleeding. All women were clinically stable during the procedure. At C-section, we could observe firm contraction and retraction of uterus, and formation of prominent rugosities on the entire surface of uterus (Fig. 1d). The amount of blood collected in suction bottle ranged from 50-200ml (Table.1).

IV. Discussion

Atonic postpartum hemorrhage is the leading cause for maternal death all over the world, especially in low resource countries [1]. 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. Effective cessation of atonic bleeding, by creating negative pressure inside the uterine cavity, with a specially designed uterine cannula was reported by Samartha Ram et.al earlier [2]. The mechanisms involved in this technique include, when negative pressure applied, the soft cervical tissues get sucked into the perforations of the cervical portion of the cannula which results in formation of closed uterine cavity. Further application of negative pressure results in global constriction, contraction, and firm retraction of uterus on the surface of cannula (Fig. 2). This assists the natural physiological process of contraction and retraction, which results in cessation of both arterial bleeding and venous oozing [2].

In this study, with prophylactic application, the blood collected in the suction bottle ranged from 50 to 250ml (Table. 1). In 7 women, there was recurrence of bleeding after first application of negative pressure, which required repeated applications (Table. 1). None of the women had massive atonic PPH, and the blood loss was well within the physiological limits of third stage bleeding.

With modifications in the sizes and shapes of SR cannula (Fig.1), we could apply cannula in both cases of caesarean section and vaginal delivery.

Prophylactic application of suction cannula in women with gross anemia complicating pregnancy is lifesaving. As these women are already in a state of cardiovascular decompensation even minimal blood loss during third stage may prove fatal.

As this technique is very simple, takes very short time to organize, and even maternity nurses can be trained, the catastrophic atonic PPH can be prevented in peripheral centers even with inadequate facilities. As the costs involved are minimal, this technique can be used liberally in all settings.

V. 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. The long term effects of ischemia on cervix and uterus due to vacuum effect has to be further explored. Its utilization in cases of inherited coagulopathies of pregnancy and DIC has to be further explored. As this is a small study, these results have to be further evaluated by randomized controlled studies with larger sample size.

Compliance with Ethical Standards

Conflict of interest: I declare that we do not have any conflict of interest in this submission.

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