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Prophylactic SR suction cannula application for high-risk women for atonic PPH: An interventional study

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Abstract

Background: Post-partum hemorrhage is a serious obstetrical emergency and one of the significant but curable cause of maternal morbidity and mortality. It always occurs suddenly and frequently also unpredictable and catastrophic. In this study SR vacuum cannula will be applied to create negative pressure inside the uterine cavity with a specifically designed cannula which is a simple, safe and cost-effective technique.

Aim of the study: To know the efficacy of the SR suction cannula in the prevention of post-partum hemorrhage in high-risk pregnancy.

Materials and Methods: This interventional study was conducted in Department of Obstetrics and Gynecology, Shri B M Patil Medical College and Research Centre, Vijayapura, Karnataka. Patients admitted in labor ward with diagnosis of high-risk pregnancy prone for atonic PPH between November 2020 to April 2022.

Study Design: A prospective interventional study.

Results: In this study, A total of 128 patients who were fulfilling the inclusion criteria were considered as subjects and divided into 2 groups, Group A – Application of SR cannula with injection Oxytocin 10 units given within 1 minute of delivery of baby and in Group B- only injection Oxytocin 10 units given within 1 minute of delivery of baby. The observation noted were: the average age group of study included are 24.36 years. Out of 64 patients in the group A 40 cases had only 100-150ml of blood loss and 2 cases had 150-200ml of blood loss but in group B all patients had blood loss above 200ml in which 39 cases had 250-300ml of blood loss and 14 had 300-350 ml of blood loss. Time taken to stop bleeding in group A was 2 min for 38 patients, 3 min for 28 cases. Where as in group B time taken to stop bleeding was 2 min in 10 cases 3 min in 28 cases, and 4 min in 25 cases, one case reached up to 5 min.

Conclusion: Based on our study we conclude that Postpartum hemorrhage (PPH) is an obstetrical emergency which can happen following any delivery. It is a major cause of maternal morbidity, and one of the top three causes of maternal mortality. Hemorrhage is the leading cause of the admissions to the intensive care unit and the most preventable cause of the maternal mortality. Prophylactic application of SR suction cannula in high-risk woman for atonic PPH averts catastrophic bleeding. SR suction cannula 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 2-3 minutes in atonic PPH as shown in this study. But in some cases, like complete atonic PPH it is not useful and they need surgical interventions And It gives time to arrange blood and blood products, shifting patients to tertiary care center or operation theatre. This life saving 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.

Keywords: Atonic post-partum hemorrhage, SR suction cannula, prophylactic application, blood loss, bleeding

Introduction

Post-partum hemorrhage is a major obstetrical emergency and one of the important but preventable causes of maternal morbidity and mortality. It is always sudden and catastrophic. Unless timely action is initiated, maternal death could occur in a short period. It is the leading cause of maternal death in developing countries. Thus worldwide 1,27,000 died due to postpartum hemorrhage every year ^[1]. India current maternal mortality ratio (MMR) stands at 167 deaths per 1 lakh live birth ^[1]. Postpartum hemorrhage (PPH) is defined as blood loss exceeding 500ml following vaginal delivery and >1000ml accompanied by sign 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).

Clinical definition, which is more practical states, any amount of bleeding from or into the genital tract following birth of baby up to the end of the puerperium, which adversely affects the general condition of the patient evidenced by rise in pulse rate and falling blood pressure. Estimates of blood loss at delivery are notoriously inaccurate, with significant underreporting being the rule. Limited instruction on estimating blood loss has been shown to improve the accuracy of such estimates. Also, a decline in hematocrit levels of 10% has been used to define PPH, but determinations of hemoglobin or hematocrit concentrations may not reflect the current hematological status additional important secondary sequelae from hemorrhage exist and include adult respiratory distress syndrome, DIC, acute renal failure, loss of fertility and pituitary necrosis. PPH is often classified as primary and secondary PPH based on post-partum duration. Primary or early PPH occurring within 24 hours of birth. Secondary or late PPH occurring more than 24 hours post-birth to up to 12 weeks of post-partum. Common cause of PPH is four Ts- Tone (atonicity), Tissue (retained bits, blood clots), Trauma (genital tract injury) and Thrombin (coagulopathy). In addition, even though some risk factors like obstructed prolonged labor, accidental hemorrhage, PIH, polyhydramnios, and big babies are known to cause atonic PPH. Globally, as per the World Health Organization (WHO) estimate, the maternal mortality rate (MMR) fell nearly by 44% over the past 25 years. The MMR is not coming down in low resource countries. In India, PPH is the leading cause of death (28%). About 50% of these women died due to atonic PPH. The only management strategy even today is “watchful expectancy” and act immediately that the usually quoted first 1 or 2 hours as “Golden hours” when the problem develops. Immediate measures are “Call for extra help”. Simpler techniques like uterine massage, uterotonic drugs and uterine packing and balloon tamponade can be practiced in low resource settings. The rapidity with which some women slip into coagulation failure and multi organ dysfunction syndrome from hemorrhagic shock is alarming. Because of these complex reasons the maternal mortality is not coming down in low resource countries. Hence, we need for a simpler and easier technique which can stop bleeding, or at least stop bleeding temporarily to buy some time to tide over the crisis especially in low resources setting. In low resource settings unpredictable sudden massive bleeding makes it difficult to organize competent manpower, compatible blood, and transport to higher medical centers. Hence the present study brings into focus the invention of new technique SR suction cannula for atonic PPH management. One Indian study 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. Simpler technique of SR PPH suction cannula in these women can prevent catastrophic atonic PPH, Maternal death and bring down MMR in low resource settings.

In this study SR vacuum cannula were applied to create negative pressure inside the uterine cavity with a specially designed uterine cannula, which is a simple, safe and cost-effective technique.

Methods:

The study was carried from January 2021 to April 2022 at a tertiary care hospital. Women admitted in labor ward in Department of OBSTERTICS & GYNAECOLOGY in B.L.D.E. (DEEMED TO BE UNIVERSITY) Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura fulfilling the inclusion and exclusion criteria. The patients will be informed

about study in all respects and informed written consent was obtained. Before starting the study, clearance was obtained from institutional ethical committee. Women included in the trial were with the diagnosis of high-risk pregnancy prone for atonic PPH.

A total of 128 high risk pregnant women who were recruited onto the study were divided into 2 groups with each group containing 64 women. The Group A the prophylactic SR cannula were applied with 10 units of oxytocin IM injection and group B only 10 units oxytocin IM given.

The study was to measure the amount of blood loss and compare between group-A and group-B.

After the delivery of the baby and placenta, patient was kept in the lithotomy position, under a good source of light, a wide blade vaginal speculum was applied and 1 cm of anterior cervix is grasped with a sponge holder.

After the delivery of the baby and placenta, the assistant applies mid traction on the cervix with a sponge holder, and the obstetrician inserts left 2 fingers into the cervix. The right hand inserts the cannula into the uterus taking the guidance of the left hand fingers. Left palm supporting the fundus per abdomen, bimanually feels the cannula and its position. The size of the cannula was selected according to the fundal height. The precautions help to avoid perforation. After the application the negative pressure for 15 minutes, the suction machine was put off, but the cannula was held in the same position and negative pressure of 650mmHg were applied by putting on suction cannula system was kept undisturbed. The suction cannula was put on for 15 minutes every 15 minutes for 1 hour.

Methods of measurement of blood loss:

Group-A: The blood collected in the suction bottle were measured and recorded

Group-B: The blood collected in the conical calibrated Brass V Drape were measured and recorded.

Statistical Analysis

- The data obtained will be entered in a Microsoft Excel sheet, and statistical analysis were performed using statistical package for the social sciences (Version 20).
- Results will be presented as Mean±SD, counts and percentages and diagrams.
- For normally distributed continuous variables between two independent t-test. For not normally distributed variables, Mann Whitney U test was used.
- Categorical variables between two groups were compared using Chi square test.
- $P < 0.05$ will be considered statistically significant. All statistical tests will perform two tailed.

Results

In this study a total of 128 patients who met the inclusion criteria in women admitted in labor room with diagnosis of high-risk pregnancy in BLDE(DU), Shri B M Patil Medical College, Hospital & Research Institute, Vijayapura from November 2020 to April 2022 were included and divided into 2 groups i.e., group-A and group-B. In group-A of 64 patients applied with SR suction cannula for 15 minutes each time with 650 mmHg of pressure along with 10 Units of oxytocin I.M and in group-B 64 cases only 10 Units oxytocin I.M was given 1 minutes after delivery of the baby. The data was arranged in Microsoft excel sheet and analyzed statistically.

Table 1: Age distribution of study participants

Age	No. of patients with SR cannula	No. of patients without SR cannula
<20 years	11(17.18%)	7(10.93%)
21 to 30 years	49(76%)	54(84.37%)
>30 years	4(6.25%)	3(4.68%)
Total	64(100%)	64(100%)

It is observed that in our study the maximum no. of patients belonged to the age group of 21-30 years is in group -A 76%(N-

49) and in group-B 84.37% (N-54), followed by <20 years in group-A17.18%(N-11) and in others as shown in the table.

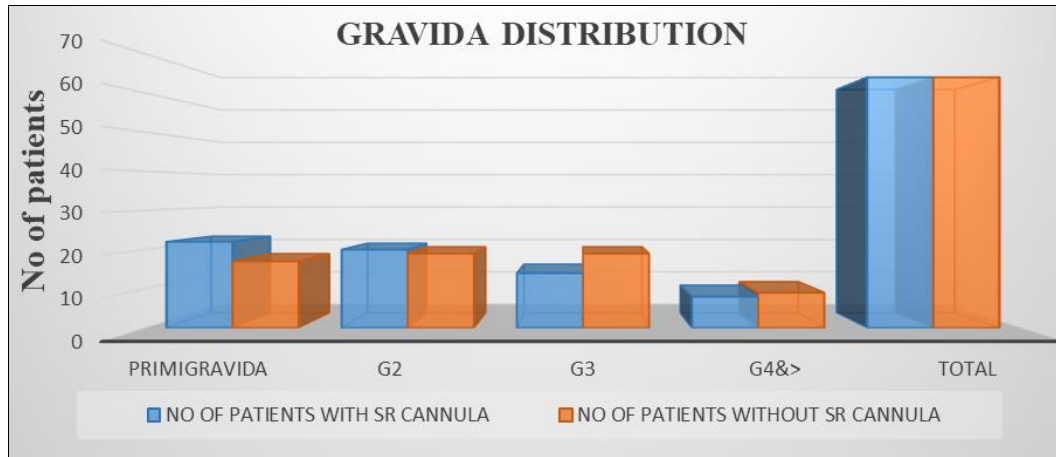


Fig 1: Gravida distribution of study participants

In this study 34.4% (N-22) cases were primigravida, 31.25%(N-20) were G2, 21.87%(N-14) were G3 and 12.50% (N-8) were G4 & above in group-A and in group-B, 26.6%(N-17) cases

were primigravida, 29.7%(N-19) were G2, 29.7%(N-19) were G3 and 14.1%(N-9) were G4 & above.

Table 2: Distribution of study according to time taken to stop bleeding

Time taken to stop bleeding (minutes)	No of patients with SR cannula	No of patients without SR cannula
2	38 (59.37%)	10 (15.62%)
3	26 (40.62%)	28 (43.75%)
4	0	25 (39.06%)
5	0	1 (1.56%)
Total	64 (100%)	64 (100%)

In this study in group-A 59.37% (N-38) patients took only 2 minutes to stop bleeding, and 40.62%(N-26) patients took 3 minutes to stop bleeding after the application of SR suction cannula in case of group-B majority of cases i.e. 39.06%(N-25) took 4 minutes to stop bleeding and 1.56%(N-1) took 5 minutes

to stop bleeding, 43.75%(N-28) cases took 3 minutes to stop the bleeding and 15.62%(N-10) cases took 2 minutes to stop bleeding. When compared to group-A with group-B all of the cases taken less than 3 minutes to stop bleeding. In case of group- B most of the cases took more than 4 minutes.

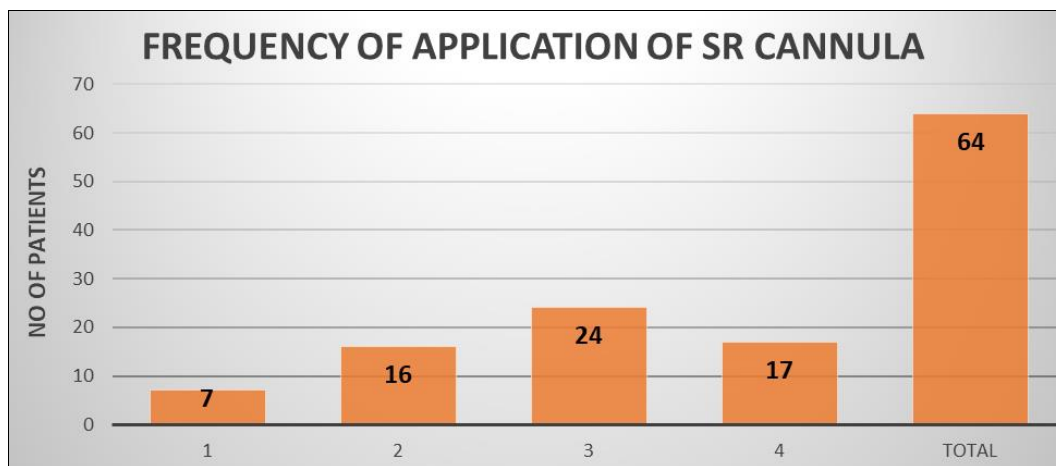


Fig 2: Distribution of study according to number of times negative pressure applied.

In the study 37.5%(N-24) cases were applied with SR cannula for 3 times, 26.6% (N-17) cases were applied for 4 times,

25%(16) cases were applied for 2 times and 10.95%(N-7) cases were applied for 1 time.

Table 3: Distribution of study according to amount of blood loss

Amount of blood loss	No of patients with SR cannula	No of patients without SR cannula
300-350	0	14 (17.18%)
250-300	0	39 (60.93%)
200-250	0	11 (21.8%)
150-200	2 (3.12%)	0
100-150	22 (34.37%)	0
50-100	40 (62.50%)	0
TOTAL	64 (100%)	64 (100%)

P value <0.001 statistically significant

In this study in group-A majority of the subjects i.e. 62.55%(N-40) had blood loss of 50-100ml, 34.37%(N-22) cases had blood loss of 100-150ml only 3.12%(N-2) had 150-200ml blood loss but in group-B majority of the cases 60.93%(N-39) cases had

blood loss and 17.18%(N-11) had 200-250ml of blood loss. When compared the blood loss in both the groups, group-A cases had the minimal blood loss with statistical p-value of <0.001 which is statistically significant.

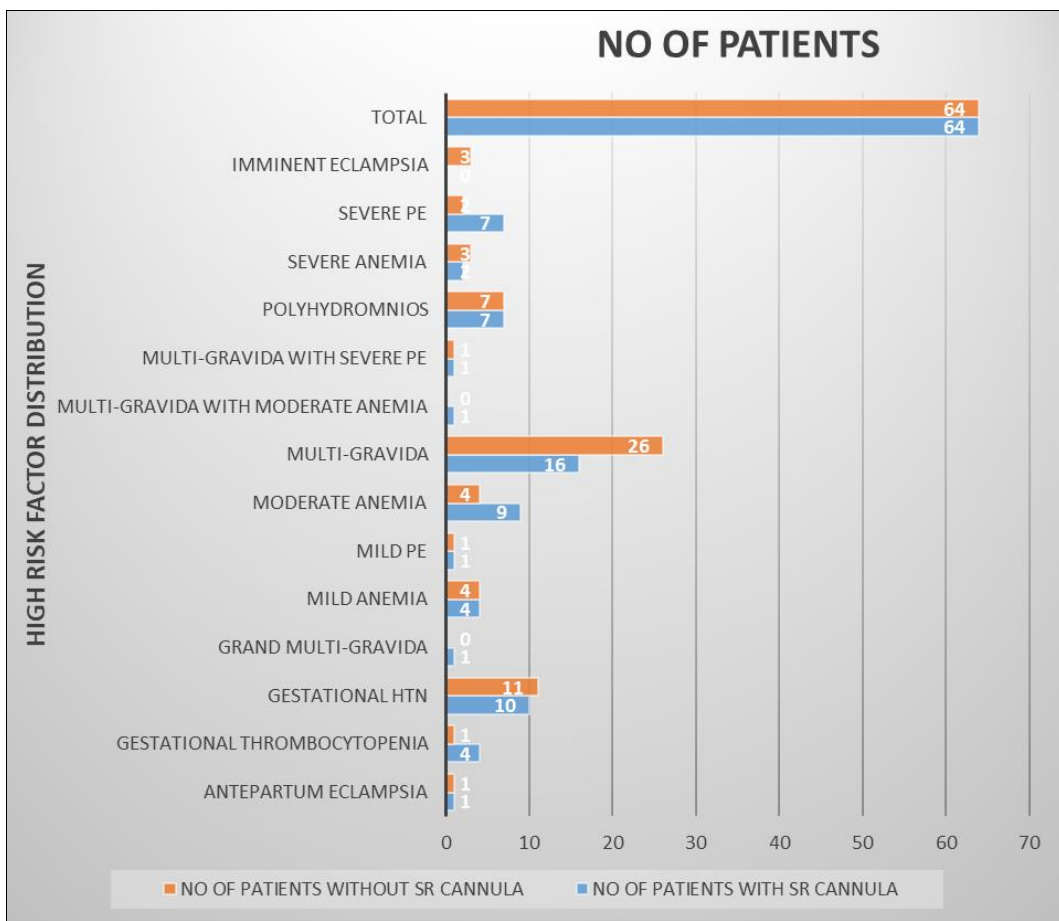


Fig 3: Distribution of study population according to risk factor

In this study most common associated risk factor was multigravida which was distributed 25%(N-16) cases in group-A and 40.62%(N-26) cases in group-B. And next common associated risk factor was gestational hypertension and was distributed 15.62%(N-10) cases in group-A and 17.12%(N-11) cases in group-B, 3rd most common associated risk factor was polyhydramnios and was equally distributed 10.93%(N-7) cases in both the groups and other associated risk factors were distributed as shown in the figure No-3.

Discussion

This study was undertaken to assess the efficacy of prophylactic SR suction retraction cannula a novel, effective, simple and

minimally invasive technique for avoiding excess blood loss in high-risk. Women for atonic postpartum hemorrhage. The procedure reduces blood loss and the need for peripartum hysterectomy and other invasive procedures. A total of 128 patients who were fulfilling the inclusion criteria were considered as subjects and divided into 2 groups group-A application of SR cannula with injection oxytocin 10 units given within one minute after delivery of the baby and in group-B only injection oxytocin 10 units given within 1 minutes after delivery of baby. The observations noted were the average age group of the study included are 24.36 years. Out of 64 patients in group A 40 cases had only 50-100ml of blood loss, 22 cases had 100-150ml of blood loss and 2 cases had 150-200ml of blood loss but

in group B all patients had blood loss above 200ml in which 39 cases had 250-300ml of blood loss and 14 had 300-350ml of blood loss. Time taken to stop bleeding in group A is 2mins for 38 patients, 3mins for 28 cases. where as in group B, time taken to stop bleeding was 2mins in 10 cases 3mins in 28 cases, and 4mins in 25 cases, one case reached up to 5mins. Hence according to the results found in our study explains the effectiveness of the SR cannula in the management of atonic PPH in high-risk pregnancy prone for atonic PPH.

Conclusion

Based on our study we conclude that Postpartum hemorrhage (PPH) is an obstetrical emergency which can happen following any delivery. It is a major cause of maternal morbidity, and one of the top three causes of maternal mortality. Hemorrhage is the leading cause of the admissions to the intensive care unit and the most preventable cause of the maternal mortality. Prophylactic application of SR suction cannula in high-risk woman for atonic PPH averts catastrophic bleeding. SR suction cannula 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 2-3 minutes in atonic PPH as shown in this study. But in some cases, like complete atonic PPH it is not useful and they need surgical interventions and it gives time to arrange blood and blood products, shifting patients to tertiary care center or operation theatre. This life saving 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 effect has to be further explored.

Conflict of Interest

Not available

Financial Support

Not available

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