



Purse-String Compression Sutures at Cesarean Section: its Role in Prevention of Primary Post-Partum Hemorrhage (PPH) in Port Harcourt.

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ABSTRACT

Background: Obstetric hemorrhage is one of the four leading causes of maternal death in women during delivery. Thromboembolism, hypertensive disorders, and infection being the other three.

Objective: To highlight the efficacy of a simple surgical procedure, during cesarean section in preventing primary postpartum hemorrhage in women who are predisposed to having it.

Methods: After closure of the transverse lower segment incision on the uterus, the operator moves laterally to the left round ligament. An absorbable vicryl-2 suture on a round bodied needle is passed through the ligament, about 2 cm below the level of the uterine incision. The suture is knotted and passed through an avascular space in the adjacent broad ligament. The suture is then passed through the uterine wall at the level of the utero-cervical junction in a purse-string fashion posteriorly and continuing anteriorly under tension until it gets to the left round ligament (the starting point). The two edges of the suture are knotted together and cut about 1 cm from the knot.

Result: One thousand and five (1005) patients had this procedure done between 2014-2020. Their mode of delivery was cesarean section, and all of them had predisposing factors to primary postpartum hemorrhage. 997 (99.2%) had blood loss of <1000 ml. Only 8 (0.79%) had intraoperative and post-operative blood loss >1000 ml. These were due to extensive cervical lacerations and co-agulation disorders.

Conclusion: It is suggested that the reduced blood loss in these women who were predisposed, was as a result of the purse-string suture during cesarean section. Reduced incidence of primary postpartum hemorrhage results in reduced incidence of maternal death due to this cause.

INTRODUCTION

Obstetric hemorrhage is one of the major causes of maternal mortality and morbidity all over the world, especially in sub-Saharan Africa.^[1,2] More than 50% of the population of childbearing women in developing countries like Nigeria live in rural areas where standard obstetric care and skilled (specialized) personnel may not be available, as in the cities.^[1,2,4]

Knowledge of a simple surgical technique during cesarean section (CS) to prevent primary postpartum hemorrhage in women with risk factors will go a long way to reduce the incidence of maternal mortality and morbidity from primary postpartum hemorrhage.^[2,3,10]

Purse-string compression suture (PSCS) is a surgical method of preventing primary postpartum hemorrhage (PPH) in women who are predisposed (having risk factors) to PPH and are being delivered by cesarean section.

Primary postpartum hemorrhage is bleeding from the genital tract within 24 hours of delivery in excess of 500ml in vaginal delivery, and 1000ml during cesarean section, or any amount of blood loss that compromises the hemodynamic stability of the woman.^[2,4] It is a major component of obstetric hemorrhage.

There are risk factors that predispose a woman to having PPH. These risk factors include:

- Antepartum hemorrhage secondary to Abruptio Placentae and placenta previa
- Previous history of postpartum hemorrhage
- Over-distention of the uterus secondary to fetal macrosomia, multifetal gestation, polyhydramnios grand multiparty, protracted labor, precipitous labor and delivery
- Intra-amniotic infection
- Prolonged induction of labor.
- Use of halogenated anesthetic agent.^[2, 4, 6]

When a decision is taken to deliver these women by cesarean section, adequate precautions are taken pre-operatively and intra-operatively to prevent obstetric hemorrhage.

These measures could be conservative or surgical. They include availability of blood or blood products, oxytocics, Ergometrine, Carboprost tromethamine (Hemabate), Prostaglandine E₂, Prostaglandine E₁ analog-misoprostol recombinant factor VIIa.

Intra-operative surgical measures like uterine compression sutures (e.g. B-Lynch compression sutures, Hayman uterine sutures, Gilstrap multiple transverse compression sutures) are successful in avoiding hysterectomy in approximately 50% of women with severe postpartum hemorrhage secondary to uterine atony or placenta accrete.^[2,3,8,9]

Most of these surgical methods are used for treatment of primary postpartum hemorrhage. Purse-string compression suture is a preventive measure taken

during cesarean section, so that primary postpartum hemorrhage will not occur, thus more complex procedures will not be necessary. It is not curative. As the famous saying goes, "prevention is better than cure."

METHODOLOGY

This was a retrospective descriptive cross-sectional study conducted at the Rivers State University Teaching Hospital (RSUTH), Port Harcourt. The intraoperative and postoperative blood loss in women who had cesarean section with predisposing factors for primary post-partum hemorrhage (PPH).

Intraoperative blood loss was assessed by the number of abdominal packs that were fully soaked. 120ml per fully-soaked abdominal pack, and 100ml for a partially blood-soaked abdominal pack.

Post-operative blood loss was assessed by total number of sanitary pads used by the woman in the first 24 hours. Each fully-soaked sanitary pad is approximately 20ml.

All the folders of women who had cesarean section between January 1st 2014 to December 31st, 2020 were reviewed. Those that had purse-string compression sutures were separated and coded. Those that had predisposing factors for PPH, but did not have purse-string sutures applied were also collected and coded. The blood loss during cesarean section and immediate postoperative period were noted for each of these patients. Inclusion criteria was all women who had cesarean section between January 2014 to December 2020, and had purse-string suture inserted during cesarean section. The data was sorted, coded and analyzed using Statistical Package for Social Sciences (SPSS) IBM version 25.0.

Study Population

This study was conducted in the Rivers State University Teaching Hospital. It is a 370 bed hospital located at Harley Street Port Harcourt Local Government Area of Rivers State, South-South Nigeria. It is a tertiary health institution that provides all levels of health care services to Rivers, Bayelsa, Delta, Imo, Abia and Akwa-Ibom States. The Obstetrics/Gynaecology is one of the clinical departments of the hospital with twelve (12) Consultant Staff respectively.

Description of Procedure

After the closure of the transverse lower segment incision on the uterus, the operator moves laterally to the left round ligament. An absorbable vicryl-2 suture on a round-bodied needle is passed through the round ligament about 2cm below the level of the transverse incision. A knot is tied at the level of the round ligament, and the needle is passed through an avascular space in the left broad ligament, posteriorly to the uterus. At the

utero cervical junction level, the needle is passed through the uterine wall in a purse-string fashion on the posterior uterine wall until it gets to the right broad ligament. The needle is then passed to the anterior uterine wall through an avascular space in the right broad ligament. The needle continues in the uterine wall in a purse-string fashion just below the transverse incision on the anterior uterine wall until it gets to the left round ligament.

On reaching the left round ligament, the needle is passed through the round ligament about 1cm above the starting point. The two edges of the suture are then tied together under tension and knotted. The sutures are cut, and the uterus examined to ensure hemostasis. The uterus is returned into the peritoneal cavity, and the anterior abdominal wall is closed in layers, as is usual during cesarean section.

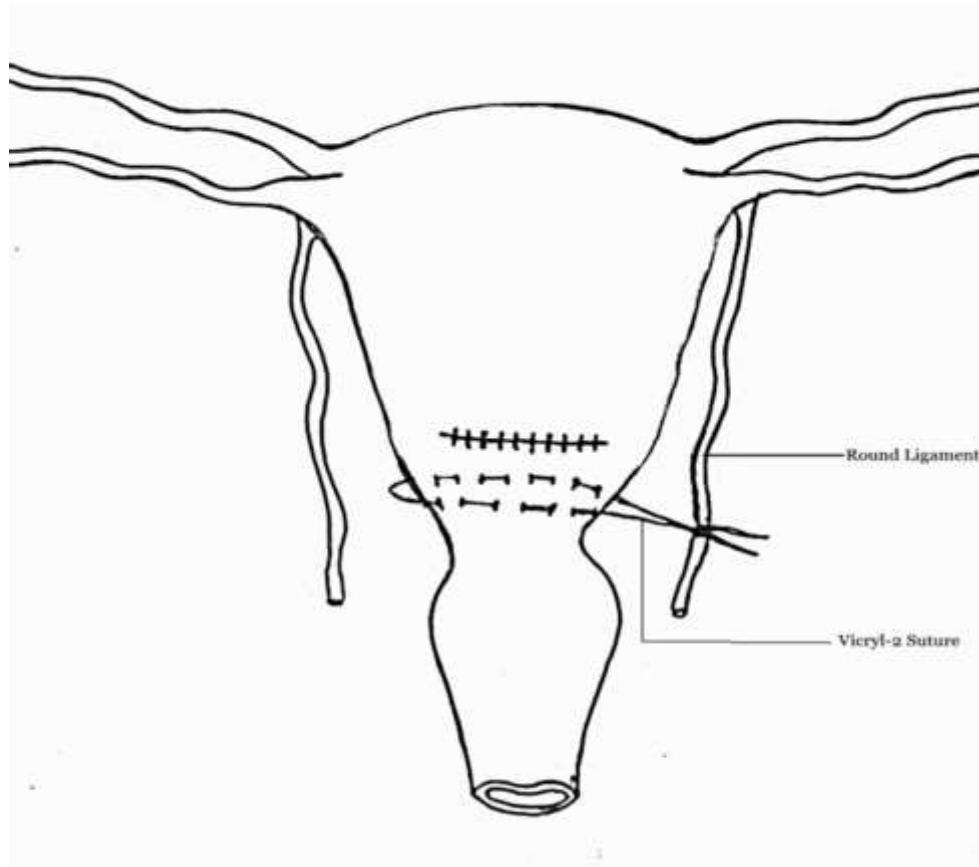


Figure 1: Illustration of purse-string suture

RESULTS

Table 1: The total number of patients that had purse-string sutures applied by the investigators of this study (1005).

Year	Total No. of Cesarean Section	Emergency CS	Elective CS
2014	1,130	754	376
2015	1059	706	353
2016	1140	760	380
2017	1095	750	345
2018	1266	844	422
2019	959	639	320
2020	795	530	265

Total number of cesarean sections within this period was 7444.

A total of 7444 cesarean sections were done between 2014-2020. Two thousand and forty-five (2045) of them had predisposing factors for primary postpartum hemorrhage.

Table 2: Predisposing/Risk Factors to Primary Postpartum Hemorrhage (Uterine Atony) in the 2045 patients.

Predisposing/Risk Factors before Cesarean Section	Number of Patients Affected
Fetal Macrosomia	322
Multifetal Gestation (Twins, Triplets, etc.)	254
Polyhydramnios	189
Placenta Previa	240
Abruptio Placentae	178
Previous History of PPH	150
Protracted Labor	182
Prolonged Induction of Labor	166
Grand Multiparity	125
Intraamniotic Infection	99
Multiple Uterine Fibroids Coexisting with Pregnancy	140

Some patients had more than one risk factor, but their major risk factor was singled out and selected for this study.

Table 3: Findings/Complications amongst 2045 patients who had CS with presence of risk factors for PPH.

Findings/Complications	Cesarean Sections with Purse String Sutures	Cesarean Sections without Purse String Sutures
No:	1005	1040
Average Intra-Operative Blood Loss	600-800ml	600-900ml
Average Post-Operative Blood Loss	300-350ml	800-2000ml
Absence of PPH Blood Loss < 1000ml	997 (99.2%)	832 (80%)
Presence of PPH Blood Loss > 1000ml	8 (0.8%)	208 (20%)
Success of Medical Intervention to prevent PPH	99.5%	80%
Number of Patients returned back to theater (2 nd look)	5	68
Hysterectomy	-	17
Deaths from PPH	-	5

One thousand and five (1005) of these women had purse-string sutures applied during the cesarean section procedure. 997 (99%) had post-operative blood loss of less than 1000ml. Only 8 (<1%) had post-operative blood loss of >1000ml. One thousand and forty (1040) women who had predisposing factors for primary postpartum hemorrhage did not have this procedure done during their cesarean section.

Blood loss in this group showed 832 (80%) Intraoperative and postoperative blood loss of <1000ml. 20% of these women had blood loss greater than 1000ml (208 women).

It was obvious that the purse-string suture during cesarean section had prevented primary postpartum hemorrhage in the women that had this procedure.

Intraoperative Blood Loss – Not Significant.

Port-Operative Blood Loss – Significant Difference

All the surgeries were done by experienced obstetricians (Senior Registrar and above). This was done to reduce time of surgery; thus, reducing intra-operative blood loss.

The eight patients that had PPH in the group with purse string sutures were found to have laceration of the cervix that was not detected at CS (5). Three (3) had clotting disorders that were treated with fresh whole blood and plasma concentrates.

208 (20%) of those without purse string sutures had blood loss greater than 1000ml. More than 50% of these (150) were due to uterine atony despite the short operating time and experience of the obstetrician.

Medical and surgical interventions were done. Seventeen (17) had hysterectomy for intractable hemorrhage. All patients with PPH had blood transfusion. Five (5) maternal deaths were recorded during this period of study due to PPH.

DISCUSSION

The causes of primary postpartum hemorrhage are majorly uterine atony, lacerations anywhere on the uterus, cervix or broad ligaments, retained products of conception and blood clotting effects.^[1,2,10,11]

Preoperative assessment for risk factors of PPH are usually risk factors or predisposing factors for uterine atony. These include antepartum and hemorrhage due to placenta previa or abruptio placentae, over distention of the uterus due to multifetal gestation, polyhydramnios, protracted labor or prolonged induction of labor and multiple uterine fibroids. Others are grand multiparity, intra-amniotic infection, previous history of PPH.^[1]

These were the inclusion criteria for the 2045 patients selected for this study. Blood clotting disorders were not assessed in all the above patients, especially in Category 1 emergency cesarean section cases where decision-to-delivery time was within 30 minutes.

Further work needs to be done to evaluate clotting disorders in patients with PPH. Cervical laceration cannot be assessed by a risk factor pre-operatively, except there was frank bleeding per vaginam before CS.

Other factors that can affect blood loss include the skill of the surgeon, duration of surgery, pre-operative blood volume and standardized protocol for blood loss assessment by theater staff.

Purse-string compression suture (PSCS) during cesarean section is a form of prevention of primary postpartum hemorrhage in women that are predisposed. Other surgical methods for management of obstetric hemorrhage are mainly used as treatment, not prevention. These procedures are carried out when the problem is already established.^[3,8]

The procedure is relatively simple and does not require an experienced surgeon or a specialist to carry it out. It can be used in developed and developing countries all over the world. In poor resource settings, or countries where, due to financial constraints, most women cannot afford medications like Carbetocin (an Oxytocin derivative), Recombinant Factor VIIa, Carboprost (Hemabate), a simple preventive procedure like this will be lifesaving for these women and very cost-effective.^[2,6,7]

Application of purse-string compression sutures during cesarean section causes compression of the uterus at the utero-cervical junction as well as vasoconstriction of the major uterine vessels as they ascend the lateral walls of the uterus.

This reduces blood flow to the uterus, and thus prevents excessive blood loss after surgery. The collateral circulation around the uterus prevents ischemia to the uterus. The suture used is Vicryl-2 suture, which is absorbable, thus constriction of the vessels and compression of uterus is temporary.

The compression suture is an effective alternative to more complex procedures like hysterectomy and

hypogastric artery ligation.^[2,4,7,10] There are several surgical techniques already in use for the treatment of PPH. These include uterine compression sutures, uterine artery ligation, internal iliac (hypogastric) artery ligation, hysterectomy.

The B-Lynch technique has been in use since 1997. Others like two vertical compression sutures and horizontal compression sutures are modifications of the B-Lynch technique. These compression sutures are said to have prevented hysterectomy in 50% of cases. In addition, future fertility may be preserved by the use of compression sutures.^[4, 9, 10, 11]

From our work in the Rivers State University Teaching Hospital, application of the sutures led to the remarkable reduction in the incidence of primary postpartum hemorrhage in our cesarean section cases. Thus, there was a reduction in the incidence of maternal death due to primary postpartum hemorrhage.

Simple transverse purse-string compression suture is limited to only patients that undergo cesarean section, because that is when the utero-cervical junction will be accessible to apply the sutures. Patients who have high risk for primary postpartum hemorrhage, but had vaginal delivery cannot benefit from this procedure.

CONCLUSION

Purse-string compression suture (PSCS) is recommended for use in cases where cesarean section is the mode of delivery in a woman that has predisposing factors to primary postpartum hemorrhage. This preventive measure will help to reduce the incidence of maternal deaths from this cause.

There is need for simpler and more accessible methods of preventing or controlling post-partum hemorrhage, be it medical, surgical or radiological. The goal is to reduce incidences of maternal mortality in Nigeria.

Conflict of Interest

There was no conflict of interest

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