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Original Research Article

Cervico-isthmic compression suture: an effective method to manage PPH during caesarean-section for placenta previa

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ABSTRACT

Background: Obstetric hemorrhage is the leading cause of maternal mortality, placenta previa and placenta accreta spectrum (PAS) are major causes of it. Most of time these bleeding don't respond to uterotonics drugs in placenta previa. In failed first-line management of PPH, cervico-isthmic compression sutures are effective to control PPH from lower uterine segment in placenta previa. The objectives of this study were to determine effectiveness of Cervico-isthmic compression suture in management of PPH during caesarean section for placenta previa the primary outcome was assessed by the need of blood transfusion, caesarean hysterectomy, ICU care, total hospital stay and incidence of maternal mortality and the secondary outcome was to describe the complications of the procedure in peri-operative periods.
Methods: This retrospective study was carried out in the department of obstetrics and gynecology, ANMMCH, Gayajee, from April 2025 to March 2023. It included 36 patients of placenta previa in which cervico- isthmic compression suture was applied.
Results: In the study group the mean age was 27±4.18 years. The gestational age at the time of delivery ranges from 32.3 to 37.4 weeks. Postpartum hemorrhage was adeptly managed with the compression sutures in 34 patients (94.45%), while in 2 patients (5.5%), caesarean hysterectomy was needed. Notably, 66.66% of patients (n=24/36) necessitated blood transfusions during peri-operative periods. There was no any recorded maternal mortality.
Conclusions: Cervico-isthmic compression suture is a simple, quick and effective measure for intractable bleeding from placental bed or atonic lower uterine segment in cases of placenta previa.

Keywords: Caesarean section, Cervico-isthmic compression suture, Caesarean hysterectomy, PPH, Placenta previa

INTRODUCTION

Obstetric haemorrhage is the leading cause of maternal mortality, accounting for 27% of all maternal deaths occurring worldwide each year. 94% of all maternal deaths occur in low and lower middle-income countries.[1]

One of the major causes of obstetric haemorrhage is placenta previa and placenta accreta spectrum (PAS). The rate of placenta previa and PAS is on increasing trend as a result of rising rate of Caesarean deliveries and other uterine surgeries, maternal age and use of assisted reproductive technology (ART) placing greater demands on maternity related resources.[2] Postpartum haemorrhage due to placenta previa being one of the most challenging conditions for the obstetricians to tackle intraoperatively.

In placenta previa, opened large sinuses at placental bed and inadequate muscle surrounding it leads to poor lower uterine segment contraction and retraction, results in torrential bleeding and its consequences. Most of time these bleeding don't respond to uterotonics drugs. In failed first-line management of PPH, compression by balloon tamponade, compression sutures of the uterus, sequential devascularization of the uterus including anterior division of internal iliac artery ligation and selective radiological

arterial embolization are different surgical options for management of PPH. Hysterectomy is the last resort. Internal iliac artery ligation (anterior division) needs expertization in an emergency condition. Selective radiological arterial embolization is available only at few centers. So easier and safe surgical steps with high efficacy should be available that can be done by on floor working obstetricians with fair experience. Compression sutures have important role in the conservative management of PPH. These sutures are now also recommended by WHO as the second line to medical management.[3-5]

Various compression sutures are described, specially designed to stop the bleeding by localized compression of the lower uterine segment like transverse annular compression suture, transverse B-lynch uterine ccompression sutures.[6,7] These sutures are effective in dealing the PPH from lower uterine segment in placenta previa but sequences of suturing are quite difficult to remember in an emergency situation. Hayman et al described a simplified approach to uterine compression sutures (simplified modification of B-lynch technique).[8] They also advocated for isthmic cervical apposition suture in cases of bleeding from the lower uterine segment during caesarean section due to placenta previa.[9] There are few studies or case reports done on this suture. The aim of the study was to find out its effectiveness so that we can make a protocol regarding the PPH management (surgical) during caesarean delivery for placenta previa at our center.

Objectives

The objectives of these studies were to determine effectiveness of cervico-isthmic compression suture in management of PPH during cesarean section for placenta previa the primary outcome was assessed by the need of blood transfusion, caesarean hysterectomy, ICU care, total hospital stay and incidence of maternal mortality and the secondary outcome was to describe the complications of the procedure in peri-operative periods.

METHODS

This retrospective observational study was carried out in the department of obstetric and gynaecology, ANMMCH, a tertiary care center, Gayajee, after permission from institute ethical committee from April 2025 to March 2023. It included 36 patients of placenta previa in which cervico-isthmic compression suture were applied during Caesarean section.

Inclusion criteria

It included patients of placenta previa who underwent caesarean section and had cervico- isthmic compression suture application in those patients who had PPH from placental bed and failed 1st line treatment and other conservative measures (B/L uterine artery ligation, placental bed hemostatic sutures).

Exclusion criteria

Patients with placenta accreta spectrum, PPH due to generalized atonic uterus, and PPH from lower uterine segment responded to uterotonics and conservative methods (bilateral Uterine artery ligation, placental bed hemostatic sutures). We collected all necessary information of the cases of caesarean section (performed for placenta previa) throughout the study period from hospital's case records. Total 132 women had caesarean section for placenta previa and cervico- isthmic compression suture was applied in 36 patients (27.27%) who had PPH from placental bed and failed 1st line treatment and other conservative measures (B/L Uterine artery ligation, placental bed hemostatic sutures). Patient's demographic data, clinical presentation and finding, laboratory and ultrasonographic findings were collected. Consent for the application of compression sutures and the necessity for a caesarean hysterectomy was duly noted. Different methods that were used to control PPH during the procedure were noted. Peri-operative complications data were collected. For blood loss estimation during the procedure, we noted pre-operative and post-operative haemoglobin value for estimation of blood loss.

Surgical technique

During caesarean section after delivery of baby and placenta, when torrential bleeding (PPH) from placental bed will not respond to 1st line treatment (oxytocin, methergin, carboprost, misoprostol, tranexamic acid, uterine massage) along with B/L uterine artery ligation and placental bed hemostatic sutures, then cervico- isthmic compression suture is applied. Lower uterine segment of the exteriorized uterus is compressed first, if bleeding stop then a no. 1 vicyl with straight needle is passed through the uterus above the bladder reflection (to prevent damage to bladder and ureter) 2 fingers width below the lower edge of uterine incision and 1 finger width medial to the lateral edge of lower segment from anterior to posterior and bring back from posterior to anterior at about 2-3 cm medial to the entry point of the suture and tied anteriorly. Similar suture is applied to other side. To prevent accidental closure of cervical canal a closed artery forceps will be kept (Figure 1 and 2). Then cervico- isthmic compression suture's effect is assessed by visual control of bleeding in the lower segment of the uterus as well as in the vagina. If the PPH is under control, uterus and abdomen are closed in layers.

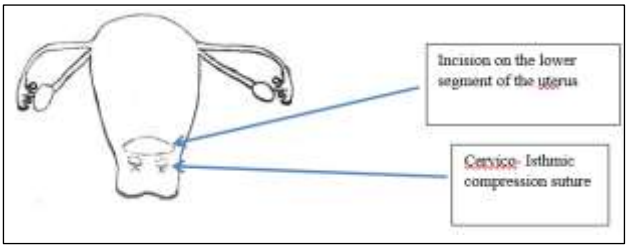

Figure 1: Showing diagrammatic presentation of cervico-isthmic compression suture.

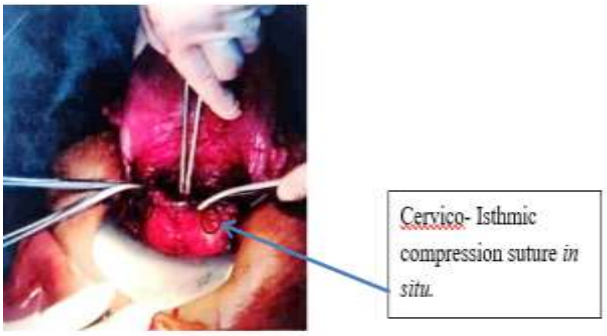

Figure 2: Intra-operative application of cervico-isthmic compression suture during caesarean section.

RESULTS

All data collected and analyzed by using statistical tools-MS office Excel and Graphpad prism 8.

Total 132 women had lower segment caesarean section for placenta previa and cervico-isthmic compression suture were applied in 36 patient (27.27%). All cases were unbooked (Figure 1). In the study group (n=36), the mean age was 27±4.18 years and mean gravidity was 3.5±2.9, the gestational age at the time of delivery ranges from 32.3-37.4 weeks (Table 1).

In past obstetrical history, 8 patients had normal vaginal delivery, 12 patients had normal vaginal delivery and history of dilation and evacuation, 12 patients had previous caesarean delivery and in 4 primigravida patients placenta previa was present. In study group most of the patients had placenta previa (n=22, 61.11%) whereas low lying placenta was present in 14 patients (38.89%).

PPH was controlled with this compression sutures in 34 patients (94.45%). In 2 patients (5.5%), caesarean hysterectomy was required due to uncontrolled bleeding and deteriorating haemodynamic condition of the patients (Figure 3).

There was no bladder or gut injuries, 2 patients (5.5%) were shifted to intensive care unit, in post-operative period no PPH was noted, 3 patients (8.34%) had wound dehiscence which was managed by secondary re-suturing and appropriate antibiotics.

Most of the patients (n=24/36) required blood transfusion (66.66%) in intra-operative and post-operative periods because of pre-operative anaemia of variable degree due to acute blood-loss. Total duration of stay in the hospital (post-procedure) was 8-10 days in 33 patients (91.67%), only 3 patients had to stay longer (15-21 days) due to wound dehiscence (Table 2). After discharge from the hospital, follow up information of the study group patients was not available. There was no maternal mortality recorded.

Table 1: Maternal characteristics of the study group (n=36).

Maternal characteristics	Mean	Median	Range
Age (years)	27±4.18	28	20-34
Gravidity	3.5±2.9	2	(1-6)
Gestational age at delivery (weeks)	35.6±1.49	36	32.3-37.4
Pre-operative Hb (g/dl)	9.64±2.3	9.2	(6.6-13.8)
Post-operative Hb (g/dl)	9.86±1	9.9	(7.6-11.6)
Time taken to apply compression suture (sec)	186.66±36.81	180	(120-270)

Table 2: Outcomes of the procedure (n=36).

Outcomes	N (%)
Bladder, ureter injury	0
Gut injury	0
ICU care	2 (5.5)
Secondary PPH	0
Need of hysterectomy	2 (5.5)
Wound gap	3 (8.6)
Prolonged hospital stay (>10 days)	3 (8.6)
Maternal mortality	0
Need of blood transfusion	24 (66)

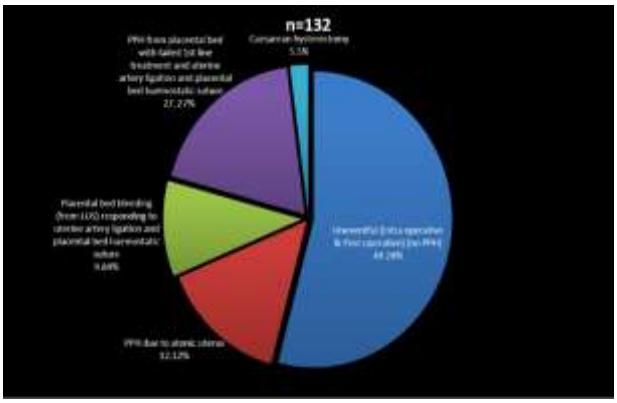

Figure 3: Outcomes of placenta previa (n=132).

DISCUSSION

There are various uterine compression sutures for atonic PPH. The care bundle for first-line treatment of PPH should include rapid institution of uterine massage, administration of an oxytocic agent and tranexamic acid, intravenous fluids, examination of genital tract and escalation of care.[1] If first-line treatment of PPH with uterotonics (oxytocin, methergin, misoprostol or carboprost tromethamin), fundal massage or manual uterine compression does not adequately work, placement

of compression suture can be done to stop bleeding and stabilize the patients, avoid hysterectomy and ultimately reduce maternal morbidity and mortality. The three most used compression sutures technique for PPH are B-lynch, Hayman and Pereira.[10-12] Hayman et al described a simplified approach to uterine compression sutures (modification of B-lynch technique), a transverse cervico-isthmic compression suture, traversing the anterior and posterior walls of the uterus, can be placed to address bleeding from lower uterine segment.

Based on available literature, the success rate of compression sutures is 76-100%.[13] In the present study the success rate was 94.45% (n=34), only in 2 cases (5.5%) where cervico-isthmic compression suture was unable to control PPH, Caesarean hysterectomy was done. Similar success rate was found by Suravi Sarkar et al, where success rate was 88.9%.[14] Only 4.4% cases required hysterectomy. Penotti et al in their study, found effective and complete control of bleeding that was immediately achieved in all cases at the end of the procedure.[15] Li et al found success rate 86.7% (13/15) for stopping haemorrhage and only 2 cases required gauze packing to stop bleeding but hysterectomy was not needed.[16]

In our study we found that when placental bed hemostatic suture and bilateral uterine artery ligation were failed (Figure 1) only then cervico-isthmic compression suture was applied, however WHO advocates bilateral uterine artery ligation should try after compression suture.[17] Bilateral uterine artery ligation is easier step and it does not disturb uterine cavity and also, we have open area to assess the effect of the artery ligation. So, it depends upon surgeon's experience and preference. Sentilhes et al also supports uterine artery ligation to be done prior to applying compression suture in lower uterine segment.[18]

Assessment of postpartum blood loss by visual estimation is frequently inaccurate, meaning that PPH often goes unrecognized or is identified when it is too late to provide a life-saving intervention. Objective methods of quantifying blood loss, which are superior to visual estimation, are more likely to detect PPH.

WHO recommends use of calibrated drape to measure postpartum blood loos in cases of vaginal birth, however the blood loss estimation during caesarean section needs additional research for more accurate methods.[1] In our study we noted pre-operative and post-operative day-3 haemoglobin for assessment of postpartum blood loss. Most of patients had already been received blood transfusion in intraoperative and immediate post-operative periods due to low haemoglobin and deteriorating condition of the patients (pre-operative Hb range 6.6 to 13.8 g/dl)

In the present study, after discharge from the hospital, all patients were followed in outdoor patient department, so regarding post-operative complications like pyometra, pelvic adhesion, synechiea, serosal and myometrial erosion and necrosis information couldn't get from patient's medical records.[19] So, this study recommends prospective study regarding Cervico-isthmic compression suture's long-term outcomes (post-operative complications, menstrual abnormalities, fertility issues due to uterine factor). However, the purpose for which this suture was applied immediate control of bleeding and to preserve the uterus was markable (success rate=94.45%). So, it is highly efficient and easier surgical step that can be done before doing major surgical steps or hysterectomy to save life of the patients due to PPH.

CONCLUSION

Cervico- isthmic compression suture is an easy surgical step and highly effective in dealing PPH during caesarean section for placenta previa. So strongly recommend that it should be tried before doing any other complicated surgical procedure (like ligation of anterior division of internal iliac artery) and caesarean hysterectomy. This retrospective study is lacking in post-operative follow up information to find out long term outcome of this suture. So, need prospective study with large sample size to support and validate the findings.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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