



Original Article

Outcome of Lower Uterine Compressive Suture for the Management of Postpartum Hemorrhage Due to Placenta Previa During Cesarean Section

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Abstract

Background: Lower uterine compression suture (Cervical-Isthmic apposition suture technique) is a new but effective method to arrest postpartum hemorrhage (PPH). The effectiveness of the suture is not only due to local compression of the anterior and posterior walls of the uterus but also related to the indirect compression of the intramyometrial vessels running from the lateral edge of the lower uterine segment to its media part.

Objectives: The aim of this study was to determine the outcome of uterine compression sutures for the management of PPH due to placenta previa during cesarean section.

Materials and methods: This hospital-based prospective observational study was conducted in the Department of Obstetrics and Gynecology of Rajshahi Medical College Hospital from January 2016 to December 2017. A total of 45 women who developed severe postpartum hemorrhage due to placenta previa during cesarean section were selected peroperatively or postoperatively as the study case. A lower uterine compression suture was given to all the patients. If the bleeding was not well controlled, then other adjunctive procedures were performed. Patients with a bleeding disorder, type I placenta previa, cases other than placenta previa, and morbid adherents of placenta were excluded from the study. The patients were examined postoperatively and again in 2nd week and 6th week after hospital discharge for evaluation of any complications. Data regarding history, physical findings, and investigation were collected from the patient and the patient's record.

Result: Among the total of 45 cases, PPH was controlled in 88.9%(40) cases with compression sutures in the lower uterine segment, and only 11.1% (5) cases required additional procedures. It was observed that higher age groups, multiparous women, patients with <37 weeks of pregnancy, and previous history of cesarean section were significantly associated with a higher amount of bleeding.

Conclusion: Lower uterine compressive compression suture is an effective and safe method to control PPH due to placenta previa during cesarean section and can preserve the uterus for further pregnancy and menstruation.

Key words: PPH, Uterine compressive suture.

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Introduction

Postpartum hemorrhage (PPH) has been defined as bleeding in excess of 500 ml following a vaginal delivery or 1000 ml following a cesarean section from the birth canal within 24 hours.¹ It is still one

of the leading causes of maternal mortality and morbidity, as more than 125,000 women die every year from these complications.² In developing countries, approximately 28% of maternal deaths each year are caused by postpartum hemorrhage,

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and the risk is 1 in 1000 deliveries.³ However, 90% of maternal death due to PPH is preventable.⁴

Placental abnormalities are a major contributor to obstetric hemorrhage. The most common placental abnormalities are placental abruption, placenta previa and adherent (accreta, increta, or parcreta), and retained placenta. Placenta previa occurs in approximately four of every 1000 pregnancies beyond the 20th week of gestation.^{5,6}

Sometimes bleeding may be uncontrollable in placenta previa, as the lower segment has less musculature and is poorly retractile in nature. Often a short but critical window of opportunity is available for taking prompt and effective action to make the difference between life and death.^{7,8} After removal of the complete placenta previa during cesarean section, massive hemorrhage can occur and cannot usually be treated pharmacologically. In these circumstances, several modalities to reduce bleeding have been suggested, including packing the lower uterine segment with gauze, oversewing the implantation site with interrupted sutures, performing a stepwise uterine vessels ligation, compressing the uterus with an original or modified B Lynch procedure, ligating internal iliac arteries, embolising pelvic arteries, and finally hysterectomy when all measures fail.^{9,10,11,12,13,14}

B-Lynch et al. reported in 1997, and in 2002, Hayman et al. proposed a simplified approach to uterine compression sutures that involved slight modification of the B-Lynch technique.^{15,16} They also advocated an ischemic cervical apposition suture in case of persistent bleeding from the lower uterine segment during cesarean section due to placenta previa.⁷ This is a lower uterine segment compressive suturing technique which is a very effective and safe technique.

B Lynch suture and Hayman suture are generally effective for treating PPH due to uterine atony but may not stop bleeding from the lower uterine segment. Further surgical treatment, such as ligation of the internal iliac artery, embolization of the uterine arteries, or hysterectomy, is traditionally employed when conservative treatment fails to control bleeding from the lower

uterine segment. However, this treatment often causes complications and adverse events.^{15,16}

The UK study did not find a significant difference in the success rate between various compression sutures.¹⁷ A more recent study from Argentina demonstrated interesting data; all four sutures used (B-Lynch, Hayman, Cho, and Pereira suture) achieved a >94% success rate for uterine atony (bleeding from the uterine body); however, for bleeding from the cervix or upper vagina (85% consisting of placenta previa or placenta accreta).¹⁸

Many studies had been performed in a developed country. But there is no study done in our country in this field. So, a preliminary prospective study was conducted to evaluate the outcome of compression suture of the lower uterine segment to control PPH due to placenta previa during cesarean section.

Materials and Methods

It was a prospective type of observational study conducted in the Obstetrics & Gynecology department of Rajshahi Medical College Hospital during the period Jan 2016 to Dec 2017. A total of 45 patients who developed PPH due to placenta previa during cesarean section were selected through the purposive sampling technique. Primary PPH due to placenta previa (Type-I, Type-2 anterior) after vaginal delivery, severe PPH due to placenta previa required an immediate hysterectomy, failure of successful removal of the placenta (Morbid adherent of the placenta) and PPH other than placenta previa were excluded.

Study Procedure

During the surgical procedure, blood loss was measured from the volume of blood aspirated from the surgical field and absorbed by gauze and swabs from the moment of placenta removal. Soon after surgical delivery, uterotonics were initiated with 5 IU of oxytocin as a bolus intravenous injection followed by rapid administration of 20 IU of oxytocin in 1000 ml saline within 15-30 minutes. Continuous administration of the same concentration of oxytocin at 250 ml/h was prolonged till the second hour after the delivery; in cases of massive bleeding after removal of

placenta previa, an initial attempt to suture any obvious bleeder was made. When no effective control of bleeding was obtained, and there was persistent, significant bleeding, blood loss >1000 ml was considered severe PPH. In this condition and with no sign of uterine atony, the uterus was exteriorized, and the bladder further displaced anteriorly. There, bimanual anteroposterior compression of the lower uterine segment was applied for at least 60 s. If the simple procedure was effective in reducing or eliminating the bleeding and if heavy bleeding reappeared after the release of manual compression, then the lower uterine segment compressive suturing technique was performed. When PPH was not controlled by compression suture, then other adjunctive procedures like intrauterine gauze packing or

uterine artery ligation were applied. If all measures failed, then hysterectomy was done. Data regarding history, physical findings, and investigation were collected from the patient and the patient's record. The patient's intraoperative information was taken from the surgeon who performed a cesarean section. Informed written consent was taken for all cases. All cases were followed up to the 7th POD and again evaluated at the 2nd & 6th week of delivery after hospital discharge to evaluate any complications.

Data were analyzed using the SPSS software program version 16. The Association of the variable was tested by t-test or ANOVA as appropriate, with the level of significance being set at 5%.

Results

Table 1: Distribution of the study patient by age, parity, and frequency of antenatal checkups in relation to the amount of bleeding (n=45).

	Amount of bleeding			Mean (±SD)	P value
	<2000ml n (%)	>2000ml n (%)	Total n (%)		
Age group (years)					
1. <25 years	5 (21.7)	4 (18.2)	9 (20)	1611.11 (±416.67)	<0.001
2. 25-30 years	15 (65.2)	5 (22.7)	20 (44.4)	1475.00 (±443.52)	
3. 30-35 years	3 (13.0)	6 (27.3)	9 (20.0)	1944.44 (±527.05)	
4. >35 years	0 (0)	7 (31.8)	7 (15.6)	2714.29 (±487.95)	
Parity					
1. Primipara	9 (39.1)	4 (18.2)	13 (28.9)	1500.00 (±408.25)	<0.05
2. Multipara	14 (60.9)	18 (81.8)	32 (71.1)	1906.25 (±665.24)	

Antenatal check-up					
1. Regular	10 (43.5)	4 (18.2)	14 (31.1)	1500 (±588.35)	0.001
2. Irregular	13 (56.5)	12 (54.5)	25 (55.6)	1740 (±502.49)	
3. No	0 (0)	6 (27.3)	6 (13.3)	2666.67 (±408.25)	
Total	23 (100)	22 (100)	45		

Table 2: Status of the amount of bleeding in relation to gestational age, mode of previous delivery, and grading of placenta previa (n=45).

	Amount of bleeding			Mean (±SD)	P value
	<2000ml n (%)	>2000ml n (%)	Total n (%)		
Gestational age					
<37 weeks	7 (30.4)	17 (77.3)	24 (53.3)	2020.83 (±520.83)	<0.01
>37 weeks	16 (69.6)	5 (22.7)	21 (46.7)	1523.81 (±641.79)	
Mode of previous delivery					
Cesarean section	5 (35.7)	10 (55.6)	15 (46.9)	2166.67 (±698.64)	<0.05
NVD	9 (64.3)	8(44.4)	17 (53.1)	1676.47 (±557.37)	
Grading of placenta previa					
Minor placenta previa	12 (52.2)	6 (27.3)	18 (40.0)	1472.22 (499.18)	<0.01
Major placenta previa	11 (47.8)	16 (72.7)	27 (60.0)	2000.00 (±620.17)	
Total	23 (100)	22 (100)	45		

Figure 1: Pie diagram shows the outcome of compression suture of the lower uterine segment.(n=45)

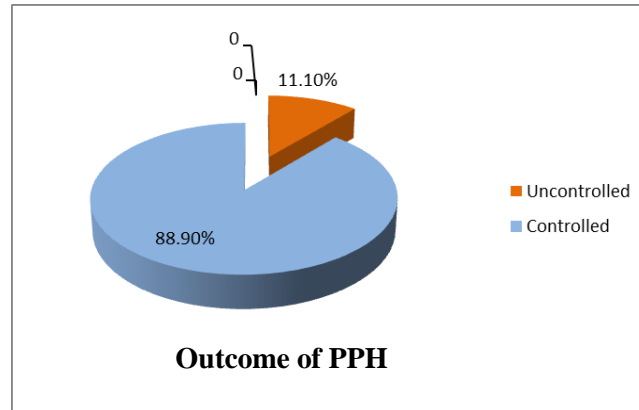


Table 3: Number of additional procedures in uncontrolled cases of study patients (n=45).

Type of adjunctive procedure	Frequency	Percent of total cases
1. Gauze packing	2	4.4
2. Uterine artery ligation	1	2.2
3. Hysterectomy	2	4.4
Total	5	11

Bleeding was controlled with compression sutures in the lower uterine segment (Cervical isthmic apposition sutures) in 40 cases (88.9%), and only five patients (11.1%) required additional procedures (Fig-1). In this study, patients between age 18 to 40 years of age (Table 1). The mean (\pm SD) age was 27.89 (\pm 5.65) years, the mean (\pm SD) gestational age was 34.93 (\pm 3.86) weeks, and the mean (\pm SD) bleeding in patients was 1788.89 (\pm 625.03) ml (Table-2).

The highest number of patients was observed between 25-30 years of age (44.4%), and the lowest was observed in the >35 years group (15.6%). A higher age group was found to be significantly associated with a higher amount of bleeding ($F=13.184$, $df=3$, $p<0.001$). A significantly higher amount of bleeding was observed in the >35 years of age group as compared to the <25 years ($p<0.001$), 25-30 ($p<0.001$), and 30-35 years ($p<0.05$) age group. Higher mean bleeding was observed in multipara (1906.25ml), and it was statistically significant ($t=2.043$, $df=43$, $p<0.05$) as compared to primipara. The lower amount of mean bleeding was observed in patients with a history of antenatal check-ups (regular and irregular), which was 1500 (\pm 586.35) ml and 1740 (\pm 502.49)ml, respectively, and it was statistically significant ($F=10.785$, $df=2$, $p<0.001$). (Table-1)

Lower (<37 weeks) gestational age was observed to be significantly associated with a higher amount of bleeding ($t=2.864$, $df=43$, $p<0.01$) as compared to higher gestational age (>37 weeks). The majority of the patient with placenta previa had a previous history of NVD (53.1%), and patient with previous cesarean section was found to be associated with higher mean bleeding as compared to NVD ($t=2.206$, $df=30$, $p<0.05$) and it is statistically significant. In the study, major placenta previa was found in 27 (60.0%) patients, and it was significantly associated with a higher amount of bleeding ($t= 3.014$, $df= 43$, $p<0.01$) as compared to minor placenta previa.(Table-2) Bleeding was controlled with compression sutures of the lower uterine segment in 88.9% (40) of cases who developed PPH during cesarean section

due to placenta previa, and only 11.1% (5) required additional procedures. (Fig-1) Among the five patients who required additional procedures, 2 (4.4%) cases required gauze packing, 1 (2.2%) patient required uterine artery ligation, and 2 (4.4%) patients required a hysterectomy. (Table-3)

Discussion

Bleeding from the lower uterine segment during cesarean section remains a life-threatening problem, particularly in women with placenta previa. This prospective observational study was carried out with the aim of finding out the outcome of a lower uterine compression suture. There are few studies available regarding the effectiveness of lower uterine compression sutures, and the present study is also trying to evaluate the outcome. In our study mean age of cases was 27.89 (± 5.65) years, the mean gestational age was 34.94 (± 3.86) weeks, mean blood loss was 1788.80 (± 626.03) ml. Higher age, multipara, irregular antenatal check-up, lower gestational age, previous cesarean section, and major placenta previa all are associated with significantly higher amounts of bleeding (Table-1&2) as we know that the incidence of placenta previa is increased beyond the age of 35 years and PPH also more related to higher age group. In one study median (range) maternal age was 35 (27-40) years, and Li et al. reported patient age range was 23-42 years (Median, 29 years).^{19,20}

When conservative treatment failed, bleeding was controlled with a compression suture of the lower uterine segment in 88.9% (40) cases, and only 11.1% (5) required additional procedures (Fig-1). Among the five patients who required additional procedures, 2 (4.4%) cases required gauze packing, 1 (2.2%) patient required uterine artery ligation, and 2 (4.4%) patients required hysterectomy (Table 3). Penotti et al. showed effective and complete control of bleeding that was immediately achieved in all cases at the end of the procedure. An additional surgical procedure, such as ligation of the internal iliac artery and embolization of the uterine artery, was avoided.¹⁹ The success rate of another study for stopping hemorrhage was 86.7% (13/15) and only two cases required gauze packing to stop bleeding, but there was no need for hysterectomy.²⁰

All the women were clinically evaluated post-operatively, 2nd week, and around six weeks after delivery, but no complications were found. So, to reduce maternal mortality, preserve fertility, and reduce post-operative complications, lower uterine compression suture (cervical isthmic opposition suture) may play an important role as a safe, conservative procedure to control postpartum hemorrhage during cesarean section.

Conclusion

Compression suture in the lower uterine segment (Cervical isthmic apposition suture) is an effective procedure to control postpartum hemorrhage due to placenta previa during cesarean section. A higher amount of bleeding was observed in advanced age and multiparous patients and also in patients with a previous history of cesarean section. It is a life-saving procedure with fewer post-operative complications. But sometimes few adjunctive procedures may be needed. The limitations of our study were the small sample size and a shorter duration of follow-up.

Conflict of interest: None declared

References

1. Khannum Z. Primary postpartum haemorrhage: Effective treatment modalities. *Ann King Edward Med coll.* 2005;11: 17-19.
2. WHO, Reducing the Global Burden: postpartum hemorrhage, Making pregnancy safer. 2007. World Health Organization: Attending to 136 Million Births, Every Year: Make Every Mother and Child Count: The World Report 2005. Geneva, WHO. 2005:62-63.
3. Drife J. Management of primary postpartum hemorrhage. *Br J ObstetGynaecol*1997;104(7):275-277
4. Senthiles L, Gromez A, Razzouk K, Resch B, Verspyck E, Marpeau L. B-Lynch suture for massive persistent postpartum hemorrhage following stepwise uterine devascularization. *Acta Obstet Gynecol* 2008; 87: 1020-1026.
5. Shabana A, Fawzy M, Refaie W. Conservative management of placenta percreta: a stepwise approach. *Arch Gynecol Obstet.* 2015;291:993e8. hArulkumaran, edited by Richard Warren, Sabaratnam. Best practice in labour and delivery (1st ed. 3rd printing, ed). Cambridge: Cambridge University Press. 2009:pp. 142-146.
6. Wortman AC, Alexander JM. Placenta accreta, increta, and percreta. *Obstet Gynecol Clin North Am.* 2013;40:137e54.

7. Mukhopadhyay S, Arulkumaran S. Golden hour in the management of postpartum haemorrhage. *Women's Health. Proceedings of the world Congress on Women's Health 2000*, Organised by FOGSI and BOGS 2000;B10-15.
8. Arulkumaran, edited by Richard Warren, Sabaratnam. *Best practice in labour and delivery* (1st ed. 3rd printing. ed). Cambridge: Cambridge University Press.2009;pp. 142–146.
9. Ying H, Duan T, Bao Y-R, Song Y-H, Wang D-F: Transverse annular compression sutures in the lower uterine segment to control postpartum hemorrhage at cesarean delivery for complete placenta previa. *Int J Gynecol Obstet* 2010; 108: 247–249.
10. Rabbo A, Senthiles L, Descamps P. Which surgery should be the first-line uterine sparing procedure to control severe postpartum hemorrhage? *FertilSteril* 2011; 95:e71.
11. Kayem G, Kurinczuk JJ, Alfirevic Z, Spark P, Brocklehurst P, Knight M. Uterine compression sutures for the management of severe postpartum hemorrhage. *Obstet Gynecol.* 2011;117:14–20.
12. Clark AI, Phelan JP, Yeh SY, Bruce SR, Paul RH. Hypogastric artery ligation for obstetric hemorrhage. *Obstet Gynecol.* 1985; 66: 353–356.
13. Doumouchtsis SK, Papageorghiou AT, Arulkumaran S. Systematic review of conservative management of postpartum hemorrhage: what to do when medical treatment fails. *ObstetGynecolSurv.* 2007;62:540–547.
14. Senthiles L, Trichot C, Resch B, Sergent F, Roman H, Marpeau L, Verspyck E. Fertility and pregnancy outcomes following uterine devascularization for severe postpartum haemorrhage. *Hum Reprod* 2008; 23: 1087–1092.
15. B-Lynch C, Coker A, Lawal AH, Abu J, Cowen MJ. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. *Br J Obstet Gynaecol.* 1997;104:372–375.
16. Hayman RG, Arulkumaran S, Steer PJ. Uterine compression sutures: surgical management of postpartum hemorrhage. *Obstet Gynecol.* 2002;99:502–506.
17. Kayem G, Davy C, Goffinet F, Thomas C, Clément D, Cabrol D. *Conservative versus extirpative management in cases of placenta accreta. Obstetrics and gynecology.* 2004;104 (3):531–536.
18. Palacios-Jaraquemada JM. Efficacy of surgical techniques to control obstetric hemorrhage: analysis of 539 cases. *Acta Obstet Gynecol Scand.* 2011;90:1036–1042.
19. Penotti M, Vercellini P, Bolis G, Fedele L. Compressive Suture of the Lower Uterine Segment for the Treatment of Postpartum Hemorrhage due to Complete Placenta Previa: A Preliminary Study. *Gynecol Obstet Invest.* 2012;73:314–320.
20. Li GT, Li XF, Liu YJ, Li W, Xu HM. Symbol “&” suture to control atonic postpartum hemorrhage with placenta previa accrete. *Archives of Gynecology and Obstetrics.* 2015; 291:305–310.

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