Liaquat Medical Research Journal (LMRJ)
Open access, Peer review Journal OPEN ACCESS

Original Article

B- LYNCH SUTURING IN POSTPARTUM HAEMORRHAGE MANAGEMENT AND MATERNAL OUTCOME

Ayesha Jameel, Shahida Shaikh, Majida Ali, Sadif Wager , Mehwish Memon, Mahak Memon

Gynecology and Obstetrics Department, Shaikh Zayed Women Hospital Chandka Medical College, Larkana, Pakistan

Correspondence:
Majida Ali, Department of Gyanecology and Obstetrics, Shaikh Zayed Women Hospital Chandka Medical College Larkana, Sindh, Pakistan

Email:
mashorimajidaali@gmail.com

DOI:
10.38106/LMRJ.2025.7.1-03
Received: 13.11.2024
Accepted: 15.03.2025
Published: 31.03.2025

ABSTRACT:

Surgical care of atonic Postpartum Hemorrhage (PPH) following medically unsuccessful treatment has recently been documented, involving the application of uterine compression sutures over the whole thickness of both uterine walls. In both developing and developed nations, PPH continues to rank among the top 5 causes of maternal death, out of the reported cases 75% to 90% are caused by uterine atony. This study was aimed to monitor the B Lynch suture's effectiveness in treating PPH. A total of 104 females between age of 20 and 45 years who were experiencing PPH and were between 36 and 42 weeks' gestation were included in the study. Patients with any bleeding disorders, genital hematomas, conception retirements, ruptured uteruses, and genital injuries were not included. Success criteria were tracked, such as bleeding control within 15 minutes of the surgery. The mean age of females was 27.69 ± 3.68 years. There were two different mean gestational ages: 39.98 ± 1.57 weeks and 40.04 ± 1.68 weeks, with 92.30% success rates. Over 104 women who had postpartum hemorrhages during cesarean sections and who did not respond to conservative treatment were treated with B Lynch suturing, there were only eight (7.69%) patients who failed to respond to this approach and underwent hysterectomy. There were no reported cases of uterine necrosis. Furthermore, two patients were reopened for an abdomen rupture. The results showed that the B-Lynch suture had a good success rate in controlling PPH and improving maternal outcomes. When treating unmanageable postpartum bleeding, B-lynch sutures are a simple, safe, easy, and fertility-preserving procedure.

Keywords: maternal outcome, PPH, and B-Lynch

INTRODUCTION

In uterine atony during postpartum hemorrhage (PPH) keeping in view of such complication when conservative therapy fails, B-Lynch (1997) reported a method used to compress and continuously mechanically stitch the uterus. This is a straightforward, safe, and fertility-preserving method for managing unmanageable PPH. Consequently, a number of changes to the process have been announced in an effort to make it easier to understand and more efficient (1-3). More than 125,000 women are thought to lose their lives to PPH annually worldwide. Postpartum hemorrhage kills one baby out of every 1,000 deliveries. Seventy-five to ninety percent of primary PPH cases are caused by uterine atony. More than 500 milliliters of blood lost per vagina in the first 24 hours after delivery is referred to as primary PPH. Minor PPH with 500–1000 ml of blood loss, and Major PPH with more than 1000 ml of blood loss, are the two main categories described. Around the world, it is a leading cause of obstetric morbidity and mortality. The second most frequent cause is cuts, which include third and fourth-degree perineal tears, uterine rupture, and cervico-vaginal tears (4-6).

The primary cause of maternal death globally is hemorrhage following childbirth. Nonetheless, deaths from PPH may be avoided with prompt identification and treatment. Uterine atony, genital tract lacerations, retained placenta, uterine inversion, abnormal placentation, and coagulation abnormalities are the main causes of PPH. A prior pregnancy is a major risk factor for PPH, thus healthcare professionals should take all necessary precautions to determine its severity and cause (7-10). In order to prevent the death of a critically ill patient, both medical and surgical methods of managing PPH are employed. These methods include the use of uterotonics, non-surgical

methods like balloon tamponade and procoagulant medications like fibrinogen concentrate, as well as surgical methods like sutures, artery ligations, and/or hysterectomy, antifibrinolytic medications like tranexamic acid, and/or endovascular radiologic interventions. These approaches are based on updated, recently published international and national guidelines (11, 12). The causes of secondary postpartum hemorrhage include inherited coagulation deficiencies, retained products of conception, infection, and subinvolution of the placental location (13, 14). One percent to six percent of deliveries result in PPH. Between 70% and 90% of all hemorrhages are caused by uterine atony, most frequently occurring cause of PPH (15).The variables at risk comprised of antepartum bleeding throughout this particular pregnancy. Greater than four pregnancies is known as grand multiparity, past experience with retained placenta or PPH, ethnicity of Asian descent, maternal obesity with >35 kg/m^2 is the body mass index (BMI), existing anomalies of the uterus, maternal age more than 40 years, anemia in mothers particularly when Hb is less than 9 g/dL or confirmed abruption. There are a number of predisposing factors have also been reported, includes uterine over distention, pregnancy-induced hypertension, macrosomia and polyhydramnios (10-12).

There are several viable therapeutic options, including straightforward bi-manual compression, oxytocic medications like oxytocin and ergometrine, and prostaglandins, which are quick, easy, safe, and efficient but in certain situations they fail to control bleeding. A variety of uterine compression sutures, including one that passes through the anterior and posterior uterine walls entirely, have been reported as effective in controlling PPH. The first person to draw attention to this method was Christopher B. Lynch. The first patient to undergo the operation was in 1989 and had significant PPH but had refused a hysterectomy. The goal of the suture was to continuously compress the vertical arteries (13, 14). If the bleeding is not controlled it can lead to drastic complications including hypovolemic shock, coagulation, acute renal injury, liver failure, acute respiratory distress syndrome in adults, and death resulting in high maternal mortality (15-17). This study was conducted to evaluate outcome of B-Lynch in women presenting with PPH not responding to conventional therapy in low resource situation.

METHODS:

This was a prospective study conducted in the Obstetrics and Gynecology Department at Sheikh Zayed Women's Hospital, Chandka Medical College, Larkana, Sindh, Pakistan from 1st July 2023, to 1st July 2024. During this period 4893 obstetric admissions were made, along with 4031 deliveries (1798 vaginal deliveries), 2234 cesarean sections, 321 primary postpartum hemorrhage, and 45 secondary PPH cases. During this study period 104 patients of PPH did not respond to conventional methods of management.

This study covered all cases that were referred as critical emergencies and hospital admissions of labouring patients from surrounding areas either during their prenatal time or within 42 days following delivery. Every patient's biodata, including a thorough medical history that included information on age, parity, gestational age, current symptoms, mode of admission, socioeconomic status, history of obstetrics and gynecology, medical or surgical illnesses, and blood loss, was considered. The pattern of management was recorded such as blood transfusions, medical and surgical procedures, admission to the intensive care unit, hospital stay, discharge, and follow-ups on the seventh and forty-two days after giving birth.

Statistical analyses

Data was analyzed using Statistical Package for Social Sciences version 22.

RESULTS:

From 1 July 2023 to July 2024, a total of 321 women developed primary PPH, out of which 63 women presented with rapture uterus, 121 were uterine atony, retained products of conceptus (RPOCS) were 47, retained placenta were 15, 1st and 2nd degree perineal tears were seen in 11 patients, 3rd and 4th degree perennial tears were found in 6 patients, cervical tears were seen in 54 patients, and uterine inversion was seen in 4 patients (Table 1). Demographic characteristics of the study participants (n=104) are presented in Figure 1-4. All PPH women treated by medical treatment to control bleeding (i.e. transxemic acid, oxytocin, mifepristone) and were successful but those PPH women which did not respond to medical treatment (n=104) then considered for surgical treatment by using

uterine compressor sutures that is B-lynch. Vicryl no 1 or 2 used in this procedure which is delay absorbable suture material up to 3 months. Among PPH women 104 selected for surgical treatment B-lynch applied and in 96 women (92.30%) it was successful in controlling bleeding while in 8 women it failed and those patients then proceeded to obstetrical hysterectomies (Table 2). Out of 104 B-lynch women 100 of them used multiple blood transfusion including whole blood, FFP fresh frozen plasma, platelets, PCV packed cell volume. In these patients mean hospital stay was 7 days (±SD 0.8), puerperal morbidity was seen in 10 patients and there was no reporting of pyometria or adhesions. At the follow-up 86 patients reported no change in menstrual flow, 6 patients reported reduced while 12 patients reported to have increased flow.

Table 1. Summary of the causes of Post-partum haemorrhage in the study population

S #	Causes of post-partum haemorrhage	Frequency n(%)
Primary Post-partum Haemorrhage (n=321)		
1	Uterine atony	121 (37.69)
2	Ruptured uterus	63 (19.62)
3	Cervical tear	54 (16.82)
4	Retained products of Conceptus (RPOCS)	47 (14.64)
5	Retained placenta	15 (4.67)
6	First and second degree perineal tears	11 (3.42)
7	Third and fourth degree perineal tears	6 (1.86)
8	Uterine inversion	4 (1.24)
Secondary Post-partum Haemorrhage (n=45)		
11.	Uterine infection	45 (1.11%)

Table 2. Post-operative findings in patients who had B-lynch application (n=104)

Post-operative findings	n (%)
Uterus salvage: bleeding controlled/reduced after application	96 (92.30%)
Caesarean hysterectomy: bleeding persist even after application	8 (7.69%)

Table 3. Clinical profile and demographic areas of women with B- lynch suture application (n=104)

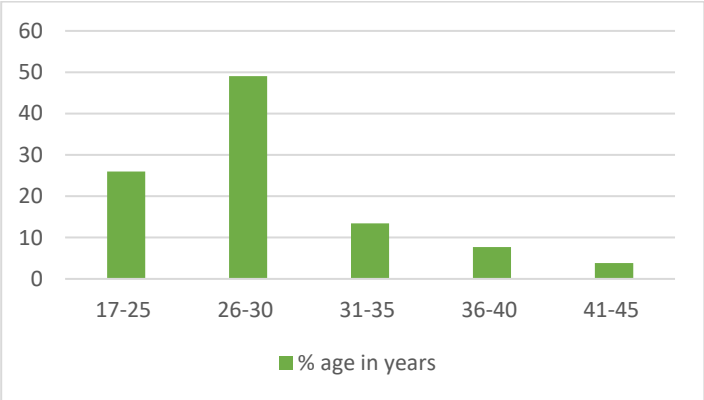

Figure 1. Age distribution of the study participants

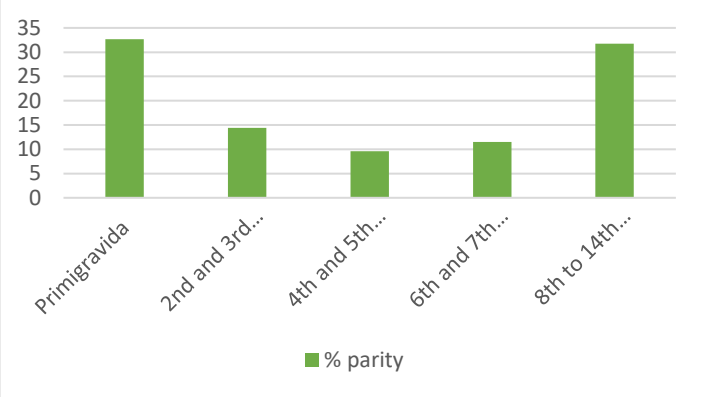

Figure 2. Parity of the study participants

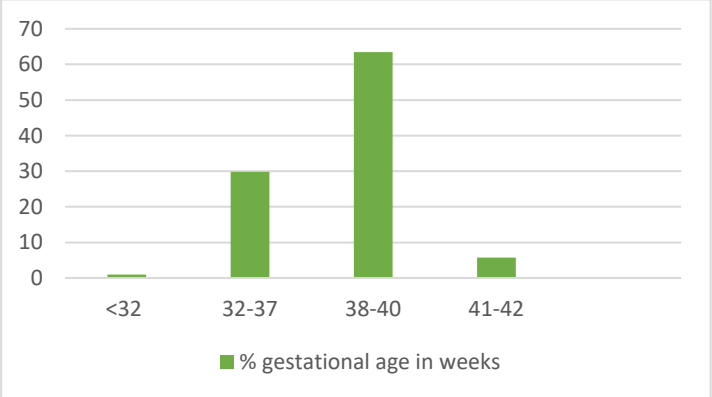

Figure 3. Pattern of gestational age of the study participants

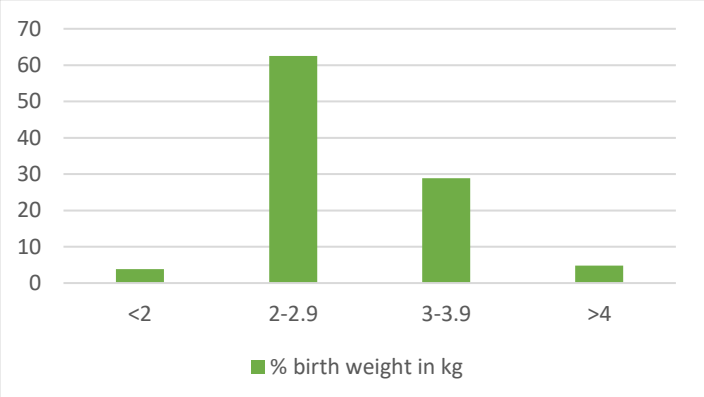

Figure 4. Pattern of birth weight in the study participants

DISCUSSION

Obstetricians are always plagued by the possibility of fatal complications, which, if left unchecked, can have even worse outcomes. In the event of a maternal death, PPH frequently results in legal troubles. The most frequent cause of PPH, which is also the leading cause of maternal mortality in underdeveloped nations, is uterine atony. The key to preventing a disastrous outcome is health care providers' early, active, and coordinated response to reduce blood loss (17, 18,). There are numerous risk factors associated with caesarean sections, uterine atony is a typical consequence after these procedures. Patients with conditions including multifetal pregnancy, polyhydramnios, protracted labor, and macrocosmic babies are at higher risk of developing PPH. One simple, quick, and efficient method for treating uterine atony is uterine compression suture (19, 20). B-Lynch et al. (1997) initially reported on it, stating that the success rate ranged from 76% to 100%, with an average of 97%. Additionally, B-Lynch stated in his initial study that "this procedure's cost-effectiveness may encourage developing countries to consider its application when necessary, both for prophylactic and therapeutic purposes." (21-23). This method has been employed in several reports as a preventative measure in high-risk cases of postpartum hemorrhage, including triplet pregnancies, eclampsia, protracted labor, obstetric labor, chorioamnionitis, prolonged second-stage, pre-eclampsia, and uterine atony following delivery (23-25).

In recent times, the B-Lynch suture has proven to be a highly beneficial method for controlling uncontrollable bleeding, which could otherwise result in maternal morbidity and mortality. It is straightforward and effective, producing satisfactory hemostasis upon application. Should it fail, alternative, more drastic procedures remain available (26, 27). It is a quick, straightforward, and effective procedure that produces a good level of hemostasis upon application. If it is unsuccessful, there are still procedures like ceasearon and obstetrical hysterectomies which can be considered (27-29). This method can be employed in an emergency to maintain life and fertility because it is quick and easy to use (30). According to WHO standards, compression sutures should be used before vascular ligations if medical conservative therapy fails (31). According to several accounts, B-Lynch was simply used to treat postpartum hemorrhage; no vascular ligation was necessary in these situations, and the results for the pregnancy were favorable (32). When nonmedical and medical measures fail to reduce bleeding after atonic postpartum hemorrhage, uterine compressive sutures are a tried-and-true method. It is possible to leave the absorbable suture in place, and it usually won't cause issues for subsequent pregnancies (33, 34).

In every instance, the postpartum ultrasonography data showed no hematometra or other issues (34). Nonetheless, additional long-term assessment is required to determine the reproductive function and consequences following this procedure. Additionally, there is no chance of significant vascular and ureter damage. A number of surgical methods, including Choo sutures and isthmocervical suturing compression sutures, have been described in the literature. These methods include the Cho-Square compression suture, Hayman technique, Pereira compression suture, Ouahba technique of compression suture, and Hackethan technique (35-37). Still, there are certain issues and not all patients are safe using these compression sutures. When compared to other compression sutures, the B-Lynch suture is rather safe since it does not stitch the anterior and posterior uterine walls together (38). Furthermore, our modification of the B-Lynch procedure is mostly due to the suture material and needle. A unique long, curved needle is required for suturing into the anterior and posterior walls of the uterus in the original B-Lynch procedure as well as later modified techniques like Hayman and Cho. Since it is difficult to locate this particular needle in the obstetric operating room, we found that using the standard suture material for myometrial closure in caesarean sections—chromic catgut number 1 with a 40 mm needle—is a simple and straightforward option. Compared to 9.3±2.8 minutes when utilizing the B-Lynch technique, this technique can be completed in about 2 or 3 minutes (38-40). Massive PPH and elevated maternal mortality are always associated with placenta

accreta syndrome (PAS). Around 3,000 mL of blood loss is linked to PAS, and hysterectomy rates are similarly high (40, 41).

The most prevalent delivery method was caesarean section, which is comparable to an Indian study that found that only 24% of patients had planned LSCS and 76% of patients had emergency LSCS. This suggests that PPH mostly happens in life-threatening situations. Comparably, in an Indian study, 23.52% of women underwent an elective caesarean section and 76% underwent an emergency CS (42, 43).

The study's limitation was that the majority of cases were treated in uterine atony following the failure of medical intervention but prior to the onset of severe postpartum blood loss. As a result, it was unclear whether this surgery was beneficial in treating severe bleeding. The long term follow-up was not included to explore preservation of fertility.

CONCLUSION

In terms of maternal morbidity and mortality, PPH remains the primary cause. Medical intervention should be done if a woman develops PPH, if it fails then modified B-Lynch sutures or B-lynch sutures at the fundus and a portion of the corpus uteri can reduce postoperative complications and shorten surgical times while also having a hemostatic effect in patients with PPH. Modified B-Lynch sutures has shown potential for promotion in clinical practice as a safe, quick, and efficient hemostatic technique for treating and preventing postpartum hemorrhage in twin pregnant women undergoing cesarean sections.

Conflict of Interest

Authors declare no conflict of interest.

Ethical consideration

The study was approved by the local Ethical Review Committee.

REFERENCES

1. FIGO Guidelines: Prevention and treatment of postpartum haemorrhage in low-resource settings; International Journal of Gynaecology and Obstetrics 117 (2012) 108–118
2. Saving Lives, Improving Mothers' Care; Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2016-18, December 2020
3. Fullerton G, Danielian PJ, Bhattacharya S; Outcomes of pregnancy following postpartum haemorrhage. BJOG. 2013 Apr;120(5):621-7. Doi: 10.1111/1471-0528.12120. Epub 2013 Jan 23.
4. Carroli G, Cuesta C, Abalos E, et al; Epidemiology of postpartum haemorrhage: a systematic review. Best Pract Res Clin Obstet Gynaecol. 2008 Dec;22(6):999-1012. doi: 10.1016/j.bpobgyn.2008.08.004. Epub 2008 Sep 25.
5. Intrapartum care for healthy women and babies; NICE Guideline (Dec 2014 - updated Dec 2022)
6. Silver RM, Landon MB, Rouse DJ, et al; Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol. 2006 Jun;107(6):1226-32.
7. Magon N, Babu K; Recombinant Factor VIIa in Post-partum Hemorrhage: A New Weapon in Obstetrician's Armamentarium. N Am J Med Sci. 2012 Apr;4(4):157-62. doi: 10.4103/1947-2714.94938.
8. Singh S, McGlennan A, England A, et al; A validation study of the CEMACH recommended modified early obstetric warning system (MEOWS). Anaesthesia. 2012 Jan;67(1):12-8. doi: 10.1111/j.1365-2044.2011.06896.x. Epub 2011 Nov 9.
9. Mousa HA, Blum J, Abou El Senoun G, et al; Treatment for primary postpartum haemorrhage. Cochrane Database Syst Rev. 2014 Feb 13;2:CD003249.
10. Widmer M et al - for the WHO CHAMPION Trial Group; Heat-Stable Carbetocin versus Oxytocin to Prevent Hemorrhage after Vaginal Birth, The New England Journal of Medicine, 2018
11. Price N, B-Lynch C; Technical description of the B-Lynch brace suture for treatment of massive postpartum hemorrhage and review of published cases. Int J Fertil Womens Med. 2005 Jul-Aug;50(4):148-63.
12. World Health Organization. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.

13. Sajedinejad S, Majdzadeh R, Vedadhir AA, Tabatabaei MG, Mohammad K. Maternal mortality: a cross-sectional study in global health. Global Health. (2015) 11(1):1–13. doi: 10.1186/s12992-015-0087-y
14. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO Analysis of causes of maternal death: a systematic review. Lancet. (2006) 367(9516):1066–74. doi: 10.1016/S0140-6736(06)68397-9
15. Postpartum Haemorrhage, Prevention and Management; Royal College of Obstetricians and Gynaecologists (December 2016)
16. Prata N, Bell S, Weidert K; Prevention of postpartum hemorrhage in low-resource settings: current perspectives. Int J Womens Health. 2013 Nov 13;5:737-52. doi: 10.2147/IJWH.S51661. eCollection 2013
17. Oliveira MI, da Costa VS, Mer S, Osório J, Martins AP. Thrombocytopenia in pregnancy, a challenge in the intensive care unit (ICU). Rev Esp Anestesiol Reanim (Engl Ed). 2019 Aug-Sep;66(7):385-389
18. Arnold MJ, Keung JJ, McCarragher B. Interventional Radiology: Indications and Best Practices. Am Fam Physician. 2019 May 01;99(9):547-556.
19. Alemu FM, Fuchs MC, Martin Vitale T, Abdalla Mohamed Salih M. Severe maternal morbidity (near-miss) and its correlates in the world's newest nation: South Sudan. Int J Womens Health. 2019;11:177-190.
20. Lin L, Chen YH, Sun W, Gong JJ, Li P, Chen JJ, Yan H, Ren LW, Chen DJ. Risk factors of obstetric admissions to the intensive care unit: An 8-year retrospective study. Medicine (Baltimore). 2019 Mar;98(11):e14835.
21. Changede P, Chavan N, Raj N, Gupta P. An Observational Study to Evaluate the Maternal and Foetal Outcomes in Pregnancies Complicated with Jaundice. J Obstet Gynaecol India. 2019 Feb;69(1):31-36.
22. Joseph CM, Bhatia G, Abraham V, Dhar T. Obstetric admissions to tertiary level intensive care unit - Prevalence, clinical characteristics and outcomes. Indian J Anaesth. 2018 Dec;62(12):940-944.
23. Gillissen A, van den Akker T, Caram-Deelder C, Henriquez DDCA, Bloemenkamp KWM, de Maat MPM, van Roosmalen JJM, Zwart JJ, Eikenboom J, van der Bom JG., TeMpOH-1 Study Group. Coagulation parameters during the course of severe postpartum hemorrhage: a nationwide retrospective cohort study. Blood Adv. 2018 Oct 09;2(19):2433-2442.
24. Rogers J, Wood J, McCandlish R, Ayers S, Truesdale A, Elbourne D. Active versus expectant management of third stage of labour: the Hinchingbrooke randomised controlled trial. Lancet. 1998 Mar 07;351(9104):693-9.
25. Shakur H, Beaumont D, Pavord S, Gayet-Ageron A, Ker K, Mousa HA. Antifibrinolytic drugs for treating primary postpartum haemorrhage. Cochrane Database Syst Rev. 2018 Feb 20;2(2):CD012964.
26. Tanaka H, Matsunaga S, Yamashita T, Okutomi T, Sakurai A, Sekizawa A, Hasegawa J, Terui K, Miyake Y, Murotsuki J, Ikeda T. A systematic review of massive transfusion protocol in obstetrics. Taiwan J Obstet Gynecol. 2017 Dec;56(6):715-718.
27. Vasquez DN, Plante L, Basualdo MN, Plotnikow GG. Obstetric Disorders in the ICU. Semin Respir Crit Care Med. 2017 Apr;38(2):218-234.
28. Arab M, Ghavami B, Saraeian S, et al,. Successful Management of Two Cases of Placenta Accreta and a Literature Review: Use of the B-Lynch Suture and Bilateral Uterine Artery Ligation Procedures. Iran Red Crescent Med J. 2016, 9;18(4):e35006.
29. Lynch B, Einspruch EL. With or without an instructor, brief exposure to CPR training produces significant attitude change. Resuscitation. 2010;81(5):568–75.
30. Wen R. Clinical study on the treatment of postpartum haemorrhage by hand-held compression of the lower uterine segment. Contemp Med. 2019;25(8):122–3.
31. Hao YING. Uterine Compression Sutures: Yesterday, Today and Tomorrow. J Int Obstet Gynecol. 2011;38(5):375–7.
32. Mascarello KC, Horta BL, Silveira MF. Maternal complications and cesarean section without indication: systematic review and meta-analysis. Rev Saude Publica. 2017;51:105.
33. Şahin H, Soylu Karapınar O, Şahin EA, et al. The effectiveness of the double B-lynch suture as a modification in the treatment of intractable postpartum haemorrhage. Obstet Gynaecol. 2018;38(6):796–9.

34. Downes KL, Grantz KL, Shenassa ED. Maternal, Labor, Delivery, and Perinatal Outcomes Associated with Placental Abruption: A Systematic Review. Am J Perinatol. 2017 Aug;34(10):935-957.
35. Maswime S, Buchmann E. A systematic review of maternal near miss and mortality due to postpartum hemorrhage. Int J Gynaecol Obstet. 2017 Apr;137(1):1-7.
36. Hundley VA, Avan BI, Sullivan CJ, et al; Should oral misoprostol be used to prevent postpartum haemorrhage in home-birth settings in low-resource countries? A systematic review of the evidence. BJOG. 2013 Feb;120(3):277-85; discussion 86-7. doi: 10.1111/1471-0528.12049. Epub 2012 Nov 27.
37. Bellad MB, Tara D, Ganachari MS, et al; Prevention of postpartum haemorrhage with sublingual misoprostol or oxytocin: a double-blind randomised controlled trial. BJOG. 2012 Jul;119(8):975-82; discussion 982-6. doi: 10.1111/j.1471-0528.2012.03341.x.
38. Mackeen AD, Packard RE, Ota E, et al; Antibiotic regimens for postpartum endometritis. Cochrane Database Syst Rev. 2015 Feb 2;(2):CD001067. doi: 10.1002/14651858.CD001067.pub3.
39. Mulic-Lutvica A, Axelsson O; Postpartum ultrasound in women with postpartum endometritis, after cesarean section and after manual evacuation of the placenta. Acta Obstet Gynecol Scand. 2007;86(2):210-7.
40. Bacterial Sepsis following Pregnancy; Royal College of Obstetricians and Gynaecologists (April 2012)