Al-Azhar International Medical Journal

Volume 5 | Issue 5 Article 6

5-31-2024

Efficacy of Bilateral Uterine Artery Ligation Versus Uterine Fixation Suture (Modified B-Lynch) in Treatment of Atonic Post-Partum Hemorrhage

Abdelmoniem Mohamed Zakaria
Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Fahd Abdelaal El Omda
Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Sherif Hassan Hamza Hassan Elshamy
Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt, shhelshamy@yahoo.com

How to Cite This Article
Zakaria, Abdelmoniem Mohamed; El Omda, Fahd Abdelaal; and Elshamy, Sherif Hassan Hamza Hassan (2024) "Efficacy of Bilateral Uterine Artery Ligation Versus Uterine Fixation Suture (Modified B-Lynch) in Treatment of Atonic Post-Partum Hemorrhage," *Al-Azhar International Medical Journal*: Vol. 5: Iss. 5, Article 6.
DOI: https://doi.org/10.58675/2682-339X.2408

ORIGINAL ARTICLE

Efficacy of Bilateral Uterine Artery Ligation Versus Uterine Fixation Suture (Modified B-Lynch) in Treatment of Atonic Post-Partum Hemorrhage

Abdelmoniem M. Zakaria, Fahd A. El Omda, Sherif H. H. H. Elshamy *

Department of Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: ***One of the significant obstetrical crises that can turn a typical physiological labor and delivery process into a potentially fatal situation in a matter of minutes is post-partum hemorrhage (PPH).***

Aim and objectives: ***To aid in lowering the incidence of maternal morbidity and death due to atonic PPH.***

Patients and methods: ***One hundred patients with a high risk of atonic PPH who presented with PPH (blood loss of 1000 ml) to the Obstetrics and Gynecology Department at Al-Hussein University Hospital and Ismailia Medical Complex between November 2021 and October 2022 were the subjects of a prospective comparison study. Two groups of patients were formed: Group A: B lynch sutures and medical care were provided to 50 patients. Group B: 50 individuals received medication and bilateral uterine artery ligation.***

Results: ***Causes of PPH were insignificantly different between the studied groups. Both groups have a similar proportion of multiparity (40%), while Group B has a slightly higher incidence of anemia (24%) compared to Group A (20%). Group A shows a higher occurrence of polyhydramnios (12%) compared to Group B (8%), while chorioamnionitis and prolonged delivery rates are comparable between the two groups. Notably, both groups have a low incidence of multiple pregnancies (4%), and differences in macrosomic baby rates are minimal, with Group A at 8% and Group B at 6%.***

Conclusion: ***Both bilateral uterine artery ligation and B-Lynch sutures, when used in conjunction with medical treatment, are similarly effective in managing atonic PPH. The choice between these two techniques may depend on the individual patient's clinical condition, surgeon's expertise, and resource availability.***

Keywords: Bilateral Uterine Artery; Uterine Fixation Suture; Post-Partum Hemorrhage

1. Introduction

PPH is the biggest threat to a mother's life during her reproductive years and is responsible for 30% of pregnancy-related maternal deaths. Uterine atony is the primary causative cause, accounting for 60–70% of postpartum hemorrhage instances. Other factors that may contribute include an abruption of placental increta, accrete, percreta, uterine inversion, and uterine rupture.[1]

The following organizations have come together to form this consensus statement: ESA, EBCOG, FIGO, the Network for the Advancement of Patient Blood Management, Haemostasis and Thrombosis, ITAL, and FIGO in Europe. It offers advice on how to avoid and deal with PPH.[2]

Blood loss above 1,000 milliliters following cesarean section is referred to as PPH. This can also mean needing a blood transfusion or a 10% change in hematocrit between admission and postpartum, according to the American College of Obstetrics and Gynecology. The first 24 hours after delivery are considered primary PPH, and the next 24 hours to 12 weeks after delivery are considered secondary PPH.[3]

Accepted 21 May 2024.
Available online 31 May 2024

* Corresponding author at: Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt. E-mail address: shhelshamy@yahoo.com (S. H. H. H. Elshamy).

https://doi.org/10.58675/2682-339X.2408

Uterine atony may be the cause of 75%–90% of primary PPH. Because, as they say, "prevention is better than cure," obstetricians ought to be adept at identifying PPH risk factors and implementing preventative treatments. The responsibility lies with the practicing obstetrician in remote locations where blood banks are not easily accessible. The identification of PPH risk factors is crucial.[4]

Uterine atony is the cause of PPH in most cases. Prior occurrences of atony of the uterus, chorioamnionitis, fibroids within the uterine cavity, placenta previa, inadequately perfused myometrium during shock, over dilated uterus that has several fetuses, excessive amniotic fluid, complying with rapid or prolonged labor, oxytocin-induced or augmented labor, grand or high multiparity, Tocolytic therapy and magnesium sulfate therapy are potential causes of uterine atony.[5]

PPH is treated with both medicinal and surgical methods. Uterine fundal massage, bi-manual uterine compression, and uterotonic medicines are the first line of treatment for PPH. Using an intrauterine balloon or gauze tamponade.[6]

For this first line of treatment, the WHO suggests intravenous oxytocin. Ergometrine, either with or without oxytocin or a prostaglandin medication (such as 800 ug sublingually of misoprostol), is advised as a second line of treatment.[7]

The current study aims to contribute to decreasing maternal morbidity and mortality rates because of atonic postpartum hemorrhage.

2. Patients and methods

A prospective comparison study was carried out on one hundred patients with atonic PPH (blood loss of 1000 ml) who presented to the Obstetrics and Gynecology Department at Al-Hussein University Hospital and Ismailia Medical Complex. Two groups of patients were formed: Group A: B lynch sutures and medical care were provided to 50 patients. Group B: Medication and bilateral uterine artery ligation were administered to 50 individuals during the November 2021 to January 2022 study period.

2.1.Ethical consideration:

The Al-Azhar Faculty of Medicine's Ethics Committee should approve every study protocol. The local research and ethics committee should approve the study protocol. After being fully informed about the purpose of the study, each participant was requested to sign a written consent form. The patients who took part in the study were informed of the methods and goals. Data confidentiality was guaranteed, maintained at all times, and framed honestly and respectfully with regard to the patient's dignity. Patients ought to be aware of the study's benefits—no risk of injury, either real or imagined, to the patients involved. Patients who were involved in the study had the freedom to leave at any moment and without explanation.

2.2.Inclusion criteria

Those having a cesarean section who are at high risk for anemia, abruptio placentae, courvelliar's uterus, poly water retention, Crucial data comprises of vital signs including pulse rate and blood pressure, tracking uterine contractions, evaluating vaginal hemorrhage, completing pre and postoperative-blood-tests-to-determine-the-hematocrit and hemoglobin levels, and strategizing for future surgical intervention.

2.3.Exclusion criteria:

Coagulation factor deficiency, anticoagulant medication, consumptive coagulopathy, uterine myoma, thrombocytopenic purpura, hemorrhagic systemic illness, and Müllerian dysfunction.

The sample size: This formula was used to calculate it (Dawson & Trapp, 2004)[8]

$$n = 2\left[\frac{\left(Z_{\alpha/2} + Z_{\beta}\right) * \sigma}{\mu_1 - \mu_2}\right]^2$$

Where n represents the sample size, Z α/2 is the critical value that divides the central 95% of the Z distribution from the 5% in the tail, Having a 1.96 value. Given a value of 0.84, Zβ is the critical number that divides the lowest 20% within the Z distributions from the upper 80%. σ denotes the standard deviation estimate, which comes in at 26.8. The mean overall loss of blood (measured in milliliters) for the first group is 785, while the mean overall bleeding loss (measured in milliliters) for the second group is 770. (Mohamed et al., 2018)9

Based on the preceding data, it was determined that 50 participants were needed in each group, resulting in a total sample size of 100.

2.4.Sampling technique:

The sampling method employed was probability sampling, namely simple random sampling. I was utilizing a computer-generated roster.

Independent variables: Crucial data comprises vital signs, including pulse rate and blood pressure, tracking uterine contractions, evaluating vaginal hemorrhage, completing pre and postoperative blood tests to determine the hematocrit and hemoglobin levels, and strategizing for future surgical intervention.

Dependent variable: The ability to stop

intraperitoneal or vaginal bleeding was used to measure how well hemorrhage control was working.

2.5.Confounding variables: None.

All patients were subjected to:

Pretreatment data is represented by demographic characteristics (including age, parity, mode of delivery, and causes of PPH) and amount of blood loss. To identify any contraindications for the use of different uterotonics, a thorough medical history from the patient or attendees will be sorted. Obstetric hemorrhage is considered an emergency. Hence the following would evaluate the patients: B.P., pulse, vital statistics, Hemoglobin and hematocrit levels in preoperative and postoperative blood samples, vaginal hemorrhage, and uterine contraction.

Primary postpartum hemorrhage (PPH) is defined as the expulsion of over 1000 ml of blood from the genital tract following a vaginal delivery or a cesarean section performed through the lower segment. Blood loss exceeding 1000 ml during vaginal delivery or cesarean section is regarded as a reason for bilateral uterine artery ligation or placement of B-Lynch suture if pharmaceutical interventions to limit life-threatening hemorrhage have proven ineffective.

The procedure employed for bilateral UAL involved making a horizontal incision in the peritoneum covering the vesicouterine pouch. The peritoneum covering the uterine isthmus and cervix was then dissected downwards in a blunt manner, and this dissection was subsequently extended laterally.

The researcher used the B-Lynch suture. Brace suture, also known as B-Lynch suture (Figure 8). One makes an incision on the lower uterine segment or removes the CS suture. Points a and b are where the needle punctures the spot, puncturing it 3 cm below and 3 cm above the uterine incision margin. At the same level as the upper anterior entry site (point c), the needle punctures the uterine posterior wall while the thread is being transferred across to compress the fundus (curved arrow). Subsequently, the needle enters the uterus from the luminal side and passes through to the outside (point d). At last, the needle reaches the anterior wall at the same level as the locations of the initial entry (e and f), and the thread is tied off. The B-Lynch sutures can alternatively be called the "brace suture" due to the presence of two longitudinal sutures that bear a resemblance to a "brace-suspender."There were no immediate negative occurrences.

The side of the uterine segment should be cut (similar to a CS incision) regardless of vaginal delivery. The anterior and posterior uterine walls should not be transfixed in their entirety. These are the characteristics that define the B-Lynch(suture).

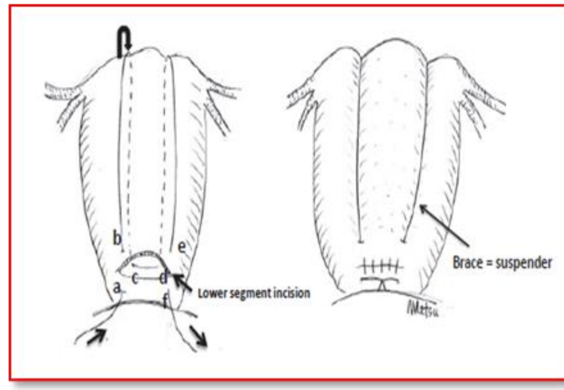

Figure 1. The Lynch suture. The position at which the needle pierces the uterine wall is indicated by the letters (a–f).[10]

The uterus was exteriorized before a straightforward bimanual compression test was used to evaluate the possible efficacy of the B-Lynch suture. In the event that this maneuver lessens the amount of blood lost, a traditional B-Lynch suture application method utilizing vicrylno-2 will be employed. Blood loss was calculated by gathering all patient blood and clots onto a kidney tray with a 1000 ml capacity. Five hundred milliliters of blood loss was equivalent to a fist-sized clot. The blood collected in the suction bottle and the mops that absorbed blood will be included in the calculation of blood loss. The estimated quantity of amniotic fluid will be removed from the overall blood loss estimation. Hemoglobin levels were measured before and 24 hours following the insertion of sutures.

For a full day, patients were placed in a high-dependency area, and their vital signs, including blood pressure, pulse, intake and output, vaginal hemorrhage, and uterine fundal height, were closely monitored. Transfusion of blood was performed based on the patient's post-procedure hemoglobin percentage and intraoperative blood loss. Every case will be examined for blood loss, blood transfusion requirements, the need for additional surgical procedures such as uterine artery ligation, and the choice to undergo a hysterectomy.

Blood loss was then split into four categories for analysis: mild (1000–1500 ml), moderate (1500–2000 ml), severe (2000–2500 ml), and huge (>2500 ml). Patients were also placed into two groups based on the number of transfusion units needed (< 3 and > 3 transfusion units). On day three, every case was closed. They were monitored for the emergence of problems, such as infection or secondary PPH, for six weeks after giving birth. The patients received a one-week prescription for antibiotics prior to being released.

2.6.Statistical analysis:

The analysis was conducted using SPSS v26, developed by IBM Inc. in Armonk, NY, USA. The normality of the data distribution was assessed using the Shapiro-Wilks test and histograms. The numerical parametric data were reported as the mean and the standard deviation (SD) and were evaluated using an unpaired student t-test. The quantitative non-parametric data were reported using the median and interquartile range (IQR), which were evaluated using the Mann-Whitney test. In percentages and frequencies, qualitative variables are described. To compare every two quantitative groups, the T-student test of independent samples is utilized. The probability of atony in both groups over the first six hours will be examined using the X2 = Chi-square test. mL of postoperative vaginal bleeding in each group. We will compare and contrast uterine fixing sutures (modified B Lynch) with bilateral uterine artery ligation. A test of insignificance is defined as $P > 0.05$, a test of significance as $P < 0.05$, and a very significant test as $P < 0.001$.

3. Results

Table 1. Demographic characteristics of the studied groups.

		Group A (n=50)	Group B (n=50)	P value
Age (years)	Mean ± SD	30.76 ± 5.79	30.66 ± 5.65	0.931
	Range	21 - 40	21 - 40	
BMI (kg/m^2)	Mean ± SD	26.53 ± 2.95	27.14 ± 3.13	0.312
	Range	20.57 - 33.20	20.72 - 33.27	
Parity	Nulliparous	16 (32%)	17 (34%)	0.832
	Multiparous	34 (68%)	33 (66%)	
Mode of delivery	NVD	34 (68%)	35 (70%)	0.829
	CS	16 (32%)	15 (30%)	

BMI: body mass index, NVD: natural vaginal delivery, CS: cesarean section

There were no discernible differences in age, BMI, parity, or mode of delivery between the groups under study.

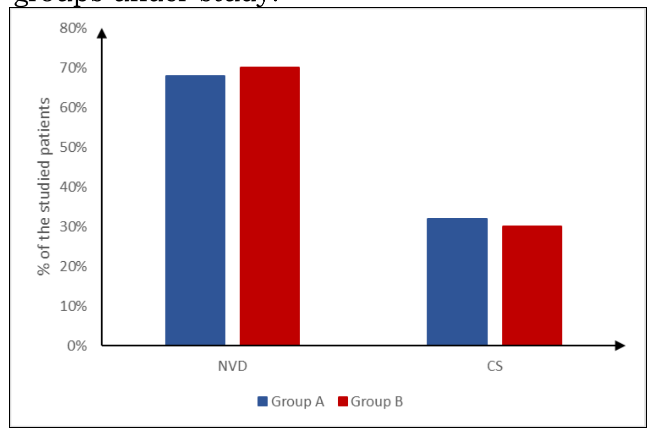

Figure 2. Delivery method used by the groups under study.

Table 2. Etiologies of postpartum hemorrhage in the examined cohorts.

	Group A (n=50)	Group B (n=50)	P value
Multiparity	20 (40%)	20 (40%)	0.970
Anemia	10 (20%)	12 (24%)	
Polyhydramnios	6 (12%)	4 (8%)	
Chorioamnionitis	5 (10%)	4 (8%)	
Prolonged delivery	3 (6%)	5 (10%)	
Multiple pregnancy	2 (4%)	2 (4%)	
Macrosomic baby	4 (8%)	3 (6%)	

PPH: postpartum hemorrhage.

The causes of postpartum hemorrhage (PPH) were similar among all the groups included in the study.

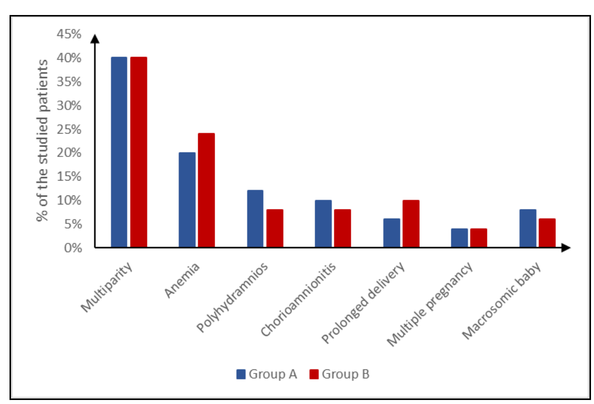

Figure 3. Causes of PPH of the studied groups.

Table 3. Blood loss and vaginal bleeding of the studied groups.

		Group A (n=50)	Group B (n=50)	P value
Blood loss	Mild (1000-1500ml)	13 (26%)	13 (26%)	0.777
	Moderate (1500-2000ml)	13 (26%)	14 (28%)	
	Severe (2000-2500ml)	7 (14%)	10 (20%)	
	Massive (>2500ml)	17 (34%)	13 (26%)	
Number of transfusions required	<3	26 (52%)	27 (54%)	0.841
	>3	24 (48%)	23 (46%)	
Vaginal bleeding (ml)	Mean ± SD	273.44 ± 48.35	268.76 ± 39.38	0.597
	Range	202 - 349	201 - 347	

There were no appreciable differences in blood loss, the number of transfusions needed, or vaginal bleeding between the groups under study.

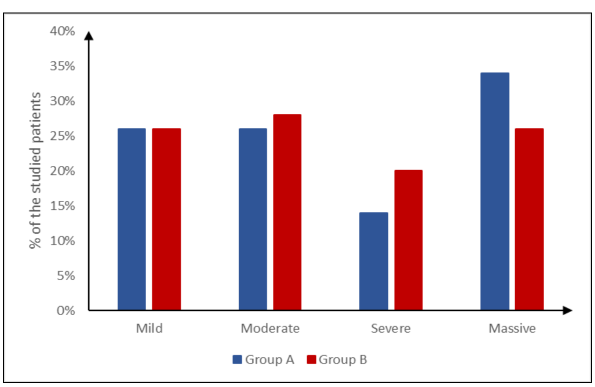

Figure 4. Blood loss in the groups under study.

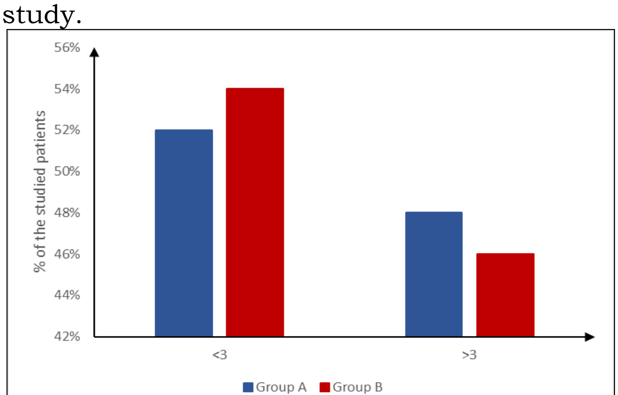

Figure 5. Number of transfusions required of the studied groups.

Table 4. The vital signs of the study groups were assessed both at the moment of surgery and six hours later later.

		Group A (n=50)	Group B (n=50)	P value
Immediate pulse (beats/min)	Mean ± SD	74.48 ± 3.29	74.86 ± 3.4	0.572
	Range	70 - 80	70 - 80	
Postoperative pulse (beats/min)	Mean ± SD	77.08 ± 3.93	77.54 ± 3.78	0.552
	Range	70 - 85	70 - 85	
Immediate SBP (mmHg)	Mean ± SD	106.88 ± 5.41	105.02 ± 5.48	0.091
	Range	95 - 115	95 - 115	
Postoperative SBP (mmHg)	Mean ± SD	111.76 ± 6.55	111.06 ± 5.65	0.569
	Range	100 - 125	100 - 123	
Immediate DBP (mmHg)	Mean ± SD	69.24 ± 5.59	67.84 ± 5.7	0.218
	Range	57 - 79	56 - 78	
Postoperative DBP (mmHg)	Mean ± SD	74.4 ± 6.35	74.02 ± 5.98	0.759
	Range	61 - 87	60 - 86	

SBP: systolic blood pressure, DBP: diastolic blood pressure

Immediate and postoperative pulse, The groups under research did not show any significant difference in terms of DBP and SBP.

Table 5. Hb and HCT levels before and 24 hours postoperative of the studied groups.

		Group A (n=50)	Group B (n=50)	P value
Pre Hb (g/dl)	Mean ± SD	10.2 ± 1.93	10.04 ± 1.95	0.689
	Range	7 - 13.5	7 - 13.5	
Post Hb (g/dl)	Mean ± SD	8.2 ± 2	8.05 ± 2	0.716
	Range	4.7 - 11.6	4.8 - 11.8	
Hb change (g/dl)	Mean ± SD	2 ± 0.34	1.99 ± 0.34	0.884
	Range	1.5 - 2.5	1.5 - 2.5	
Pre HCT (%)	Mean ± SD	32.06 ± 1.92	32.02 ± 2.13	0.922
	Range	28 - 35	28 - 35	
Post HCT (%)	Mean ± SD	29.94 ± 2.11	30.06 ± 2.44	0.793
	Range	27 - 34	25 - 34	
Hb HCT (%)	Mean ± SD	2.12 ± 0.77	1.96 ± 0.88	0.336
	Range	1 - 3	1 - 3	

Hb: hemoglobin, HCT: hematocrit

There was no noticeable distinction between the pre- and post-HCT and Hb levels of the groups under study.

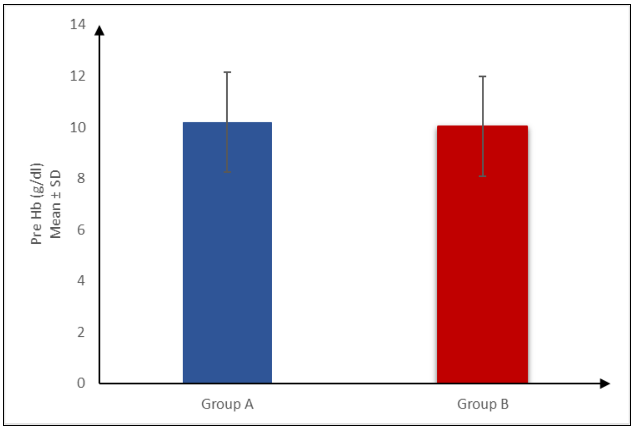

Figure 6. Pre Hb of the studied groups.

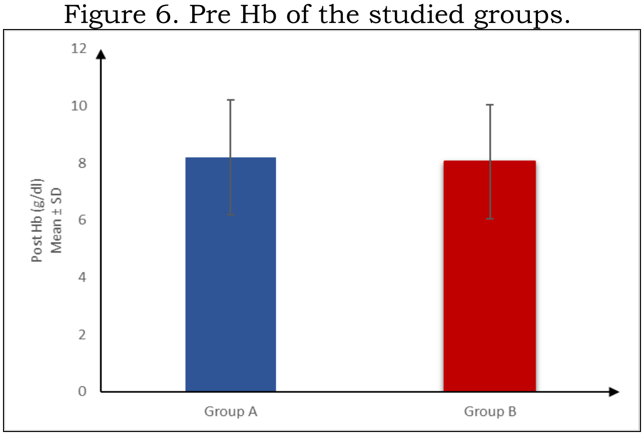

Figure 7. After Hb of the groups under study.

Table 6. Complications of the studied groups.

	GROUP A (N=50)	GROUP B (N=50)	P VALUE
PPH	1 (2%)	2 (4%)	0.978
BLOOD TRANSFUSION	1 (2%)	2 (4%)	
FURTHER SURGERY (HYSTRECTOMY)	1 (2%)	2 (4%)	
BLADDER INJURY	1 (2%)	1 (2%)	

PPH: postpartum hemorrhage

Complications were insignificantly different between the studied groups.

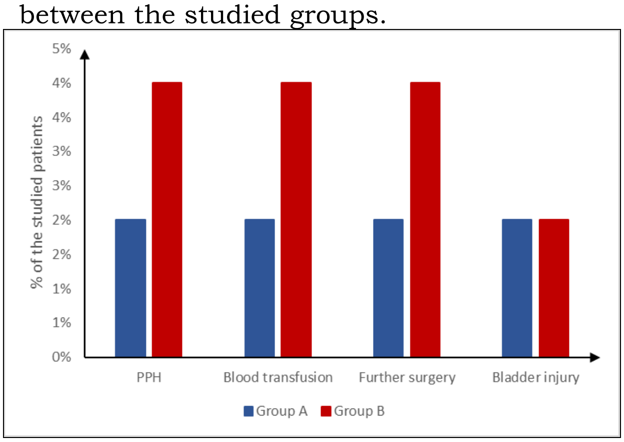

Figure 8. Complications of the studied groups.

4. Discussion

In our study, the causes of PPH were insignificantly different between the studied groups. Both groups have a similar proportion of multiparity (40%), while Group B has a slightly higher incidence of anemia (24%) compared to Group A (20%). Group A shows a higher occurrence of polyhydramnios (12%) compared to Group B (8%), while chorioamnionitis and prolonged delivery rates are comparable between the two groups. Notably, both groups have a low incidence of multiple pregnancies (4%), and differences in macrosomic baby rates are minimal, with Group A at 8% and Group B at 6%.

Mohamed et al. [9] said that patients with polyhydramnionitis or anemia, multipara, twin pregnancies, emergency CS visits, macrosomic babies, and patients in danger of uterine atony were among the patients covered.

Şahin et al.[10] sought to report on the results of a number of patients treated with double B-Lynch sutures for hemorrhage. Risk factors included preeclampsia, placental abruption, placenta previa, macrosomia, inducement of labor, prior cesarean section, and polyhydramnios were identified.

Blood loss, the quantity of transfusions needed, and vaginal bleeding did not differ statistically between the groups under investigation in our study.

This was in agreement with Mohamed et al.[9], who demonstrated that there was no statistically significant difference in lowering blood loss during cesarean section between bilateral uterine artery ligation and uterine compression suture (B-Lynch). At 6 hours postoperatively, the study groups' total blood loss (251.02 ± 21.83 ml) and (246.00 ± 21.39 ml) were considerably lower than those of the control group (332.62 ± 18.87 ml) ($p < 0.001$).

The previous study of Vijayasree et al.[11] demonstrated that in emergency cardioscopy, a B-Lynch suture reduces postpartum blood loss.

The previous study of Liu et al.[12] In patients with fibroid uteri, bilateral uterine artery ligation considerably decreased the amount of blood lost during cesarean section.

Shahin et al. [13] The study showed that combining bilateral uterine artery ligation (UAL) with B-Lynch compression suturing is a reliable and efficient method for controlling bleeding caused by adherent placental remnants and atonic postpartum hemorrhage in women who want to preserve their fertility.

Fahmy[14] stated that while bilateral uterine artery ligation is a safe and successful way to manage postpartum bleeding, 8–20% of cases require a hysterectomy due to the procedure's inability to control hemorrhage.

In our investigation, there were no appreciable differences in the analyzed groups' immediate and postoperative heart rate, SBP, or DBP.

This is in harmony with Mohamed et al.[9]. The individual who made the statement asserted that there had been no statistically significant disparity in the vital data of the study groups both during the procedure and six hours after that.

The pre-and post-HCT and Hb levels did not substantially differ among the groups under investigation in our study.

This is in accordance with Mohamed et al. [9]. They found that the study groups' postoperative hematocrit and hemoglobin levels were significantly greater than those of the control group ($p < 0.001$). Hemoglobin reduction in the study groups was substantially lower than in the control group ($p < 0.001$). However, there are no appreciable variations throughout the research groups.

In the study of Liu et al.[12], the pre-operative baseline hemoglobin levels of the two groups did not significantly differ from one another. There was no discernible difference between the intraoperative blood loss and first-day postoperative hemoglobin levels of the patients in the two groups in group I patients.

In our study, complications were insignificantly different between the studied groups.

4. *Conclusion*

When combined with medical care, bilateral uterine artery ligation and B Lynch sutures are similarly effective in managing atonic PPH. The choice between these two techniques may depend on the individual patient's clinical condition, surgeon's expertise, and resource availability.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

References

1. Yousaf, T.; Khalid, T. Effectiveness of uterine compression suture as a conservative measure to control post-partum haemorrhage: At a secondary care hospital. ISRA Med J.2019; 11(3), pp.133-6.
2. Muñoz M, Stensballe J, Ducloy-Bouthors AS, et al. Patient blood management in obstetrics: prevention and treatment of postpartum haemorrhage. A NATA consensus statement. Blood Transfus. 2019;17(2):112-136.
3. ACOG Committee on Adolescent Health Care. ACOG Committee Opinion No. 349, November 2006: Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. Obstet Gynecol. 2006;108(5):1323-1328.
4. Koh E, Devendra K, Tan LK. B-Lynch suture for the treatment of uterine atony. Singapore Med J. 2009;50(7):693-697.
5. AVERY, DM. Review of Medical and Surgical Management of Postpartum Hemorrhage. American Journal of Clinical Medicine.2011; 8(1).
6. Traoré, Y., Téguété, I., Bocoum, A., Traoré, M., Dao, S., Bomini, M. K., and Dolo, A. Management and Prognosis of Early Postpartum Hemorrhage in African Low Setting Health. Open Journal of Obstetrics and Gynecology. 2018;8(1), 1-9.
7. World Health Organization WHO. Recommendations for the prevention and treatment of postpartum hemorrhage Geneva WHO: 2012. Accessed August 9, 2021.
8. Trapp, RG. Dawson, B.; Basic and clinical biostatistics.2004; 4th ed. USA: McGraw-Hill.
9. MOHAMED, EH.; AHMED, T.; IBRAHEIM, AEM., et al. A Prospective Comparative Study between the Efficacy of Uterine Compression Sutures (B-Lynch) and Bilateral Uterine Artery Ligation for the Prevention of Atonic Postpartum Haemorrhage during Caesarean Section in High Risk Women. The Medical Journal of Cairo University.2018; 86(September), pp.3349-3358.
10. Şahin H, Soylu Karapınar O, Şahin EA, Dolapçıoğlu K, Baloğlu A. The effectiveness of the double B-lynch suture as a modification in the treatment of intractable postpartum haemorrhage. J Obstet Gynaecol. 2018;38(6):796-799.
11. Vijayasree M. Efficacy of Prophylactic B-Lynch Suture during Lower Segment Caesarian Section in High Risk Patients for Atonic Postpartum Haemorrhage. Kathmandu Univ Med J (KUMJ). 2016;14(53):9-12.
12. Liu WM, Wang PH, Tang WL, Wang IT, Tzeng CR. Uterine artery ligation for treatment of pregnant women with uterine leiomyomas who are undergoing cesarean section. Fertil Steril. 2006;86(2):423-428.
13. Shahin AY, Farghaly TA, Mohamed SA, Shokry M, Abd-El-Aal DE, Youssef MA. Bilateral uterine artery ligation plus B-Lynch procedure for atonic postpartum hemorrhage with placenta accreta. Int J Gynaecol Obstet. 2010;108(3):187-190.
14. Fahmy K. Uterine artery ligation to control postpartum hemorrhage. Int J Gynaecol Obstet. 1987;25(5):363-367.