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# EFFECTIVENESS OF B-LYNCH SUTURE IN PATIENTS WITH POST-PARTUM HEMORRHAGE

*Original Research*

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## ABSTRACT

**Background:** Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality globally, with uterine atony accounting for the majority of cases. In severe instances, unresponsive bleeding may require emergency surgical intervention, which poses a risk to maternal health and fertility. Uterine compression sutures, particularly the B-Lynch technique, have emerged as an effective method for hemorrhage control and uterine preservation. However, local data supporting its efficacy remain limited.

**Objective:** To assess the outcome of B-Lynch suture in patients with postpartum hemorrhage.

**Methods:** This descriptive case series was conducted at the Department of Obstetrics & Gynecology, Lady Willingdon Hospital, Lahore, over six months from December 2024 to May 2025. A total of 90 patients, aged 18–40 years and presenting with atonic PPH unresponsive to medical therapy, were enrolled through non-probability consecutive sampling. B-Lynch sutures were applied under spinal anesthesia by a single surgical team. Patients were monitored postoperatively for 24 hours. Outcome variables included operative time, estimated blood loss, fall in hemoglobin, and need for blood transfusion. Data were recorded on a structured proforma and analyzed using SPSS version 25.

**Results:** The mean age of the patients was 29.43 ± 6.77 years, with a mean BMI of 25.86 ± 4.30 kg/m² and gestational age of 38.73 ± 1.13 weeks. The mean operative time was 53.03 ± 4.58 minutes, mean blood loss was 748.34 ± 89.97 mL, and mean fall in hemoglobin was 0.99 ± 0.61 g/dL. Blood transfusion was required in 6 (6.67%) patients.

**Conclusion:** The B-Lynch suture technique proved to be a safe and effective surgical intervention for controlling postpartum hemorrhage, with favorable outcomes in operative time, blood loss, hemoglobin reduction, and transfusion need.

**Keywords:** Blood Transfusion, Hemoglobin, Obstetric Surgical Procedures, Postpartum Hemorrhage, Surgical Sutures, Uterine Atony, Uterine Hemorrhage.

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## INTRODUCTION

Postpartum hemorrhage (PPH) remains one of the leading causes of maternal mortality worldwide, contributing to significant clinical, emotional, and legal burdens for obstetricians. Despite advancements in obstetric care, PPH continues to pose a critical challenge, particularly when it arises from uterine atony, which accounts for approximately 70% to 80% of cases (1). This condition can rapidly progress to life-threatening hemorrhage if not managed promptly and effectively. The implications of PPH are not solely limited to maternal survival but extend to major surgical interventions such as cesarean hysterectomy, which can severely affect a woman's fertility and future reproductive choices (2). Globally, PPH occurs in about 4% of vaginal deliveries and up to 6% of cesarean sections, with uterine atony identified as the most common underlying cause (3). Standard first-line management includes uterine massage, bladder emptying, and timely administration of uterotonics and antifibrinolytics such as tranexamic acid, all of which aim to restore uterine tone and reduce bleeding (4,5). However, in cases where medical management fails, surgical interventions become necessary. Among these, the B-Lynch uterine compression suture has gained prominence as an effective and fertility-preserving option for controlling atonic PPH. Yet, the choice of surgical technique is influenced by several factors, including the site of hemorrhage, patient stability, and the surgeon's expertise, with no consensus on a superior approach due to limited comparative data (6,7).

Women with multiple pregnancies are at notably higher risk for developing PPH, with studies indicating a 2.26 to 4-fold increased risk compared to singleton pregnancies, and a 2.11-fold increased risk for severe PPH specifically (5,6). This further highlights the need for robust and adaptable surgical strategies. While various modifications of the B-Lynch technique are employed globally, local data evaluating its outcomes remain scarce. Moreover, all gynecologic surgeons should be proficient in adjunctive hemostatic techniques such as uterine artery and ovarian artery ligation, which can serve as intermediate steps before proceeding to hysterectomy in refractory cases (8). Importantly, the use of absorbable sutures in B-Lynch procedures has not been associated with significant complications in subsequent pregnancies, supporting its role as a safe fertility-sparing measure (9,10). Given the high burden of PPH and the need for surgical solutions that both save lives and preserve reproductive potential, there is a pressing need to evaluate the effectiveness of the B-Lynch suture within specific populations. Although international data support its efficacy, there is a notable lack of research in local healthcare settings. Therefore, the present study aims to assess the clinical outcomes of the B-Lynch suture in the management of postpartum hemorrhage. By generating context-specific evidence, this research seeks to validate existing findings, guide clinical decision-making, and enhance obstetric surgical practices within the local context.

## METHODS

This descriptive case series was conducted at Unit II, Department of Obstetrics and Gynecology, Lady Willingdon Hospital, Lahore, following approval from the Institutional Review Board (IRB). The study spanned a duration of six months, from December 2024 to May 2025, and enrolled a total of 90 patients. The sample size was calculated using the WHO sample size calculator, incorporating a 95% confidence level, a precision (d) of 0.03, and a mean operative time of 52.67 ± 6.17 minutes associated with B-Lynch sutures as reported in prior literature (10,11). A non-probability consecutive sampling technique was employed to recruit eligible participants from post-delivery wards. Women aged between 18 and 40 years who delivered at a gestational age of more than 37 weeks and developed postpartum hemorrhage due to uterine atony unresponsive to medical therapy were included. Additional inclusion criteria comprised risk factors such as multiple gestation (confirmed via ultrasound), previous history of PPH, multiparity, anemia (hemoglobin <10 g/dL), prolonged labor (>24 hours), and placental abnormalities including accreta, increta, previa, and abruption. In contrast, women were excluded if they had thyroid dysfunction (TSH >5 IU), thrombocytopenic purpura, uterine fibroids (detected on ultrasound), were receiving anticoagulation therapy (verified through medical records), had prolonged prothrombin time (PT >15 seconds), thalassemia, Müllerian anomalies (evidenced by anti-Müllerian hormone [AMH] >4.0 ng/mL), or hypertensive disorders of pregnancy (BP ≥140/90 mmHg). Informed written consent was obtained from all eligible participants prior to inclusion in the study (12). Demographic and clinical characteristics such as age, body mass index (BMI), gestational age, parity, booking status, mode of delivery, and identified risk factors for PPH were recorded. All participants underwent B-Lynch uterine compression suturing under spinal anesthesia, performed by a single surgical team assisted by the researcher, ensuring procedural consistency. Operative time was recorded in minutes from skin incision to skin closure.

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Postoperatively, patients were monitored in the maternity ward for 24 hours, during which blood loss was quantified by weighing sanitary pads before and after use (net weight difference, where 1 mg was equated to 1 mL). A fall in hemoglobin levels was measured, and if a decline greater than 2 g/dL was observed, blood transfusion was administered. The primary outcomes of interest included mean operative time, estimated blood loss, need for blood transfusion, and change in hemoglobin levels within the first 24 hours. Postpartum hemorrhage was defined as blood loss exceeding 500 mL after vaginal delivery or more than 1000 mL following cesarean section, in accordance with standard guidelines. Management of all patients adhered to institutional protocols under consultant supervision, ensuring the highest standards of care. Data collection was documented using a predesigned proforma and subsequently analyzed using SPSS version 25. Continuous variables such as operative time, blood loss, and hemoglobin change were presented as mean ± standard deviation (SD). Categorical outcomes such as need for blood transfusion were reported as frequencies and percentages. Stratification was performed based on age, BMI, gestational age, parity, mode of delivery, cause of risk, and booking status. Post-stratification analysis involved applying independent samples t-tests to compare continuous variables and the chi-square test for categorical variables. A p-value ≤0.05 was considered statistically significant.

## RESULTS

The study included 90 patients with a mean age of 29.43 ± 6.77 years and a mean BMI of 25.86 ± 4.30 kg/m². The average gestational age at delivery was 38.73 ± 1.13 weeks. In terms of parity, 22.2% were nulliparous, 21.1% had parity of one, 42.2% parity of two, and 14.4% parity of three. A total of 65.6% of patients were booked cases, while the remainder were unbooked. Vaginal deliveries accounted for 56.7% of the cases, whereas cesarean sections were performed in 43.3%. Risk factors associated with postpartum hemorrhage included anemia and prolonged labor, both noted in 25.6% of patients, followed by a previous history of PPH in 20%, placental complications in 17.8%, multiparity in 8.9%, and multiple gestation in 2.2%. The mean operative time for the B-Lynch procedure was 53.03 ± 4.58 minutes. The mean estimated postoperative blood loss was 748.34 ± 89.97 mL. Hemoglobin levels before and after delivery averaged 10.55 ± 0.63 g/dL and 9.55 ± 0.70 g/dL, respectively, indicating a mean drop in hemoglobin of 0.99 ± 0.61 g/dL. Blood transfusions were required in 6.7% of patients. Subgroup analysis showed no statistically significant differences in operative time when stratified by age (p = 0.939), gestational age (p = 0.634), BMI (p = 0.697), or mode of delivery (p = 0.061). Similarly, blood loss showed no significant association with age (p = 0.922), gestational age (p = 0.657), BMI (p = 0.117), or mode of delivery (p = 0.405). The mean fall in hemoglobin also did not vary significantly across age (p = 0.725), gestational age (p = 0.595), BMI (p = 0.415), or delivery mode (p = 0.761). Blood transfusion requirements remained statistically insignificant when stratified by age (p > 0.999), BMI (p = 0.677), gestational age (p = 0.669), and mode of delivery (p = 0.694).

**Table 1: Basic demographics and clinical parameters of females enrolled (n = 90)**

| | | Frequency |
|---|---|---|
| Age (Years) | | 29.43±6.77 (18.0-40.0) |
| BMI (kg/m$^2$) | | 25.86±4.30 (19.0-33.0) |
| Gestational age | | 38.73±1.13 (37-40) |
| Parity | Nulliparous | 20 (22.2%) |
| | One | 19 (21.1%) |
| | Two | 38 (42.2%) |
| | Three | 13 (14.4%) |
| Booking Status | Booked | 59 (65.6%) |
| | Unbooked | 31 (34.4%) |
| Mode of delivery | Vaginal | 51 (56.7%) |
| | C-Section | 39 (43.3%) |
| Risk factors for PPH | Placental complications | 16 (17.8%) |
| | History of PPH | 18 (20.0%) |
| | Multi-parity | 8 (8.9%) |
| | Anemia | 23 (25.6%) |
| | Prolonged Labor | 23 (25.6%) |
| | Multiple gestation | 2 (%2.2) |

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**Table 2: Outcome observed during following-up of females (n = 90)**

| | | |
|---|---|---|
| Operative time (minutes) | | 53.03±4.58 (45.0-60.0) |
| Post-op blood loss | | 748.34±89.97 (601.0-898.0) |
| Hb Before delivery | | 10.55±0.63 (9.50-11.60) |
| Hb after 24 hours | | 9.55±0.70 (8.10-10.80) |
| Fall in Hb | | 0.99±0.61 (0.30-3.30) |
| Need for blood transfusion | Yes | 6 (6.7%) |
| | No | 84 (93.3%) |

**Table 3: Comparison of outcome variables between age, gestational age, BMI and MOD**

| | | Operative Time (min) | | p-value |
|---|---|---|---|---|
| | | n | Mean | |
| Age Groups | ≤ 30 | 50 | 53.00 ± 4.75 | 0.939 |
| | >30 | 40 | 53.07 ± 4.42 | |
| Gestational age | 37-38 | 34 | 52.73 ± 4.42 | 0.634 |
| | 39-40 | 56 | 53.21 ± 4.71 | |
| BMI | ≤ 25 | 44 | 53.23 ± 4.77 | 0.697 |
| | >25 | 46 | 52.85 ± 4.44 | |
| Mode of delivery | Vaginal | 51 | 53.82 ± 4.59 | 0.061 |
| | C-section | 39 | 52.00 ± 4.41 | |
| Post treatment blood loss (ml) | | | | |
| Age Groups | ≤ 30 | 50 | 749.18 ± 91.81 | 0.922 |
| | >30 | 40 | 747.30 ± 88.78 | |
| Gestational age | 37-38 | 44 | 744.00 ± 91.19 | 0.657 |
| | 39-40 | 46 | 752.50 ± 89.60 | |
| BMI | ≤ 25 | 34 | 729.23 ± 85.96 | 0.117 |
| | >25 | 56 | 759.95 ± 91.12 | |
| Mode of delivery | Vaginal | 51 | 741.39 ± 86.44 | 0.405 |
| | C-section | 39 | 757.43 ± 94.75 | |
| Fall in Hb | | | | |
| Age Groups | ≤ 30 | 50 | 0.97 ± 0.59 | 0.725 |
| | >30 | 40 | 1.02 ± 0.64 | |
| Gestational age | 37-38 | 44 | 0.95 ± 0.59 | 0.595 |
| | 39-40 | 46 | 1.03 ± 0.63 | |
| BMI | ≤ 25 | 34 | 0.93 ± 0.67 | 0.415 |
| | >25 | 56 | 1.03 ± 0.57 | |
| MOD | Vaginal | 51 | 1.01 ± 0.70 | 0.761 |
| | C-section | 39 | 0.97 ± 0.47 | |
| Need for Blood transfusion | | | | |
| | | Yes | No | |
| Age groups | ≤ 30 | 3(6.0%) | 47(94.0%) | >0.999 |
| | >30 | 3(7.5%) | 37(92.5%) | |
| BMI | ≤ 25 | 2(4.5%) | 42(95.5%) | 0.677 |
| | >25 | 4(8.7%) | 42(91.3%) | |
| Gestational age | 37-38 | 3(8.8%) | 31(91.2%) | 0.669 |
| | 39-40 | 3(5.4%) | 53(94.6%) | |
| Mode of delivery | Vaginal | 4(7.8%) | 47(92.2%) | 0.694 |
| | C-Section | 2(5.1%) | 37(94.9%) | |

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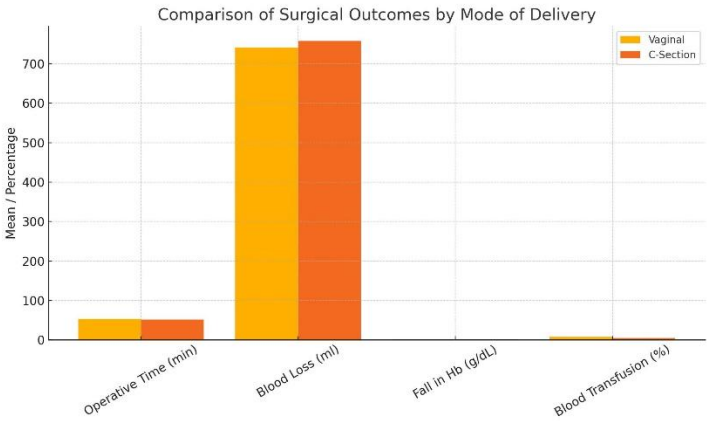


*Figure 1 Comparison of Surgical Outcomes by Mode of Delivery*

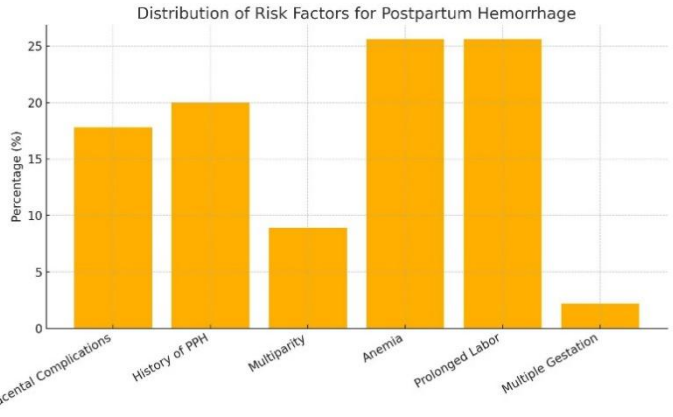


*Figure 2 Distribution of Risk Factors for Postpartum Hemorrhage*

## DISCUSSION

The findings of this study support the effectiveness of the B-Lynch uterine compression suture as a valuable intervention for managing postpartum hemorrhage (PPH) due to uterine atony, particularly in settings where preserving fertility is a clinical priority. The observed outcomes, including a mean operative time of 53.03 ± 4.58 minutes, average blood loss of 748.34 ± 89.97 mL, and a minimal hemoglobin drop of 0.99 ± 0.61 g/dL, align with several earlier reports that advocate for the technique's utility and safety. Prior studies have demonstrated comparable operative times and levels of blood loss, reinforcing the procedural feasibility in both emergency and resource-constrained environments (13,14). Furthermore, the low requirement for blood transfusion in only 6.7% of patients indicates an overall effective hemorrhage control, consistent with earlier findings that reported transfusion needs ranging from 4% to 8% following B-Lynch application (15,16). Several studies have documented B-Lynch success rates between 82% and 95%, underscoring its global relevance as a uterine-sparing technique for managing intractable atonic PPH (17-19). This study complements such literature by adding context-specific data from a local tertiary care setting, where a high proportion of the population remains at increased risk of obstetric complications due to anemia, multiparity, and inadequate antenatal care. These real-world variables strengthen the relevance of the current results, especially considering that 25.6% of patients had anemia and a similar proportion experienced prolonged labor—both significant contributors to PPH.

Comparable studies have reported uterus preservation rates above 90%, with only a minority of cases necessitating hysterectomy. In line with this, the current study reported no need for emergency hysterectomy, indirectly indicating successful hemorrhage control in all enrolled patients. In one referenced study, approximately 94.7% of patients had their uterus preserved, with a single hysterectomy performed due to continued bleeding despite the suture application (19,20). Another study from the region reported slightly lower success rates, between 83% and 91%, which may be attributed to differences in surgical skill, patient comorbidities, and timing of intervention (17,21). Such variation highlights the need for early recognition and prompt surgical response, which was evidently achieved in this study. In addition to its clinical efficacy, the B-Lynch suture offers substantial advantages in terms of procedural simplicity, cost-effectiveness, and its compatibility with cesarean sections. Although variations exist in technique and suture material, the core principle of uterine compression has remained consistently beneficial. Studies comparing different uterine compression techniques found no significant difference in hemostatic outcomes, yet some approaches resulted in lower postoperative pain, shorter hospital stays, and reduced morbidity—factors that could be explored in future comparative research (7).

The strengths of this study include a clearly defined inclusion criterion, consistent surgical technique performed by a single team to eliminate inter-operator variability, and rigorous postoperative monitoring of hemoglobin levels and transfusion requirements. The use of objective measurements for blood loss, such as pad weight estimation, further enhances the credibility of outcome assessment. However, certain limitations must be acknowledged. The study design did not include a comparison group, such as patients receiving alternative surgical interventions or conservative management alone, which restricts the ability to evaluate relative effectiveness. Additionally, long-term reproductive outcomes, including future pregnancies and uterine integrity, were not assessed, which would have

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provided a more comprehensive understanding of the fertility-preserving claim associated with the B-Lynch suture. The single-center nature of the study also limits the generalizability of findings to broader populations with differing obstetric care standards. Despite these limitations, the results underscore the B-Lynch suture's critical role in the timely management of atonic PPH, particularly in women who desire uterine preservation. Future research should incorporate multicenter trials with long-term follow-up to assess reproductive outcomes, patient satisfaction, and comparative effectiveness of different compression techniques. Integrating this knowledge into clinical guidelines can further refine surgical preparedness and improve maternal outcomes in resource-limited and high-risk populations.

## CONCLUSION

The findings of this study conclude that the B-Lynch suture technique is a safe, practical, and effective surgical option for the management of postpartum hemorrhage resulting from uterine atony. It offers significant clinical value by controlling bleeding promptly while preserving the uterus, thus supporting fertility in women of reproductive age. The procedure demonstrated favorable outcomes in key perioperative parameters, reinforcing its role as a reliable intervention in obstetric emergencies. Its application in a local setting further validates its utility and feasibility, contributing valuable evidence to guide practice in similar clinical environments.

**AUTHOR CONTRIBUTION**

| Author | Contribution |
|---|---|
| Arifa Shareef* | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Uzma Hussain | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |

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