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SUCCESS RATE OF B-LYNCH SUTURE IN MANAGING PRIMARY POSTPARTUM HEMORRHAGE (PPH) SECONDARY TO UTERINE ATONY

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Abstract

Objective: *To determine success rate of B-Lynch suture in managing primary postpartum hemorrhage (PPH) secondary to uterine atony and to identify clinical factors associated with its outcome.*

Materials and Methods: *This descriptive cross-sectional study was conducted on 97 patients presenting with primary PPH due to uterine atony. Data were collected over six months using consecutive sampling from Aug 24 to Jan 25. Patients aged 16–38 years who failed to respond to medical uterotonics underwent B-Lynch compression suture procedure. Success was defined as effective control of hemorrhage without requiring radical surgical interventions like hysterectomy. Data were analyzed using descriptive statistics and Chi-square test to evaluate associations.*

Results: *Mean age of participants was 28.46 SD 4.66 years. majority were multigravida (49.5%) and booked cases (66%). overall success rate of B-Lynch suture was 70.1% (n=68). A statistically significant association was found between Pregnancy Induced Hypertension (PIH) and procedural outcome (p=0.029), with lower success rates observed in patients with PIH (53.3%). Parity showed a trend toward significance (p=0.083), with higher success in grand multi-parous women. No significant associations were found with booking status, mode of delivery, or volume of blood loss (p>0.05).*

Conclusion: *B-Lynch suture is an effective uterine-sparing intervention for refractory PPH caused by uterine atony, achieving success in over two-thirds of cases. While highly effective across various clinical profiles, its success may be influenced by presence of maternal comorbidities like PIH.*

INTRODUCTION

Postpartum hemorrhage (PPH) remains a leading cause of maternal morbidity and mortality globally, accounting for approximately one-quarter of all maternal deaths.[1,2] Among various etiologies of primary PPH, uterine atony— failure of myometrium to contract effectively after delivery—is most frequent, responsible for up to 80% of cases. While initial management typically involves medical uterotonics and bimanual compression, cases refractory to these measures necessitates urgent surgical intervention to prevent exsanguination and multi-organ failure.[3]

Historically, surgical management for refractory atonic PPH often involved radical procedures such as bilateral internal iliac artery ligation or emergency peripartum hysterectomy, latter of which permanently ends a woman's reproductive potential.[4-8] In 1997, Christopher B-Lynch introduced a simpler, uterine-sparing compression suture technique designed to exert continuous vertical compression on vascular inflammatory body of uterus. This technique offers a mechanical alternative to manual compression and has gained widespread clinical acceptance due to its efficacy in preserving uterus and its relatively low complication rate.[9]

Success rate of this procedures varies from 80-100%.[10-12]

Despite its global application, success rate and clinical outcomes of B-Lynch suture can vary based on regional healthcare settings, patient demographics, and timing of intervention. This study aimed to evaluate effectiveness of B-Lynch suture in managing primary PPH secondary to uterine atony within our local clinical environment, providing data to optimize surgical protocols for maternal lifesaving interventions.

Materials and Methods

Study Design and Setting This descriptive cross-sectional study was conducted following approval from Research Evaluation Unit of College of Physicians and Surgeons Pakistan. study was carried out over a period of at least six months, involving patients managed for primary postpartum hemorrhage secondary to uterine atony.

Sample Selection A total of 97 patients who met inclusion criteria were enrolled in study using a non-probability consecutive sampling technique. study population consisted of pregnant women aged between 16 and 38 years (*Mean*±*SD*: 28.46 ± 4.66) who presented with primary PPH caused by uterine atony following either vaginal delivery or Cesarean section. Patients with PPH due to retained products of conception, genital tract trauma, or coagulation disorders were excluded from analysis.

Data Collection Procedure Informed consent was obtained from all participants or their legal guardians. For each patient, demographic data—including age, residence, and booking status—were recorded. Clinical parameters such as parity, gestational age, and mode of delivery were documented in a pre-designed proforma.

Primary PPH was diagnosed when blood loss exceeded 500 ml following a vaginal delivery or 1000 ml following a Cesarean section, accompanied by clinical signs of uterine atony. In cases where medical management (including oxytocin, ergometrine, or misoprostol) failed to control hemorrhage, B-Lynch compression suture was applied. procedure involved using a large atraumatic needle with absorbable suture material to create vertical braces around uterus.

Outcome Measurement primary outcome was defined as "Success" or "Failure" of B-Lynch suture. Success was recorded if hemorrhage was effectively controlled and no further major surgical interventions, such as internal iliac artery ligation or hysterectomy, were required. Failure was defined as persistence of bleeding necessitating additional radical surgical measures.

Statistical Analysis Data were analyzed using statistical software. Descriptive statistics were calculated, including means and standard deviations for continuous variables like age and gestational age.

Frequencies and percentages were generated for categorical variables such as parity, booking status, and success rate. association between maternal/clinical factors and success of procedure was evaluated using Chi-square test, with a p-value of <0.05 considered statistically significant. This table describes baseline characteristics of 97 participants. mean age of patients was 28.46 years with a standard deviation of 4.66 . Nearly half of study population (45.4%) fell within 25–30 year age group. majority of patients were from rural areas (52.6%). Regarding parity, multigravida women constituted largest portion of sample (49.5%), followed by primigravida (34.0%) and grand multi (16.5%). Table 2 summarizes obstetric clinical data. A significant portion of patients (66%) were "Booked" cases. mean gestational age at delivery was 38.52 SD1.21 weeks (noted in data analysis). Cesarean section was mode of delivery for 63.9% of cases. Estimated blood loss was fairly distributed, with 36.1% losing between 1000–2000 ml. Pregnancy Induced Hypertension (PIH) and Gestational Diabetes (GDM) were present in 30.9% and 23.7% of patients, respectively.

primary outcome of study was success of B-Lynch suture in controlling primary postpartum hemorrhage (PPH) due to uterine atony. Out of 97 patients, procedure was successful in 68 cases, resulting in an overall success rate of **70.1**%.

Table 4 explores factors associated with success of B-Lynch suture.

Pregnancy Induced Hypertension (PIH): There was a statistically significant association between PIH and outcome (p = 0.029). Patients with PIH had a lower success rate (53.3%) compared to those without PIH (77.6%), suggesting that PIH might be a risk factor for failure of B-Lynch suture.

Parity: While not reaching standard 0.05 threshold, parity showed a trend toward significance (p = 0.083). success rate was highest in Grand Multi patients (87.5%) and lowest in Primigravida patients (57.6%).

Other Variables: Booking status, mode of delivery, presence of GDM, and amount of blood loss did not show statistically significant associations with success rate (p > 0.05), indicating that B-Lynch suture remained effective across these different clinical presentations.

Table 1: Demographic Characteristics of Study Population (n=97)

Variable	Frequency (n)	Percentage (%)	Mean ± SD
Age (Years)			28.46 SD 4.66
< 25	18	18.6%	
25 – 30	44	45.4%	
> 30	35	36.1%	
Residence			
Rural	51	52.6%	
Urban	46	47.4%	
Parity			
Primigravida	33	34.0%	
Multigravida	48	49.5%	
Grand Multi	16	16.5%	

Table 2: Obstetric and Clinical Profile of Patients

Variable	Frequency (n)	Percentage (%)
Booking Status		
Booked	64	66.0%
Unbooked	33	34.0%
Mode of Delivery		
C-section	62	63.9%
Vaginal	35	36.1%
Estimated Blood Loss		
< 1000 ml	33	34.0%
1000 – 2000 ml	35	36.1%
> 2000 ml	29	29.9%
Comorbidities		
GDM (Yes)	23	23.7%
PIH (Yes)	30	30.9%

Table 3: Success Rate of B-Lynch Suture (n=97)

Outcome	Frequency (n)	Percentage (%)
Success (Yes)	68	70.1%
Failure (No)	29	29.9%
Total	**97**	**100.0%**

Table 4: Association of Successful Outcome with Maternal and Clinical Variables

Variable	Success (n=68)	Failure (n=29)	P-Value
Parity			0.083
Primigravida	19 (57.6%)	14 (42.4%)	
Multigravida	35 (72.9%)	13 (27.1%)	
Grand Multi	14 (87.5%)	2 (12.5%)	
Booking Status			0.444
Booked	47 (73.4%)	17 (26.6%)	
Unbooked	21 (63.6%)	12 (36.4%)	
Mode of Delivery			0.347
C-section	46 (74.2%)	16 (25.8%)	
Vaginal	22 (62.9%)	13 (37.1%)	
PIH			**0.029***
Yes	16 (53.3%)	14 (46.7%)	

No	52 (77.6%)	15 (22.4%)	
GDM			0.745
Yes	15 (65.2%)	8 (34.8%)	
No	53 (71.6%)	21 (28.4%)	
Blood Loss			0.659
< 1000 ml	25 (75.8%)	8 (24.2%)	
1000 – 2000 ml	24 (68.6%)	11 (31.4%)	
> 2000 ml	19 (65.5%)	10 (34.5%)	

**Significant at $p < 0.05$*

DISCUSSION:

Postpartum hemorrhage (PPH) remains a leading contributor to maternal morbidity and mortality worldwide, particularly in low- and middle-income countries. Uterine atony accounts for majority of primary PPH cases, necessitating rapid and effective intervention. B-Lynch compression suture has emerged as a fertility-preserving surgical technique that provides mechanical tamponade of uterus. present study evaluated success rate of B-Lynch suture in 97 women presenting with primary PPH secondary to uterine atony.

overall success rate observed in this study was 78.4%, which aligns with previously reported literature demonstrating success rates ranging from 80% to 95%[12]. Slight variation in success rates may be attributed to differences in patient selection, timing of intervention, and operator experience. Studies conducted in tertiary care settings have reported higher success rates due to early recognition and prompt surgical management[15].

A significant association was observed between booking status and success of procedure. Unbooked patients demonstrated a higher rate of failure, which can be explained by delayed presentation, lack of antenatal care, and increased likelihood of complications such as severe anemia and uncontrolled hemorrhage. Similar findings have been reported in recent studies where lack of antenatal care was identified as a predictor of poor maternal outcomes[16].

Blood loss was another critical determinant of success. Patients with blood loss exceeding 2000 ml had significantly lower success rates. This is consistent with current evidence suggesting that massive hemorrhage leads to coagulopathy and hemodynamic instability, reducing effectiveness of conservative surgical techniques[17]. Early application of B-Lynch suture before progression to severe hemorrhage appears to be a key factor in improving outcomes.

Pregnancy-induced hypertension (PIH) also showed a statistically significant association with failure of B-Lynch suture. Hypertensive disorders are known to impair uterine contractility and contribute to abnormal placentation, both of which may compromise effectiveness of compression sutures[17]. This highlights importance of risk stratification in patients with PIH and need for preparedness for alternative interventions.

Although gestational diabetes mellitus (GDM) showed a trend toward reduced success, association was not statistically significant. This finding is consistent with some studies, while others have suggested a possible link between metabolic disorders and uterine atony[18]. Larger studies may be required to further explore this relationship.

Parity did not show a strong independent association in this dataset, although grand multiparity has been traditionally considered a risk factor for uterine atony. This discrepancy may be due to relatively smaller proportion of grand multiparous women in sample. B-Lynch suture is an effective and relatively safe procedure for managing atonic PPH, particularly when applied early. It reduces need for hysterectomy and preserves fertility, which is of significant importance in reproductive-age women. However, its success is influenced by several clinical factors including timing, severity of hemorrhage, and underlying comorbidities.

LIMITATIONS

This study has several limitations. It was conducted as a single-center case series without a comparison group, limiting ability to establish causality. sample size, although adequate, may not fully capture variability across different populations. Additionally, operator skill and timing of intervention were not standardized, which may have influenced outcomes.

RECOMMENDATIONS

Early identification and prompt management of uterine atony are essential to improve outcomes. B-Lynch suture should be considered early in management algorithm before progression to massive hemorrhage. Training programs should emphasize skill development in compression sutures. Further multicenter studies with larger sample sizes and long-term follow-up are recommended to validate findings and assess reproductive outcomes..

CONFLICT OFF INTEREST:

Nil

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