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Research Article

The effectiveness of b-lynch sutures in management of atonic postpartum haemorrhage during caesarean section

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ABSTRACT

Background: Surgical methods of controlling uterine bleeding by inserting compression sutures have been developed to reduce the incidence of emergency hysterectomy and to preserve fertility in patients with atonic postpartum haemorrhage (PPH). The aim of the study was to determine the efficacy of B-Lynch suture in management of atonic PPH and to determine whether timely application of B-Lynch suture in uncontrolled atonic PPH obviates the need for hysterectomy and thus help in pursuing subsequent fertility.

Methods: A prospective observational study of 30 patients who underwent B-Lynch suturing for atonic PPH during lower segment cesarian section (LSCS), refractory to medical line of management was conducted. The amount of blood loss, need for blood transfusion and hysterectomy were noted. The patients were followed-up for 6 months for any late postoperative complications and for any infertility issues.

Results: The procedure was successful in 100% of the cases following failure of medical line of management. None of them required hysterectomy or uterine devascularisation. All patients had uneventful puerperium. No evidence of ischemic necrosis or pyometra on assessment of patients on 6 month follow up.

Conclusions: This procedure proves to be a valuable addition for surgical treatment of atonic PPH and great advantage in young patients with restoration of future fertility with the added advantage of lesser time of application, lesser blood loss, lesser blood transfusion, lesser skill required. Thus, B-Lynch suturing can be adopted as a mid-step before resorting to uterine devascularisation or hysterectomy when medical line of management fails.

Keywords: Atonic postpartum haemorrhage, B-Lynch, Lower segment cesarian section

INTRODUCTION

Postpartum haemorrhage (PPH) is a major cause of worldwide maternal mortality, from 13% in developed countries to 34% in developing countries.¹ It has been estimated worldwide that over 1,25,000 women die of PPH each year.² In India, 25.6% of maternal deaths are due to haemorrhage.³ PPH is defined as blood loss which decreases the hematocrit (Hct) by 10% of the prenatal values or needs a transfusion.⁴

Primary postpartum haemorrhage (PPH) is defined as loss of more than 500 ml of blood from or into the genital tract in the first 24 hours after vaginal delivery or more than 1000 ml following caesarean delivery.⁵ It has been estimated that the incidence is 3.9% in vaginal deliveries and 6.4 % in caesarean.⁵

Uterine atony in which there is failure of the uterine muscle to contract normally following delivery of the baby and placenta is responsible for 70% of all cases of PPH.⁶ Haemorrhage which persists in spite of

conventional treatment will threaten the life of the mother; wherein hysterectomy is resorted to as the last life saving measure. This in turn can be relatively difficult to perform and has the obvious disadvantage of depriving the woman of future fertility. In the recent years interest has surged in the uterine compression sutures as a conservative surgical measure for treating PPH. Uterine compression sutures include a suture that runs through the full thickness of both uterine walls (anterior and posterior). When tied, the suture allows tight compression of the uterine walls and stops the bleeding.⁷ Single or multiple stitches may be inserted at the same time and according to the shape, they may be called Brace suture (B-Lynch) a simple brace (Hayman) or square sutures (Cho).⁸⁻¹⁰ B-Lynch suture originally described by Christopher B-Lynch in has gained utmost popularity. The theory behind this technique is mechanical compression of uterine vascular sinuses that prevent further engorgement with blood and continued haemorrhage.

METHODS

The present study was prospective observational study conducted at Lokmanya Tilak Municipal Medical College and General Hospital, Mumbai from November 2012- November 2014. A total of 30 cases were enrolled till June 2014 and the last case was followed up till November 2014. The data was collected by studying pregnant women who had atonic PPH during LSCS (lower segment caesarean section) in which B-Lynch suturing was done following failure of medical line of management. It included both booked and unbooked patients. The test of potential efficacy for B-Lynch suture application was done by simple bimanual compression after exteriorizing the uterus. If the latter procedure reduces the blood loss, then B-Lynch suture was applied.

Inclusion criteria

Patient undergoing caesarean sections landing up in atonic PPH during LSCS with failure of medical line of management.

Exclusion criteria

- PPH after vaginal delivery
- Secondary PPH
- PPH due to causes other than atonicity
- B-Lynch suture application e. g. in cases of placenta previa

Method of collection of data

A record of patient's age, gravidity and parity, gestation of pregnancy at which the B-Lynch suture was applied, the indication for caesarean section and the cause of primary PPH was kept. A detailed medical history was taken to recognize any contraindication for use of various uterotonics. B-Lynch sutures were taken only when the

atonic uterus failed to respond to medical line of management. Medical line of management included uterotonics i.e. oxytocin, ergometrine, carboprost and misoprostol. Treatment included infusion of 10 units of the oxytocin followed by additional infusion of 20 units of oxytocin, if uterus remained flabby after 5 minutes. If the uterus still remained flabby and bleeding persisted after 10 minutes, inj. methylergometrine 0.25 mg IM (intramuscular) or inj. carboprost 0.25 mg either IM/intramyometrial were further given considering the contraindications for their use. If bleeding still persisted after 15 minutes, tab misoprostol 1000 µgm was administered per rectally. After 20 minutes if the uterus was still atonic and bleeding persisted, bimanual compression was done. If this reduced the blood loss, then B-Lynch suture was applied using a No-2 chromic catgut. Haemoglobin (Hb%), bleeding time (BT) and clotting time (CT) were estimated when patient had atonic PPH during LSCS just prior to B-Lynch suture application.

The blood loss was estimated by measuring the amount of blood suctioned out in suction apparatus after the placental delivery and by mops soaked with blood. The clots and blood from the vagina were collected in a separate kidney tray and measured. Approximately 1 gram of blood clot was considered equivalent to 3 (ml) millilitre of blood loss. The total amount of blood loss was estimated by adding all the values and subtracting the amount of liquor measured following amniotomy.

Bleeding per vaginum and uterine contour were observed for 24 hours post procedure. Hb% was repeated 24 hours after procedure. Blood was transfused depending on intraoperative blood loss and patient's post-procedure Hb%. The amount of blood loss, need for blood transfusion and the need for additional surgical methods like uterine artery ligation, internal iliac artery ligation and hysterectomy to control bleeding were studied in all cases undergoing B-Lynch procedure.

All cases were discharged on tenth day following suture removal. They were followed up till 6 months postpartum (one week after discharge, one month later and six months later). At each visit menstrual history was taken and any complaints like pain in abdomen, foul smelling lochia was asked. General and pelvic examination was done to note any complication like ischemic necrosis of uterus or pyometra. Six patients could be followed up to 18 months postpartum.

The statistical analysis was done using SPSS package. The results are presented in numbers and percentages for qualitative data and average and SD for quantitative data in tables. The student 't' test was used to determine whether there was a statistical difference between two groups in the parameters measured. The p-value of < 0.05 was considered as significant.

RESULTS

Table 1: Demographic and clinical profile.

| Characteristics | Number(n=30) | Percentage (%) |
|-----------------------------------|--------------|----------------|
| Age (years) | | |
| <= 20 | 4 | 13.33 |
| 21-25 | 6 | 20 |
| 26-30 | 17 | 56.67 |
| >30 | 3 | 10 |
| Weight (kg) | | |
| 40-50 | 10 | 33.33 |
| 51-60 | 15 | 50 |
| 61-70 | 4 | 13.33 |
| >70 | 1 | 3.33 |
| Gravidity | | |
| G1 | 15 | 50 |
| G2 | 11 | 36.67 |
| G3 | 04 | 13.33 |
| Gestational age (weeks) | | |
| <32 weeks | 1 | 3.33 |
| 32.1-34 | 5 | 16.67 |
| 34.1-37 | 7 | 23.33 |
| 37.1-40 | 12 | 40 |
| 40.1-42 | 5 | 16.67 |
| Birth weight(kg) N=32 (2 twins) | | |
| < 2 | 6 | 18.75 |
| 2-3 | 14 | 43.75 |
| 3.1-4 | 11 | 34.37 |
| >4 | 1 | 3.12 |

During the study period, a total of 30 patients who underwent B-lynch suturing were studied, as per their demographic criteria and outcome in terms of blood loss, pre and post procedure Hb, subsequent need for blood transfusion and need for hysterectomy. Table 1 shows the demographic and clinical profile of the patients who underwent B-Lynch suturing. The mean age in this study group was 26.6 years and 56.6% were in the age group range of 25-30 years. The mean weight in this study group was 54.7 kg and 50% were in the weight range of 51-60 kg.

Table 4: Mean distribution of blood loss according to gravidity.

| Gravida | N | Mean blood loss | Standard deviation | Minimum | Maximum | P-value |
|---------|----|-----------------|--------------------|---------|---------|---------|
| Primi | 15 | 1173.33 | 198.08 | 1000 | 1800 | 0.00016 |
| Multi | 15 | 1553.33 | 464.24 | 1100 | 2800 | |
| Total | 30 | 1363.33 | 400.41 | 1000 | 2800 | |

There was no significant difference in the preoperative and post-operative Hb at the time of delivery based on the gravidity of the patient (Table 5). The mean pre-procedure Hb was 10.16 gm% and mean post- procedure Hb was 8.15 gm%. The mean difference in pre and post procedure Hb was 2.01 gm% with a significant p-value of

Table 2: Distribution of causative factors for PPH.

| Causative factors | Number | % |
|--|---------------------------|-------|
| Prolonged labour | 10 | 33.33 |
| APH (abruption placenta/placenta previa) | 9 | 30 |
| Prolonged PROM | 6 | 20 |
| Big baby | 2 (1 with GDM) | 6.67 |
| Multiple pregnancy | 2 (1 with polyhydramnios) | 6.67 |
| Chorioamnionitis | 1 | 3.33 |
| Total | 30 | |

Table 3: Distribution according to blood loss.

| Blood loss (in ml) | Number (n=30) | Percentage |
|--------------------|---------------|------------|
| 1000-1500 | 23 | 76.67 |
| 1501-2000 | 5 | 16.67 |
| 2001-2500 | 1 | 3.33 |
| >2500 | 1 | 3.33 |

Primigravida constituted 50% of the patients in our study group. In this study group, 56.67% were term pregnancies whereas 43.33% were preterm pregnancies with a mean gestational age was 37.5 weeks. 43.75% babies had birth weight in the range of 2-3 kg, and those weighing more than 3 kg constituted 37.5% of cases. The mean birth weight in this study group was 2.7 kg, the range being 1.2 kg - 4.2 kg. The major risk factor accounting for atonic PPH was prolonged labour (33%), followed by APH (30%) and prolonged PROM (20%) (Table 2). The mean blood loss in our study was 1363 ml, the range being 1000 ml to 2800 ml. Majority (76.67%) had blood loss in the range 1000-1500 ml whereas only 6.67% had a blood loss of more than 2000 ml which can be attributed to timely application of B-Lynch suture (Table3). The mean blood loss in primigravida was 1173 ml (range being 1000ml-1800ml) and in multigravida was 1553ml (range being 1800ml-2800ml). There was a significant difference (p <0.05) in the mean blood loss in primigravida and multigravida (Table 4).

<0.001 (Table 6). 60% of the women had a decrease in Hb by 0.5-1 gm%, while 23.33% patients had a decrease in Hb by >1gm% .However only one case had a decrease in Hb by more than 2 gms%. (Table 7). The need for blood transfusion was dependent both on the pre operative Hb% and the amount of blood lost during the

operation. 40% of the patients required 1 unit whereas 23.33% needed ≥ 3 units blood transfusion.

16.67% of the patients did not need any blood transfusion, reflecting the effectiveness of B-Lynch suture in reducing the blood loss and obviating the need for blood transfusion (Table 8).

Table 5: Mean distribution of pre and post-operative Hb values according to gravidity.

| | | N | Mean | Standard deviation | P-value |
|----------------|-------|----|-------|--------------------|---------|
| Pre-operative | Primi | 15 | 10.19 | 1.21 | 0.839 |
| | Multi | 15 | 10.13 | 2.26 | |
| Post-operative | Primi | 15 | 8.21 | 0.99 | 0.278 |
| | Multi | 15 | 8.08 | 1.11 | |

Table 6: Mean distribution of Hb values.

| | N | Mean | Standard deviation | Mean difference | P-value |
|------------|----|-------|--------------------|-----------------|---------|
| Pre-op Hb | 30 | 10.16 | 1.78 | 2.01 | 0.000 |
| Post-op Hb | 30 | 8.15 | 1.04 | | |

Table 7: Distribution according to decrease in Hb% during LSCS.

| Decrease in Hb (gm%) | Number (n=30) | Percentage (%) |
|----------------------|---------------|----------------|
| <0.5 | 5 | 16.67 |
| 0.5-1 | 18 | 60 |
| 1.1-1.5 | 5 | 16.67 |
| 1.6-2 | 1 | 3.33 |
| >2 | 1 | 3.33 |

Table 8: Distribution of units of blood transfusion.

| No. of units of blood transfusion | Number | Percentage |
|-----------------------------------|--------|------------|
| No blood transfusion | 5 | 16.67 |
| 1 unit blood transfusion | 12 | 40 |
| 2 units blood transfusion | 6 | 20 |
| ≥ 3 units blood transfusion | 7 | 23.33 |

Table 9: Distribution of outcome.

| Outcome | Number | Percentage |
|-----------------------------------|--------|------------|
| Successful (hysterectomy avoided) | 30 | 100 |
| Failure (hysterectomy done) | 00 | 00 |

DISCUSSION

Primary PPH is a common obstetric emergency which can lead to emergency hysterectomy in patients with treatment resistant, life threatening bleeding. Surgical methods of controlling uterine bleeding by inserting compression sutures have been developed to reduce the

The procedure was successful in 100% of the cases avoiding hysterectomy in these patients (Table 9).

Follow-up

None of the patients developed any complications like ischemic necrosis of uterus or pyometra during follow-up period.

incidence of emergency hysterectomy and to preserve fertility in these patients. In this study, we have evaluated B-Lynch suture technique for achieving uterine compression in PPH during caesarean section.

The special attributes and features of B-Lynch suture

- Simplicity of application.
- Life saving potential.
- Relative safety.
- Capacity for preserving the uterus and thus subsequent fertility.
- Satisfactory hemostasis can be assessed immediately after application.
- Its tensile strength is reduced in 48hrs, so it exerts no permanent damage to uterus.
- Effective when applied in the hypotensive patient (compression hemostasis). On return of normal pulse pressure, hemostasis is maintained
- If the procedure fails, other radical procedures can always be considered.
- The timely application of this suture also reduces the need for blood transfusion and its associated complications.

The various parameters of our study are compared with other studies as follows (Table 10).

Age

The mean age in our study was 26.6 years which was similar to the study of Nalini et al (28 years) and contrary to the finding of Koh et al (35 years) which can be explained by elderly gravid status leading to atonicity and thus PPH.^{13,16} Our finding could be because of early

marriage and early conception in the low socio economic population our hospital serves to.

Gestational age

The mean gestational age in our study was 37.5 weeks which is similar to most other studies.

Mean blood loss

The mean blood loss was 1363 ml which was similar to mean blood loss (1480 ml) in study of Tariq et al and much lesser than in study by Allahdin et al.^{15,17} This might be the result of difference in the threshold to resort to uterine compression suturing when medical management fails in achieving adequate uterine retraction. This finding also explains that timely application of B-Lynch sutures decreases blood loss and need for transfusion.

Hb

The mean difference in pre and post procedure Hb was 2.01 gm% with a significant p value of <0.05, which is more as compared to the findings of Vachani et al (0.8).¹⁵ The mean difference also depends on the timing of post operative Hb.

Birth weight

The average birth weight in our study was 2.7 kg in comparison to 3.5 kg in study by Allahdin et al.¹⁴ Larger babies predispose to uterine atony and thus PPH. Our finding could have been contrary due to the fact that

maximum patients were from low socio economic strata and thus a lower average birth weight. Most of the cases of prolonged labour had birth weight >3 kg, and two had >4 kg. Low birth weights in APH and preterm twins brought down the mean value to 2.7 kg.

Success rate

Success rate in our study was 100% with similar results in study by Pal et al and Vachani et al.^{11,12} None of the patients required hysterectomy as PPH was controlled with B-Lynch sutures. However sample size in these two studies was small 7 and 6 respectively. In the study by Nalini et al, success rate was approximately 97%. Success rate with B-Lynch in other studies ranged from 80 to 95%.^{12,13,17}

Follow up

None of the patients developed any complications like ischemic necrosis of uterus or pyometra. This finding was similar as in the study by Nalini et al where out of 75 cases, 62 were followed up till 3 months.¹⁶ However few isolated cases have been reported in literature. Grotegut et al reported the erosion of a B-Lynch suture through the uterine wall at 6 weeks postpartum.¹⁸ Also 3 cases of uterine necrosis have been reported at different time intervals. Partial ischemic necrosis of the uterus following 12 hours after caesarean section with B-Lynch suturing has also been reported by Joshi et al.¹⁹ Gottlieb et al reported a case of fundal necrosis on postoperative day 8 following post compression sutures.²⁰ Treolar et al reported a case of uterine necrosis following B-Lynch suture at 3 weeks postpartum.²¹

Table 10: Comparative table showing different study outcomes.

| Study | Sample size | Mean age (years) | Gestational age (weeks) | Blood loss (ml) | Hb diff (in gm%) | Baby wt (kg) | success rate (%) |
|------------------------------|-------------|------------------|-------------------------|-------------------|------------------|---------------|------------------|
| Pal et al ¹¹ | 6 | | | | | | 100% |
| Vachani et al ¹² | 7 | 20 (19-23) | 38 | - | 0.8 (0.3-1.8) | - | 100 |
| Koh et al ¹³ | 7 | 35 (33-41) | 36.8 | 2200 (800-5000) | - | - | 86 |
| Ghodake et al ¹⁴ | 31 | - | - | - | - | - | 93.56 |
| Allahdin et al ¹⁵ | 11 | 31 (25-38) | 38 | 3500 (2000-10000) | - | 3.5 (2.1-4.8) | 72 |
| Nalini et al ¹⁶ | 72 | 28 | 38 | - | - | - | 97.3 |
| Tariq et al ¹⁷ | 60 | 28.8 | 38 | 1480 (500-2000) | - | - | 95 |
| Present study | 30 | 26.6 (20-35) | 37.5 | 1363 (1000-2800) | 2.01 (0.6-3.4) | 2.7 (1.2-4.2) | 100 |

CONCLUSION

This observational study was conducted with the intention of determining whether B-Lynch suture is effective in controlling PPH due to uterine atony during caesarean section, when medical line of management fails. Our study shows that B-Lynch procedure is an

effective method of controlling atonic PPH resistant to medical management. It proves to be a valuable addition for surgical treatment of PPH and great advantage in young patient with restoration of future fertility with the added on advantage of relative simplicity and ease of application lesser time of application, lesser blood loss, lesser blood transfusion, and lesser skill required. It

should be attempted as early as possible in order to maximize its success and prophylactic application should always be considered in patients at high risk of atonic PPH. Application of a B-Lynch suture should be taught to all trainees and registrars in obstetrics.

Thus, we can adopt B-Lynch suture as a mid-step before resorting to uterine devascularisation or hysterectomy when medical line of management fails.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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