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Original Research Article

## Study of efficacy of compression suture in the surgical management of atonic PPH

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### ABSTRACT

**Background:** Study was conducted to analysis efficacy of compression suture in the surgical management of Atonic PPH. It's prospectively carried out with 60 cases required compression suture in managing Atonic PPH. Atonic uterus is preventable cause of maternal mortality and morbidity constituting 80% PPH cases.

**Methods:** Prospective study carried out at tertiary care center for studying efficacy of compression suture in the surgical management of atonic PPH for one year, started after approval from ethical committee.

**Results:** Compression suture is effective in managing atonic PPH. out of 60 cases, 4 patient's required obstetric hysterectomy as a last resort to control Atonic PPH. Uterus was conserved in 93.3% of cases.

**Conclusions:** Development of compression suture technique has proved to be effective in the control of massive Atonic PPH not responding to medical management is an alternative to hysterectomy when timely applied. It proves to be valuable addition for surgical treatment of PPH and for saving uteri after medical management of PPH failed. Authors can adopt compression suture as a mid-step before resorting to uterine devascularisation or hysterectomy when medical line of management fails. Resident doctors in teaching institutes must be well trained in this technique.

**Keywords:** Atonic PPH, Compression sutures, Devascularisation, Hysterectomy

### INTRODUCTION

Postpartum hemorrhage means 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.<sup>1</sup> But intraoperative estimation of blood loss is notoriously inaccurate. Thus, the American College of Obstetricians and Gynecologists defines it as a decrease in hematocrit of more than 10% from the predelivery status.<sup>2</sup>

In India 25.6% maternal death is due to postpartum hemorrhage.<sup>3</sup> Postpartum hemorrhage (PPH) is an obstetric emergency that occurs in 1 to 5% of both vaginal and caesarean deliveries, with sequel such as hemodynamic shock, renal failure, acute respiratory

distress syndrome, coagulopathy, and Sheehan's syndrome.

Atonic uterus is preventable cause of maternal mortality and morbidity constituting 80% PPH cases. The traditional management of this condition begins with conservative methods like bimanual compression, uterine massage, medical therapy with uterotonic agents, uterine tamponade with balloons and occasionally arterial embolisation, the failure of which often mandates surgical intervention. Surgical measure such as ligation of major pelvic vessels demands a rarely used skill possessed by few registrars. In the event of intractable hemorrhage despite the above measures, hysterectomy is usually final resort. To overcome PPH in 1997 Balogun Lynch Christopher described use of uterine compression

stitch to uterine atony in massive obstetrics hemorrhage with objective of compressing the uterus without devascularisation. Since its invention in 1997, the B-lynch technique has been used successfully in approximately 1,300 cases worldwide.<sup>4</sup> There are other types of compression sutures also like Pereria suture, Cho suture. This study aims studying the effectiveness of compression suture in the surgical management of atonic PPH. As it's a tertiary care institute with huge load of obstetrics, author decided to conduct the study on compression suture in control of atonic PPH and to study its types and its efficacy in terms of uterine saving surgery, to study commonly applied compression suture in management of atonic PPH and study effects and side effects of the compression suture.

## METHODS

Present study is prospective study carried out at tertiary care center for studying efficacy of compression suture in the surgical management of atonic PPH for 1 year. Study has been started after approval from ethical committee.

### Inclusion criteria

- All patients of atonic PPH who required surgical management in the form of compression suture.
- Patients delivered vaginally or by caesarian section landing in atonic PPH who required compression suture.

### Exclusion criteria

- Patients referred from outside with compression suture.
- Patients of traumatic PPH.
- Patients of PPH due to coagulation failure.

### Statistical analysis

Maternal and fetal outcome were recorded. In case of maternal death time interval between intervention and

death recorded. Detail analysis of maternal deaths was done. Statistical analysis was done as percentage. The data of patients were collected, compiled and entered in MS Excel 2008 worksheet.

## RESULTS

Compression suture was required in 50% of the cases in primipara patients in study population because of the associated risk factor in primipara landing in atonic PPH. From present study it was seen that incidence of atonic PPH requiring compression suture in primipara and multipara was almost same. Hence 50% were primipara and 46.6% were multipara. Hence from this, authors conclude that parity do not influence as etiology for atonic PPH.

**Table 1: Distribution of cases according to parity.**

Parity	No. of cases (n=60)	%
Primi	30	50
Multipara	28	46.6
Grandmultipara	2	3.3
Total	60	100

In present study, LSCS was mode of delivery in 88% cases, vaginal was mode of delivery in 6.7% and outside delivery in 5%. Hence compression sutures applied in LSCS for managing atonic PPH. Authors conclude in present study that majority of compression suture were seen in LSCS patients.

**Table 2: Distribution of cases according to mode of delivery.**

Mode of delivery	Number of cases (n=60)	%
Vaginal	4	6.7
Lscs	53	88.3
Outside delivery	3	5
Total	60	100

**Table 3: Distribution of causative factors for PPH among study population.**

Causative factors	Primipara	Multipara	Total cases (n=60)	%
Abruption	5	8	13	16.67
Placenta previa	2	5	7	8.9
Severe pre-eclampsia	8	8	16	20.5
Eclampsia	3	2	5	6.4
Prolonged labour	4	1	5	6.4
Failure of induction	3	2	5	6.4
Prolonged PROM	3	2	5	6.4
Big baby	3	1	5	5.13
Multiple pregnancy	3	1	4	5.13
Thrombocytopenia	4	0	4	5.13
Others	4	6	10	12.82
Total	42	36	78	100

n=60 this number is not matching in Table 3 because risk factors for Atonic PPH >1 in few cases. Example, Primi gravida with eclampsia with abruption with failure of induction. Major risk factor accounting to postpartum haemorrhage in primi para was severe pre-eclampsia, eclampsia and abruption. Major risk factor accounting to Post-Partum Hemorrhage in multipara was severe pre-eclampsia, abruption and placenta previa.

**Table 4: Distribution according to amount of blood loss.**

Blood loss	No. of cases	Percentage
Class 1 <1000 ml	9	15
Class 2 1500-1001 ml	26	43.3
Class 3 1501-2000 ml	16	26.6
Class 4 2001-2500 ml	9	15
Total	60	100

43% of the patients had blood loss in the range of 1000 to 1500ml which can attribute to timely application of compression suture. Amount of blood loss is measured by collecting blood in kidney tray and measuring it. Authors conclude in present study timely application of compression sutures has reduced the blood loss, thus thereby contributing in management of atonic PPH.

**Table 5: Distribution of cases according to time interval between PPH and compression suture.**

Total time interval	No. of cases (n=60)	Percentage
<2 hours	56	93.3
>2 hours	4	6.6
Total	60	100

Maximum cases (56) underwent Compression suture for PPH in less than 2 hours. Among the 4 cases 3 cases were referred from outside and one delivered in present institute had atonic PPH after 2 hours. Maximum time interval between PPH and compression Suture was 5 hours. Authors conclude in present study timely application of compression sutures has reduced the blood loss, thus thereby contributing in management of atonic PPH.

**Table 6: Distribution according to type of compression suture.**

Type of compression suture	No. of cases (n=60)	Percentage
B Lynch suture	8	13.3
Arulkumaran and Hayman suture	45	75
Pereria suture	1	1.6
Cho suture	6	1
Total	60	100

Most commonly applied compression suture study population is modified B lynch (Arulkumaran and

Hayman suture) in the 75% of the cases because of the simplicity of the application, easy technique for beginners to apply thereby aids in managing atonic PPH. While 1.6% cases underwent Pereria suture, 10% cases underwent cho suture, Pereria suture, cho suture are difficult technique as compared to Arulkumaran and Hayman suture.

**Table 7: Distribution of cases according to associated procedure performed.**

Procedure	No. of cases (n=60)	%
Compression suture alone	38	63.3
Vaginal exploration followed by compression suture	3	5
Compression suture followed by internal iliac artery ligation	15	25
Compression suture followed by obstetrics hysterectomy	4	6.7
Total	60	100

In present study PPH was controlled by compression suture in 63% cases. Most common associated procedure was compression suture with Internal Iliac Artery Ligation (IIAL). 5% cases had vaginal exploration followed by compression suture, 25% case had compression Suture followed by internal iliac artery ligation, 6.7% case had compression suture followed by obstetrics hysterectomy. Hence authors conclude that Atonic PPH is managed alone by compression sutures in present study.

**Table 8: Distribution of cases showing efficiency of compression suture as uterine salvage surgery.**

Uterine salvage	No. of cases (n=60)	Percentage
Uterine conserved	56	93.3
Hysterectomy	4	6.7
Total	60	100

Out of 60 cases only 4 patients required obstetric hysterectomy as a last resort to control Atonic PPH. Uterus was conserved in 93.3% of cases. So, authors conclude that in present study application of compression sutures for managing atonic PPH aids in conserving uterus.

**Table 9: Distribution of cases according to complications.**

Type of complication	No. of Cases	
Minor	Fever	4
	Wound Gape	2
	Haematoma	0
Major	Vesicovaginal fistula	0
	Deep vein thrombosis	0
	Uterine wall necrosis	0

In present study out of 60 patients four patients had post-operative pyrexia and two patients had wound gape. No patient had major complication. Relaparotomy is not required in any of the cases. So, authors conclude that surgical management of atonic PPH that is compression sutures has no major complication like vesico vaginal fistula, deep vein thrombosis, uterine wall necrosis

## 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 incidence of emergency hysterectomy and to preserve fertility in these patients. While treating massive atonic postpartum hemorrhage minute to minute evaluation of patient is very essentials at no cost patient should be subjected to medical line of management if golden period for medical management is crossed. In failed medical method immediate switch over to intrauterine tamponade and compression sutures. In this study; authors have evaluated different types of compression suture technique for achieving uterine compression in atonic PPH. The technique is easy to perform during emergency condition

at caesarean section. They are safe and relatively inexpensive procedure. Furthermore, the procedure enabled to avoid emergency peripartum hysterectomy and thus preserve their fertility and obviate any other surgical complications of hysterectomy in these circumstances. The timely application of this suture also reduced the need for blood transfusion and its associated complications. The various parameters of present study have been compared with other studies:

**Table 10: Mode of delivery.**

Study	Mode of delivery	
	Vaginal	LSCS
Quahba et al <sup>6</sup>	3	17
Khatoon et al <sup>5</sup>	9	6
Kulsange P et al <sup>15</sup>	7	46
Present study	7	53

In Khatoon study compression suture was applied on 9 cases (60%), after vaginal delivery and on 6 cases (40%) during LSCS as sample size was less in the study.<sup>5</sup> In Quahba, Punam and present study compression suture was most commonly applied after LSCS.<sup>6,15</sup> This may be because of aggressive management of PPH during LSCS.

**Table 11: Causative factors.**

Causative factors	Nalini et al <sup>7</sup>	Kulsange P et al <sup>15</sup>	Kalkal N et al <sup>16</sup>	Present study
Abruption	4	0	9	13
Placenta previa	0	8	0	7
Severe pre-eclampsia	17	16	0	16
Eclampsia	8	4	0	5
Prolonged labour	18	6	10	5
Failure of induction	0	0	0	5
Prolonged PROM	0	7	6	5
Big baby	0	0	0	4
Multiple pregnancy	7	0	2	4
Thrombocytopenia	0	0	0	4
Others	9	9	3	10

**Table 12: Amount of blood loss.**

Study	Blood loss (ml)
Allerhdin et al <sup>14</sup>	3500
Hackenthal et al <sup>10</sup>	2500 (2000-3500)
Koh et al <sup>4</sup>	2200 (800-5000)
Tarq et al <sup>8</sup>	1500-2000
Marasingh et al <sup>9</sup>	1800-2200
Kalkal N et al <sup>16</sup>	1000-1500
Present study	1000-1500

In Nalini study main pathology during pregnancy responsible for PPH was prolonged labour followed by pre-eclampsia in Punam study most common causative

factor was pre-eclampsia.<sup>5,7</sup> In Nidhi study most common causative factor was prolonged labour followed by abruption. In present study most common causative factor was severe pre-eclampsia followed by abruption.

Average blood loss was 1000-1500 ml which is comparable to mean blood loss in Nidhi, Tarq, and Marasingh study and much lesser than other studies. (Allerhdin, Hackenthal, Koh).<sup>4,8-10,14,16</sup> 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 compression sutures decreases blood loss and need for transfusion.

**Table 13: Success rate of compression suture.**

Study	Success rate (%)
Allerhdin et al <sup>14</sup>	72
Mohini et al <sup>11</sup>	100
Quahba et al <sup>6</sup>	95
Hackenthal et al <sup>10</sup>	100
Koh et al <sup>4</sup>	86
Khatoon et al <sup>5</sup>	93.2
Tarq et al <sup>8</sup>	95
Marasingh et al <sup>9</sup>	75
Majumdar et al <sup>12</sup>	100
Anamika et al <sup>12</sup>	100
Kulsange P et al <sup>15</sup>	94
Kalkal N et al <sup>16</sup>	93.3
Present study	93.3

Success rate in present study was 93.3% with similar results in study by Quahba, Khatoon, Tarq, and Punam and Nidhi.<sup>5,6,8,15,16</sup> Only 4 patients required hysterectomy as PPH was not controlled with compression suture. Study conducted on compression suture to control PPH by Mohini, Hackenthal, Mujumdar, Anamika shows 100% success rate.<sup>10-12</sup> Success rate with compression suture range from 82-95%. The difference in success rate could be because of difference in patient selection criteria.

**Table 14: Complication.**

Complication	Ghodake et al <sup>13</sup>	Kulsange P et al <sup>15</sup>	Present study
Fever	5	2	4
Wound gape	3	1	2
Hematoma formation	0	0	0
Deep vein thrombosis	0	0	0
Vesico vaginal fistula	0	0	0
Uterine wall necrosis	0	0	0

Prospective study conducted by Ghodake 31 patients underwent compression suture out of which 5 patients had post-operative pyrexia, 3 patients had surgical wound gape. In Punam study, 50 patients underwent modified B-lynch compression suture, 2 patient had post-operative pyrexia and 1 patient had wound gape.<sup>5</sup> In present study 60 patient underwent compression suture, 4 patients had post-operative pyrexia and 2 had wound gape.

The special attributes and features of compression suture are:

- Simplicity of application.
- Lifesaving 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 procedure can always be considered.

In conclusion, present initial series of cases of PPH treated with compression suture procedure shows that it is an effective method of controlling PPH. 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 compression suture should be taught to all trainees and registrars in obstetrics. Its relative simplicity and ease of application, its life saving potential, relative safety and above all its capacity for preserving the uterus, make it the recommended procedure of choice if conservative measures do not control PPH, and should be attempted before any radical surgery is considered.

## CONCLUSION

This study evaluates the use of compression suture in the management of Atonic PPH, after vaginal delivery and during caesarean section with failed medical management. The evaluation was done in terms of efficacy of methods in reducing the blood loss and obviating the need for hysterectomy in total number of 60 cases. Compression sutures in treatment of Atonic PPH, after failed medical methods is the boon to treat and prevent further blood loss. It is a uterine conserving surgery in massive Atonic PPH. Postgraduate students in Obstetrics and Gynecology should be trained in using compression sutures. Among the different compression sutures; Modified B-Lynch i.e.; Hayman and Arulkumar suture is simple easy technique to apply for beginners and experts. Sooner the later, principle works in taking compression sutures within a time period prior to developing an irreversible shock. Short term complication are negligible, long term complications in the form of ischemia, necrosis are not reported much in literature.

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