

To Assess the Effectiveness of Uterine Compression Sutures for the Management of Postpartum Haemorrhage

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Abstract

Aim: To compare and evaluate the effectiveness of different types of conservative surgical suture in the management of PPH (postpartum haemorrhage) after failed medical treatment. *Settings and Design:* Retrospective study at tertiary care hospital in Chandigarh and New Delhi. *Methods and Material:* Total of 62 women were included in the study, encountered over period from December 2004 to December 2016, in whom different types of conservative surgical sutures were used in combination with or without devascularisation technique for the management of PPH not responding to medical treatment. *Statistical analysis used:* Categorical variables are presented in number and percentage (%) and continuous variables are presented as mean \pm SD. *Results:* Different conservative surgical sutures used in the management of PPH were effective in 80.64% of cases (50/62). The success rate of conservative compression sutures with devascularisation techniques was 91.93% (57/62). The most common cause of PPH encountered during caesarean delivery was uterine atony (51/62, 82.25%) followed by placenta praevia (11/62, 17.74%) in our study. The success rate for U shaped compression suture in cases of uterine atony was (19/22) 86.36% and B-Lynch was 10/12 (83.33%). *Conclusions:* Conservative surgical sutures with or without devascularisation

technique are an effective method for the management of postpartum haemorrhage not responding to medical treatment.

Keywords: PPH (postpartum haemorrhage); Compression suture; Hysterectomy.

Introduction

Postpartum haemorrhage (PPH) is a life - threatening emergency encountered both during vaginal and caesarean deliveries in around 1-5% of cases [1,2] resulting in maternal morbidity and mortality especially in developing countries. Atonicity is the most common cause of PPH accounting for 80% of cases [3,4]. Other causes include *Trauma. Bleeding diatheses, Tissue related-* as retained tissues, drugs and placenta praevia alone or in combination.

The aim of our study is to compare and evaluate the effectiveness of different conservative surgical sutures in treating patients with PPH not responding to medical treatment during caesarean delivery.

Materials and Methods

The present study retrospectively reviewed the case

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sheets of all the patients of PPH encountered during caesarean delivery that required conservative surgical sutures in combination with or without devascularisation technique upon failure of medical treatment between December 2004 to December 2016 in Government Medical College, Chandigarh and Post Graduate Institute of Medical Sciences and Research, ESI Hospital, New Delhi. Total of Sixty two women with PPH due to atonicity and other causes, who were treated with conservative surgical sutures in combination with or without devascularisation technique were identified and included in the study. All the relevant details of patients as clinical diagnosis, laboratory reports, cause of PPH and surgical procedures required were evaluated in detail from the case sheets.

The suture material used was No. 1 vicryl. Conservative surgical sutures applied following unsuccessful medical management in cases of vaginal delivery were excluded from the study. The study was approved by the institutional ethical committee.

Results

The mean age of the women was 32.5 years (range 19 to 40 years) (Table 1). Mean haemoglobin concentration before delivery was 11.5 ± 0.71 g/dl and after delivery was 10 ± 1.41 g/dl. The mean gestational age was 38.4 ± 1.13 weeks. 43.54% of patients were primiparous and 56.45% of patients were multiparous. PPH not responding to medical management were encountered in 32.25% of elective caesarean deliveries and 67.74% of emergency caesarean deliveries. Table 2 summarizes the details of various sutures used.

Different combination of conservative surgical sutures with or without devascularisation techniques successfully controlled life threatening PPH in 91.93% (57/62) of patients, thus obviating the need for hysterectomy. Ten women underwent B-Lynch sutures alone, nineteen had U shaped sutures alone and nine had Cho sutures alone. Rest had different combination of conservative surgical sutures. Eleven women had B lynch, U shaped or Cho compression suture in combination with bilateral uterine artery ligation and seven women had different combination of sutures with unilateral uterine artery ligation. Conservative surgical sutures in combination with unilateral uterine artery ligation were highly effective in managing PPH in 80.64% (50/62) of patients. A haemostatic suture in the shape of square resembling Cho suture but applied only on the anterior or posterior uterine surface in combination with Cho suture were successful in all the patients of placenta praevia to control bleeding. All the women tolerated the procedure well. Blood transfusion was required in twelve patients to prevent haemodynamic decompensation. All measures including compression sutures and devascularisation failed in five women who underwent hysterectomy. All patients recovered well in the postoperative period and were discharged in a fit condition with advice to come for regular follow.

The most common cause of PPH was uterine atony (51/62, 82.25%) followed by placenta praevia (11/62, 17.74%) in our study. The success rate for U shaped compression suture used alone was (19/22) 86.36% and B-Lynch was 10/12 (83.33%) in patients with uterine atony. In placenta praevia cases, Cho sutures were found more effective in combination with haemostatic square sutures on the placental bed.

Table 1: Maternal Demographic and characteristics

Characteristics	Mean (n=62)
Age (y)	32.5 \pm 10.6
Parity	
Primiparous (n,%)	27 (43.54%)
Multiparous (n,%)	35 (56.45%)
Singleton pregnancy (n,%)	55 (88.70%)
Twin, Triplet pregnancy (n,%)	5 (8.06%), 2 (3.22%)
Mode of delivery (n,%)	
Elective CS (n,%)	20 (32.25%)
Emergency CS (n,%)	42 (67.74%)
Period of gestation (weeks)	38.4 \pm 1.13
Estimated blood loss (ml)	1050 \pm 70.71
Predelivery Hb (g/dl)	11.5 \pm 0.71
Postdelivery Hb (g/dl)	10 \pm 1.41

Abbreviations: N = Case Number, Hb = Haemoglobin, CS = Caesarean Section

Table 2: Details of Conservative surgical sutures and diagnosis

C. No.	Age (y)	Parity	GA (wks)	Delivery Mode	Diagnosis	TBL	T	Procedure
1	40	P	39.2	CS	P.P	1000	No	C, C (only on ant.)
2	29	M	32.4	CS	Transverse lie	900	No	U, B/L ut. art lig.
3	31	M	38	CS	Prev.2 CS with MSL	1100	No	U, U/L ut. art lig.
4	25	M	35.1	CS	P.P	1100	No	U, C, B/L ut. art & Ovarian art. Lig.
5	21	M	39	CS	FD	700	No	C, B/L ut.art. Lig.
6	19	P	39.2	CS	FD	800	No	B-Lynch
7	34	M	40	CS	Cord presentation	800	No	B-Lynch
8	25	M	37.5	CS	CPD in labour	800	No	U, Rt ut.art. Lig.
9	30	M	37	CS	Prev. CS NWVBAC	2000	Yes	failed B-Lyn & Dev., Hysterectomy
10	31	M	39	CS	P.P	1200	Yes	failed U & Dev., Hysterectomy
11	28	P	37.5	CS	PROM WITH FD	800	No	U
12	25	P	40.3	CS	Failed induction	900	No	U
13	25	M	37.5	CS	P.P	1000	No	C, Lt Ut.art. Lig.
14	33	M	38	CS	Prev. CS, FD	800	Yes	B-Lynch
15	24	P	38	CS	Failed induction	1000	No	B-Lynch
16	26	M	37	CS	P.P	1100	No	C, C (only on posterior surface LUS)
17	28	P	37	CS	Twin	900	No	U
18	29	M	39	CS	Twin	800	No	U
19	25	P	38	CS	Transverse lie in labour	1000	No	B-Lynch
20	26	M	34.2	CS	Triplet	1100	No	B-Lynch
21	20	M	36	CS	Failed induction	1100	No	B-Lynch
22	22	M	36.2	CS	FD	1200	No	U
23	24	M	37	CS	FD	900	No	U, Rt ut.art. Lig.
24	26	M	38	CS	FD	900	No	U
25	23	M	39	CS	FD	1100	No	U
26	24	M	40	CS	Prev CS, ST	1200	No	U,C
27	27	P	40.2	CS	Breech	900	No	U,C
28	30	M	36	CS	Prev.CS NWVBAC	1000	No	U
29	32	M	34	CS	Prev. CS, ST	900	Yes	U, L ut.ar.lig.
30	32	M	37	CS	Prev. CS, ST	1000	No	C, Lt Ut.art. Lig.
31	27	M	37.4	CS	Prev. CS, ST	1000	No	U
32	30	P	37.2	CS	P.P	1200	No	C
33	28	P	37.6	CS	Twin	1100	No	U
34	25	M	38	CS	FD	900	No	B-Lynch
35	26	P	38.2	CS	P.P	1300	No	B Lynch, B/L ut.art.lig
36	26	P	34.2	CS	Breech	1000	No	B-Lynch
37	25	P	36	CS	Twin	1000	Yes	U, L ut.ar.lig.
38	23	M	36.6	CS	FD	900	No	U
39	22	M	34	CS	Prev. CS NWVBAC	1100	No	U
40	24	M	35.5	CS	Prev. 2. CS	1200	No	U
41	26	M	32.6	CS	Breech	800	No	U
42	26	M	34.4	CS	Prev. 2 CS with MSL	2500	No	Failed B Lyn & Dev., Hysterectomy
43	27	M	37.4	CS	Prev. CS, ST	800	No	U,C
44	28	P	38	CS	FD	900	No	U,C
45	29	P	39.1	CS	NPOL	1000	No	B Lynch, U/L ut.art.lig
46	20	M	39.3	CS	FD	1100	No	U, B/L, ut.art lig.
47	30	P	36.6	CS	Breech	900	No	U
48	34	P	37.3	CS	P.P	1200	Yes	C, C (Ant only)
49	26	P	38.4	CS	P.P	1200	Yes	C, C (post only)
50	27	P	36.6	CS	Breech	800	No	C
51	28	M	37	CS	Severe PIH	1100	No	C
52	26	P	36.4	CS	FD	1000	No	U
53	26	M	37.5	CS	Severe PIH	1000	Yes	U
54	28	P	38.1	CS	Severe PIH	1100	No	U,C
55	25	P	34.6	CS	Eclampsia	1200	No	U,C
56	24	M	37	CS	FD	2000	Yes	Failed U & Dev., Hysterectomy
57	23	P	36.6	CS	Severe PIH	1200	No	U
58	26	P	37	CS	Breech	1100	Yes	B lynch
59	24	M	38	CS	Twin	800	No	U
60	26	P	37	CS	Triplet	1100	Yes	U,C
61	26	P	37.5	CS	P.P	1100	Yes	Failed U&Dev.,Hysterectomy
62	25	P	37.6	CS	P.P	1100	No	C

Abbreviations: C=Case, GA=Gestational age, TBL=Total blood loss, T=Transfusion required, U=U shaped compression suture, C=Cho suture, Dev=Devascularisation, U/L=Unilateral, B/L=Bilateral, Lig=Ligation, P.P=Placenta praevia, CS=caesarean section, Prev.=previous, NWVBAC=not willing for VBAC, ST=scar tenderness, FD=fetal distress, MSL=meconium stained liquor, Ant=anterior, Post=posterior

Discussion

Primary PPH is a major cause of maternal morbidity and mortality worldwide especially in developing countries. It can lead to dreadful complications as hemodynamic decompensation, renal failure, disseminated intravascular coagulation and Sheehan's syndrome [2]. According to SRS (sample registration system), MMR (maternal mortality ratio, defined as number of maternal deaths per one lac live births) in India has declined from 167 in 2011-2013 to 130 in 2014-2016. The reason proposed for this decrease is due to increase in the number of institutional deliveries. But still the most common cause of maternal morbidity and mortality in India remains haemorrhage especially postpartum haemorrhage.

Quantatively, the definition of PPH is blood loss of more than 500 ml in normal delivery and more than 1000 ml in caesarean delivery. The more practical clinical definition of PPH, defines it as any amount of blood loss that threatens the hemodynamic stability of the woman necessitating the need for blood transfusion. Atonicity is the most common cause which occurs due to failure of the uterus to contract and this is more common during caesarean deliveries. With the rising rate of caesarean section and repeat caesarean sections, associated complications has also increased and one of the most dreadful complication is primary PPH. So there is need to create awareness for use of the different types of conservative surgical techniques which are effective in managing life threatening haemorrhage, obviating the need for caesarean hysterectomy.

Uteroplacental blood flow progressively increases from 50 ml/min in non-pregnant state to around 650 ml/min at term. The blood volume of pregnant woman starts to increase from about 6th week and increases by 30 to 60% above non-pregnant value at 30-32 weeks of gestation [4,5]. This uteroplacental blood flow is carried by the spiral arteries and their accompanying vein. After separation of the placenta, these vessels are

avulsed and hemostasis at these sites is achieved by contraction of the myometrium that compresses these sinuses followed by subsequent clotting and obliteration of their lumens. Any adhered pieces of placenta and large blood clot at these sites prevent effective myometrial contraction which can impair haemostasis at implantation site resulting in fatal PPH [4,5].

The development of conservative surgical interventions not only saved patients life but also helped in saving their reproductive life. In 1997, B Lynch [6] and colleagues described a surgical technique for PPH in which a pair of vertical brace sutures was secured around the uterus. Price and B Lynch (2005) [7], summarized 17 reports in which 44 of 46 procedures were successful. Later a number of modifications of B Lynch technique were developed and named after the inventors name as Bhal [8] in 2005, Cho [9] in 2000; Hayman [10] in 2002; Pereira [11] in 2005.

The principle governing the use of different forms of conservative surgical sutures was to compress the uterus so that the sinuses are closed and decrease the blood flow to the uterus by selective devascularisation.

In 2000, Cho et al. [9] discovered box shaped suture in the shape of square to approximate the anterior and posterior uterine wall. These sutures were especially effective in managing PPH resulting from placenta praevia and placenta praevia accrete. In 2002, Hayman et al. [10] proposed a simpler version of B lynch uterine compression suture that involved two vertical sutures in addition two transverse horizontal cervico-isthmic sutures. A simple modification of Hayman suture is U shaped suture in which only vertical sutures are applied and are nowadays most frequently used because of its simplicity and effectiveness in managing PPH.

In our study period, we were able to avoid hysterectomy with the use of conservative surgical compression sutures either alone or in combination with devascularisation in around 91.93% of patients with PPH. Recent trends show success rate of 90% to 100% for different conservative compression suture [6].

Few reports of complications from conservative surgical sutures have been reported in the literature such as uterine necrosis [12,13,14,15], haematometra, [16] pyometra [17], Asherman syndrome [18], broad-ligament haematoma, peripheral nerve ischemia, and inadvertent ligation of the lower limb arteries have also been reported [19,20]. The

combination of conservative compression suture with devascularisation procedure were more likely associated with these complications [12]. Conservative surgical management of PPH also includes procedure like internal iliac artery ligation and radiological arterial embolization. Radiological embolization of the uterine artery requires good set up of interventional radiology, which is only available in super specialized hospital. To do internal iliac artery ligation, one needs to have expertise in this procedure and most of the surgeons lack this expertise. So both the techniques are not frequently used due to lack of expertise and set up. Since caesarean section is now one of the commonly performed procedures on pregnant women, one should be well acquainted with simpler conservative surgical techniques as compression sutures which are quite effective in management of life threatening post-partum haemorrhage.

By detailed analysis of case sheets of patients in whom conservative surgical sutures were used in the management of intractable PPH make us conclude that timely use of appropriate conservative surgical techniques can prevent the patient from progressing to hemodynamic decompensation and save the life of the patient. Moreover, these surgical techniques also preserve the reproductive life of patients. The two most important factors governing the type of conservative surgical suture to be used is the patient's haemodynamic status and aetiology of the PPH.

In our study period, analysis of the surgical records showed that the most common conservative surgical technique used to treat intractable PPH was U shaped suture followed by, B-Lynch and Cho suture with or without devascularisation procedure. U shaped sutures were found to be more commonly used as it required less expertise and was found to be effective alone in 86.36% of cases giving us evidence that this simpler technique can efficiently control PPH. Moreover the chances of complication with this technique are the least. Uncontrolled PPH in patients of placenta praevia is mostly due to bleeding sinuses in the lower uterine segment as contraction of uterus is less marked in the lower uterine segment. In these cases, Cho sutures and its modification (square shaped haemostatic suture only on one surface) were highly effective in controlling bleeding in combination with or without devascularisation.

Conclusion

Conservative surgical sutures with or without

devascularisation technique was found effective in the management of intractable PPH, obviating the need for hysterectomy in around 91.93% of the cases. Simple U sutures can safely and effectively be used for uterine compression in the management of postpartum bleeding due to atonic uterus.

Key Messages

Appropriate conservative surgical sutures should promptly be used in the management of PPH not responding to medical management, hence obviating the need for unnecessary hysterectomy and the most simple and safe surgical technique is the use of simple U compression suture.

Conflict of Interest: No

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