



Comparative Study between Modified Transverse and Hayman Suture Regarding the Efficacy and Purperium Complications in Thi-Qar

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Background: Main causes of death post-partum is the uncontrolled hemorrhage, that managed by different modalities, where uterine compression suture had different efficacies as a main interventional tools of sever postpartum hemorrhage.

Aim: comparing different sutures types (modified transverse and Hayman suture) regarding their efficacy through its impact and in determining the final outcome and complications of post-partum hemorrhage.

Materials and methods: A prospective comparative analytical study including 122 females, who underwent delivery between March 2017 and December 2019, all of them followed for 1 week, 6 weeks, 6 months. Were the samples collected from Bent-Al-Huda teaching hospital and Al-Rehman private hospital-Thi-Qar, 2 groups of study; 1st one (52) underwent modified B-lynnch suturing (Hyman suturing) while the 2nd group (70) underwent transverse sutures of modified Ouahba suture, written consent had taken from all patients, SPSS version 24 used for analysis.

Results: Among 122 delivered women suffer from primary post-partum hemorrhage, 52 (42.63%) were sutured by Hayman suture, and 70 (57.37%) were sutured by transverse suturing. There was significant statistical difference between the types of intervention and blood loss P value <0.05. There was significant statistical difference between the types of intervention and complication

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development (p value=0.0001). There was no significant independent predictors or determinant for the complication development except the type of intervention. Only follow-up period and complication were truly to be correlated with type of intervention, the other variable were confounders

Conclusion: Even though the hemostasis had been achieved in both maneuver with excellent success rate, the transvers suture carrying high rate of persistent pain but the Hayman suture carry higher rate of serious complication such hysterectomy and intestinal obstruction. several factors determine the choosing of the suture type such as site, severity and cause of bleeding and the surgeon experience.

Keywords: Modified transverse uterine suture; Hayman suture; ThiQar.

1. INTRODUCTION

Annually more than hundred twenty five thousand cases of post- partum hemorrhage (PPH) died, world-wide [1], where it complicates nearly 3.7%, 6.4% of normal vaginal and caesarean section deliveries respectively [2].

In India about one quarter (25.6%) of deaths in maternity are caused by hemorrhage [3]. Uterine atony estimate about more than three quarter of "Primary type of post-partum hemorrhage PPPH" (75%-90%) [4].

In Iraq the situation is differ, where, Kawakeb et al study illustrate that the occurrence as an incidence rate for primary PPH was only 1.2%. where mainly caused by uterine atony as a causal rate fifty seven percent, and mainly risked by multiparous cause as a 86% [5], other study done in Al-Zahra hospital by Al-Turiah at 2016 show incidence of uterine atony was 55.5% [6].

The management as a traditional strategy for PPH is conservative one that comprising bimanual compression, balloons with the uterine tamponed, uterotonic agents supplements, and infrequently embolization of artery [7] if there was failure so it mandatory for intervention surgically, that include ligation of major pelvic vessels. which infrequently used skill possessed by a small number of registrars. In occasion when hemorrhage become intrac table, in spite of the measures above, hysterectomy is typically the final option.

Continuous uterine atony treated by innovative technique devised by Christopher B-Lynch at 1997 where the used suture enveloping and mechanical compressing uterus in an to hysterectomy avoidance attempt [8]. Hayman suture, the modification of B-Lynch suture, suggestions of the possible benefit that it easy and fast applicable, overcoming the

hysterectomy performance (lower segment), when vaginal delivery or caesarian section followed by PPH [9].

A study in UK [10] use the compression suture, before development of evident disseminated intravascular complications (DIC), as soon as possible, avoid the invasive procedure to get hemostasis success rate in united Kingdom (UK) study [10] was lower than other studies, compression sutures remain one of the main tools of hysterectomy prevention (at least more than three quarter of cases). The efficacy of the compression suture is time-tested.

Some institutions might employ the compression suture at the PPH last instant, thus, target consist of PPH women with very severe stage; others institutes apply it in less severe situations. This heterogeneity in the patients leading to various result. compression sutures failure was less often than the successful rate. The efficacy of the compression suture is thus difficult to evaluate. Even though, no reliable data, the success rate previously reported has been 76–100% [11].

the study aimed that to compare different sutures types (modified transverse and Hayman suture) regarding their efficacy through its impact and in determining the final outcome and complications of post-partum hemorrhage.

2. MATERIALS AND METHODS

2.1 Study Design, Time and Place

A prospective comparative analytical study including 122 females, who underwent delivery between march 2017 and December 2019, all of them followed for, 1 week, 6, weeks 6 months. Were the samples collected from Bent-Al-Huda teaching hospital and Al-Rehman private hospital-Thi-Qar.

Where about 40 cases per years, had recruited, PPPH" 24 hours-loss of blood more than five hundred cubic centimeter" that determined visually by inspection, were they attending specialist in gynecology and obstetrics at the outpatient clinic(whether delivered in the same hospital or in other and received by referral) or admitted to emergency unite as an emergency case. The sample divided into two main groups, 1st one (52) underwent modified B-lynch suturing (Hyman suturing) while the 2nd group(70) underwent transverse sutures of modified Ouahba suture, all the patients recruited with in the study were under the following this Sampling and sample size: sample was a collective convenience sample that fit for the time of the study (3 years) and fitting for the inclusion criteria, which was 122 women complaining from PPPH.

2.2 Inclusion criteria

Going through caesarean sections ending with atonic PPH (where the atony determined by uterine abdominal examination, then bimanual exam under anesthesia) within lower segment caesarian section (LSCS) and failure of management by non-surgical intervention lines, where they were fully term , and do elective CS, not completing her family. While PPH after normal vaginal delivery (NVD), secondary type of PPH, APH, cases with history of bleeding tendency, and lastly complicated intra-operatively CS(such urinary bladder(UB) and or intestinal injury), suturing done after failing of all trials(massage, compression bimanually, ergometrine, and misoprostol. The mandatory hysterectomy need was avoided, but ligation for uterine and or ovarian vessels was needed for some cases. Suturing by Gunashila's universal circumferential was done in some cases

Monofilament strong suture is the ideal, (to reduce conceivable trauma to the friable tissue of the atonic uterus), and absorbed quickly. And riding by needle which is a straight. Ideally the suture require mentsto keep the stretchy strength for 2-3 days.

2.3 The Hayman Suturing Procedure Done as

1. Anesthetized patient appropriately underwent urinary catheterization
2. Asameincision of caesarean section had used appropriately.

3. By abdomen entrance the uterus exteriorizing andrechecked frequently toidentifying anypoints of bleeding. If bleeding was diffuse as in uterine atonyand coagulopathy or profuse placental bleeding where no obvious bleeding point is observed, then compression bimanually was firstly plasticized then technique by Hayman suture assess the potential chances of success. Swabbing of vagina to approve adequate bleeding control.
4. After controlling of vaginal bleeding , using of a straight or curved needle to uterus trans-fixation the from front - back, impartialoverhead the bladder reflection then tied at the fundus of the uterus. 1suturingon each side of the uterus of the or more than one suture ifbroad [12] particularly if uterus was.

2.4 Post Procedure

patients discharged seven days after. Follow up were done for 6 weeks later then six months later to detect the predicted and unpredicted complications, were they underwent full examination after interviewing full written consent was taken from the patient and their husband before the surgical intervention, statistical analysis was done by usage of SPSS version 26v, where percentages, frequency, paired t test and chi-square test were used, correlation analysis for the independent variables also was also assessed.

2. four transverse sutures (modified Ouahba suture) (Fig. 1-B). Four sutures penetrating uterus trans-fixally. 4sutures made trans versing uterus, one in the segment at lower uterus and the other 2 in the uterine body middle part (b). Then, 2–3 cm above the third one and avoiding the latero-medial suturing of the uterine horn transfixing sutures are made to the (1 and 2) to avoide tube blokage. where 95% of the PPH population achieved hemostasis [12] Of these 19, eight women hoped for pregnancy and six subsequently became pregnant, all having a term delivery. Ouahba et al. [12] requested that this type of suturing, as a Cho suture modification, where multiple square suture (Cho suture), through which the needle transfixes the uterus posteriorlyth rough anterior. Then done in the same manner twice but in "square" manner. 4-5 square sutures for an atonic uterus must be done. If the bleeding point is evident, suturing should be performed

to compress the bleeding site. Cho et al. [13].

A written consent had obtained from all patients before they enter in the study, it also done as routine work in preoperative schedule in Iraq, also the directorate of health in Thi-Qar, give us the overall agreements to be engaged within this work, the management officers of both hospitals were fully agreed and cooperative to do the research.

2.5 Statistical Analysis

The collected data were fed into SPSS version 24 data sheet for tabulation and analysis.

Statistical analysis was performed using multivariate analysis and ANOVA for continuous variables and chi square test and Fischer exact for nominal variables. P values < 0.05 were considered statistically significant

3. RESULTS

Among 122 delivered women suffer from primary post partum hemorrhage, 52 (42.6%) were sutured by Hayman suture, and 70 (57.37%) were sutured by transverse suturing, where significantly differ statistically in their age, parity, mode of deliver and place of delivery with no difference in their gestational age. As shown in table one.

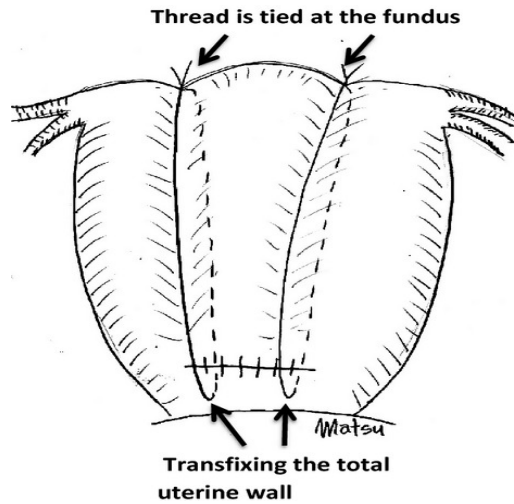


Fig. 1 A. Hayman suture

<https://obgyn.onlinelibrary.wiley.com/doi/10.1111/aogs.12077>

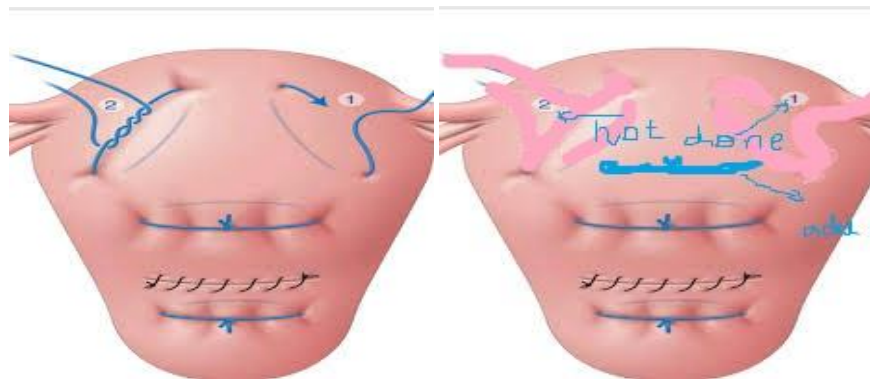


Fig. 1B. Modified Ohiba transverse suture

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.meduweb.com%2Fimportant-stitches-in-uterus-against-atony%2F&psig=AOvVaw12VLY8g1I7gn7hmygwDTz2&ust=1621420200883000&source=images&cd=vfe&ved=2ahUKEwi3pY6Kg9PwAhWT_bsiHUipDL0Qr4kDegUIARDiAQ

Table 1. Types of intervention according personal characters as a determinants of post-partum hemorrhage

Factors expected to be as personal character determinants		Type of intervention		Total	Pearson Chi-Square, P value
		Hayman suture	Transverse suture		
Age by years	<20	3	16	19	9.083 ^a
		15.8%	84.2%	100.0%	0.028
	20-	8	15	23	
		34.8%	65.2%	100.0%	
	26-	20	22	42	
	47.6%	52.4%	100.0%		
	30 and more	21	17	38	
		55.3%	44.7%	100.0%	
Parity	One	5	19	24	11.536 ^a
		20.8%	79.2%	100.0%	0.009
	Two	13	26	39	
		33.3%	66.7%	100.0%	
	Three	22	17	39	
	56.4%	43.6%	100.0%		
	3 & more	12	8	20	
		60.0%	40.0%	100.0%	
Gestational period	Term	32	40	72	.238 ^a
		44.4%	55.6%	100.0%	0.123
	Preterm	20	30	50	
		40.0%	60.0%	100.0%	
Mode of delivery	Lower segment CS	42	38	80	9.270 ^a
		52.5%	47.5%	100.0%	0.002
	NVD	10	32	42	
		23.8%	76.2%	100.0%	
place of Delivery	Primary cases	40	39	79	5.880 ^a
		50.6%	49.4%	100.0%	0.015
	Referred	12	31	43	
		27.9%	72.1%	100.0%	
Total	Number	52	70	122	
	Percentage	42.6%	57.4%	100.0%	

There was significant statistical difference between the types of intervention and blood loss as shown in Table 2, and blood transfusion as in Fig. 2.

There was significant statistical difference between the types of intervention and complication development (p value=0.0001), while follow-up period and time of application of

sutures don't show such association, as shown in Table 3.

There was significant statistical difference between the types of intervention and types of complication as shown in table above. While figure bellow show significant statistical difference between the types of intervention and amount of blood loss (p value<0.05)

Table 2. Blood loss according to type of intervention

Intervention	N	Mean	Std. Deviation	95% Confidence Interval for Mean		ANOVA, P
				Lower Bound	Upper Bound	
Hayman suture	52	1592.307	689.4431	1400.3655	1784.2499	6.6110, 0.011
Transverse suture	70	1297.857	573.789	1161.0418	1434.6724	
Total	122	1423.360	639.8987	1308.6656	1538.0557	

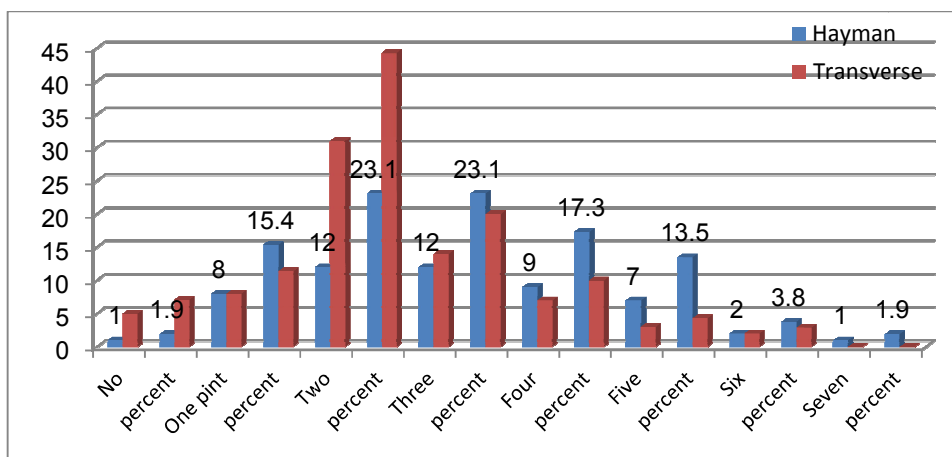


Fig. 2. Blood transfusion (number of pint(s)) according to type of intervention
Fischer Exact test= 11.546, P value= 0.02

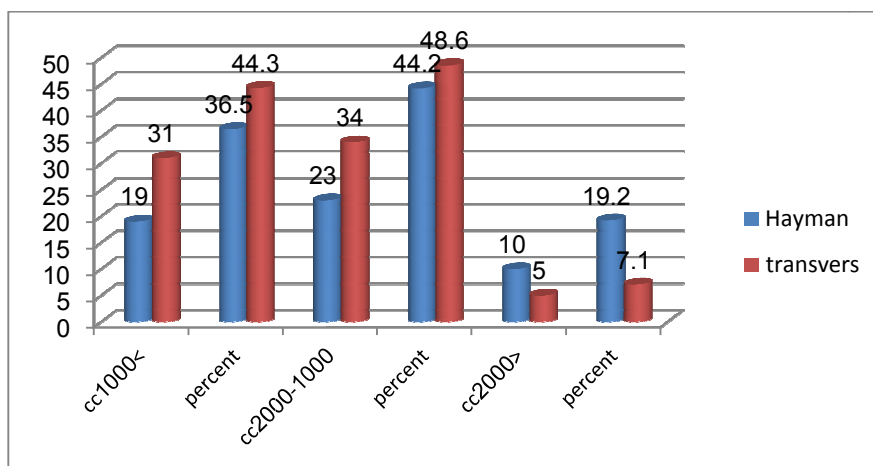


Fig. 3. Amount of blood loss according to type of intervention used
Chi square =4.103, p value=0.031

Table 3. Types of intervention according interventional factors as a determinants of post-partum hemorrhage

Factors expected to be as interventional determinants		Type of intervention		Total	F.E, P value
		Hayman suture	Transverse suture		
Follow up period	1 st 24 hours	1 33.3%	2 66.7%	3 100.0%	4.296, 0.494
	7 days	7 43.8%	9 56.3%	16 100.0%	
	1-6 weeks	22 39.3%	34 60.7%	56 100.0%	
	Till subsequent pregnancy at institute	20 52.6%	18 47.4%	38 100.0%	
	coming subsequent pregnancy for ANC	1 14.3%	6 85.7%	7 100.0%	
	Delivered in subsequent pregnancy at institute	1 50.0%	1 50.0%	2 100.0%	
	Time to apply suture from detection of PPH	<10 minutes	20 51.3%	19 48.7%		39 100.0%	1.903 0.064
	11-20 M	20 37.0%	34 63.0%	54 100.0%	
	.>20 M	12 41.4%	17 58.6%	29 100.0%	
Complication	No	6 75.0%	2 25.0%	8 100.0%	37.488 0.0001
	Persistent pain	20 24.1%	63 75.9%	83 100.0%	
	hysterectomy	13 76.5%	4 23.5%	17 100.0%	
	Intestinal obstruction	13 92.9%	1 7.1%	14 100.0%	
Total	No.	52	70	122	
	%	42.6%	57.4%	100.0%	

Table 4. Interventiontype according complication

Interventiontype	complication				Total	FE, P value
	No	Persistent pain	Hysterectomy	Intestinal obstruction		
Hayman suture	5 62.5%	15 18.1%	6 35.3%	6 42.9%	32 26.2%	59.815 0.002
Hayman suture + ovarian &uterine vessels ligation	1 12.5%	5 6.0%	7 41.2%	7 50.0%	20 16.4%	
Transverse suture	0 0.0%	59 71.1%	2 11.8%	0 0.0%	61 50.0%	
Transverse suture+ ovarian &uterine vessels ligation	2 25.0%	4 4.8%	2 11.8%	1 7.1%	9 7.4%	
Total % within complication	8 100.0%	83 100.0%	17 100.0%	14 100.0%	122 100.0%	

Table 5. logistic regression analysis of independent factors of the type of intervention

Step 9:	Odd's ratio	S.E.	Wald	D f	Sig.	Exponential B
Follow up period(1)	.693	1.871	.137	1	.711	2.000
Follow up period(5)	4.730	2.146	4.860	1	.027	113.327
complication(2)	4.674	1.341	12.139	1	.000	107.076
complication(3)	2.210	1.436	2.367	1	.124	9.114
Constant	-4.674-	1.949	5.749	1	.016	.009

a. Variable(s) removed on step 2: Delivery place

b. Variable(s) removed on step 3: parity.

c. Variable(s) removed on step 4: time.

d. Variable(s) removed on step 5: Gestation period.

e. Variable(s) removed on step 6: age

f. Variable(s) removed on step 7: Blood Loss.

g. Variable(s) removed on step 8: Blood transfusion.

h. Variable(s) removed on step 9: Mode Of delivery.

Only follow-up period and complication were truly to be correlated with type of intervention, the other variable were confounders

Complication	B	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
				Lower Bound	Upper Bound
[age=1.00]	142.677	.882	9.202E+61	.000	. ^b
[age=2.00]	-11.970-	.963	6.330E-6	4.672E-227	8.575E+215

Step 9:	Odd's ratio	S.E.	Wald	D f	Sig.	Exponential B
[age=3.00]	-1.714-	.526	.180	.001	.	36.127
[parity=1.00]	-124.059-	.899	1.324E-54	.000	.	b
[parity=2.00]	-10.418-	.942	2.989E-5	4.515E-127	.	1.978E+117
[parity=3.00]	-.216-	.944	.806	.002	.	325.491
[Gestationperiod]	.346	.857	1.413	.033	.	60.500
[MOD=1.00]	154.396	.439	1.131E+67	2.048E-103	.	6.243E+236
[RBL=1.00]	17.826	.971	55159791.863	.000	.	b
[RBL=2.00]	1.362	.623	3.905	.017	.	896.389
[RBL=3.00]	0 ^c	.	.	.	.	.
[Bloodtransfusion]	17.829	.999	55315595.657	.000	.	b
[Bloodtransfusion]	.253	1.000	1.288	.000	.	b
[time=1.00]	.592	.791	1.808	.023	.	143.044
[time=2.00]	.197	.939	1.218	.008	.	190.145
[time=3.00]	0 ^c	.	.	.	.	.
[Followupperiod=1]	-8.862-	.995	.000	.000	.	b
[Followupperiod=5]	-38.232-	.975	2.490E-17	.000	.	b

There was no significant independent predictors or determinant for the complication development except the type of intervention.

4. DISCUSSION

4.1 Strength of the study

Comparative interventional study done for the first time in our society.

Limitation: Follow-up for years to know that if getting pregnancy or no.

Other types of management modalities in form of uterine compression sutures was difficult to be assessed, because of unavailability with in the public hospitals

Finding: The current study show that there was differences in some factors, that consider as a determinants in our study.

Among 122 delivered women suffer from primary post-partum hemorrhage, 52 (42.6%) were sutured by Hayman suture, and 70 (57.8%) were sutured by transverse suturing, where significantly differ statistically in their age, parity, mode of deliver and place of delivery with no difference in their gestational age.

There was significant statistical difference between the types of intervention and blood loss. Only follow-up period and complication were truly to be correlated with type of intervention, the other variable were confounders.

4.2 Uterine Compression Sutures Efficacy

Success Rate: Neither controlled trials or Randomized Cont. Trials had been determined which suture of uterine compression is best, in achieving hemostasis [14-15]. Eleven original papers and articles showing that average hemostasis rate was very high(97%), varies from three quarter to full percent (76 - 100%). various suturing process exhibit various success rate, where, suture of B-Lynch that most performed widely. Showing response 99.5% [10].

A systematic review at 2007 [16] exhibited (91.7%) uterine compression sutures success rate (not confined to the B-Lynch suture). A Kayem G study of [10] showing a lower success rate. This UK prospectivestudy (2007 – 2009) with success rate of 75% [10].

Our study showing full success rate for both group, it was of high similarity to many studies

listed above [10] also similar to eleven original articles that were showing 76– 100% a success rate of. Considering the small numbers of each study, this difference may not be clinically significant. A study in United Kingdom [10] also show no significant difference in the rate of success among various compression sutures. A more recent study from Argentina [17] demonstrated interesting data. All four sutures used (B-Lynch, Hayman, Cho, and Pereira suture) achieved a >94% success rate for uterine;

Time of Suture Application: In our study there was no significant statistical differences between the time of application of transverse suture and Hayman, Which study had no role in complication development, that differ from other studies, where delay of between 2-6 hours from delivery to uterine compression suture was associated independently with a 4 folds increase in the risk of hysterectomy [18]. This differ from our results, where, there was no significant independent predictors or determinant for the complication development except the type of intervention.

Complication Development: There was significant statistical difference between the types of intervention and complication development (p value=0.0001), while follow-up period and time of application of sutures don't show such association

There was significant statistical difference between the types of intervention and types of complication as shown in table above. While figure bellow show significant statistical difference between the types of intervention and amount of blood loss (p value<0.05)

Comparison of efficacy among various sutures nevertheless, for bleeding from the cervix or upper vagina (85% consisting of placenta previa or placenta accreta), only the Cho square suture was in employment, at a success rate of 93%. It was concluded that the Cho suture was useful to regulator lower genital bleeding [17]. Although Hayman et al. [19] devised transverse cervico-isthmus sutures for lower segment bleeding, B-Lynch, Hayman and Pereira sutures were essentially devised to compress the uterine body. The Cho suture [13] used for bleeding from sites other than the uterine body and its compression is tight, that may explain why it achieved better hemostasis of the lower segment bleeding. There have been no RCTs or organized trials to determine the best procedure

to achieve hemostasis. Obstetricians like to use “accustomed” or “experienced” procedures, principally in an emergency setting. Thus, in the future RCT be difficult to perform. The presence of various procedures itself may indicate that there is no one consider as best” procedure at present: if an optimal one happened, the others have been uncontrolled. Further observational studies may be needed, taking into account characteristics and backgrounds of the patients. Complications and future fertility there have no reports of maternal mortality unpaid to uterine compression sutures. Some^a 2013 The Authors 85 complications have been reported [16], including uterine necrosis [20], pyometra [18] and uterine synechiae [21]. Even if no definite data are available, the Cho suture seems to be associated more commonly with complications compared with other sutures. This is rational because complications may be associated with “compression tightness” and “uterine penetration.” As labeled, the needle transfixes the anterior and posterior walls 16–20 times in the Cho suture, which not only lead to tight compression but furthermore withdraw the site of blood supply. The tight firmness of the Cho suture provide good hemostasis but, sequentially, also lead to some complications possibly related to the compression. Williams textbook [22] designates, “reports of complications from compression sutures have been slowly emerging. At this while, their incidence is unknown but is likely low.” Exclusive of the studies in which patients did not desire future pregnancies [23-24], the rate of future pregnancy was 11–75%, with an average rate of 32% (18/57). On the other hand, in no study, was the follow-up long enough to define future fertility. Additionally, many women having received compression sutures and, having qualified a life-threatening delivery, may less commonly wish for future pregnancies, and this made the analysis difficult. To our information, there are no large population studies available regarding future pregnancy. A latest article in this Journal [25] summarized complications after the use of firmness sutures. They determined that, overall, the use of uterine compression suture may be safe, but that development with hysteroscopy and image technique seems useful, seeing reported complications after the suture.

5. CONCLUSION

Even though the hemostasis had been achieved in both maneuver with excellent success rate,

the transvers suture carrying high rate of persistent pain but the Hayman suture carry higher rate of serious complication such hysterectomy and intestinal obstruction. Several factors determine the choosing of the suture type such as site, severity and cause of bleeding and the surgeon experience

CONSENT

As per international standard or university standard, patients’ written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Author has declared that no competing interests exist.

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