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EFFICACY OF HAYMAN SUTURE IN THE TREATMENT OF ATONIC POSTPARTUM HEMORRHAGE

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ABSTRACT

Purpose: *The study aims to investigate the effectiveness of Hayman's suture in the management of Atonic postpartum hemorrhage.*

Subjects and Method: *The study includes 37 patients who developed severe atonic PPH not responsive to pharmacological measures at the Department of Obstetrics and Gynecology at Aswan University hospital, in the period between Mars 2018 and December 2019. This is a case series study of 37 patients upon whom Hayman suture is applied when failed to respond to medical management, step-wise devascularization of the uterus is attempted when the suture cannot control the bleeding alone, reserving hysterectomy as a last resort when all measures are failed.*

Results: *Results of the research None of the 37 patients of our study required hysterectomy to control the bleeding, Hayman suture succeeded solely to arrest the hemorrhage in 30 patients (81.1%), while 7 patients(18.9%) required step-wise devascularization of the uterus with Hayman suture to stop the bleeding. It is not uncommon for complications to be described with the use of uterine compression sutures. In our study, we did not report any complications.*

Conclusion: *The application of Hayman's suture is a fast, efficient, non-complex, lifesaving and fertility-sparing technique to control atonic postpartum hemorrhage.*

INTRODUCTION

Postpartum hemorrhage (PPH) is a major cause of maternal mortality worldwide ranging from 13% in developed countries to 34% in developing countries (Say et al., 2014). Uterine atony is the most frequent cause of PPH and accounts for 80% of all cases. Although assessment of risk factors is important, PPH typically occurs unpredictably, and no parturient is immune to the risk. When PPH persists despite aggressive medical treatment, attention should be given to early surgical intervention to avoid morbidity (Nanda & Singhal, 2011). The traditional management of this condition begins with conservative methods such as bimanual compression, medical therapy with uterotonic agents, uterine tamponade with balloons and occasionally arterial embolization the failure of which often mandates surgical intervention. Surgical measures such as ligation of the major pelvic vessels demand a rarely used skill possessed by a few registrars. In the event of intractable hemorrhage despite the above measures hysterectomy is usually the final resort (Ghezzi et al., 2007). In 1997, Christopher B Lynch devised an innovative technique

to treat uterine atony where a continuous suture was used to envelop and mechanically compress the uterus in an attempt to avoid hysterectomy. Since then this technique has been widely used around the world (B-lynch et al., 1997).

In 2002, Later Dr. Richard Hayman and Prof. Arulkumaran in Derby suggested an easy uterine compression suture technique that involved slight changes to the B-Lynch technique. The Hayman suture can be applied more rapidly and easily, which is key in an emergency. It also avoids the need for lower segment hysterotomy when PPH follows a vaginal delivery, therefore decreasing the trauma to the atonic bleeding uterus. (Hayman, Arulkumaran& Steer, 2002).

METHODOLOGY

This is a case series study that was conducted at the Department of Gynecology and Obstetrics at Aswan university hospital on all parturient who develop atonic PPH not responsive to non-surgical management in the period between March 2018 and December 2019. All of the study subjects delivered by C.S in which the abdomen was already open, Hayman suture was applied as described in the original report (Hayman et al., 2002), if the bleeding hadn't stopped, stepwise devascularization of the uterus was done to control the Postpartum hemorrhage. All of the study subjects were operated on by the same surgeon. There was an assessment of the efficacy of Hayman suture to stop PPH, either alone or in a combination with other maneuvers. There was also an assessment of the need for hysterectomy as definitive management for when Hayman's suture failed to stop the bleeding.

Patients in this study had pre-operative evaluation regarding the clinical examination and basic investigations including (CBC, coagulation profile, Kidney functions, and liver functions). There was recording for the blood loss, time duration of the maneuver, intra-operative and early post-operative complications.

RESULTS AND DISCUSSION

Graphical representation summarizing the study patients and the intervention is done to them Fig (1).

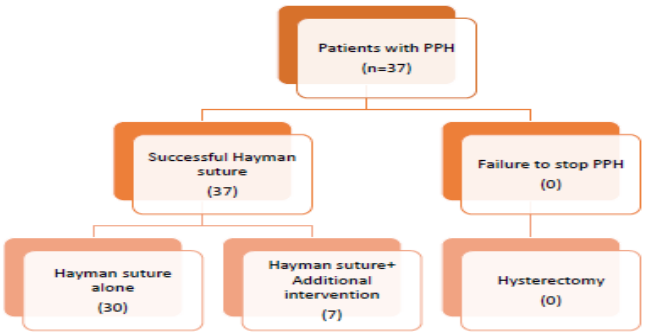

Figure 1. the study patients and the interventions given to control the PPH

Demographic Data

The mean age of the study group was 27.7 years (±6.4years). The mean gestational age was 37 weeks (±2.78 wks). As shown, 12 of the study subjects were primigravida (32.4%) and 25 of them were multigravida (67.6%) all of them delivered via cesarean section (100%) and all of the deliveries were inside the hospital (100%). Table (1).

Table 1. Demographic Data

	Mean/N	SD/%
Age of the patient	27.8	±6.4
Gestational age	37.2	±2.78
Parity		
• Primigravida	12	32.4%
• Multigravida	25	67.6%
Mode of delivery		
• Cesarean section	37	100%
• Vaginal delivery	0	0%
Place of devlivery	Inside the hospital	100%

The distribution of the risk factors

The risk factors among the study patients are listed in Table (2). The table shows abruption placenta as the commonest occurring risk factor (12 patients 32.4%) and 11 patients had prolonged or obstructed delivery (29.7%), 9 patients had uterine overdistension as a risk (24.3%). Only 3 patients had previous PPH as risk (8.2%), 1 patient had anemia (2.7%) and 1 had signs of chorioamnionitis (2.7%)

Table 2. Risk Factors among the Study Patients

Risk factor	N (%)
Abruptio placenta/ Couvlier uterus caused by severe PET	12 (32.4%)
Prolonged-Obstructed labour	11 (29.7%)
Uterine over distension	9 (24.3%)
Previous PPH	3 (8.2%)
Anemia	1 (2.7%)
Chorioamnionitis	1 (2.7%)

**PET: Pre-eclampsia*
**PPH: Postpartum hemorrhage*

The Effect of Hayman suture in controlling atonic PPH

Hayman suture succeeded as the only intervention in 30 cases of the total 37 (81.1%), while it needed another intervention (bilateral uterine artery ligation) to control the hemorrhage in 7 cases (18.9%). Hysterectomy was avoided in all of the study cases (0%).

Table 3. Efficacy of Hayman suture among the study patients

Procedure	Number	Ratio
Hayman suture alone	30	81.1%
Hayman suture + another intervention	7	18.9%
Hysterectomy	0	0%

The duration needed to apply Hayman suture

The Maximum duration needed to apply Hayman suture was 240 seconds. (4min), while the minimum duration was 100 seconds. (1.5 min), with average 160.2 sec (2min&40sec.) ±31.7 sec, this time duration was for the application of the suture. Table (4)

Table 4. Time duration of Hayman suture application

	Mean	Min	Max	SD
Time duration (sec)	160.2 sec	100 sec.	360 sec.	±31.7 sec

The intraoperative and early postoperative complications

Complications for the study population during the hospital stay in Table(5), where 15(40.5%) patients went into shock, and about 8(21.6%) patients got a puerperal fever, 3(8.1%) of the patients get paralytic ileus. Moreover, 1(2.7%) had DIC, and they were admitted to ICU and eventually went into renal failure. No patient died in this study.

Table 5. the intraoperative and early postoperative complications

Complication	N (%)
Shock	15 (40.5%)
Fever	8 (21.6%)
Paralytic ileus	3 (8.1%)
Renal failure	1 (2.7%)
DIC	1 (2.7%)
ICU admission	1 (2.7%)
Mortality	0 (0%)

***DIC:** Disseminated Intravascular Coagulopathy*
***ICU:** Intensive Care Unit*

Atonic PPH is considered the most frequent cause of obstetrical hemorrhage where there is the failure of the uterus to contract sufficiently after delivery and to arrest bleeding from vessels at the placental implantation site. The study aimed at studying the efficacy of Hayman compression suture in the treatment of atonic PPH.

Regarding the Effectiveness and Success in our study, 30 patients, representing 81.1 %, were successful in arresting atonic PPH using only Hayman sutures, while 7 patients, representing 18.9% required additional maneuver which was the step-wise devascularization of the uterus in concomitant with Hayman suture to stop the bleeding. No case in our study required Hysterectomy indicating succeeding in 100% of cases to prevent hysterectomy due to PPH.

In another study done in Upper Egypt (Fahmy et al., 2016), shows that Hayman suture only succeeded in 64.63% of cases, while the additional intervention was required for 30.48% of patients. Hysterectomy was inevitable in 4 cases representing 4.87% of the study population i.e. hysterectomy was avoided in 95.13% which was lower than previous studies on Hayman suture including (Nanda & Singhal, 2011) with a success rate of 93.75% and the other one (Al Riyami et al., 2011) showed success rate 92% achieved.

Ghezzi and his colleagues (Ghezzi et al., 2007) published a study of 11 cases in which Good compression of the uterus was achieved and hemostasis was established in 10 out of 11 (90.9%) women with the Hayman suture, and no further interventions were required. In one case with placenta Previa, a transverse isthmic-cervical compression suture was inserted before the vertical apposition suture, to decrease the blood loss from the lower uterine segment. One woman ultimately required a hysterectomy for intractable hemorrhage and hemodynamic instability.

In a study done by Majumdar et al., (2012) succeeding to stop PPH using Hayman suture was sufficient in 83.7%, while requiring additional maneuver was in 7% of cases. Hysterectomy was avoided in all of the cases 100%. In another study, Meena et al., (2016) similar results of Hayman suture succeeding in stopping atonic PPH either alone or in association with other intervention were achieved, whether it was a vascular ligation or another suture. Hysterectomy was avoided in 100% of cases even if another maneuver or intervention was added to the compression suture.

In Colombia, José et al., (2020), 86.81% responded satisfactorily. In 5.49% the selective ligature of the uterine arteries was added; in 3.29% it was required to add the ligature of hypogastric arteries, and in 4.39% obstetric hysterectomy was the solution for the control of bleeding.

In a 4 years institutional experience in a tertiary hospital in Mexico, Moreno-santillán et al., 2018) found Hayman suture was performed on 87 patients to control intractable postpartum hemorrhage that did not respond to uterotonic agents. Hayman suture was successful in 89.65%

of the cases. In 8.15% uterine vessels and ovarian vessels were also ligated and 2.2% required hysterectomy because of persistent bleeding. The postoperative course was uncomplicated

Regarding the Blood Loss, our study showed the average blood loss before applying Hayman suture, being 1384 ml ± 427 ml. The other studies showed similar results to our study. Majumdar et al., (2012) reported an average blood loss of 1640 ml ±487 ml, and Fahmy et al., (2016) reported an average blood loss of 1450 ml± 500 ml. The blood loss with mean bleeding 1310.4 ± 730.3 mL was in the studies conducted by Moreno-santillán et al., (2018), and José et al., (2020) reported the average of quantified bleeding in the group was 1475.39 ± 716.82mL (range between 950 and 3250mL).

The need for blood transfusion in our study appeared in the total blood transfusion that ranged through (0-6) units of Packed RBCs with a mean of 3 units ±1.6, compared to other studies as (Fahmy et al., 2016) which showed a range of (3-11) units of Packed RBCs with a mean value of 4.7 units ± 2.1

In our study, when calculating the time interval for application of the suture, it was of a maximum of 6 minutes with a mean of 2 min and 40sec ± 31.7 sec. In the study by Moreno-santillán et al., (2018), the average time for Hayman suture was 5.1 minutes, and the study done by José et al., (2020) the surgical technique of Hayman's compressive sutures had an average surgical time of 4.96 ± 1.03 minutes (range between 3 and 8 minutes).

It is not uncommon for complications to be described with the use of uterine compression sutures. In our study, we did not report any complications. However, Hayman (Hayman et al., 2002) emphasized that unequal tension could be complicated by segmental ischemia. Some surgeons reported these complications, where ischemic uterine necrosis was reported by (Agrawal et al., 2020) after Hayman's suture was applied for intractable PPH. Also, Ileo-uterine fistula following Hayman stitch application was reported (Sagili & Murali, 2016). In addition, uterine compression sutures were uncommonly reported to cause pyometra formation as in (Ochoa et al., 2002) and (Friederich et al., 2007), also, formation of Intrauterine synechia was reported (Rathat et al., 2011) and Asherman's syndrome (Wu & Yeh, 2005) and (Goojha et al., 2010).

The main limitation to our study is the lack of post-operative follow-up for the long term to detect the post-operative problems and complications. Though rare, our study does not include information about the fertility and menstruation of the patients after discharge. Our study also lacks a control group, and it is not a comparative study

CONCLUSION

Based on the results of this study, the application of Hayman suture is a fast, efficient, non-complex, lifesaving, and fertility-sparing technique to control the atonic postpartum hemorrhage.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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