

# Use of compressive sutures in the control of obstetric hemorrhage as a conservative measure of the uterus, in naval medical center, from June 2017 to December 2020

## Abstract

**Objective:** To describe the results obtained in the use of compression sutures in the control of obstetric hemorrhage as an alternative measure that conserves the uterus.

**Materials and methods:** Observational, cross-sectional, descriptive, and retrospective, carried out at the Naval Medical Center in Mexico City, from June 2017 to December 2020. Patients with a diagnosis of postpartum obstetric hemorrhage were included. In which advanced surgical techniques were applied, such as compression sutures with the Hayman and B-Lynch technique. The variables of 1) Amount of bleeding before and after applying the compression suture, 2) Procedure time, 3) Hemoglobin concentration on admission to the care unit, 1 hour after the bleeding and 24 hours after the procedure were analyzed. surgical intervention, 4) outcome of the techniques, 5) complications. SPSS version 22 was used for data analysis.

**Results:** 72 patients were registered: 46 patients with application of the Hayman technique and 26 patients with the B Lynch technique. Blood loss after the application of the techniques was lower ( $p < 0.001$ ). The surgical time in the application of compression sutures was  $85.8 \pm 17.6$  minutes. The concentration at hospital admission and 1 hour after bleeding was significantly lower ( $p < 0.01$ ) versus 24 hours later ( $p < 0.05$ ). Among the causes of obstetric hemorrhage, we found uterine atony with 59 patients (81.94%), bleeding at the placental insertion site 8 (11.11%) and placenta previa 5 (6.94%). No maternal deaths associated with suturing techniques were reported.

**Conclusion:** Uterine suture techniques represent a useful, fast and uncomplicated procedure for the control of obstetric hemorrhage and a uterine- conserving measure.

**Keywords:** B-Lynch, hayman, obstetric hemorrhage, advanced surgical techniques in obstetrics

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## Introduction

Postpartum hemorrhage (PPH) is one of the most feared obstetric complications and one of the top three causes of maternal mortality in the world. It is universally defined as blood loss greater than 500 ml after vaginal delivery or 1 000 ml after caesarean section. Other authors define it as any bleeding that occurs in the postpartum, capable of producing hemodynamic instability or that threatens to cause it. It is a serious obstetric complication, which implies a life-threatening situation for the patient and whose most frequent cause is uterine atony.<sup>1</sup> PPH affects about 2% of all parturient women. It is associated with almost a quarter of the world's maternal deaths, being the leading cause of maternal mortality in most underdeveloped countries.<sup>2</sup> It is estimated that more than 125,000 women die from PPH worldwide annually. It is a significant factor that also contributes to extremely severe maternal morbidity and long-term disability.<sup>3</sup> In its most severe forms it significantly affects fertility. Between 2009 and 2010, massive blood loss was the leading cause of extremely severe maternal morbidity. That is, hemorrhage especially that generated in the immediate postpartum period is the previous step that is interrelated with the main cause of maternal death, in the world and in Mexico.

General measures of resuscitation in PPH, such as uterine

massage, prophylactic use of uterotonic agents, active management of delivery and relevant volumetric replenishment, are fundamental in the intensive approach of the entity,<sup>4</sup> however, in many cases they fail to be effective in stopping bleeding, making surgical intervention necessary. Obstetric hysterectomy has been used as an optimal resource to resolve situations or obstetric complications related to peripartum, but conservative surgical management of the uterus in the face of PPH has proven to be a useful therapeutic alternative to reduce bleeding, allow hemodynamic stability in case of requiring a surgical intervention of greater complexity and preserve fertility in those patients with unmet parity.<sup>5,6</sup> Since the late twentieth century, several invasive techniques to control bleeding and preserve fertility have been described in the medical literature, which have been used worldwide.<sup>7</sup> The most used are intrauterine compressive measures through balloon tamponade or compresses, the realization of compressive sutures (B-Lynch, B-Lynch-Marasinghe, Hayman-Arulkumaran, Ho-Cho, Mehmet Mutlu Meydanli, Hackethal or compressive sutures in U, Ouahba, Zheng, Mostfa and the combination of some of these), arterial ligations or devascularizations and arterial embolization.<sup>8</sup> The most used and internationally disseminated techniques are those described by B-Lynch and Hayman with evidence of their effectiveness and minimal complications.<sup>9</sup> These were introduced in Mexico at the end of 2015, after an international course on the subject was taught.<sup>10</sup>

## Materials and methods

During the period from June 2017 to December 2020, a total of 72 patients with obstetric hemorrhage in CEMENAV were treated. Figure 1 shows the percentage of patients who required the implementation of compressive sutures, divided into two groups. The first group shows women who underwent Hayman technical sutucompressive. The second group shows women who underwent B-Lynch technical compressive suture. The analysis of the patients included in this study sample showed that at the beginning of the years of study the surgical technique that had the highest percentage of performance was the B-Lynch technical compressive suture, however in the course of the years of study the implementation of the technique decreased showing a lower percentage of use in 2020. In contrast, the results showed that in 2017 the Hayman technique was less used compared to B-Lynch, however it showed an increase in the implementation for the control of obstetric hemorrhage during the following years, being the most used technique at the end of 2020. These patients underwent hayman and B Lynch compression suture surgical techniques for the control of obstetric hemorrhage. The average age of the patients was  $26.25 \pm 6.70$  with an age range of 17 to 42 years. The average number of weeks of gestation was  $37.97 \pm 2.1$ . The main cause for which the patients presented obstetric hemorrhage was uterine atony, mostly with 81.94%, which required surgical intervention to control the bleeding. Figure 2 shows the use of the most used surgical technique for the control of obstetric hemorrhage, it is observed that the most used technique was that of Hayman with 63.88% and that of B Lynch with 36.11%.

The weight and height of this study population was obtained, obtaining with this a body mass index. Of the 46 patients operated with Hayman technical compressive suture only 30 (65.21%) patients had a body mass index within normal parameters, 11 (23.91%) patients were overweight, 5 (11.90%) patients were classified as grade I obese. With an average body mass index for this group of  $24.1 \text{ kg/m}^2$ . The second group that was operated with B-Lynch technical compressive suture consisting of 26 patients only 12 (46.15%) patients had a body mass index within normal parameters, 13 (50%) patients were overweight, 1 (3.84%) patients were classified with obesity grade I. with an average body mass index for the second group of  $25.15 \text{ kg/m}^2$ .

Among the comorbidities during pregnancy, a large percentage of patients presented hypertension and gestational diabetes, of which, for the first study group that corresponds to the Hayman technique, 9 (19.56%) patients presented arterial hypertension during pregnancy y 10 (21.73%) pacientes presentaron diabetes gestacional. While for the second group that corresponds to the B-Lynch 5 technique (19.23%) patients presented arterial hypertension during pregnancy and 4 (15.38%) had gestational diabetes.

Regarding the use of compressive sutures in the resolution of pregnancy, Figure 3 shows that 76.39% were used during cesarean sections, with the Hayman technique being used in 50%, while the B Lynch technique was used in 26.3% of the patients. Sutures were used during childbirth in 19.44%, with 12.5% and 6.9% in Hayman and B Lynch respectively. Finally, 4.17% were used for abortions, with 1.3% for Hayman and 2.7% for B Lynch.

Figure 4 shows the frequency of the week of gestation in which the advanced surgical technique, compressive sutures, described in two groups, the first group (Hayman technique) and the second group (B-Lynch technique) were implemented, with a range of 25 to 41.4 weeks of gestation, with a mean of 37.92 and 38.07 weeks of gestation for Hayman and B-Lynch respectively.

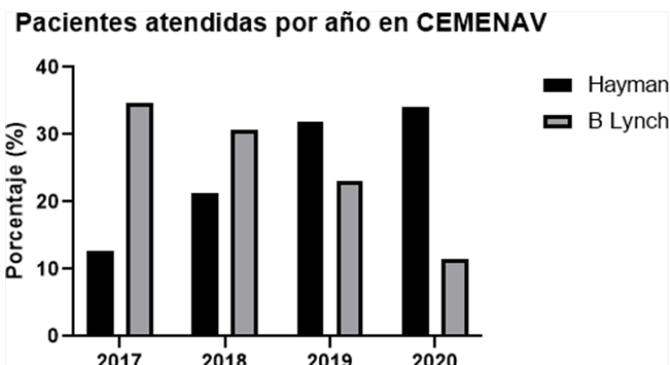


Figure 1 Patients treated per year in the period from June 2017 to December 2020 at the Naval Medical Center.

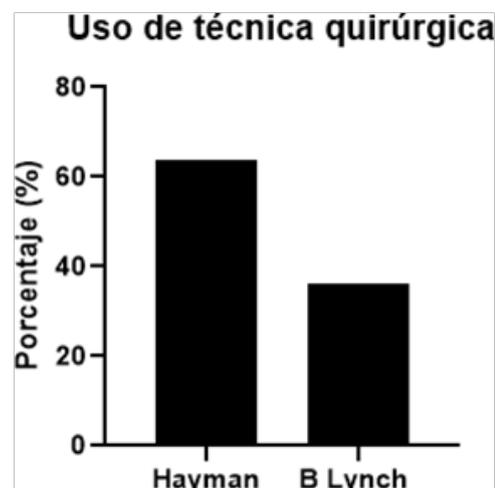


Figure 2 Percentage of the use of compressive sutures according to the use of each surgical technique.

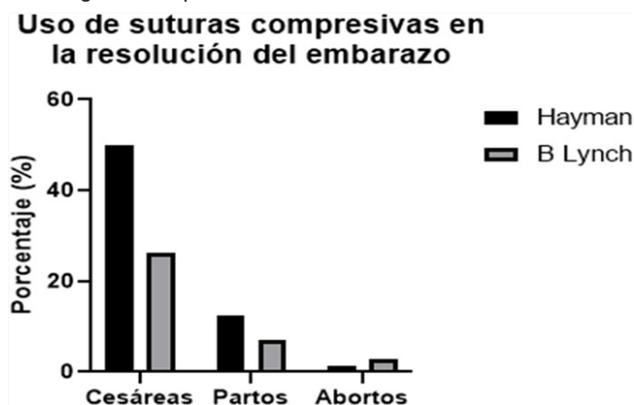


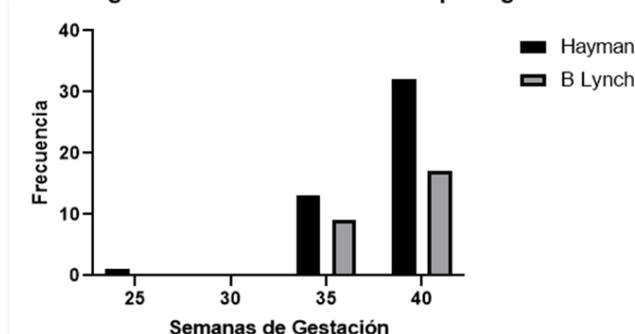
Figure 3 Use of compressive sutures in the resolution of pregnancy.

Figure 5 shows the percentage of patients who needed to enter the intensive care unit, the analysis of the patients included in this study showed that only 4 patients of the total of 72 patients required admission to the intensive care unit, this represents only 5.55% of the total patients, in the first group only 3 patients out of 46 patients required admission to this unit representing 6.52%, while for the second group only 1 patient out of 26 required admission to this unit representing 3.84%.

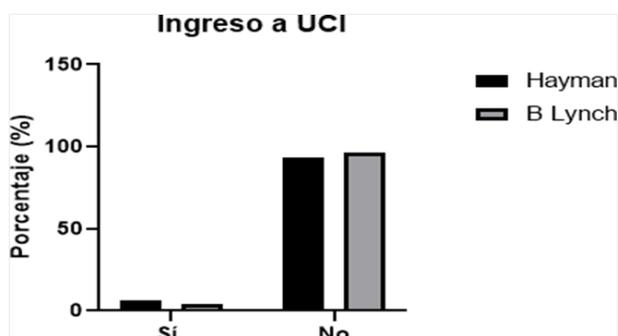
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**Semana gestacional de intervención quirúrgica**

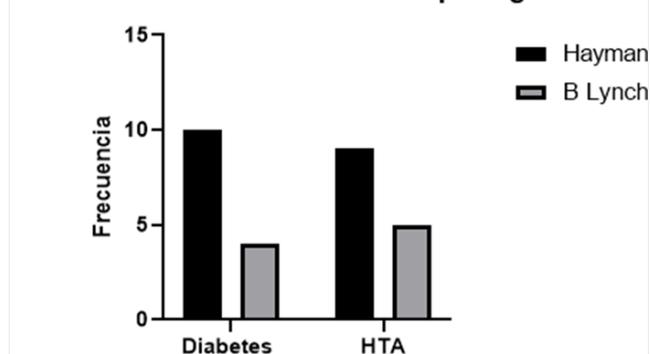


**Figure 4** Frequency in the week of gestation in which the surgical intervention was implemented.



**Figure 5** Admission to intensive care unit.

**Hipertensión arterial y diabetes en pacientes intervenidas con las técnicas quirúrgicas**



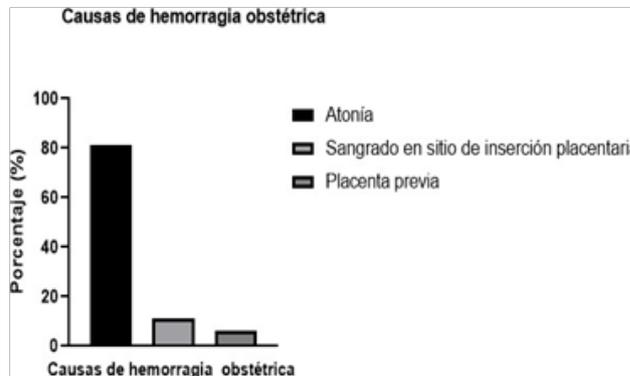
**Figure 6** Admission to intensive care unit.

Regarding the Causes of obstetric hemorrhage, Figure 7 and Figure 8 show the percentage of the 3 main causes of obstetric hemorrhage resulting in this study, the analysis of the patients included in this study showed that the most reported cause of obstetric hemorrhage was uterine atony with 59 (81.94%) patients, in second place bleeding at the placental insertion site with 8 (11.11%) patients, and as a third cause with only 5 (6.94%) patients placenta previa.

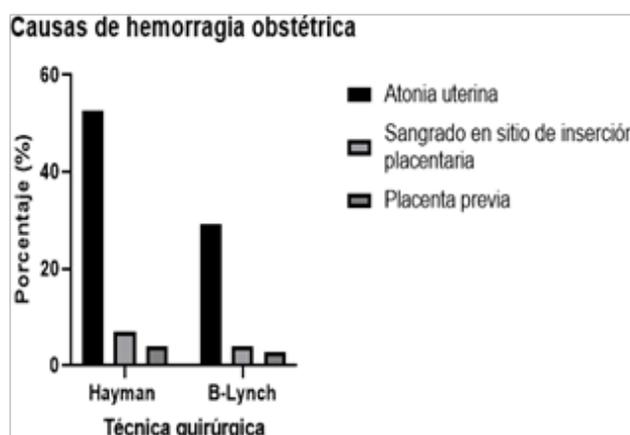
In second place bleeding at the placental insertion site with 8 (11.11%) patients, and as a third cause with only 5 (6.94%) patients with placenta previa. The mean preoperative hemoglobin levels in

the first group were 11.64 mg/dL and postoperative 9.28mg/dL while in the second group they were in the preoperative 11.64mg/dL and postoperative 9.12mg/dL, showing a decrease in hemoglobin of 2.3mg/Dl. Indicating that there is no statistically significant difference between pre- and postoperative hemoglobin levels between both types of compressive suture technique.

**Causas de hemorragia obstétrica**



**Figure 7** Causes of obstetric hemorrhage.



**Figure 8** Causes of obstetric hemorrhage.

The number of pregnancies at the time of needing the compressive sutures was for Sutura Hayman 1.82 gestas, of which 26 (56.52%) patients had only 1 gesta, 8 (17.39%) patients had 2 gestas, 8 (17.39%) patients had 32 (4.34%) patients had 4 pregnancies and 2 (4.34%) patients had 5 pregnancies. While for suture B-Lynch 2.26 feats. Of which 7 (26.92%) patients had 1 gesta, 11 (42.30%) patients had 2 pregnancies, 5 (19.23%) patients had 3 pregnancies and 3 (11.53%) patients had 5 pregnancies because the data did not have a normal distribution, we performed an analysis with non-parametric tests. No differences were found between days of hospital stay, blood loss, time to resolution of bleeding, or pre- and postoperative haemoglobin levels.

All patients had clinical data of hypovolemic shock to varying degrees. Bleeding after the application of suture techniques was 185±65mL. in the case of caesarean sections and 165±55mL in postpartum (p<0.001). The estimated time of the procedure was 85.8±17.6 minutes. For the Hayman technique 83.9±17.1 vs B Lynch 89.2±18.3 minutes, however no difference was found between these two measurements p=0.20. The hemoglobin concentration at admission was 11.6±1.4g/dL, 1 hour after the hemorrhagic event and the application of the sutures of 8.4±1.7g/dL haemoglobin (p<0.01), and at 24 h of treatment 9.2±1.6g/dL (p<0.05).

This figure shows the percentage of technique used to control obstetric bleeding. The analysis of the patients who make up this study showed that the Hayman technical compressive suture is the most used in the control of hemorrhage, showing a higher percentage of implementation with a 63.88 %.

Percentage of the use of compressive sutures in caesarean sections, deliveries and abortions.

## Discussion

The frequency of obstetric hemorrhage has increased, mainly due to the increase in cesarean sections, and inadequate administration of uterotonics, according to the latest national indicators, this complication occupies the second cause of maternal death in Mexico and according to the World Health Organization and Lalonde and collaborators in 2018 as the first cause of death worldwide.

Our results showed that in CEMENAV, as a third-level care center, it makes use of advanced surgical techniques for the control of obstetric hemorrhage, the study time was considered from 2017, because from that date the use of both sutures began. During the period from 2017 to 2020, 72 patients with obstetric hemorrhage were treated, with uterine vs placental atony being the most frequent cause of this condition.

The patients had an average age of 26.25±6.70 years. In 63.88% of the patients, the Hayman suture was used and in 36.11% that of B Lynch, it should be noted that a gradual increase in the use of Hayman was observed from the implementation of both surgical techniques.

The projected goals for this research study were to describe if the implementation of advanced surgical techniques such as Hayman and B-Lynch technical compressive sutures were good enough for the control of obstetric hemorrhage and as a conservative measure of the uterus. For which, according to the results described, it has been shown that the implementation of these techniques is adequate treatment for this pathology of great importance in patients who, as a result of uterine atony, present obstetric hemorrhage.

The objective was met, since according to the results it was determined that patients in whom the resolution of pregnancy is by cesarean section have a higher percentage of presenting uterine atony and consequence of this onset of obstetric hemorrhage.

With the treatment of these techniques only 5.55% of the total sample required admission to the intensive care unit and it was determined that the hospital stay after treatment with this technique is 2.9 days, these data agree with De la Luna, Trejo-Romero, Guzmán, Villar Jiménez and their collaborators, those who in their studies describe not having 100% effectiveness and report complications associated with these treatments that sometimes required admission to the intensive care unit.

The application successively in nearby treatments for the control of obstetric hemorrhage, of advanced surgical techniques, compressive sutures techniques Hayman and B-Lynch guarantee the adequate treatment for the management of obstetric hemorrhage, reduce hospital stay, surgical re-intervention, admission to the intensive care unit, the cost for health services and mainly is an adequate measure of uterus preservative.<sup>11-35</sup>

## Conclusion

The surgical alternatives that conservative the uterus to postpartum obstetric hemorrhage, broken down in this work, are useful therapeutic procedures for the control of obstetric hemorrhage.

These favor the hemodynamic stabilization of the extremely serious obstetric patient, in case of requiring another type of treatment. Despite being described in the medical literature, there are no conclusive studies about the greater efficacy of one or more techniques over the others, but the authors consider that the one described by Hayman, it is the most recommended conservative surgical practice of the uterus, since it demonstrates hemostatic capacity, it is a simple technique, requires less surgical time and is associated with low morbidity, in addition to preserving fertility in those women who wish to continue procreating.

B-Lynch and Hayman suture techniques represent a suitable option for the treatment of obstetric hemorrhage. Success rates are high, procedure time short and significantly decrease bleeding. The safety is adequate, they are easy to apply and with low frequency of complications. They constitute the first-line conservative surgical treatment in the control of postpartum hemorrhage.

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## Conflicts of interest

The authors did not report any potential conflicts of interest.

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