

Effectiveness of Isthmic Circumferential Suturing Technique in Reducing Hemoglobin and Hematocrit Decline During Cesarean Section for Uterine Atony and High Risk Cases

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ABSTRACT

Background: Postpartum hemorrhage is the most important obstetric complication that poses a threat to maternal life. The most common cause is uterine atony. Studies are still ongoing to reduce the morbidity and mortality risks of cases with high risk of uterine atony, since there are no 100% effective methods for postpartum hemorrhage. This study aimed to compare Hemoglobin (hb) and Hematocrit (Htc) values before and after cesarean section in patients with uterine atony during cesarean section and high risk of uterine atony by applying the isthmic circumferential suture technique.

Material and Method: This is a retrospective cohort study conducted from January 2021 to June 2024. Among 6423 patients who delivered by cesarean section in a secondary care hospital, 135 patients who developed uterine atony during cesarean section underwent therapeutic isthmic circumferential suturing technique. Prophylactic uterine circumferential suturing technique was performed in 520 patients with high risk of uterine atony.

Result: In the cases of uterine atony in which we applied therapeutic isthmic circumferential suturing technique, the mean Hb/Hct value before cesarean section was 11,2/34,6 while the mean Hb/Hct value after cesarean section was 8,3/27,9. In 8 post op cases, erythrocyte suspension between 1-3 units and fresh frozen plasma between 1-2 units were transfused. Hysterectomy was not performed in any case. The mean Hb/Hct value of the cases with high risk of uterine atony in whom we applied prophylactic isthmic circumferential suturing technique was 10, 9/34, 3 before cesarean section, while the mean Hb/Hct value after cesarean section was 9, 4/30, 3. In 10 patients with low Hb value <8, erythrocyte suspension transfusions of 1-2 units were administered upon post op Hb value <7. We found Hb/Hct values of 8, 3/27, 8 p<0.05 in cases with uterine atony significantly lower than Hb/Hct values (9, 4/30, 3 p>0.05) in cases with high risk of atony.

Conclusion: In cases with uterine atony during cesarean section and in cases with a high risk of atony, the technique of the isthmic circumferential suture not only eliminates the risk of postpartum hysterectomy, but also prevents excessive decrease in Hb/Hct values and significantly reduces the risk of postpartum transfusion.

Key Words: Postpartum hemorrhage, C-section, Uterine atony, Isthmic circumferential suturing technique

Introduction

Postpartum Hemorrhage (PPH) is the most critical obstetric risk factor following vaginal or cesarean delivery, threatening maternal life and causing maternal mortality worldwide [1]. Cesarean delivery is still the most common obstetric procedure performed worldwide [2]. PPH is the most important complication of labor requiring urgent intervention [3]. PPH causes 25%-30%

of maternal deaths worldwide each year [4]. Early PPH is bleeding of more than 500 ml in vaginal delivery and more than 1000 ml in a cesarean section in the first 24 hours after delivery [5]. The most common cause of postpartum bleeding is Uterine Atony (UA) with a rate of 80% [6-8]. Factors increasing the risk of uterine atony include maternal age of 35 years and above, grand multiparity, gestational hypertension/preeclampsia, eclampsia, chorioamnionitis, prolonged premature

Received: 26-October-2024, Manuscript No. ijocs-24-151130;

Editor assigned: 05-November-2024, Pre QC 24-151130(PQ); **Reviewed:** 07-November-2024, QC No. ijocs-24-151130(Q); **Revised:** 12-November-2024, Manuscript No. ijocs-24-151130(R);

Published: 25-November-2024; DOI: 10.37532/1753-0431.2024.18(9).319

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rupture of membranes and polyhydramnios, prolonged labor, induction of labor, intervened labor, and a birth weight of 4000 g and above [9-16]. Furthermore, incompatible contractions such as myoma uteri and placenta previa or massive hemorrhage into the myometrium such as placental abruption, history of uterine atony, and some general anesthetics (halogenated hydrocarbons) that provide uterine relaxation can be listed [17].

The causes of PPH are divided into 4 main groups. 1-uterine atony 2-placental problems 3-genital tract traumas 4-genital tract traumas and systemic diseases such as coagulation defects and uterine atony account for 80% of these bleedings [18,19]. Our hospital has a high case volume and the highest number of deliveries in the region. Three gynecologists perform 3000 vaginal and cesarean deliveries annually. In this study, we investigated the effect of the technique of the isthmic circumferential suture on Hemoglobin (Hb) and Hematocrit (Hct) values after cesarean section in patients who developed uterine atony during cesarean section and who were at high risk of uterine atony.

Material and Method

This study was designed as a retrospective cohort study conducted at Level 2 Cihanpol Hospital from January 2021 to June 2024. Out of 6423 patients who delivered by cesarean section, 135 patients who developed uterine atony during cesarean section underwent therapeutic isthmic circumferential suturing technique. Prophylactic circumferential suturing technique was performed in 520 patients with high risk of uterine atony. Hb and Htc values before cesarean section and Hb and Htc values after cesarean section were compared in patients who underwent isthmic circumferential suture technique. During cesarean section, if uterine atony was diagnosed and the uterus did not contract despite oxytocin, methylar amp and uterine massage, or if the amount of bleeding was >1000 ml, the isthmic circumferential suture technique was applied. In 25 cases, THE double isthmic circumferential suture technique was applied. IBM SPSS Statistic Data Editor version-26 was used for statistical analysis. Hemodynamic values were compared with independent samples t test. Ethics Committee approval was obtained from the Ministry of Health, Mardin Provincial Health Directorate on 30.09.2024 with the number E-68051626-770-255419972. Isthmic circumferential suturing technique; a 2 mm-3 mm window is opened in the avascular area of the

bilateral broad ligament on the kern incision line between the round ligament and the lateral wall of the uterus. The needle is entered through the anterior window with a cut 1/0 vicryl clamp tip, passed around the surface of the posterior wall of the uterus and exited from the anterior of the other broad ligament window. After making sure that the intestine and momentum are not compressed posteriorly with appropriate force under the cesarean incision on the anterior surface of the uterus, 4-5 knots are tied (Figure 1-6). If the 2nd isthmic circumferential suture is needed, a 2 mm-3 mm window is opened from an avascular area corresponding to the upper line of the kern incision line in the broad ligament and the 2nd suture is passed with the same method. The uterus is tied on the anterior wall above the caesarean incision with appropriate force posteriorly by tying 4-5 knots after making sure that the intestine and momentum are not compressed. Thanks to this technique, uterine perfusion of bilateral ascending uterine artery branches is interrupted and bleeding control is provided by applying all-round compression to the lower segment of the uterus.



Figure 1: Passing the suture through the left broad ligament.

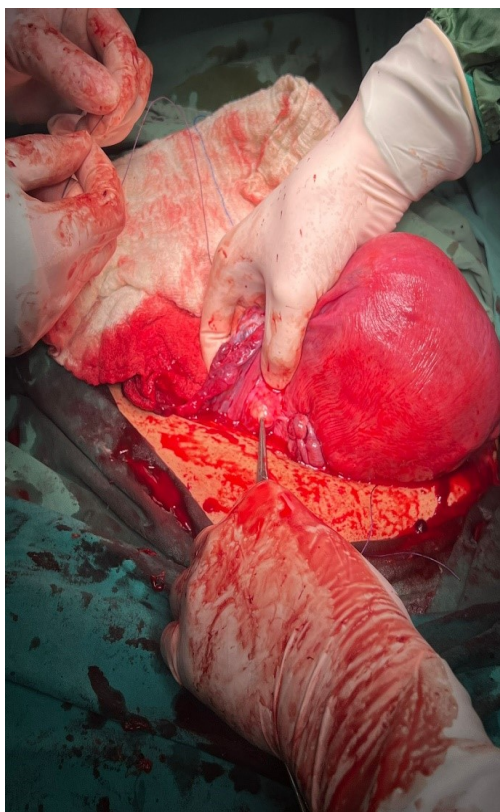


Figure 2: Suture with clamp from the right broad ligament withdrawal.

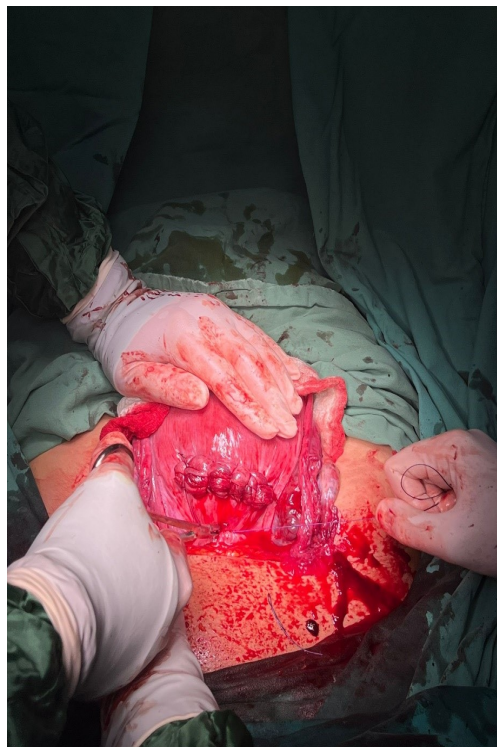


Figure 4: Fixing the surgical suture with a portegou so that it does not loosen.

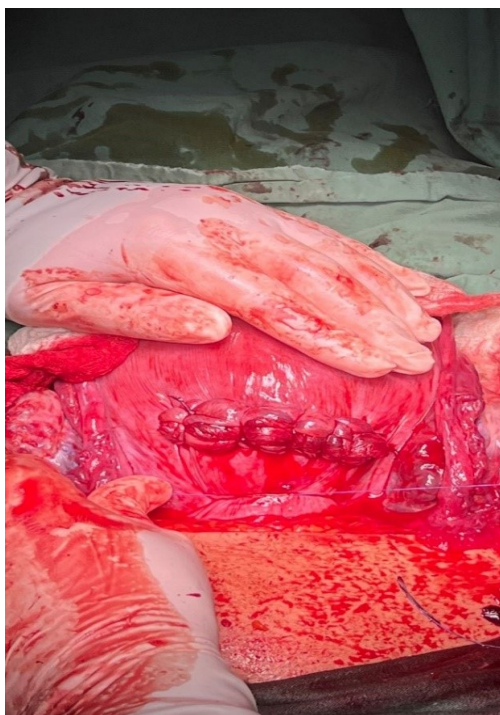


Figure 3: Removal of the surgical knot.

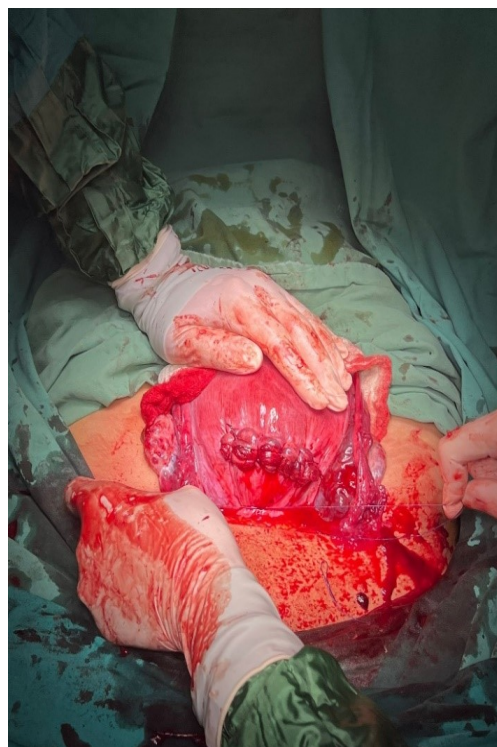


Figure 5: Anterior view of the uterus with discarded 4-5 knot.

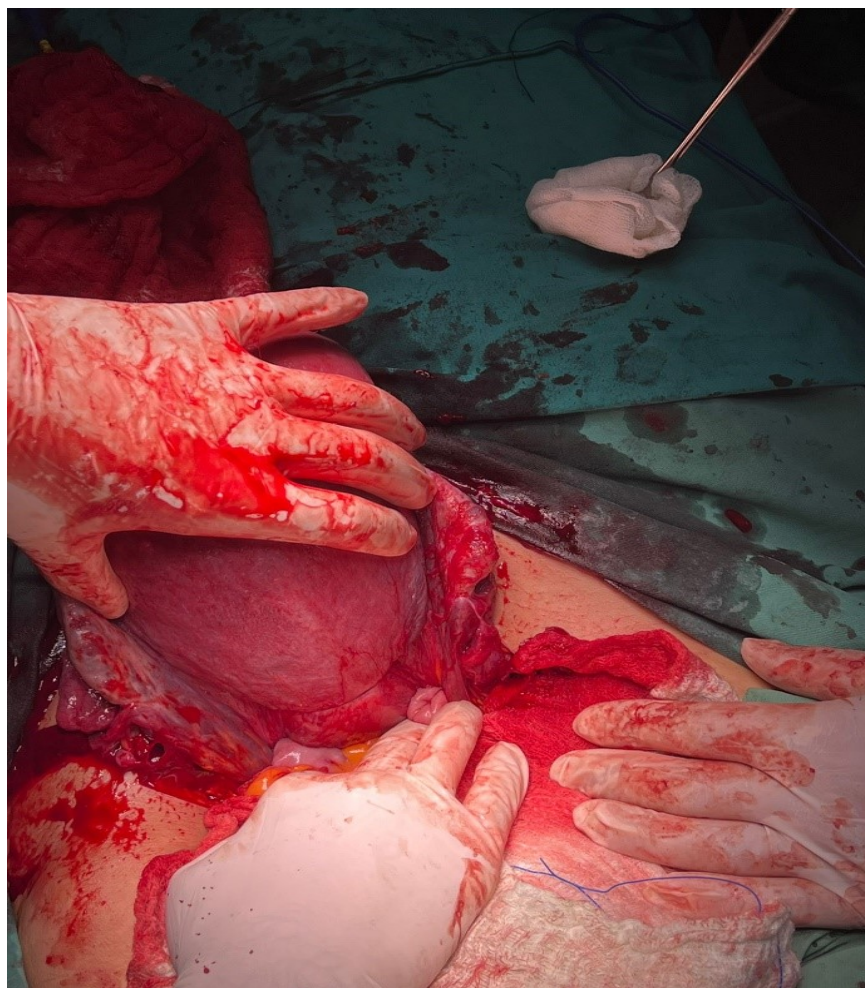


Figure 6: Posterior view of the uterus.

Results

A total of 655 cases with 135 uterine atony and 520 cases with high risk of uterine atony were included in the study (Table 1). Presents the demographic characteristics of the patients who participated in the study (Table 2). In uterine atony cases in whom we applied therapeutic isthmic circumferential suturing technique, the mean Hb/Hct value before cesarean section was 11, 2/34, 6 whereas the mean Hb/Hct value after cesarean section was 8, 3/27, 9 (Table 3).

Post op 8 cases received Erythrocyte Suspension (ES) transfusion between 1-3 units and Fresh Frozen Plasma (FFP) transfusion between 1-2 units. In two cases, hematoma collection in the uterine cavity was aspirated vaginally by relaparotomy due to persistent bleeding and blood collection in the uterine cavity at the 6th hour postoperatively. The 2nd Isthmic circumferential suture technique was applied over the cesarean

incision. Following hemostasis, the abdominal layers were duly closed. Hysterectomy was not performed in any case with uterine atony. The mean Hb/Hct value before cesarean section was 10,9/34.3, while the mean Hb/Hct value after cesarean section was 9,4/30,3 in the cases with high risk of uterine atony in whom we applied prophylactic isthmic circumferential suturing technique (Table 3). None of the cases were relaparatomized. Among the patients with a low Hb value <8, 10 patients had a post op Hb value <7 and received ES transfusion of 1-2 units. Patients who received 2 units of ES transfusion received 1 unit of FFP transfusion.

We found that Hb and Hct values of patients with uterine atony after cesarean section were lower than those of patients with high risk of atony (p-value <0.001, p-value <0.003) (Table 3). This is due to the massive bleeding that occurred during the operation in patients with atony during the cesarean section.

Table 1: Patients who underwent therapeutic and prophylactic isthmic circumferential suturing technique and their numbers.

Number of atony cases during cesarean section	135
Number of macrosomic fetus cases	66
Number of cases with moderate to severe polyhydramnios	52
Number of twin-triplet pregnancy cases	75
Number of cases with preeclampsia+HELLP syndrome	30
Number of Placenta Previa cases	30
Number of placental abruption cases	25
Number of IUmf cases	15
Number of uterine myomatosis cases	15
Number of Grand Multiparity cases	30
Number of non-progressive trauma cases	44
Number of cases with Chorioamnionitis and Fever >38	15
Previous Number of cases with a history of atony at birth	13
Number of Gestational Thrombocytopenia cases <100	15
Number of cases with Hb value <8	35
Number of C/S cases >3	65

Table 2: Demographic Characteristics of the cases.

Mean Age:	27.2
Number of Obese and Morbidly Obese Cases:	72(%10,9)
Number of DM Cases using insulin:	38(%5,8)
Number of Cases with Hypertensive Disorders:	68(10,3%)
Mean Caesarean Section Week:	36.5
Average Number of Gravida and Parity:	3,1-2,6
Number of cases aged >35 years:	75(%11,4)

Table 3: Hb and Htc values before and after caesarean section in patients who underwent therapeutic and prophylactic isthmic circumferential suturing technique.

Number of Patients	Hemoglobin		Hematocrit	
	Preoperative	Postoperative	Preoperative	Postoperative
Therapeutic (n:135)	11.2 ± 1	8.3 ± 1.1	34.6 ± 2.3	27.9 ± 3
Prophylactic (n:520)	10.9 ± 1.6	9.4 ± 1.3	34.3 ± 3	30.3 ± 2.9
p-Value	0.4	0.001	0.6	0.003

Discussion

This study showed that the technique of isthmic circumferential suturing applied in cases of uterine atony during cesarean section and in cases with a high risk of atony was highly

effective in reducing both the risk of postpartum hysterectomy and blood loss. In the literature, there are medical and surgical methods mostly applied in cases of uterine atony. Surgical methods; tamponade techniques (tampon

application with gauze. Bakri balloon). Surgical techniques; uterine artery ligation. B Lync hypogastric artery ligation hysterectomy [20]. Medical methods have become prominent in protection against atony in cases with high risk of uterine atony [21]. There is no publication in the literature that applies the prophylactic volumetric circumferential suturing technique in cases with a high risk of uterine atony.

Among the 520 patients who underwent prophylactic intrauterine circumferential suture technique. Only 10 of the 520 patients with a pre-cesarean section Hb value <8 needed 1-2 units of ES transfusion. Which is considered to be an important success of the method? In the literature; we have previously published this suture technique in 15 patients with atony [22]. In this article; we applied the method in 135 cases with uterine atony and 520 cases with high risk of atony. The same method was found to be effective in cases with a high risk of uterine atony. The fact that only 2 cases out of 135 patients needed relaparotomy and none of them underwent hysterectomy and post op intensive blood transfusion was not needed shows the effectiveness of the method.

Conclusion

In cases with uterine atony during cesarean section and in cases with a high risk of atony. The technique of isthmic circumferential suturing not only eliminates the risk of postpartum hysterectomy but also significantly reduces the need for transfusion by preventing excessive decrease in Hb/Hct values. Therefore, maternal morbidity is significantly reduced. The application of the technique of isthmic circumferential suturing with only 45 cm-50 cm 1/0 vicryl in 30 seconds without causing any complications illustrates the ease and efficiency of the method.

Acknowledgements

Not applicable.

Author's Contribution

BK and MAY determined the topic and wrote the manuscript. ZD and HA analyzed data. SBK revised the manuscript.

Declarations

Ethics Committee approval was obtained from the Ministry of Health. Mardin Provincial Health Directorate with the number E-68051626-770-255419972 on 30.09.2024.

Due to the fact that it was a retrospective study. it was informed by the Ethics Committee Commission of the Mardin Provincial Health Directorate and the consent was waived.

Consent for Publication

Not Applicable

Competing Interests

The authors declared no conflicts of interest with respect to the research. authorship and publication of this article.

Funding

This Work has not been supported by any institution.

Data Availability

The data that support the findings of this study are preserved in the Private Cihanpol Hospital. These data can be request from the corresponding authors (Bülent Kurkut and Mem Arjen Yıldırım).

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