

Evaluation of Efficacy and Safety of Topical Hemostatic Agents in Controlling Obstetric and Gynecologic Hemorrhage

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Abstract

Background: Intraoperative hemorrhage remains a major concern of surgery in obstetrics and gynecology. Morbidity can be severe, resulting in increased transfusion rates, hospital stay, cost and rarely mortality. **Aim of the Work:** the study aims to assess the efficacy and safety of topical hemostatic agents in different causes of bleeding in obstetrics and gynecology as post-partum hemorrhage, myomectomy, and ectopic pregnancy. **Patients & Methods:** This study was carried out on 60 female patients divided into 2 groups. Group 1: Patients with PPH, myomectomy operation, and ectopic, who have bleeding during surgery who and given the usual management protocol of a university hospital plus the use of a THA (gel foam) Group 2: Patients with PPH, myomectomy operation, and ectopic and given the usual management protocol. **Results:** Those technically simple procedures such as the use of Gel foam at the bleeding sites should have priority in cases of PPH, Myomectomy and Ectopic pregnancy because they are effective, reliable, and can be performed under easy instructions and by less trained personnel. In this study, Hemoglobin level was much greater in group A than in group B, per post-operative data (p-value = 0.05). **Conclusion:** The study's findings, imply that topical hemostatic agents would help to treat intraoperative bleeding in patients who have had myomectomy, ectopic pregnancy, or postpartum hemorrhage. When compared to the standard code red management procedure alone.

Keywords: Topical Hemostatic; control; Hemorrhage; Obstetric.

Introduction:

Excessive bleeding is one of the most common symptoms in women when they visit their gynecologist. In most cases, the cause is associated with primary obstetric and gynecological diseases. Postpartum estimated to occur in 5% of births, is defined as blood loss of more than 500

hemorrhage (PPH) is one of the main causes of massive blood loss in obstetrics and one of the top causes of maternal mortality worldwide. Primary PPH, milliliters within the first 24 hours after birth. One of the major causes of maternal

death worldwide, particularly in underdeveloped nations, is postpartum hemorrhage (PPH) (1). Either atony or placental site bleeding or severe female genital tract lacerations cause it to happen. Uterine massage, uterotonics, intrauterine bags or catheters, bimanual or aortic compressions, compression sutures, and uterine devascularization are just a few of the many techniques utilized to manage PPH (2). When normal surgical procedures (such as suturing, cautery, or pressure) are inadequate or inconvenient to use, topical hemostatic drugs are used as adjuncts to control intraoperative bleeding. Surgical disciplines such as cardiology, otolaryngology, urology, and others have discussed the use of topical hemostatic agents (THAs) for controlling intraoperative bleeding (3).

Aim of the work:

This study aims to evaluate the efficacy and safety of topical hemostatic agents in various causes of bleeding in obstetrics and gynecology, including postpartum hemorrhage, myomectomy, and ectopic pregnancy.

Patients and methods:

This randomized clinical study included 60 female patients recruited from October 2022 to May 2023 from the Benha University Department of Obstetrics and Gynecology and Qalyub Specialist Hospital, and who were recruited from the Benha University Faculty of Medicine before the study. Approval was obtained from the obstetrics and gynecology and ethics committee (MS 7-9-2022). Informed consent was obtained from all individual participants included in the study.

Inclusion criteria:

- 1- Age 18-45 years
- 2- Patient had post-partum hemorrhage.
- 3- Ectopic pregnancy.
- 4- Fibroid and symptomatic.

Exclusion criteria:

- 1- Blood diseases with history of bleeding disorder
- 2- Traumatic causes of bleeding

Participants were randomly allocated to:

Group A: Patients with PPH, myomectomy operation and ectopic pregnancy who were given the usual code-red management protocol plus the use of a THA.

Group B: Patients with PPH, myomectomy operation and ectopic pregnancy, and have bleeding during surgery who were given the usual code-red management protocol.

Sample size :

Power and Sample size calculations software version 3.0 was used to compute sample size. A total sample size of 30 per group were enough to identify an 80% power and 5% level of significance. This number was increased to 41 subjects per group.

Method:

Gel foam (absorbable gelatin sponge) is used locally for mechanical hemostasis at bleeding sites (within the uterine cavity in case of uterine atony, bleeding at placental sites, outside the uterine cavity, at uterine sutures or at complex obstetric sites) It is mechanical agent delivered to the site of uterine bleeding during myomectomy.

Cut the sponge to the size of the bleeding site and hold it in place for several minutes above the 9-suture line during open myomectomy. In cases of compromised ectopia, after removing the products of conception from the fallopian tubes in the bleeding bed, gel foam was applied to the implantation site.

Gel Foam 20×60 ×70 mm sterile sponge produced by Pfizer, New York, USA, and available in Medical Supplies Stores in Egypt

Statistical analysis

The collected data were modified, coded, and tabulated using the Statistical Package for the Social Sciences (IBM Corp., 2017 release. IBM SPSS Statistics for Windows, version 25.0, Armonk, NY: IBM Corp.). Data were presented and appropriate analyses were performed depending on the type of data obtained for each parameter.

- **Normality of data**

To check if the data distribution was normal, the Shapiro-Wilk test was used.

- **Descriptive statistics:**

For numerical data that is regularly distributed, the mean and standard deviation (\pm SD). The range and median of numerical data that is not regularly distributed.

The percentage and frequency of non-numerical data.

- **Analytical statistics:**

- **Mann Whitney Test (U test)** was employed to evaluate the statistical

significance of a non-parametric variable's difference between two research groups.

- **Chi-Square test** was employed to look at the connection between two qualitative factors.
- **Probability of results** If a p-value is less than 0.05 at the 95% confidence interval, it is deemed significant.

Results

In the current study, 60 participants had gynecological or obstetric procedures. They were 39.03 years old on average. Their BMI was 28.16 kg/m² on average. The causes of the bleeding were 26.7% following ectopic pregnancy intervention, 36.7% following myomectomy, and 36.7% following postpartum hemorrhage.

Study subjects were further divided into two groups according to management of bleeding:

- Group A included 30 cases with PPH, myomectomy operation and ectopic who will be given the usual code-red management protocol plus the use of a THA (Gel Foam).

- Group B included 30 cases with PPH, myomectomy operation and ectopic, and have bleeding during surgery who will be given the usual code-red management protocol of our university hospital, **Figure 1**

Operative details in the studied groups:

Time to achieve complete hemostasis (sec) and Intraoperative blood loss (mL) were significantly lower in group A than group B (P-value = 0.003 and 0.004, respectively). Operative time was

insignificantly different between both studied groups (P-value = 0.554).

In Group A n=30 Operative time (min): 50.79±11.49. Time to achieve complete hemostasis (sec) 186.8±23.37 Intraoperative blood loss (mL): 103.22±60.04.

In Group B: n=30 Operative time (min): 60.94±17.44. Time to achieve complete hemostasis (sec) 342.17±125.32. Intraoperative blood loss (mL): 260.98±57.14, **table 1, Figure 2.**

Post operative differences in the studied group:

Group A n=30: Hospital stay (days) 2.9±0.64, HGB difference from pre operation 1.44±0.44, Need of blood transfusion 0(0%)

Group B n=30: Hospital stay (days) 3.15±1.02, HGB difference from pre

operation 2.09±0.66, Need of blood transfusion 1(3.33%), **table 2, Figure 3.**

Hemoglobin was much greater in group A than in group B, per post-operative data (p-value = 0.05). The length of hospital stays and the requirement for blood transfusions did not change much.

In group A, 54 percent of patients had one piece of gel foam administered to achieve homeostasis, while 23% had two pieces and the rest 23% had three pieces of gel foam. The demographic parameters included a mean age of 39.03 years, a BMI of 28.16 kg/m², and the reasons for the bleeding were 26.7% after an ectopic pregnancy intervention, 36.7% after a myomectomy, and 36.7% after post-partum hemorrhage, **table 3.**

Table" 1: Operative details in the studied groups.

	Group A n=30	Group B n=30	Test Mann-Whitney	p
Operative time (min)	50.79±11.49	60.94±17.44	1.252	0.554
Time to achieve complete hemostasis (sec)	186.8±23.37	342.17±125.32	4.924	0.003*
Intraoperative blood loss (mL)	103.22±60.04	260.98±57.14	3.254	0.004*

Table 2: Post operative differences in the studied groups.

	Group A n=30	Group B n=30	Test Mann-Whitney	P
Hospital stay (days)	2.9±0.64	3.15±1.02	0.104	0.917
HGB difference from pre operation	1.44±0.44	2.09±0.66	2.794	0.05*
Need of blood transfusion	0(0%)	1(3.33%)	1.107	0.313

Table 3: No of gel foam pieces used to achieve homeostasis in group A.

Group A (n=30)			
		n(%)	Indication
No of Gel Foam pieces used	1.00	16(54%)	8 (Ectopic pregnancy) 8 (Myomectomy)
	2.00	7(23%)	3 (Myomectomy) 4(Post partum hemorrhage)
	3.00	7(23%)	7 (Post partum hemorrhage)

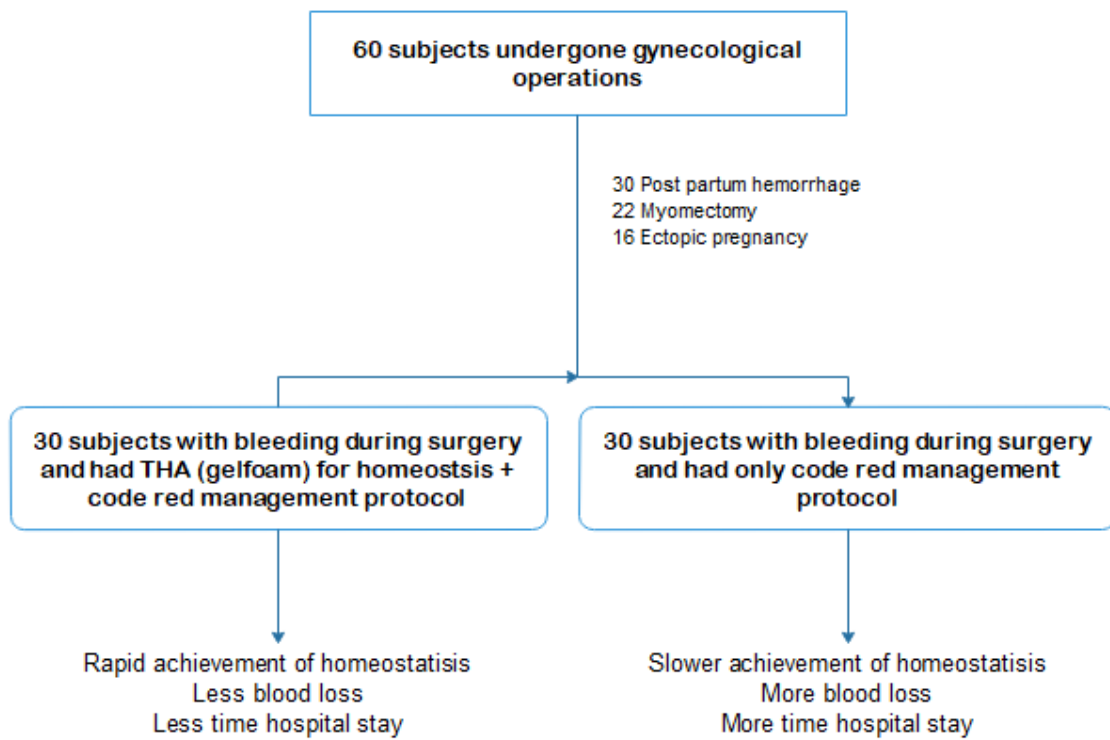


Figure 1: Flowchart of the current study and outcome.

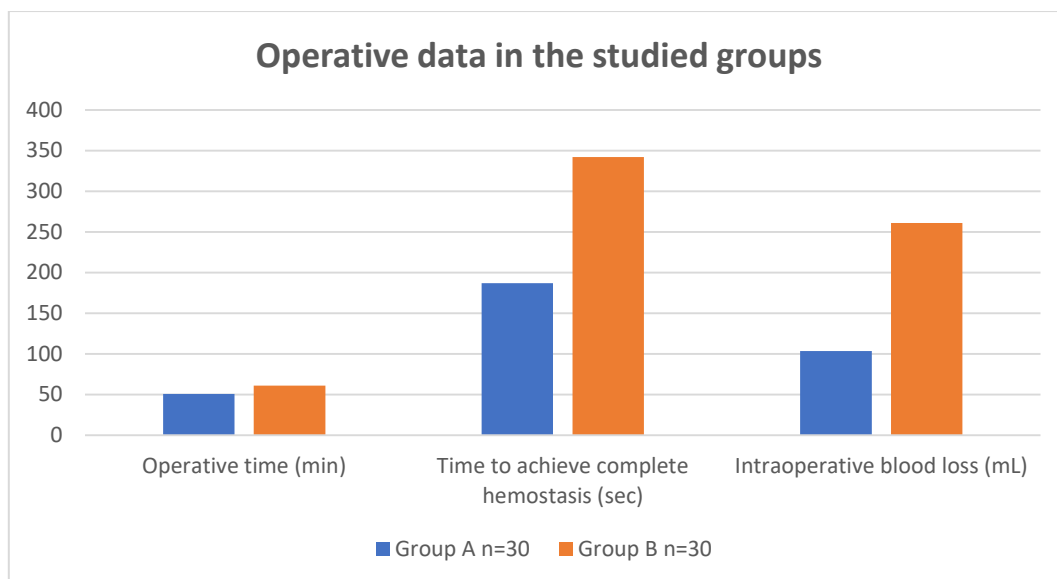


Figure 2: Operative data in the studied groups.

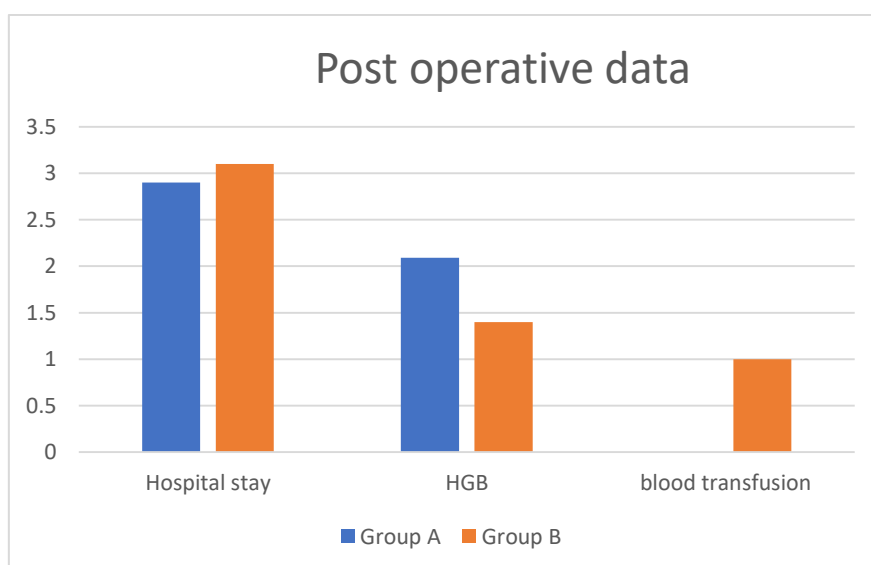


Figure 3: Post-operative differences in the studied groups.

Discussion:

Life-threatening bleeding during surgery can result from significant obstetric diseases such as ectopic pregnancy, myomectomy, and postpartum hemorrhage (PPH). PPH is a leading global cause of maternal morbidity and mortality, contributing significantly to maternal mortality, Intraoperative bleeding is a

danger associated with myomectomy, a surgical treatment used to remove uterine fibroids and ectopic pregnancy, a condition in which a fertilized egg implants outside the uterus. This can provide significant challenges for medical practitioners. methods for determining blood loss, including visual assessment, photometric

analysis, gravimetric blood loss determination, blood loss formulas using hemoglobin and hematocrit monitoring, and imaging analysis.

Surgical treatments such as cautery, ligation, sutures, and other ways are commonly used in standard care protocols for PPH, myomectomy, and ectopic pregnancy to reduce bleeding. In addition to resuscitation techniques, blood transfusions, and coagulation management, these protocols are designed to stabilize the patient's state and accomplish hemostasis. Even with these well-established procedures, controlling bleeding during surgery can be challenging, particularly in situations involving significant bleeding or when locating and controlling the bleeding source proves to be challenging.

Given the crucial nature of ectopic pregnancy, myomectomy, and PPH, creative and practical techniques are required to improve intraoperative bleeding management. Topical hemostatic agents (THA) have become a viable supplementary technique for hemorrhage control. THA is a topical hemostatic agent that act by encouraging coagulation and closing blood arteries, may be administered directly to the bleeding site to produce quick and focused hemostasis.

The patients were divided into two groups:

- **Group A:** obtained standard code-red handling procedure with THAs added.
- **Group B:** gotten the standard code-red handling procedure.

In this investigation, gel foam, or absorbable-gelatin sponge, was employed as a THA. Preoperative evaluations included a full medical history, physical and gynecological exams, laboratory tests, an EKG, a chest radiograph, and a pelvic ultrasound.

Our results are in line with other research that examined comparable patient demographics and reasons for bleeding in obstetric and gynecological patients. For instance, based on the research Additionally, they discovered that the bulk of bleeding episodes occurred during the puerperium (41.5%), followed by post-myomectomy hemorrhage (31.7%), and that the average age of women who had bleeding following myomectomy was 38.2 years. Did (4).

Additionally, our findings concur with a study revealed women who suffered from postpartum hemorrhage had a mean age of 39.8 years and a BMI of 28.5 kg/m² (5) .

In addition, a study discovered that 28% of cases needing intervention, ectopic pregnancy was a prevalent cause of bleeding in gynecologic patients (6) .

Confirming our findings another study assessed that LHA's (gel foam) contribution to PPH control and twelve vaginal births and forty-eight cesarean sections (CS) were among them. The researchers discovered that 26.7% of instances required bilateral uterine artery ligation, whereas 73.3% of cases had bleeding controlled with the application of Gel foam. Furthermore, it is evident that 13.3% of instances required a blood transfusion, whereas 86.7% of cases did not. Based on the indication for Gel foam usage, they discovered a statistically

significant difference between the bleeding stopping with Gel foam and the bleeding stopping after undergoing bilateral uterine artery ligation. Additionally, depending on the quantity of Gel foam pieces employed, there was a statistically significant difference in hemostasis following bilateral uterine artery ligation and hemostasis obtained using Gel foam. Similarly, there was a highly significant statistical difference in the need for blood transfusion between hemostasis achieved using Gel foam versus hemostasis with bilateral uterine artery ligation (7).

In relation to the current study others discovered that older mothers exhibited a higher proportion of different risk factors linked to postpartum hemorrhage (PPH), including placenta previa, retained placenta tissues, and uterine rupture. Although the association between maternal age and PPH risk was not explicitly addressed in our investigation, these findings corroborate our hypothesis that older mothers may be at higher risk for PPH (1,8,9).

others observed that primiparity was associated with a high risk of PPH, with the first delivery being a contributing factor. This result is in line with our study's conclusion that women who are primiparous have a greater risk of PPH (8,10).

About the relationship between risk of PPH and prior cesarean section (CS) birth, Knight et al. discovered that there was a higher chance of PPH following a CS delivery. This aligns with recent studies on topical hemostatic agent usage in CS patients (11).

The following writers discuss the use of topical hemostatic agents in obstetrics both offer instances of topical hemostatic agent usage in obstetric situations, so reinforcing the need on assessing the topical hemostatic agents' safety and effectiveness (12–15).

Nevertheless, writers discovered a correlation between fecundity and PPH, whereas Vyas and Saha did not identify any (16,17).

According to studies revealed that having multiple births did not significantly increase the risk of PPH. This runs counter to the conclusions that confirm the Primipara status is a major risk factor for PPH (8–10,16).

Our results are in line with other research that found no appreciable variations in age or BMI between groups. For instance, based on the research listed below we compared the age and BMI of patients getting topical hemostatic agents to those not receiving them in order to assess the effectiveness of this treatment in heart surgery patients (18). This is in line with our study, which found that there were no appreciable variations in BMI or age between groups B and A.

The use of topical hemostatic agents in patients having liver resection surgery was also examined in a research which found no statistically significant changes in age or BMI between the topical hemostatic agent-treated group and the control group (19). This is in line with our research, which revealed no appreciable variations in age or BMI between groups B and A.

Furthermore, systematic analysis assessed the effect of topical hemostatic agents on

patient outcomes in a range of surgical procedures and discovered no appreciable variations in age or body mass index between patients who and those who did not receive topical hemostatic agents. Not located (20). This is in line with our study, which found that there were no appreciable variations in BMI or age between groups B and A.

On the other hand, according to this study we assessed the use of several topical hemostatic agent types in patients having heart surgery. In this trial, there were no statistically significant differences in intraoperative blood loss or need for transfusions between the topical hemostatic agent group and the control group (21). Our study demonstrated a considerable decrease in intraoperative blood loss in group A as compared to group B, which is in opposition to this finding.

Conclusion

The study's findings, taken together, imply that topical hemostatic agents might be helpful in treating intraoperative bleeding in patients who have had myomectomy, ectopic pregnancy, or postpartum hemorrhage. When compared to the standard code red management procedure alone, the results showed that the application of topical hemostatic agents considerably shortened the time to achieve full hemostasis and reduced intraoperative blood loss. The topical hemostatic agent group had a statistically significant drop in hemoglobin levels, however there were no significant changes in the duration of hospital stay or the need for transfusions. Moreover, neither the length of the operation nor the difficulties that followed

it were considerably impacted using local hemostatic agents.

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