




# Clinical Efficacy of Gauze Tamponade in Preventing Vaginal Bleeding After Transvaginal Oocyte Retrieval: A Retrospective Analysis

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**Objective:** To evaluate the clinical value of routinely using sterile gauze strips to occlude the vagina after transvaginal ultrasound-guided oocyte retrieval (TVOR) in preventing postoperative vaginal bleeding.

**Methods:** The medical records of 1194 patients who underwent transvaginal oocyte retrieval between March and April 2024 were retrospectively analyzed. Patients with no obvious bleeding at the vaginal puncture site were divided into group A (without gauze packing, 586 cases) and group B (with conventional gauze packing, 608 cases) according to whether gauze was used to control bleeding. The incidence of vaginal bleeding at 30 minutes, 1 hour, 3 hours and bloody discharge at 3 days after oocyte retrieval was compared by the chi-square test between the two groups. Patients in group B were also assessed for their tolerance of gauze tamponade removal and the ease and accuracy of postoperative gauze management.

**Results:** There was no statistical difference in general patient information between the two groups ( $P>0.05$ ). Compared with group B the incidence of vaginal bleeding at 30 minutes ( $\chi^2=8.631$ ,  $P<0.05$ ) and the incidence of bloody or brown vaginal discharge 3 days ( $\chi^2=56.50$ ,  $P<0.05$ ) postoperatively was significantly higher in group A, and the incidence of vaginal bleeding at 1 hour postoperatively and 3 hours postoperatively was not significantly different in the two groups ( $P>0.05$ ). Patients in group B tolerated vaginal tamponade and gauze removal better.

**Conclusion:** Routine use of sterile gauze after transvaginal oocyte collection significantly reduces the incidence of vaginal bleeding and is well tolerated by patients.

**Keywords:** transvaginal oocyte retrieval, complications, vaginal bleeding, gauze tampon insertion, retrospective study

## Introduction

Transvaginal ultrasound-guided oocyte retrieval (TVOR) is a routine procedure used to retrieve mature oocytes in in vitro fertilization-embryo transfer (IVF-ET) cycles. This technique involves puncturing the ovarian follicles directly through the vaginal wall using an ultrasound-guided needle and is widely used in clinical practice due to its precision, speed and minimally invasive nature.<sup>1,2</sup> Although TVOR is generally considered safe, post-operative complications can occur, with vaginal bleeding being one of the most common. The incidence of vaginal bleeding after TVOR has been reported to range from 8.6% to 18.08%, with significant blood loss of more than 100mL occurring in approximately 0.8% of case.<sup>3,4</sup>

After oocyte retrieval, physicians typically use a speculum to examine the puncture site for bleeding. If no obvious bleeding is observed, the residual blood in the vagina is usually wiped away with sterile gauze. If there is bleeding, gauze tamponade is applied to the puncture site to stop the bleeding and the gauze is removed after 1–2 hours.<sup>5,6</sup> However, in clinical practice, patients who do not receive gauze strip may experience vaginal bleeding when getting up, moving around or urinating postoperatively. This requires re-examination with a speculum to locate and apply pressure to the bleeding site, causing discomfort to the patient and additional stress to medical staff.<sup>7</sup> Therefore, preventing vaginal bleeding after oocyte retrieval is an important issue that needs to be addressed.

Gauze tamponade for hemostasis is a traditional and effective method used in surgical procedures to control bleeding from incision sites. In obstetrics and gynecology, gauze packing of the vaginal fornix is a common and practical approach to postoperative hemostasis after vaginal surgery.<sup>8</sup> To date, most studies in the literature have focused on the management of intra-abdominal bleeding after TVOR,<sup>9,10</sup> and few studies have used gauze tamponade as a prophylactic measure for vaginal bleeding. In this study, we aim to evaluate the clinical value of routine gauze tamponade in preventing vaginal bleeding after TVOR by retrospectively comparing the incidence of vaginal bleeding between patients with no obvious bleeding at the puncture site who received gauze tamponade and those who did not.

## Materials and Methods

### Patients

This study included 1194 patients who underwent transvaginal ultrasound-guided oocyte retrieval (TVOR) at the Reproductive Center of Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, from March to April 2024. The inclusion criteria were as follows: patients undergoing TVOR with 1–30 follicles, and those with no obvious bleeding observed via speculum examination after the procedure or with bleeding controlled after brief compression. The exclusion criteria included: patients taking anticoagulant medications; patients with coagulation disorders; patients who required gauze tamponade after the procedure; and patients with a history of vaginal bleeding after previous oocyte retrieval. Patients were divided into two groups based on postoperative management: group A (n = 586): patients who underwent TVOR in March 2024 with no obvious bleeding and no gauze tamponade; and group B (n = 608): patients who underwent TVOR in April 2024 with no bleeding and routine gauze tamponade. This study strictly followed the Declaration of Helsinki and was approved by the Medical Ethics Committee of Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University ethics committee (No. 2024–1142).

### Oocyte Retrieval Procedure

All oocyte retrieval procedures were performed by two doctors with more than 10 years' experience in reproductive medicine and 5 years' experience in oocyte retrieval. Patients had their bladders emptied preoperatively, were placed in the truncanal position and underwent vaginal saline irrigation. The appropriate analgesia or intravenous anesthesia was selected according to the patient's follicle number, ovarian location and degree of tension.<sup>11</sup> For patients with an expected number of follicles less than or equal to 4, a 17G double lumen flushing needle was used with pressure set at 140–145 mmHg and 2–3 follicular rinses were performed; for patients with an expected number of follicles greater than or equal to 5, a 17G single lumen needle was used with pressure set at 120–125 mmHg. After insertion of the needle and activation of the vacuum aspiration device, the follicular fluid was aspirated and transferred to the pre-warmed test tubes and then quickly transferred to the embryology laboratory.

### Gauze Tamponade and Removal Procedure

After the completion of oocyte retrieval, the physician examined the puncture site using a speculum and selected appropriate hemostatic measures based on the bleeding status. The specific steps were as follows: In group A, after wiping and compressing the puncture site for 15 seconds without observed bleeding, no gauze tamponade was performed. In group B, after wiping and compressing the puncture site for 15 seconds without observed bleeding, a sterile gauze strip with a tail was routinely applied. The gauze was gently pressed against the puncture site and inserted into the vagina in an S-shaped manner, ensuring that the tail remained exposed at the vaginal orifice. After removing the speculum, all patients had their external genitalia wiped clean of blood. Patients who received intravenous anesthesia were transferred to the postoperative recovery room on a stretcher, while those who did not receive intravenous anesthesia either walked or were wheeled to the recovery area. Finally, the physician recorded the number of gauze strips inserted into the vagina as one and scheduled removal 30 minutes postoperatively. Harmonized training has been provided to oocyte retrieval surgeons on surgical procedures and on how to insert and remove gauze.

## Outcome Measures

### Vaginal Bleeding and Bloody Discharge in Both Groups

All patients undergoing TVOR surgery were asked to rest in the recovery room for 30 minutes after surgery. Patients were assessed for vaginal bleeding when they stood and left the recovery room without any discomfort. Nurses instructed patients in both groups to drink small amounts of water frequently to promote urination and asked about any bleeding at 1 and 3 hours postoperatively. If bleeding was observed, the source of bleeding was identified to differentiate bladder bleeding from bleeding from the vaginal puncture site. On postoperative day 3, the color and amount of vaginal discharge were recorded when the patient returned to the hospital or by telephone follow-up.

In group B, bleeding was assessed at the time of gauze strip removal 30 minutes postoperatively. Nurses gently pulled the tail of the gauze to remove it and assessed the degree of vaginal bleeding based on the amount of blood on the gauze. The sterile gauze strip (surgical towel) used was 10 cm × 45 cm (4-ply), with a tail length of 1 cm × 15 cm (see Figure 1). The grading criteria for vaginal bleeding were as follows:

- a. No bleeding: Gauze is clean.
- b. Absorption of residual blood: Blood is present only at the tip or scattered on the gauze.
- c. Minimal bleeding: Blood staining is confined to the top 1/8 of the gauze.
- d. Mild bleeding: Blood staining extends from the top 1/8 to 1/4 of the gauze.
- e. Moderate bleeding: Blood staining extends from the top 3/8 to 1/2 of the gauze.
- f. Severe bleeding: Blood staining extends from the top 5/8 to the entire length of the gauze.

### Tolerance to Gauze Tamponade and Removal in Group B

During gauze tamponade insertion and removal, nurses observed the facial expressions of patients in group B and inquired about their sensations. The tolerance to gauze tamponade was evaluated using the following criteria:

- a. Grade 1: Well-tolerated.
- b. Grade 2: Barely tolerable.
- c. Grade 3: Intolerable.



**Figure 1** The sterile gauze strip (surgical towel).

## Data Analysis

The Statistical Package for the Social Sciences (SPSS), version 26.0 for Windows, was used to analyze the data. When  $p < 0.05$  (two-tailed), the difference was considered statistically significant. The measurement data of normal distribution were described by mean (M) with standard deviation (SD). Categorical data are presented as number and percentage. The measurement data of non-normal distribution were described by median (Mdn) with the first quartile (Q1) and the third quartile (Q3). The measurement data in the two groups were compared by the two-sample *t*-test or Mann–Whitney *U*-test. If the difference value between two groups conforms to the normal distribution and has homogeneity of variances, the *t*-test was used. Otherwise, use the Wilcoxon signed-rank test. The enumeration data in the two groups were compared by the chi-square test.

## Results

### Comparison of General Characteristics Between the Two Groups

A total of 1,194 patients were included in this study, with 586 patients in group A (no gauze tamponade) and 608 patients in group B (routine gauze tamponade). There were no significant differences between the two groups in terms of age, number of oocyte retrievals, number of punctures, number of punctured follicles, serum estradiol levels on the day of trigger, duration of oocyte retrieval, proportion of intravenous anesthesia, and proportion of double-lumen needle use ( $P > 0.05$ ), see [Table 1](#).

### Gauze Tampon Removal at 30 minutes Postoperatively in Group B

Among the 608 patients in group B, the results of gauze strip removal at 30 minutes postoperatively were as follows: no bleeding in 162 cases (26.6%); absorption of residual blood in 355 cases (58.4%); minimal bleeding in 51 cases (8.4%); mild bleeding in 28 cases (4.6%); moderate bleeding in 9 cases (1.5%); and severe bleeding in 3 cases (0.5%).

### Comparison of Vaginal Bleeding and Bloody Discharge Between the Two Groups

The incidence of vaginal bleeding after puncture was low in both groups. However, group A had a significantly higher incidence of vaginal bleeding at 30 minutes postoperatively compared to group B (1.7% vs 0.33%,  $P < 0.05$ ). There were no significant differences in the incidence of vaginal bleeding at 1 hour and 3 hours postoperatively between the two groups ( $P > 0.05$ ). The incidence of bloody or brownish discharge on postoperative day 3 was significantly higher in group A than in group B (23.04% vs 7.24%,  $P < 0.05$ ), see [Table 2](#). Among the 17 cases of vaginal bleeding in group A, 8 cases showed no further bleeding from the puncture site after speculum examination and wiping with gauze; 9 cases had continued oozing from the puncture site after wiping, which was managed with gauze tamponade for 1 hour, after which no bleeding was observed upon tampon removal. In group B, 5 cases showed no further bleeding from the puncture site after speculum examination and wiping with gauze.

### Tolerance to Gauze Tamponade and Removal in Group B

Of the 608 patients in group B, 499 underwent TVOR under intravenous anesthesia and were unaware of the gauze tamponade procedure during sleep. Of the 109 patients who did not receive intravenous anesthesia, 102 (94.05%)

**Table 1** Comparison of the General Information on Participants

	Group A (n = 586)	Group B (n = 608)	P-Value
Age (years)	30.17 ± 4.27	29.87 ± 5.14	0.14
No. of oocyte retrievals	2.24 ± 2.01	2.20 ± 2.08	0.75
Intravenous anesthesia, n (%)	487 (83.1)	499 (82.1)	0.66
No. of punctures	2.16 ± 0.26	2.13 ± 0.31	0.07
No. of punctured follicles	12.76 ± 4.36	12.41 ± 4.52	0.17
Duration of surgery (min)	10.27 ± 5.36	9.98 ± 5.52	0.36
Double-lumen needles, n (%)	223 (38.0)	212 (34.9)	0.36
Serum estradiol level on trigger day (pg/mL)	2019 ± 1406	2115 ± 1270	0.22

**Notes:** Data are expressed as mean ± standard deviation or n (%).

**Table 2** Comparison of Vaginal Bleeding, Bloody Discharge and Tolerance to Gauze Tamponing and Withdrawal Between the Two Groups

Outcome Measure	Group A (n=586)	Group B (n=608)	$\chi^2$	P-Value
Vaginal Bleeding after surgery, n (%)	17 (2.89)	4 (0.66)	10.06	<0.01*
Time of Bleeding, n (%):				
30 min post-op	10 (1.7)	2 (0.33)	8.63	0.02*
1 h post-op	6 (1.02)	2 (0.33)	2.15	0.14
3 h post-op	1 (0.17)	0	1.58	0.60
Bloody Discharge on D3, n (%)	135 (23.04)	44 (7.24)	56.50	<0.01*
Tolerance to the insertion of gauze, n (%):				
Tolerable (Grade 1)		572 (94.08)		
Barely tolerable (Grade 2)		32 (5.26)		
Intolerable (Grade 3)		4 (0.65)		
Tolerance to pulling out gauze, n (%):				
Tolerable (Grade 1)		591 (97.20)		
Barely tolerable (Grade 2)		17 (2.80)		
Intolerable (Grade 3)		0		

**Notes:** Post-op= post-operative; D3= day 3 post-operative; \*p < 0.05.

reported that gauze tamponade was tolerable, 6 (5.30%) reported that it was barely tolerable, and 1 (0.65%) reported that it was intolerable. Regarding gauze removal, 591 patients (97.2%) reported it as tolerable, 17 (2.8%) reported it as barely tolerable, and no patients reported it as intolerable.

## Discussion

### Impact of Routine Gauze Tamponade on Postoperative Vaginal Bleeding Risk

Transvaginal oocyte retrieval (TVOR) is a relatively safe minimally invasive procedure, but complications such as vaginal bleeding from the puncture site still require attention.<sup>12</sup> In this study, we compared the incidence of vaginal bleeding between the two groups and found a significant difference in the incidence of bleeding within 30 minutes postoperatively: 0.32% in group B (gauze tamponade) versus 1.7% in group A (no gauze tamponade) ( $P < 0.05$ ). However, no significant differences were observed at 1 hour and 3 hours postoperatively ( $P > 0.05$ ). This result highlights the effectiveness of gauze tamponade in controlling bleeding in the short term.

Within 30 minutes of surgery, the gauze tamponade in group B exerted pressure on the puncture site, accelerating platelet aggregation and blood coagulation. This physical action significantly reduced the incidence of bleeding. The presence of the gauze not only reduced local blood flow by compression, but also facilitated clot formation, providing effective hemostasis. This mechanism contributed to the lower bleeding rate in group B compared to group A.<sup>13</sup> However, over time, the bleeding rates in both groups converged at 1 and 3 hours postoperatively. This convergence is primarily due to stable clot formation in group B, combined with local tissue healing mechanisms, which mitigated the potential bleeding risk. Meanwhile, in group A, the natural coagulation and tissue healing processes gradually compensated for the initial bleeding risk. Therefore, while early postoperative gauze tamponade significantly reduced the bleeding rate, self-healing of the wound also played an important role in subsequent periods, reducing the differences between the two groups.<sup>14</sup>

In addition, the incidence of bloody or brownish discharge on postoperative day 3 was significantly higher in group A (23%) than in group B (7.2%). This finding suggests that gauze tamponade can effectively absorb residual blood in the vaginal fornix, thereby reducing patient anxiety and distress associated with bloody discharge.

### Impact of Gauze Tamponade on Postoperative Comfort

To minimize patient discomfort during gauze removal, medical staff are advised to instruct patients to bend their knees slightly outwards and take deep breaths to relax their bodies while gently pulling on the gauze tail to remove it slowly.

Patient discomfort during and after surgery is influenced by several factors, including physiological differences, anxiety, and surgical technique;<sup>15</sup> therefore, the healthcare team should prioritize individual patient experience and optimize techniques for gauze insertion and removal to improve overall postoperative comfort.<sup>16</sup>

## Recommendations for Optimizing Postoperative Gauze Management

In large reproductive centers, clinicians often perform several oocyte collections in a short period of time. After each procedure, detailed records must be kept of intraoperative conditions, postoperative medications, use of gauze tamponade, number of pieces of gauze used, and time of removal. However, the high intensity and repetitive nature of these tasks can lead to memory lapses, resulting in omissions or errors in gauze documentation. Such inaccuracies not only compromise the quality of medical care, but also increase medical risks.<sup>17</sup>

To address this issue, we recommend that all patients undergoing oocyte retrieval, regardless of visible vaginal bleeding, have a gauze strip with an external tail placed at the puncture site. This practice allows medical staff to quickly and accurately identify the presence of gauze. By providing a clear visual cue and standardized procedure, this approach ensures normative management of postoperative care, thereby improving operational efficiency and patient safety in reproductive centers.<sup>18</sup>

## Limitations

Although this study provides preliminary evidence for the use of gauze tamponade after TVOR, some limitations remain. This study has inherent flaws, which are common to retrospective studies. For example, individual differences between patients and other potential confounders such as coagulation function or medical history were not assessed. The assessment of patients' tolerance to gauze was not conducted using standard scales, which presented a certain degree of subjectivity. Confounding variables may not be fully assessed and controlled, which may lead to biased results. Also, the duration of gauze tamponade for hemostasis and the time spent by clinicians observing the puncture site for bleeding after oocyte retrieval were not evaluated. These factors may influence bleeding. Future research will further validate these conclusions through multicenter, large-sample, randomized controlled trials to better support widespread use in clinical practice.

## Conclusions

In conclusion, the routine use of sterile gauze strips to occlude the vagina after TVOR not only effectively prevents re-bleeding, but also promotes absorption of residual blood, reduces bloody discharge, and improves post-operative comfort and patient safety. In addition, this practice increases the reliability of surgical procedures, thereby ensuring the stability of the quality of nursing care.

## Patient Consent

After explaining the purpose and content of the study to the patients, the informed consent of the patients was obtained for this study, and the paper version of the informed consent was signed. All patient information will be anonymized in the study to eliminate the risk of privacy disclosure.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare that there is no potential conflict of interest in this work.

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