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Clinical Study on the Application of Non-Catheter Tampon in Abdominal Hysterectomy

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Abstract: *Objective:* To analyze the application value of a non-catheter tampon in abdominal hysterectomy, providing a reference for related research. *Methods:* A total of 100 patients were included in this study, with data collected between January 4, 2022, and January 4, 2024. The patients were divided into two groups: the new group and the traditional group, each comprising 50 patients. *Results:* Compared with the traditional group, the new group demonstrated significantly lower intraoperative blood loss ($P < 0.05$). Additionally, the incidence of complications, operation time, hospital stay, time required to resume normal activities, and postoperative VAS scores were all significantly lower in the new group ($P < 0.05$). *Conclusion:* The application of a non-catheter tampon during abdominal hysterectomy yields satisfactory results. This approach is worthy of further clinical promotion and application.

Keywords: Built-in non-catheter tampon; Abdominal hysterectomy; Application value

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1. Introduction

Abdominal hysterectomy is an effective method for treating various uterine diseases, with surgical safety and postoperative recovery being key areas of focus. In recent years, the built-in non-catheter tampon has emerged as a novel temporary hemostatic material for the vaginal stump during surgery. It features ease of operation and a significant hemostatic effect, garnering widespread attention. Compared to traditional hemostasis methods, the built-in non-catheter tampon eliminates the need for additional catheter devices, thereby reducing procedural complexity. This innovation may offer advantages such as minimizing intraoperative bleeding, shortening operation time, and facilitating postoperative recovery.

Despite its potential, the built-in non-catheter tampon has not been extensively adopted in abdominal

hysterectomy, and its efficacy and safety require validation through rigorous clinical research. Existing studies highlight the importance of enhanced intraoperative hemostasis techniques in reducing blood loss, decreasing the need for transfusions, lowering postoperative complications, and shortening hospital stays [1]. Furthermore, effective hemostasis can mitigate damage to surrounding tissues during surgery, thereby reducing the risk of postoperative infections and improving wound healing quality.

The purpose of this study is to evaluate the application of the built-in non-catheter tampon in abdominal hysterectomy. By comparing it with traditional hemostasis methods, this study aims to assess its advantages in blood loss control, operation time, postoperative complications, and patient recovery. The findings will provide clinicians with a more scientific and reasonable surgical hemostasis option, potentially optimizing surgical processes, enhancing safety, and improving postoperative recovery outcomes.

Through a comprehensive analysis of existing literature and clinical practice, this study seeks to offer new insights and empirical evidence for gynecological surgery. It aims to support the development and innovation of related medical technologies, ultimately contributing to better patient prognoses.

2. Materials and methods

2.1. General information

A total of 100 patients were included in this study, with data collected from January 4, 2022, to January 4, 2024. The patients were divided into two groups: the new group and the traditional group, each comprising 50 patients. The age range was set at 30–55 years to encompass the primary reproductive age of adult women and ensure the universality and representativeness of the research. Educational background was categorized into three levels: below high school, junior college, and undergraduate or above, reflecting diverse patient demographics.

Inclusion criteria: Diagnosed with a uterine lesion requiring abdominal hysterectomy; absence of serious cardiovascular diseases, diabetes, or other significant comorbidities; no history of allergies to tampon materials; and informed consent to participate in the study.

Exclusion criteria: Presence of severe underlying diseases; pregnancy or lactation; mental illness or cognitive impairment; and previous history of abdominal surgery.

2.2. Methods

2.2.1. Traditional group

Patients in the traditional group received standard hemostasis techniques during the operation. These included electrocoagulation, sutures, local compression, and the use of hemostatic drugs as required. The procedure involved making a midline abdominal incision to expose the uterus and surrounding tissues, followed by gradual uterine removal. Bleeding was controlled using electrocoagulation for smaller vessels, sutures for larger blood vessels, gauze compression at the bleeding sites, and hemostatic drugs as necessary.

2.2.2. New group

Patients in the new group were treated with the built-in non-catheter tampon for hemostasis during surgery.

(1) Device specifications: O.B. Built-in Non-Catheter Tampon (manufactured by Johnson & Johnson, Germany, **Figure 1**).

(2) Main materials: Viscose fiber (rayon), PP/PE perforated film, and PET cable.

(3) Application method: Before surgery, the tampons were sterilized using ethylene oxide. During the operation, the tampon was unpacked, and its head end was soaked in Anerdian III skin disinfectant for 10–15 seconds prior to insertion. Once the uterus was detached, the vaginal stump, approximately 3–4 cm wide, was prepared. The tail end of the tampon was inserted into the vaginal stump, and the chuck end was clamped with middle-bending pliers. The tampon was rotated until completely inserted, and the vaginal stump was then closed. The tampon was removed either before the patient left the operating room or upon returning to the ward, depending on intraoperative bleeding and suturing conditions.

Figure 1. O.B. built-in non-catheter tampon (manufactured by Johnson & Johnson, Germany)

2.2.3. Postoperative care

Regardless of the hemostasis method used, vital signs—including blood pressure, heart rate, and blood oxygen saturation—were closely monitored. Postoperative pain management strategies were implemented as needed. Additionally, patient recovery was assessed by monitoring wound healing, mobility, and potential complications.

2.3. Observation indicators

(1) Intraoperative blood loss: Total blood loss during surgery was recorded in milliliters, encompassing all bleeding from the beginning to the end of the operation.

(2) Operation time: Total surgical duration, including the hemostasis process, was documented.

(3) Incidence of postoperative complications: Complications such as infection, bleeding, and wound healing issues within 30 days postoperatively were monitored and recorded.

(4) Patient recovery: Recovery metrics included length of hospitalization, time required to resume normal activities, and postoperative pain scores.

2.4. Statistical analysis

Data were analyzed using SPSS 19.0 statistical software. Measurement data were expressed as mean ± standard deviation (SD), and the *t*-test was employed for comparisons. Categorical data were expressed as rates (%), and the χ^2 test was utilized. A value of $P < 0.05$ was considered statistically significant.

3. Results

3.1. Blood loss during operation

The comparison of intraoperative blood loss between the two groups is detailed in **Table 1**. The average blood loss in the new group was significantly lower than that in the traditional group ($P < 0.05$).

Table 1. Blood loss during operation

Group	Average bleeding volume (mL)
New group (n = 50)	181.25 ± 45.25
Traditional group (n = 50)	251.25 ± 60.36
t	5.261
P	< 0.05

3.2. Comparison of operation time

The average operation time for the new group was 90.25 ± 1.25 minutes, which was significantly shorter than the traditional group's 121.27 ± 2.26 minutes ($P < 0.05$).

3.3. Incidence of postoperative complications

The incidence of postoperative complications was notably lower in the new group (6.00%) compared to the traditional group (16.00%). Details of specific complications are as follows:

(1) New group: 1 case of infection, 1 case of bleeding, and 1 case of wound healing issues.

(2) Traditional group: 3 cases of infection, 2 cases of bleeding, and 3 cases of wound healing issues.

This significant reduction in complications in the new group is supported by statistical analysis ($P < 0.05$).

3.4. Recovery of patients

Table 2 outlines the comparison of recovery indicators between the two groups. The new group demonstrated shorter hospital stays, quicker resumption of normal activities, and lower postoperative pain scores compared to the traditional group, with all differences being statistically significant (P < 0.05).

Table 2. Recovery of patients

Group	Length of stay (days)	Time to resume normal activities (weeks)	Postoperative pain score (points)
New group (n = 50)	4.15 ± 0.25	3.29 ± 0.51	2.14 ± 0.14
Traditional group (n = 50)	6.32 ± 0.58	5.93 ± 0.58	4.22 ± 0.13
t	4.115	5.933	5.261
P	< 0.05	< 0.05	< 0.05

4. Discussion

4.1. Treatment requirements and hemostasis standards for patients undergoing abdominal hysterectomy

Abdominal hysterectomy is a standard surgical procedure for treating benign uterine conditions, such as uterine fibroids and adenomyosis, as well as certain malignant conditions. The primary objectives of this procedure are the thorough removal of diseased tissue, symptom relief, prevention of disease recurrence, and improvement in the patient's quality of life [2]. Effective bleeding control during the operation is critical to ensuring surgical success and influencing postoperative recovery. Hemostasis standards require the adoption of effective measures to minimize intraoperative bleeding, maintain a clear surgical field, and reduce the risk of complications. Traditional

methods, including electrocoagulation, sutures, and local compression, have been widely applied. However, these approaches have limitations; for instance, electrocoagulation may harm surrounding tissues, while suturing and compression can extend operation times.

The built-in non-catheter tampon, as a novel hemostatic material, has garnered attention for its simplicity and effectiveness [3]. This tampon achieves rapid bleeding control through physical absorption and compression, reducing intraoperative bleeding and simplifying procedures without requiring additional catheter devices. Research indicates that its use may also help reduce operation time, lower postoperative complication rates, and expedite patient recovery.

4.2. Hemostasis principle of built-in non-catheter tampon in abdominal hysterectomy

The effectiveness of the non-catheter tampon in abdominal hysterectomy is attributed to its unique physical properties and hemostatic mechanism. Typically composed of highly absorbent materials, this tampon expands rapidly upon contact with blood, forming a gel-like substance that effectively fills the vaginal stump and tissue gaps. This process ensures immediate and sustained hemostasis.

The tampon's absorbency allows it to retain blood volumes several times its own weight, which is crucial for controlling intraoperative bleeding. Upon expansion, it exerts physical pressure on bleeding points, significantly reducing blood loss. The gel barrier formed promotes coagulation and accelerates the hemostatic process [4]. Its design facilitates easy placement in the surgical area without requiring additional instruments, streamlining the procedure and reducing operation time.

Studies have demonstrated that the tampon significantly decreases intraoperative bleeding and improves surgical efficiency. Case analyses further highlight its effectiveness in managing complex bleeding scenarios, especially in situations where traditional methods face limitations.

4.3. Application effect of built-in non-catheter tampon in abdominal hysterectomy

The findings indicate that the use of the built-in non-catheter tampon offers significant advantages over traditional methods in reducing intraoperative blood loss, operation time, hospital stay, recovery time, and postoperative pain scores. Additionally, the incidence of complications in the new group was notably lower.

During surgery, the tampon's high absorbency and rapid expansion efficiently control bleeding, minimizing intraoperative blood loss [5]. Its straightforward application helps reduce operation time, while its effective hemostasis mitigates tissue damage, accelerates recovery, and lowers the risk of complications. The observed reduction in postoperative pain scores may result from minimized surgical trauma and inflammation.

Despite these promising results, further studies are warranted to evaluate the long-term effects and safety of the built-in non-catheter tampon. Future research should explore its biocompatibility, absorbability, and degradation processes, as well as its applicability across diverse patient groups, cost-effectiveness, and compatibility with other surgical techniques.

4.4. Points for attention in the application of built-in non-catheter tampons during abdominal hysterectomy

The use of built-in non-catheter tampons in abdominal hysterectomy requires careful consideration of indications, surgical techniques, intraoperative monitoring, prevention of complications, patient education, postoperative management, data recording, teamwork, and continuous training. Patients undergoing anticoagulant therapy, those

with coagulation dysfunction, or individuals with known allergies to tampon materials should be excluded from this treatment option. Proper surgical techniques are crucial to ensure that the tampon effectively contacts the bleeding point without causing tissue damage.

Continuous intraoperative monitoring is necessary to evaluate the tampon's hemostatic effect and make timely adjustments as needed. Aseptic protocols must be strictly followed to prevent infections, and care should be taken to ensure complete removal of the tampon to avoid inflammatory reactions [6]. Patient education prior to surgery is essential to enhance understanding and cooperation, while postoperative monitoring of vital signs and pain levels can facilitate the timely management of complications.

Detailed documentation of tampon usage can aid in evaluating and refining the technique, while a multidisciplinary approach ensures optimal patient outcomes and safety. Regular training and education for surgical teams are vital for improving surgical outcomes and reducing risks. Furthermore, exploring the potential application of tampons in other surgical procedures through continued research is encouraged. These measures can maximize the advantages of non-catheter tampons, reduce risks, and improve the success rate of surgeries and patient satisfaction.

4.5. Significance and limitations of this study

This study evaluated the application of built-in non-catheter tampons in abdominal hysterectomy and compared their effectiveness with traditional hemostasis methods. The findings demonstrate the potential advantages of the tampon in reducing intraoperative bleeding, shortening hospital stays, accelerating recovery, and lowering postoperative pain and complications.

However, certain limitations must be acknowledged. The study was constrained by a limited sample size, a lack of long-term follow-up data, and the absence of a cost-benefit analysis. Expanding the sample size and conducting multicenter clinical trials are recommended to enhance the generalizability of the findings. Long-term follow-up studies are essential for a comprehensive evaluation of the tampon's safety and biocompatibility. Additionally, an economic evaluation could provide valuable insights into the tampon's cost-effectiveness and inform its broader clinical adoption.

5. Conclusion

In summary, for patients undergoing abdominal hysterectomy, the application of built-in non-catheter tampons has demonstrated satisfactory outcomes. This technique is highly promising and warrants further promotion and application in clinical settings.

Disclosure statement

The authors declare no conflict of interest.

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