COMPARISON OF INTRAOPERATIVE MEAN BLOOD LOSS BETWEEN UTERINE ARTERY TOURNIQUET AND VAGINAL MISOPROSTOL IN CASES UNDERGOING TRANSABDOMINAL MYOMECTOMY

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ABSTRACT

Background: Transabdominal myomectomy is a common surgical procedure for the removal of uterine fibroids, often associated with significant intraoperative blood loss. Effective techniques to minimize blood loss are essential for improving surgical outcomes and reducing complications. Uterine artery tourniquet and vaginal misoprostol are widely used methods, but comparative data on their efficacy remain limited.

Objective: To compare the intraoperative mean blood loss, operative time, and hospital stay duration between uterine artery tourniquet and vaginal misoprostol in patients undergoing transabdominal myomectomy. Randomized Controlled Trial**.** Department of Obstetrics and Gynaecology, Bahawal Victoria Hospital, Bahawalpur.23-Feb-2024 to 23-Aug-2024.

Results: A total of 54 patients were included, with 27 assigned to the uterine artery tourniquet group and 27 to the vaginal misoprostol group. The mean intraoperative blood loss was **432.59 ± 191.31 ml** in the uterine artery tourniquet group and **371.19 ± 204.46 ml** in the vaginal misoprostol group (**p = 0.260**). The mean operative times were **121.93 ± 35.23 minutes** and **123.81 ± 36.94 minutes** (**p = 0.848**), respectively. The mean hospital stay durations were **2.93 ± 1.49 days** and **2.85 ± 1.35 days** (**p = 0.849**). Subgroup analyses based on parity and myoma characteristics showed no statistically significant differences between groups.

Conclusion: Both uterine artery tourniquet and vaginal misoprostol are equally effective in minimizing intraoperative blood loss, operative time, and hospital stay duration during transabdominal myomectomy. These findings support their use as viable options based on patient profiles and surgical requirements.

Keywords: Transabdominal myomectomy, uterine artery tourniquet, vaginal misoprostol, intraoperative blood loss, fibroids, surgical outcomes.

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INTRODUCTION

Uterine fibroids, also known as leiomyomas, are the most common benign tumors affecting the female reproductive system. These smooth muscle tumors of the uterus are prevalent in reproductive-age women, with an incidence rate of 20–70% depending on age and ethnicity.[1] While many fibroids are asymptomatic, a significant proportion can cause severe symptoms such as menorrhagia, pelvic pressure, infertility, and anemia, necessitating surgical intervention.[2] Transabdominal myomectomy remains the surgical treatment of choice for women desiring fertility preservation or symptom relief while retaining the uterus.[3] However, intraoperative hemorrhage remains a major concern during myomectomy, often necessitating blood transfusion or, in extreme cases, hysterectomy.[4]

To mitigate blood loss during transabdominal myomectomy, several interventions have been proposed,

including the use of uterine artery tourniquets and pharmacological agents such as vaginal misoprostol. The choice of technique depends on multiple factors, including tumor size, number, location, and the patient's hemodynamic status.[5] Fibroids disrupt the normal architecture and vascular supply of the uterus, leading to increased blood flow within the myometrium. Their highly vascular nature contributes to increased bleeding tendencies during surgical excision.[6] A surgical procedure conducted to remove uterine fibroids, involving an incision in the abdomen to access the uterus is called Transabdominal Myomectomy

The uterine arteries, which are branches of the internal iliac arteries, serve as the primary blood supply to fibroids, creating a network of capillaries prone to rupture during surgery.[7] Hemostasis during myomectomy is therefore a primary goal to prevent excessive blood loss and associated complications such as hypovolemia and coagulopathy.[8]

Various techniques have been developed to control intraoperative hemorrhage, including mechanical methods like uterine artery tourniquets and pharmacological interventions such as misoprostol.

A uterine artery tourniquet is applied by temporarily occluding the uterine arteries at the base of the uterus, thereby reducing arterial inflow and limiting blood loss during surgery.[9] This method effectively induces transient uterine ischemia, leading to reduced intraoperative bleeding without compromising long-term fertility outcomes.[10] Akbaba et al. demonstrated in a retrospective study that patients with multiple large fibroids treated with uterine artery tourniquets had significantly lower hemoglobin drops and reduced transfusion rates.[11] Misoprostol, a prostaglandin E1 analogue, is commonly used in obstetrics and gynecology due to its uterotonic properties. When administered vaginally, misoprostol promotes uterine contractions, thereby reducing uterine perfusion and minimizing blood loss during surgery.[12] A randomized controlled trial by Afolabi et al. compared perioperative vaginal misoprostol with intraoperative uterine tourniquets and found misoprostol to be an effective and easily administered alternative.[13]

Several studies have evaluated the relative efficacy of these two methods. Akbaba et al. found that uterine artery tourniquets were particularly beneficial in patients with multiple fibroids, reducing intraoperative blood loss and shortening hospital stays.[11] Conversely, Afolabi et al. emphasized the advantages of misoprostol in terms of ease of administration, lower costs, and reduced need for specialized equipment.[13] While both methods demonstrated significant efficacy, concerns regarding uterine ischemia and delayed reperfusion with tourniquets raised questions about their safety in fertility-preserving surgeries.[14] This study aims to the intraoperative mean blood loss between the use of a uterine artery tourniquet and the administration of vaginal misoprostol in patients undergoing transabdominal myomectomy , thereby contributing to the optimization of surgical protocols.

METHODS

Randomized controlled trial. Obstetrics & Gynecology Department, Bahawal Victoria Hospital, Bahawalpur. 6 months (23-Feb-2024 to 23-Aug-2024). Sample size was 54 patients (27 in each group). Non-probability consecutive sampling was done.

Inclusion Criteria

• Patients undergoing transabdominal myomectomy for the removal of uterine fibroids.
• Female patients aged between 18 and 50.
• Patients who had given informed consent for participation in the study.
• Patients who were medically fit for surgery, as assessed by preoperative screening.

Exclusion Criteria:

• Patients with known coagulation disorders.
• Patients currently on anticoagulant medication.
• Patients with a history of adverse reactions to misoprostol or any contraindications to the use of a uterine artery tourniquet.
• Pregnant patients.
• Patients who had undergone prior abdominal or pelvic radiation therapy.

Data Collection Procedure: The study was conducted at the Department of Obstetrics & Gynecology, Bahawal Victoria Hospital, Bahawalpur, upon obtaining ethical and CPSP approval. Informed consent was acquired from each participant after explaining the study in detail. During patient intake, a specialized form was used to capture demographic information (Name, age, area of residence) as well as data on confounding variables such as the patient's parity, history of abortion, and use of Combined Oral Contraceptives (COC). Pre-operatively, abdomen USG was done to categorize the myoma in terms of its number (single or multiple) and size. Randomization was performed by allowing participants to pick a slip from a bowl containing mixed slips. Half of these slips contained the letter "A," representing the Uterine Artery Tourniquet group, while the other half had the letter "B," representing the Vaginal Misoprostol group. Surgical procedures were carried out following standard hospital protocols, and operative time was recorded in minutes. Blood loss was measured using pre-determined methods, including weighing surgical towels before and after the procedure and measuring the volume of blood in the suction bottle. Post-operative hospital stay duration was documented in days.

Data Analysis: Data were entered into SPSS version 24 for comprehensive analysis. Descriptive statistics such as mean and standard deviation were calculated for age, intraoperative blood loss, operative time, and hospital

stay. Frequencies and percentages were calculated for parity (primipara/multipara), and myoma character (single/multiple). Normality of data was assessed using the Shapiro-Wilk test. Based on normality, independent t-tests or Mann-Whitney U tests were applied to compare mean intraoperative blood loss between groups. Stratification was done to control confounding variables, and statistical significance was set at $P < 0.05$

RESULTS

The mean age of the participants in the uterine artery tourniquet group was 33.89 ± 5.91 years, while the mean age in the vaginal misoprostol group was 36.89 ± 6.23 years. For the total sample, the mean age was 35.39 ± 6.20 years.

The distribution of parity among the participants shows that 51.9% (n=28) were primiparous, while 48.1% (n=26) were multiparous. This indicates a nearly balanced distribution of parity, which allows for a meaningful comparison of outcomes based on parity status. Such distribution helps assess whether parity influences intraoperative blood loss or other variables in the study.

The data on myoma character shows that 38.9% (n=21) of patients had single myomas, whereas 61.1% (n=33) had multiple myomas. The higher prevalence of multiple myomas highlights the complexity of surgical management required for such cases. Patients with multiple myomas may be at increased risk for greater blood loss and prolonged surgical times, necessitating careful preoperative planning.

The mean intraoperative blood loss was 432.59 ± 191.31 ml in the uterine artery tourniquet group and 371.19 ± 204.46 ml in the vaginal misoprostol group. Although the uterine artery tourniquet group had slightly higher blood loss, the difference between the two groups was not statistically significant ($p = 0.260$). This suggests that both techniques are equally effective in minimizing intraoperative blood loss during transabdominal myomectomy. The mean duration of surgery was 121.93 ± 35.23 minutes in the uterine artery tourniquet group and 123.81 ± 36.94 minutes in the vaginal misoprostol group. The difference in operative time between the groups was not statistically significant ($p = 0.848$). This finding implies that both techniques require similar operative durations, making them comparable in terms of procedural efficiency (Table 1)

Table 1 Comparison of blood loss and duration of surgery in both groups

Variable	Uterine Artery Tourniquet	Vaginal Misoprostol	p-value
Intraoperative blood loss	432.59 ± 191.31	371.19 ± 204.46	0.260
Mean duration of surgery	121.93 ± 35.23	123.81 ± 36.94	0.848

For patients with single myomas, the mean intraoperative blood loss was 405.60 ± 199.47 ml in the uterine artery tourniquet group and 387.82 ± 229.36 ml in the vaginal misoprostol group. The difference between the groups was not statistically significant ($p = 0.852$), indicating that both techniques are equally effective in controlling blood loss during surgery for single myomas. For patients with multiple myomas, the mean intraoperative blood loss was 448.47 ± 190.71 ml in the uterine artery tourniquet group and 359.75 ± 192.48 ml in the vaginal misoprostol group. Although the uterine artery tourniquet group had higher blood loss, the difference was not statistically significant ($p = 0.193$). This result suggests that while blood loss may trend higher in cases of multiple myomas, both interventions perform comparably in managing intraoperative bleeding.

Table 2: Intraoperative blood loss relative to no of myomata

Intraoperative blood loss	Single myomas	Multiple myomatas	p-value
Uterine Artery Tourniquet	405.60 ± 199.47	448.47 ± 190.71	0.852
Vaginal Misoprostol	387.82 ± 229.36	359.75 ± 192.48	0.193

The mean hospital stay duration was 2.93 ± 1.49 days in the uterine artery tourniquet group and 2.85 ± 1.35 days in the vaginal misoprostol group. The difference in hospital stay duration between the two groups was not statistically significant ($p = 0.849$). This indicates that both techniques had similar impacts on postoperative recovery and length of hospital stay.

DISCUSSION

The current study aimed to evaluate and compare the effectiveness of uterine artery tourniquet and vaginal misoprostol in controlling intraoperative blood loss, operative time, and hospital stay duration during transabdominal myomectomy. The findings demonstrated that both interventions are equally effective in minimizing blood loss, maintaining surgical efficiency, and supporting postoperative recovery. This discussion integrates the updated study results with current evidence, explores clinical implications, and highlights areas for further research.The mean intraoperative blood loss was **432.59 ± 191.31 ml** in the uterine artery tourniquet group and **371.19 ± 204.46 ml** in the vaginal misoprostol group, with no statistically significant difference (**$p = 0.260$**). These findings align with previous studies demonstrating the efficacy of both methods in minimizing blood loss during fibroid surgery.[15,16]

The uterine artery tourniquet reduces blood flow by temporarily compressing the uterine arteries, providing a controlled and relatively bloodless surgical field.[17] This technique has proven especially useful in cases involving large fibroids or multiple myomas, where excessive vascularity poses higher risks of hemorrhage.[18] In contrast,

vaginal misoprostol acts pharmacologically by inducing uterine contractions and vasoconstriction, thus reducing intraoperative bleeding through a non-invasive approach.[19]

Studies have shown that vaginal misoprostol is particularly advantageous in low-resource settings, where surgical instruments for mechanical occlusion may be limited.[20] However; the uterine artery tourniquet remains superior in cases requiring direct vascular control, especially for deep intramural fibroids with rich vascular networks.[21]

Stratified analysis based on parity showed no statistically significant differences in blood loss among primiparous (**p = 0.598**) and multiparous women (**p = 0.284**). These results suggest that parity does not significantly affect intraoperative blood loss outcomes, although multiparous women tended to have slightly higher blood loss, likely due to increased uterine vascularity and fibroid burden.

The significantly higher blood loss observed in patients with multiple myomas (**p = 0.193**) compared to those with single myomas (**p = 0.852**) highlights the challenges posed by increased vascularization and larger excision areas. This finding emphasizes the importance of combining techniques, such as preoperative vasopressin injections or tranexamic acid, to enhance hemostatic efficiency.[22]

The mean operative times were **121.93 ± 35.23 minutes** for the uterine artery tourniquet group and **123.81 ± 36.94 minutes** for the vaginal misoprostol group, with no statistically significant difference (**p = 0.848**). This result corroborates prior findings by Evans et al, that pharmacological agents like misoprostol do not significantly affect surgical duration compared to mechanical interventions.[23]

Uterine artery tourniquets offer the advantage of immediate and sustained vascular control during fibroid enucleation, particularly in highly vascularized uteri.[24] Meanwhile, misoprostol reduces vascular perfusion indirectly, requiring slightly longer time intervals to achieve its full hemostatic effect.[25]

Studies report that combining mechanical and pharmacological approaches can further shorten operative times by leveraging their complementary mechanisms.[26] For instance, a randomized controlled trial showed that vasopressin injection combined with uterine artery tourniquets reduced both blood loss and operative times compared to using either method alone.[27]

The absence of prolonged surgical duration in this study also supports the safety profile of both techniques, minimizing anesthesia-related complications and enhancing postoperative recovery.[28] These results are especially relevant for optimizing surgical workflows in high-volume centers and low-resource settings.[29]

Postoperative recovery, as measured by hospital stay duration, showed no statistically significant difference between groups (**p = 0.849**). Patients in the uterine artery tourniquet group had a mean stay of **2.93 ± 1.49 days**, while those in the vaginal misoprostol group had a mean stay of **2.85 ± 1.35 days**. These findings align with previous reports highlighting the importance of effective intraoperative hemostasis in reducing postoperative complications and expediting recovery.[30]

The similarity in recovery times suggests that uterine artery tourniquets and misoprostol provide equally effective hemostatic control, minimizing postoperative anemia, infection, and delayed healing.[31] However, misoprostol's pharmacological nature may offer a slight advantage in terms of patient comfort, especially in minimally invasive settings.[32]

Although multiparous women experienced slightly higher blood loss (**456.00 ± 167.35 ml**) compared to primiparous women (**410.86 ± 215.16 ml**), the difference was **not statistically significant (p = 0.284 and 0.598)**. This supports prior studies indicating that parity alone may not be a key determinant of surgical outcomes, despite theoretical concerns regarding increased vascularization in multiparous uteri.[33,34]

CONCLUSION

Both uterine artery tourniquet and vaginal misoprostol demonstrated comparable efficacy in controlling intraoperative blood loss, operative time, and hospital stay duration during transabdominal myomectomy. Stratified analyses based on parity, previous abortions, contraceptive use, and myoma characteristics confirmed no statistically significant differences, reinforcing the flexibility of either approach based on patient profiles. These findings emphasize the importance of individualized surgical planning to manage complex cases effectively.

ETHICAL APPROVAL

Ethical approval of synopsis was granted by the Institutional Ethical Committee of AMC/PGMI/LGH;

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

HF: Ideology and writing
MZ: Conceived and designed analysis
MS: Data collection
SN: Data analysis
RE: Biostatistics
FH: Data Interpretation
All Authors: Approval of the final version of the manuscript to be published

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