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Suction Evacuation versus Surgical Evacuation in Management of First Trimesteric Abortion: Prospective Study

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ABSTRACT

Background: Abortion is defined as spontaneous or induced termination of pregnancy (TOP) before fetal viability. It is essential that all healthcare providers (HCP) identify the frequency of abortion, the available modalities, the safety, the limitations, and the access issues accompanied by abortion to have the ability to offer safe and optimum quality of care (QoC) to the cases.

Objective: This study aimed to compare the efficiency and safety of suction evacuation versus surgical evacuation in management of patients with first trimester missed and incomplete abortion.

Patients and methods: This prospective randomized clinical comparative study was conducted on 200 patients who were randomly divided into: Group A (suction evacuation group): 100 patients undergoing Manual vacuum aspiration (MVA) and group B (surgical evacuation group): 100 patients and they underwent surgical evacuation

Results: The length of hospital stay (LOS) in hours was statistically significantly longer in the surgically evacuated group ($p < 0.001$). There was insignificant difference between the two groups concerning incidence of successful complete evacuation and the complications of the procedure. Patients' satisfaction in both studied groups was significantly increased in the MVA group ($p= 0.021$). The pain severity (assessed by VAS score) was significantly increased in the surgically evacuated group ($p < 0.001$).

Conclusion: MVA is safe, effective and a better option than surgical evacuation for surgical management of abortion. This is attributed to its less time consuming, shorter hospital stays and more patient satisfaction. MVA is an acceptable and satisfactory alternative approach for patients with first-trimester abortion.

Keywords: MVA, Surgical evacuation, Missed abortion, Incomplete abortion.

INTRODUCTION

Abortion is defined as the TOP before 20 weeks of gestation or resulting in the birth of a foetus weighing less than 500 grams [1].

Worldwide, one in four pregnancies results in abortion. It is essential for all HCP to identify the frequency of abortion, the available modalities, safety considerations, legal restrictions, and access challenges accompanied by abortion to deliver safe and high-QoC to cases [2]. Various approaches are used globally for managing abortion, such as expectant, medical, and surgical methods. Expectant management includes allowing time for the body for natural expulsion of pregnancy without interference, and medical management depends on the usage of ecbolics to evacuate the uterine cavity [3]. MVA is an alternative to surgery. MVA technique is highly accepted globally with limited resources as an office approach owing to its validity, safety, and minimal charges for treating the first trimester abortions [4]. MVA has been associated with minimal bleeding, less time consuming, requires short LOS. It could be done using local anaesthetic and analgesic agents, which include ibuprofen [5-7].

The WHO recommendations include the use of MVA as a favored approach in terms of uterine evacuation [8]. Electric vacuum aspiration is to some extent needed more charge. It requires electric current and a skillful operator. Unfortunately, such services are uncommon in many rural areas. As a result, the ease of use and affordability of MVA tips the balance of efficiency in its favor in healthcare contexts with low income. Even in urban healthcare contexts, MVA is becoming a favored choice as it is accompanied by shorter decision-to-procedure time and is satisfactory to cases due to minimal pain and rapid recovery. The contribution of MVA to outpatient settings could add time- and resource-saving modalities for uterine evacuation while keeping a positive patient experiences [9].

We aimed to compare the efficacy and safety of suction evacuation versus surgical evacuation in management of patients with first trimester missed and incomplete abortion.

PATIENTS AND METHODS

This prospective randomized clinical comparative study was conducted on 200 patients selected from the Obstetric Unit of the Department of Obstetrics and Gynaecology at Mansoura University Hospital (MUH). The study was done from June 2021 to December 2022.

Patients were randomly divided into two groups: Group A (Suction evacuation group): Included one hundred patients undergoing MVA with cannula attached to sixty ml syringe with double locking valve mechanism under paracervical block (PCB). The study was conducted

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at the operative theater of Department of Obstetrics and Gynaecology at Mansoura University Hospital (MUH).

Group B (surgical evacuation group): Included one hundred patients and they underwent surgical evacuation done by experience seniors under general anesthesia conducted at the operative theater of Department of Obstetrics and Gynaecology at Mansoura University Hospital (MUH).

Inclusion criteria: Age from 18 to 35 years, confirmed pregnancy with gestational age less than twelve weeks by serum B-hcg and transvaginal sonography (TVS), presentation of vaginal bleeding and abdominal pain and confirmed missed or incomplete abortion by history, examination and TVS.

Exclusion criteria: Induced, threatened and septic abortion, patients who were hemodynamically unstable, confirmed or suspected ectopic or molar pregnancy, presence of intrauterine device (IUD) and other comorbidities such as uterine abnormalities or coagulation disorders.

Sample size calculation: It was conducted according to the efficiency of Vacuum Aspiration versus Surgical evacuation of abortion as a primary outcome from preceding study by **Saeed *et al.*** [5]**.** Using G*power version 3.0.10 to calculate sample size according to difference in proportion =0.108, 2-tailed test, alpha error =0.05 and power equal eighty percent the sample size was 100 in each group.

Methods: All patients meeting the inclusion criteria were subjected to a comprehensive history and clinical examination. Blood grouping, CBC, urine analysis, urine test for pregnancy and serum BHCG and transvaginal ultrasound (US) were conducted. For the study, concerning the research, an average gestational sac diameter of 25 to 45 mm without foetal pole (anembryonic pregnancy), a crown-rump length of 7 to 40 mm associated with no cardiac activities, or the passage of products of conception (POC) with the residual endometrial lining ≥ 30 mm or women with uterine sizes less than thirteen weeks were included in the study [10].

The cases with missed abortion and closed cervical os were inquired to receive 400 mcg of misoprostol by sublingual route 1-2 hours before the procedure [11]**.** Doxycycline 200 mg was administrated as a single oral dose in both groups. Anti D immunoglobulin was given to all non-immune Rh D negative females. 800 milligrams of ibuprofen was given to the patient orally one hour prior to MVA.

Suction evacuation (Group A): Firstly, we encouraged the patient to micturate to empty her bladder, then we explained the approach steps to the patient and answered all her questions. The patient was positioned in dorsal lithotomy. We washed our hands and put on proper barrier equipment: Sterile gloves and gown, and we conducted a bimanual examination, noting the size, shape, and uterine position, and the speculum was inserted to properly inspect the whole cervical length. Cervical cleaning was conducted by using an antiseptic-soaked sponge.

Paracervical block (PCB): Paracervical block (PCB) composing of twenty-two ml volume of ropivacaine 0.5% (10 ml), lidocaine 1% (contained no adrenaline) (10 ml), and fentanyl 50 mcg/ml (two ml) was administrated.

Cervical dilatation: Dilatation isn't required when the cervix permits the smallest size cannula to fit through the cervical os. Cervical dilatation is an important step in cases with inadequate cervical dilatation. Adequate cervical dilatation is often detected among females with incomplete abortion.

Insertion of the cannula and attaching the syringe:

A vacuum was generated using a sixty ml double-valve MVA syringe. To activate the vacuum, the valve was secured by pushing button inward. The syringe barrel was held with one hand while the plunger was pulled back with the other until the plunger arms snapped outward, indicating full vacuum. The uterus was then assessed through a bimanual examination, and the cervix was disinfected with antiseptic lotion. A cannula, sized between 4 mm and 12 mm for a snug fit in the cervical canal, was selected. Using a no-touch approach, the cannula was gently inserted across the cervical canal to reach the uterine fundus. The syringe was after that connected to the cannula, and the pinch valve was released, permitting the vacuum to be moved to the uterine cavity. Uterine contents were aspirated using a rotating or back-and-forth motion of the cannula. Indicators of complete evacuation included the appearance of foam or bubbles, no additional material being aspirated, a gritty sensation as the cannula moved along the uterine walls, and the feeling of the uterus contracting around the cannula. These signs were taken as confirmation of procedure completion.

Viewing and processing POC: Involved identifying villi, gestational sac, and decidual tissue. Fetal parts may be visible as early as 8-9 weeks but should be positively recognized in pregnancies 10-13 weeks LMP. If no POC is visible in the US, re-aspiration and reevaluation of the diagnosis may be necessary. After inspection, the POC should be removed or sent for a pathological examination if needed.

Postoperative care: Involves continuous monitoring of vital signs and symptoms, ensuring uterine cramping and bleeding subside, and managing abdominal pain and excessive bleeding. Patients are asked about their satisfaction with the procedure.

Surgical evacuation (subgroup B):

Surgical procedure: After the patient was prepared with cleaning and draping, sedation was provided by an opioid analgesic, fentanyl, and benzodiazepine, midazolam. Performing a bimanual examination was conducted to evaluate uterine size and orientation. A speculum was used to retract the posterior vaginal wall, and the cervix was swabbed with Povidone-iodine (PVP-I) for disinfection beginning at the cervical os with each new sponge till the os was totally covered by antiseptic solution. With one hand, apply traction using ring forceps attached to the cervix to align the cervix and uterine body as possible, and if needed, cervical dilation was performed using Hegar dilators. Using gentle cervical traction, a suitable-sized ovum holding forceps or ring forceps was inserted into the uterus, just past the internal cervical os.

Remove all products of conception, stop the approach if there are features of a perforated uterus, followed by curettage of the uterine walls with a blunt metal curette to complete the procedure. Select the largest suitable blunt curette, as smallest ones increase the risk of trauma. Work from the fundus towards the cervix to remove debris without causing perforation. The curette was held gently between the thumb and index finger, with the handle resting against the other fingers to allow for a gentle back and forth motion. Avoid gripping the curette with entire hand. Rotation of the curette 360 degrees was conducted while proceeding with a successive vertical pass motion from the fundus to the internal os level, covering the whole uterine cavity. Vaginal toileting was performed, and a sterile pad was applied, after which the patient was transferred (in a comfortable manner).

Following the approach, cases were monitored, with regular checks on vital signs and monitoring for vaginal bleeding or other complications. A follow-up appointment was scheduled for one week later to record any complaints and to provide further care as needed.

The primary outcome was the procedure's success frequency, defined as the complete evacuation of the uterus, which was confirmed through transvaginal sonography (TVS). The study's secondary outcome measures comprised LOS, operative duration, and technique-related adverse events, such as perforated uterus, blood loss, infection, and vagal shock. Blood loss was measured by the volume collected in the aspirator cannula for suction procedures, while for surgical evacuation, blood loss was measured from the drape and kidney tray. After the procedure, patients were moved to a recovery area, where those who underwent suction evacuation were usually discharged within 2–4 hours. Patients who had surgical evacuation were generally transferred to the ward and discharged later upon stabilization. Patients were followed up for seven days post-procedure to assess pathology results and check for infection symptoms, including lower abdominal pain, vaginal discharges, and fever. A bimanual examination was conducted to evaluate uterine size and any ongoing vaginal bleeding. If any complications were identified, appropriate management was provided.

Ethical considerations: The study was done after being accepted by The Research Ethics Committee, Mansoura University. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data management and statistical analysis were performed using SPSS version 26 (IBM, Armonk, New York, United States). Quantitative data were assessed for normality using the Kolmogorov–Smirnov test, the Shapiro-Wilk test, and direct data visualization methods. Based on normality, quantitative data were summarized as means and standard deviations or medians and ranges. Categorical data were summarized as numbers and percentages. Quantitative data were compared between the studied groups using the independent t-test or Mann-Whitney U test for normally and non-normally distributed quantitative variables respectively. Categorical data were compared using the Chi-square or Fisher's exact test. All further analyses were determined based on data availability. All statistical tests were two-sided, and p-values less than 0.05 were considered significant.

RESULTS

A total of 200 women with incomplete and missed miscarriages participated in the study, with 100 individuals haphazardly assigned to either MVA or surgical evacuation.

In the MVA group, 4 women did not attend their follow-up visits, making their outcome data unavailable for analysis. Among the remaining 96 participants, all completed their treatments.

In the surgically evacuated group, 92 participants completed their treatment course and were enrolled in the analysis, while 8 females didn't return for follow-up and were ruled out from the study (figure 1).

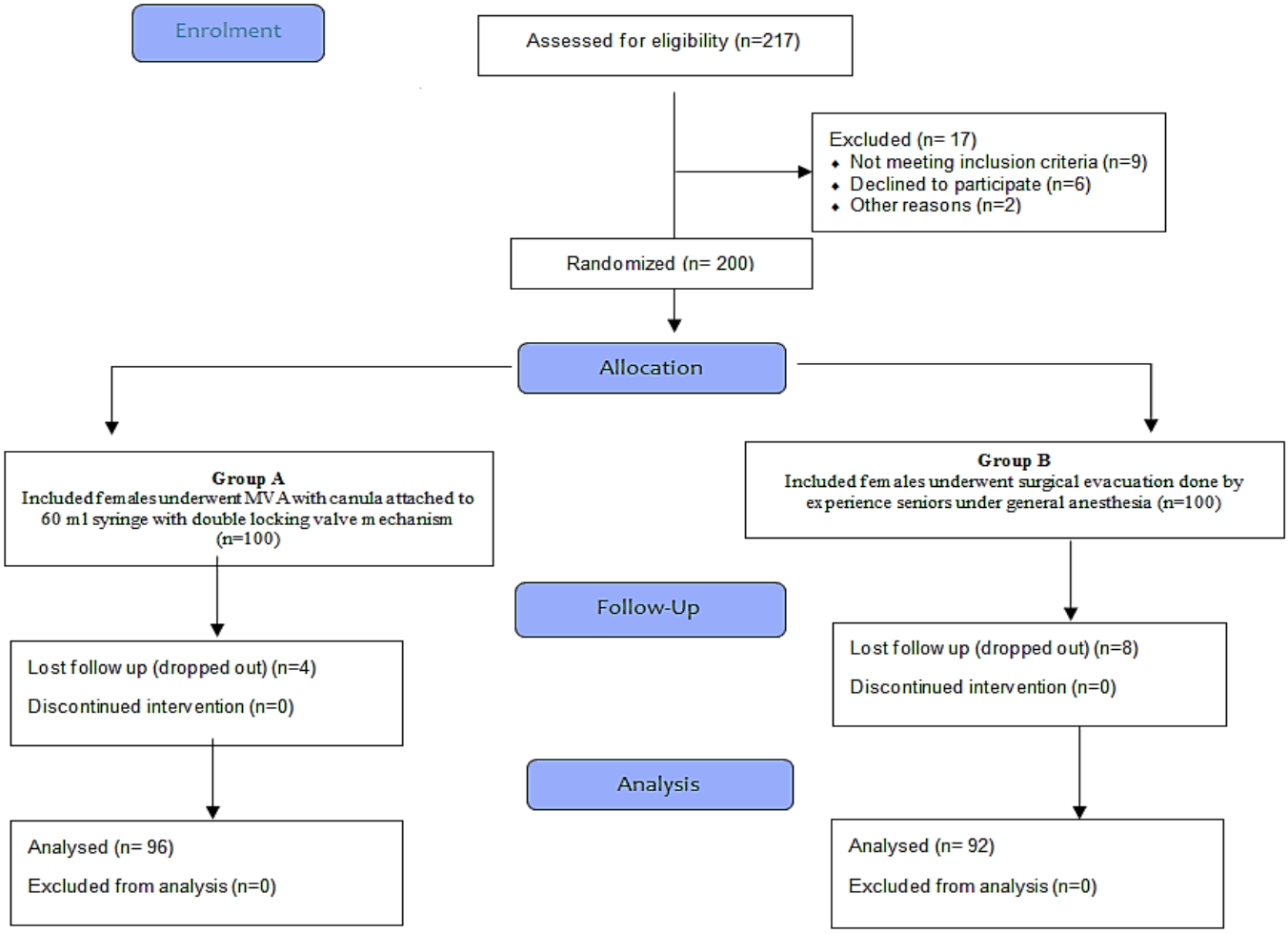

Figure (1): The Flow Chart.

Table (1) displayed that there was insignificant difference between the two study groups concerning the age (p= 0.668) and the BMI (P= 0.751).

Table (1): Demographic data and obstetric history of cases in both studied groups:

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
Age (Years)	28.77 ± 5.76	28.4 ± 6.01	t= 0.430, P= 0.668
BMI (Kg/m^2)	30.04 ± 5.35	29.76 ± 5.34	t= 0.317, P= 0.751

t: Independent samples t-test.

As shown in table (2), the duration of the procedure was statistically significantly longer in the surgically evacuated group (p< 0.001).

Table (2): Procedure time (minutes) of cases in both studied groups:

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
Procedure time (minutes)	11.13 ± 3.80	14.11 ± 4.90	t = - 4.678, P < 0.001*

t: Independent samples t-test, *: Statistically significant (p<0.05).

Table (3) illustrated that there was insignificant difference between the two study groups concerning the preprocedural haemoglobin level. However, after the procedure, the haemoglobin level was statistically significantly lower in the surgically evacuated group (p= 0.001). Also, there was insignificant difference between the two study groups concerning the preprocedural haematocrit level. However, after the procedure, the haematocrit level was statistically significantly lower in the surgically evacuated group (p= 0.005). The amount of blood loss during the procedure was statistically significantly higher in the surgically evacuated group (p < 0.001).

Table (3): Analysis of the hemoglobin level, hematocrit level and blood loss before and after procedure in the studied groups

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
Hemoglobin level before procedure (gm/dl)	11.36 ± 0.76	11.32 ± 0.81	t= 0.310 P= 0.757
Hemoglobin level after procedure (gm/dl)	10.62 ± 0.73	10.19 ± 0.46	t = 4.799 P < 0.001*
Hematocrit level before procedure (%)	34.91 ± 2.41	34.58 ± 2.79	t= 0.864 P= 0.389
Hematocrit level after procedure (%)	33.16 ± 2.29	32.16 ± 2.59	t = 2.815 P = 0.005*
Blood loss (ml)	80 (50 – 110)	95 (70 – 140)	z = - 7.229 P < 0.001*

t: Independent samples t-test, *: Statistically significant (p<0.05).

Table (4) showed that the pain severity (assessed by VAS score) was statistically significantly higher in the surgically evacuated group (p < 0.001). In addition, the duration of hospital stay in hours was statistically significantly longer in the surgically evacuated group (p < 0.001).

Table (4): VAS score of pain of cases and duration of hospital stay (hours) in both studied groups:

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
VAS score of pain	3 (1 – 6)	4 (2 – 6)	z = - 5.311 P < 0.001*
Duration of hospital stay (hours)	7 (5 – 10)	19 (14 – 24)	z = - 11.880 P < 0.001*

VAS score refers to: visual analogue system, z: Mann-Whitney t-test, *: Statistically significant (p<0.05).

Table (5) showed that the incidence of successful complete evacuation was 87.5% and 85.9% in group A and group B respectively, with insignificant difference between both groups (p= 0.742).

Table (5): Analysis of the success of the procedures in the studied groups:

Variable Complete evacuation	Group A (n= 96)	Group B (n= 92)	Test of significance
Successful complete evacuation	84 (87.5%)	79 (85.9%)	$\chi 2$ = 0.108 P = 0.742
Incomplete evacuation	12 (12.5%)	13(14.1%)	

$\chi 2$: Chi-square test.

Table (6) displayed that there was insignificant difference between the two groups concerning the complications of the procedure. The complications of the procedure included cervical trauma in 1% and 3.3%, uterine perforation in 0% and 1.1% and infection in 2.1% and 4.3% in group A and group B respectively.

Table (6): Side effects and complications in both studied groups:

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
Cervical trauma	1 (1%)	3 (3.3%)	FET = 1.111 P = 0.292
Uterine perforation	0 (0%)	1(1.1%)	FET = 1.049 P = 0.306
Infection	2 (2.1%)	4 (4.3%)	FET = 0.780 P = 0.377

FET: Fischer's exact test.

As shown in table (7), the degree of satisfaction was statistically significantly higher in the MVA group (p= 0.021).

Table (7): Patients' satisfaction in both studied groups:

Variable	Group A (n= 96)	Group B (n= 92)	Test of significance
Dissatisfied	13 (13.5%)	22 (23.9%)	MC = 7.749 P = 0.021*
Satisfied	71 (74%)	67 (72.8%)	
Highly satisfied	12 (12.5%)	3 (3.3%)	

MC: Monte-Carlo test, *: Statistically significant (p<0.05).

DISCUSSION

There was insignificant difference between the two study groups concerning the age (p= 0.668.) and the BMI (P= 0.751). This came in accordance with **Fatima *et al.*** [12] who found that the mean age of cases of surgical evacuation group was 29.35 ± 6.4 years and the mean age of the MVA group was 28.04 ± 6.2 years with insignificant difference (p>0.05).

The approach duration was statistically significantly longer in the surgically evacuated group (p< 0.001). In the same line, **Yadav *et al.*** [13] recorded that the average duration of the approach was significantly shorter in the MVA group 6.0 ± 2.8 min compared to 9.9 ± 2.4 min in the surgically evacuated group (p< 0.001).

The amount of blood loss during the procedure was statistically significantly higher in the surgically evacuated group (p < 0.001). Concerning the hemoglobin level before and after procedure in the studied groups, we reported that there was insignificant difference between the two study groups concerning the preprocedural haemoglobin level. However, after the procedure, the haemoglobin level was statistically significantly diminished in the surgical evacuation group (p= 0.001). This is consistent with, **Yadav *et al*.** [13] who recorded that in the surgical evacuation group, the moderate/severe blood loss was significantly greater than that of the MVA group (70% vas 44%) (P < 0.001). Similarly, **Kishwar *et al.*** [14] revealed more blood loss (62.5%) in the surgically evacuated group than in the MVA group (25%).

The pain severity (assessed by VAS score) was significantly increased in the surgically evacuated group (p < 0.001). Our results are consistent with **Fatima *et al.*** [12], who recorded that the mean VAS was significantly increased among cases of the surgical evacuation group, 6.23 ± 2.1, in comparison with the MVA group as 3.22 ± 2.1 (p = 0.001). Similarly, our study can be reinforced by **Yadav *et al.*** [13] who displayed that the majority of cases with MVA approach (91%) complained of mild pain, whereas 24% of them in the surgically evacuated group recorded mild pain following the approach. Pain level post procedure was significantly different between both groups (P < 0.001).

The LOS in hours was statistically significantly longer in the surgically evacuated group (p < 0.001). In concordance with **Fatima *et al.*** [12] who reported that the average LOS was only 3.5 hours in the MVA group, which was significantly lower contrasting to the surgical evacuation group at 8.15 hours.

The incidence of successful complete evacuation was 87.5% and 85.9% in group A and group B respectively, with insignificant difference between the two groups (p= 0.742). Along with our results, **Kubra *et al.*** [6] reported that in group A complete evacuation was conducted in fifty eight (63%) cases, while 60 (65.2%) were completely evacuated in group B with insignificant difference (P>0.05). In addition, **Sikander *et al.*** [15] who showed that the approach was effectively conducted in 87 (95.6%) cases in the MVA group vs. 84 (92.3%) in the surgically evacuated group with insignificant (p= 0.35).

Concerning side effects and concerning in both studied groups, we reported that there was insignificant difference between both groups concerning the complications of the procedure. The complications of the procedure included cervical trauma in 1% and 3.3%, uterine perforation in 0% and 1.1% and infection in 2.1% and 4.3% in group A and group B respectively. Our findings are in agreement with **Fatima *et al.*** [12] who recorded that uterine perforation was insignificant between both groups (P>0.05). This study is in contrast with our results in infection rate and cervical trauma as they were significantly higher among surgically evacuated cases in comparison with MVA group (p=0.001). In addition, the current result was in concordance with **Achakazai *et al.*** [16] who showed that in MVA group, no perforation noticed, whereas in surgical evacuation group, 2 (6.7%) had perforated uterus.

Considering patients satisfaction in both studied groups, we found that the degree of satisfaction was significantly increased in the MVA group (p= 0.021). Our results are consistent with **Kishwar *et al.*** [14] who revealed a 93.75% satisfaction rate in the MVA group and 50% in the surgically evacuated group displaying a significant difference between the studied groups.

Limitations: The relatively small sample size, which may limit the generalizability of the findings to larger populations. Additionally, the study lacked long-term follow-up to assess delayed complications or patient outcomes beyond the immediate postoperative period. Variability in operator expertise, particularly in the surgical evacuation group, could also influence the results. Lastly, the study was conducted in a single center, which may not represent diverse healthcare settings, especially those with limited resources. Further multicenter studies with larger cohorts and extended follow-up are recommended to validate these findings.

CONCLUSION

In conclusion, MVA was safe, efficient and a better modality than surgical evacuation for surgical management of abortion. This is attributed to its less time consumption, shorter hospital stays and more patient satisfaction. MVA is an acceptable and satisfactory alternative approach for patients with first-trimester abortion.

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