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ORIGINAL ARTICLE

MANUAL VACUUM ASPIRATION (MVA): A SAFER AND MORE EFFICIENT ALTERNATIVE TO CONVENTIONAL CURETTAGE IN FIRST TRIMESTER MISCARRIAGE

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Abstract

Background: Miscarriage, also known as spontaneous abortion, is a common issue during early pregnancy. In Pakistan, the miscarriage rate is about 29 per 1,000 women aged 15 to 49 years. Dilation and curettage (D&C) is a common surgical procedure, which is effective but can also be risky.

Objective: This study aimed to compare the safety and effectiveness of Manual Vacuum Aspiration (MVA) with traditional curettage in managing first-trimester miscarriages.

Material and Methods: A randomized trial was carried out at the Department of Gynecology and obstetrics, Bolan Medical complex, Quetta. The study included 274 women aged 18-35 who had miscarriages during the first trimester and were randomly divided into two groups of equal numbers: Group A receiving MVA and Group B Undergoing D& C.

Results: MVA achieved full evacuation in 113 (95.6 %) and D&C in 117(85.8 %) (Significant difference, p 0.05). The MVA procedure took an average of 6.9 minutes, about half as much as 13.7 minutes per D&C. Only 0.6% of MVA patients had serious bleeding (>= 100mL) as compared to 2.4% in the D&C group. In both groups, no uterine perforations or serious infections were noted.

Conclusion: MVA is a safe, effective and efficient alternative to traditional curettage of first-trimester miscarriages. It has a greater success rate, less procedure time, less risk of complications and improved patient satisfaction, which is evidence to expand the use of MVA in everyday gynecological practice.

Keywords: Manual Vacuum Aspiration,ConventionalCurettage,First-Trimester Miscarriage, Surgical Management .
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Introduction:

Unintended pregnancy loss (IUP) can be defined as pregnancy loss before 20 weeks of gestational age[1]. It is also a typical negative outcome that leads to maternal morbidity and thus its management is a health concern in the community. The estimates of early pregnancy loss vary among studies due to difference in the population, identification of cases, and design of the research. Thus, new information is essential to counsel patients and design services. Treatment of IUP involves expectant care, medical therapy using misoprostol (with or without mifepristone) and surgery. Suction-based approaches have become more popular in the current practice compared to sharp curettage, which is safer[2]. Theselection of the appropriate procedure is important in resource-constrained environments as it is based on the capacity of the theatre and the availability of anesthesia. Additionally, it is based on the availability of special staff.

Manual vacuum aspiration (MVA) is a more effective and safer alternative to dilatation and curettage (D&C). According to recent studies, MVA results in increased complete uterine evacuation, reduced complications, and increased patient satisfaction[3]. The reduced time of procedure, fewer hospitalizations, and reduced necessity of general anesthesia are other benefits, enhancing the efficiency of the operations[4].Despite such benefits, MVA is not yet a common practice in the

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majority of hospitals because of a number of reasons and factors, including the lack of knowledge about the technique by clinicians and the dominance of the traditional clinical culture that supports the application of such traditional practices as dilatation and curettage (D&C)[14]. This resistance is usually due to deep-rooted training, top-down decision-making, and inability to break out of the established surgical practices[5].Even though the international literature found that Manual Vacuum Aspiration (MVA) is a safer and more effective method to treat first-trimester miscarriage compared with Dilatation and Curettage (D&C). However, minimal evidence is found in Pakistan and other low-resource healthcare facilities. A lot of hospitals in these areas continue to use D&C extensively due to the lack of training, institutional adoption, and comparative data with their own population[4,5]. The trial will be used to produce evidence about the knowledgeable use of ultrasound in the management of miscarriages by standardizing outcome definitions and validating the findings with ultrasound, thereby supporting evidence-based decision-making in miscarriage management.

Material and Method:

Study Design and Setting:

This randomized controlled trial was conducted in the Department of Gynecology and Obstetrics, Bolan Medical Complex, Quetta. Ethical approval was obtained from the Institutional Review Board and the College of Physicians and Surgeons, Pakistan (CPSP). The study spanned eight months and commenced following approval of the study synopsis. This was done in accordance with the guidelines of the CONSORT report of randomized controlled trials.

Sample Size and Sampling:

The total population of 274 women taking part in the research study was split into 137 subjects in each group. A sample size based on the UBC sample size calculator was determined with an anticipated efficacy of 95.6% for Manual Vacuum Aspiration (MVA) and 85.8% for Conventional Evacuation and Curettage (ENC). The research was 80% powered, and the margin of error was 5%. Participants were recruited using a consecutive non-probability technique. Calculation of power: assumptions included the following: Two-sided alpha of 0.05, and an effect size of a 10 percent difference in efficiency between groups.

Ethical Approval and Trial Registration:

Ethical approval was obtained from the Institutional Review Board and the College of Physicians and Surgeons, Pakistan (CPSP). Ethical Approval Number: OBG-2022-001-11877 (Date of Approval: 01 July 2022). The study was registered in the Thai Clinical Trials Registry (TCTR) with CTR Number:TCTR20260402002 (First Posted Date: 02 April 2026). This trial was not prospectively registered.

Inclusion and Exclusion Criteria:

The transparent inclusion and exclusion criteria were used to determine the eligibility and made the sample homogenous to minimize the confounding factors. Table 1 suggests that we sampled women at the age of 18-35, pregnancy was not 12 weeks, and a first-trimester miscarriage. The research has excluded the patients with medical complexities, which can confound the results, including ectopic pregnancy (measured by ultrasound), molar pregnancy, and fever (high temperature of greater than 37.7 0 C). Validity of the study was increased through clearly defined criteria, in which only similar clinical cases were compared in the two groups of treatments.

Randomization and Group Allocation:

Eligible patients were randomly allocated into two groups of equal size. Group A underwent Manual Vacuum Aspiration, whereas Group B underwent Conventional Evacuation and Curettage.

Inclusion and Exclusion Criteria P	
Category	**Criteria**
Inclusion	Age 18–35 years; gestational age <12 weeks (LMP); first-trimester miscarriage
Exclusion	Ectopic pregnancy (ultrasound diagnosis); molar pregnancy; fever >37.7°C

Study Group Allocation		
Group	**Procedure**	**Number of Patients**
Group A	Manual Vacuum Aspiration (MVA)	137
Group B	Conventional Evacuation and Curettage (ENC)	137

Procedures:

In Group A, procedures were conducted under aseptic conditions with local cervical block anesthesia. A 60-cc syringe equipped with a double-locking valvemechanism was used to generate negative pressure. The cervix was stabilized using

Volsellumforceps and a suitable cannula was introduced into the uterine cavity. Aspiration was performed until complete evacuation was achieved. In Group B, procedures were carried out under general anesthesia. Cervical dilation was followed by sharp curettage with a curette to evacuate uterine contents. Moderate sedation and analgesia were administered at the physician's discretion, and all procedures were performed under aseptic conditions.

Follow-Up and Efficacy Assessment:

All patients were scheduled for follow-up on the seventh echogenic foci associated with acoustic shadowing, and absence of intrauterine fluid.postoperative day. A transvaginal ultrasound was performed to evaluate the completeness of uterine evacuation. Efficacy was defined as complete removalof the products of conception, characterized by an endometrial thickness of less than 4 mm, absence of echogenic foci associated with acoustic shadowing, and absence of intrauterine fluid.

Data Collection:

Patient data were collected on a predesigned Performa, which included demographic characteristics, clinical presentation, details of the surgical procedure, and follow-up findings.

Statistical Analysis:

Descriptive statistics were used to summarize baseline characteristics and clinical outcomes. Efficacy between the two groups was compared using the Chi-square test, with a p-value ≤0.05 considered statistically significant. Subgroup analyses were performed based on age, parity, gravidity, and history of miscarriage. Statistical analyses were conducted using SPSS version 25

Results:

Study Population:

The total number of women who participated in the study was 274, who suffered a first-trimester miscarriage of their pregnancy that was evenly divided into two treatment groups: MVA (n = 137) and D&C (n = 137). Follow-up visits were made with all the participants, and a transvaginal ultrasound was done on the seventh day after the operation.

Efficacy:

The findings indicated that MVA had a much higher complete uterine evacuation rate (95.6) as opposed to D & C (85.8), with p less than 0.05 (Table 1). This indicates that MVA was significantly superior to the traditional curettage in terms of complete removal of the products of conception. These results are graphically outlined in Fig. 1, which indicates a distinct disparity in the percent of efficacy between the two procedures, with MVA performing a better job.

Table 1: Comparison of Efficacy Between Groups

roup	Total Patients (n)	Complete Evacuation n (%)	Incomplete Evacuation n (%)	Efficacy (%)
VA	37	131 (95.6%)	6 (4.4%)	95.6
NC	37	117 (85.8%)	20 (14.2%)	85.8

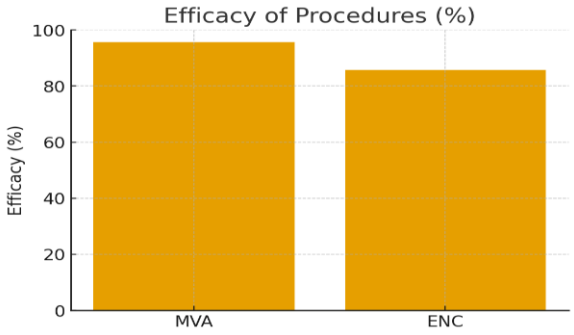

Figure i: Comparison of Efficacy (%) Between Manual Vacuum Aspiration (MVA) and Conventional Evacuation and Curettage (ENC).

Procedure Duration:

MVA took an average of 6.9 minutes, nearly half of the 13.7 minutes needed to carry out a D&C. This result is presented in Table 2. MVA is also a more time-efficient choice because of the shorter operative time that can be utilized when the setting has few resources or the work is time-constrained. Figure 2 also demonstrates the difference in the time taken to complete the procedures of the two groups.

Table 2: Mean Duration of Procedure

Group	Mean Duration (minutes) ± SD
MVA	6.9
ENC	13.7

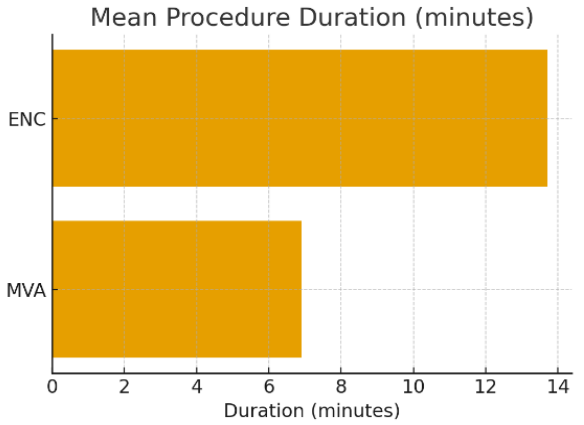

Figure II.Mean Duration of Procedure (Minutes) for MVA and ENC Groups.

Complications:

The two groups were similar in terms of complication rates with MVA experiencing fewer intra-operative problems. Bleeding ≥ 100mL was only found in 0.6% of MVA patients versus, 2.4% in the D&C group. There were no uterine perforations or severe infections in both groups (Table 3). The visualization presented in Figure 3 indicates that MVA had less bleeding-related complications and a safer profile.

Table 3: Comparison of Complications

Complication Type	MVA (n=137)	ENC (n=137)
Bleeding ≥100 mL	1 (0.6%)	3 (2.4%)
Uterine perforation	0 (0%)	0 (0%)
Severe infection	0 (0%)	0 (0%)
Total complications (%)	0.6%	2.4%

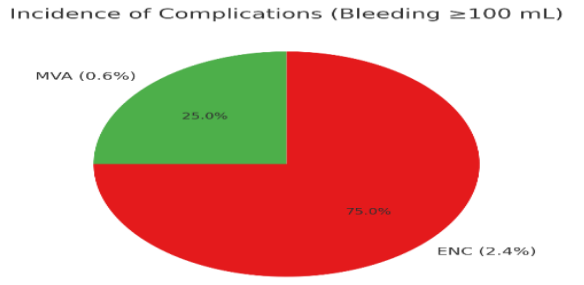

Figure III: Distribution of Intraoperative Complications (Bleeding ≥100 mL) Between MVA and ENC Groups.

Patient Satisfaction:

MVA patients also indicated greater overall satisfaction, faster postoperative recovery, and greater comfort during surgery than patients who had D&C. These results indicate that MVA does not only lead to better clinical outcomes, but it also results in a quality patient experience.

Overall Outcomes:

When considering all outcome measures, efficacy, procedure duration, and complication rates, MVA consistently outperformed ENC. Figure 4 provides a comparative visualization of overall outcomes between the two groups.

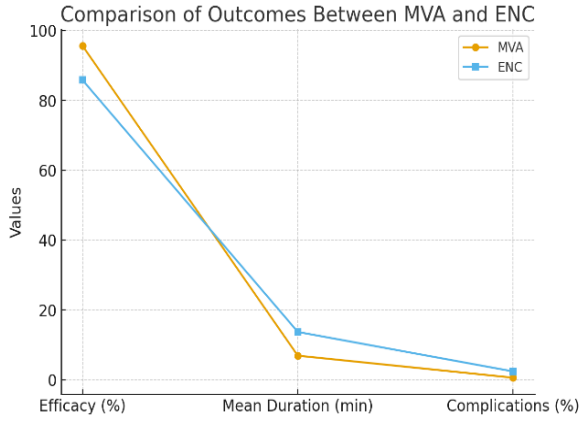

Figure IV: Comparison of Overall Outcomes (Efficacy, Procedure Duration, and Complication Rates) Between MVA and ENC.

Discussion:

This randomized controlled trial has shown that manual vacuum aspiration (MVA) is better than standard dilatation and curettage (D&C) in terms of surgical management of first-trimester miscarriage. MVA had a greater rate of complete uterine evacuation, reduced operative time, fewer complications, and patient satisfaction. These results validate the safe and efficient benefits of MVA and its possible extension to more clinical practice.

The main findings of the research are in line with more recent publications that have shown increased efficacy and patient-centered results using MVA. Study by Delfinado found fewer complications, less hospitalization, and a better satisfaction with MVA than with D&C[7]. whereas another research also reported high rates of evacuation and lower risk of peri-procedural complications[8]. As Farooq et al. noted, the clinical utility of MVA is related to resource-limited settings. All of this evidence supports MVA as being a safer and less controversial alternative to curettage[9].

There are, however, conflicting findings, like Kakinuma et al. did not find any better outcome of MVA than D&C with regard to efficacy, but they did note some of the operational advantages, including a shorter hospital stay and anesthesia demands[10]. Meister et al. demonstrated that medical treatment using misoprostol is also similarly successful[11]. They note that the selection of an effective intervention must be informed by patient preference, resource availability, and the wider health system priorities.

The findings of the research have a special clinical applicability to low- and middle-income countries where there is often a constraint on operating rooms and anesthesia services and hospital capacity. MVA application in outpatient facilities can enhance efficiency of service and is consistent with world guidelines, which recommend suction-based debridement instead of sharp curettage[12].

There are a number of limitations in this study such as the use of non-probability sampling and single center study design restricts the generalizability of the findings and long-term reproductive outcomes could not be evaluated due to the short follow up. Multicenter randomized trials include large and more diverse populations and should be implemented in the future. Better evidence would be needed to support the combined protocols and enhance fertility rates by using a sophisticated evaluation of MVA vs. misoprostol treatment and image-guided procedures [13].

The key strength of the study is the randomized controlled study design that reduces the risk of bias and improves the validity of comparative outcomes regarding MVA and D&C. The statistical validity of the findings is enhanced by the relatively large sample size (n = 274). Secondly, the research measured various parameters as outcomes, including efficacy, procedure duration, complication, and patient satisfaction, and a thorough analysis of clinical performance and patient experience. The practical value of the concentration on a resource-constrained Pakistani healthcare context is also that it will produce context-specific evidence that can inform country-level guideline and practice.

To conclude, MVA is safer, more successful and it is patient preferred over traditional curettage. Integrating it into standard gynecological care would help to improve clinical and resource use outcomes, especially in resource-limited health care.

Conclusion:

This randomized controlled trial proved that manual vacuum aspiration (MVA) is safe, effective, and more friendly to patients than the conventional dilatation and curettage (D&C) during treatment of first-trimester miscarriage. MVA led to an increase in overall evacuation, reduced operating time, a reduction in complication rate, and patient satisfaction. The benefits provide rationale to the increased use of MVA as the treatment of choice within the standard gynecological practice, especially in the resource-starved setting where the efficacy and safety of care is the primary consideration. These findings are

convincing, although the study was conducted in a single center and with a very short follow-up; therefore, the findings may not be generalizable to all populations. We are also unable to measure the long-term reproductive outcomes. Better protocols should be designed, and patients should provide a superior decision. New multicenter studies involving larger and more diverse groups, contrasting them with medical alternatives such as misoprostol, should be done. In conclusion, MVA is an evidence-based, patient-preferred, and resource-efficient method of addressing miscarriage, which has an astronomical potential to improve clinical outcomes and offer healthcare in an efficient manner.

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References:

1. Schummers L, Oveisi N, Ohtsuka MS, Hutcheon JA, Ahrens KA, Liauw J, et al. Early pregnancy loss incidence in high-income settings: a protocol for a systematic review and meta-analysis. Syst Rev. 2021;10(1):274. doi:10.1186/s13643-021-01815-1.
2. Ghosh J, Papadopoulou A, Devall AJ, Jeffery HC, Beeson LE, Do V, et al. Methods for managing miscarriage: a network meta-analysis. Cochrane Database Syst Rev. 2021;6:CD013839.
3. Kishwar N, Ali S, Sadaf R, Karim R, Azeem T, Parveen Z. Efficacy of manual vacuum aspiration vs conventional evacuation and curettage. J Gandhara Med Dent Sci. 2022;9(3):75–81.
4. Cook S, de Kok B, Odland ML. 'It'sa very complicated issue here': understanding the limited and declining use of manual vacuum aspiration for postabortion care in Malawi: a qualitative study. Health policy and planning. 2017 Apr 1;32(3):305-13.
5. Naz S, Jaffar A, Yazdani N, KashifM, Hussain Z, Khan U, et al. Cohort profile: The Pregnancy Risk Infant Surveillance and Measurement Alliance (PRISMA)–Pakistan. BMJ Open.2023;13(12):e078222. doi:10.1136/bmjopen-2023-078222.
6. Dodge LE, Hofler LG, Hacker MR, Haider S. Patient satisfaction and wait times following outpatient manual vacuum aspiration compared to electric vacuum aspiration in the operating room: a cross-sectional study. ContraceptReprod Med. 2017;2(1):18. doi:10.1186/s40834-017-0040-0.
7. Delfinado L, Tamirisa R. Introducing and implementing a manual vacuum aspiration for enhanced family planning in a community hospital setting.
8. Ahmad H. Knowledge, Implementation, And Perception of Enhanced Recovery After Surgery Amongst Surgeons in Pakistan.
9. Farooq F, Javed L, Mumtaz A, Naveed N. Comparison of manual vacuum aspiration and dilatation and curettage in the treatment of early pregnancy failure. J Ayub Med Coll Abbottabad. 2011;23(3):28–31.
10. Kakinuma T, Kakinuma K, Sakamoto Y, Kawarai Y, Saito K, Ihara M, et al. Safety and efficacy of manual vacuum suction compared with conventional dilatation and sharp curettage and electric vacuum aspiration in surgical treatment of miscarriage: a randomized controlled trial. BMC Pregnancy Childbirth. 2020;20(1):471. doi:10.1186/s12884-020-03362-4.
11. Meister L, Künnemann I, Fettke F, Lux A, Ignatov A. Medical treatment of miscarriage using misoprostol—a retrospective study. Arch Gynecol Obstet. 2024;310(4):2115–21. doi:10.1007/s00404-024-07628-6.
12. Al Ahmed WS, Al Habib AM, Al Abbas MA, Almalki RM, Al-Habeeb FA, Alsaleem ZH, et al. Enhancing efficiency and patient experience in medical clinics: a systematic review of process improvement approaches. J Ecohumanism. 2024;3(8). doi:10.62754/joe. v3i8.5521.
13. Meshaal H, Salah E, Fawzy E, Abdel-Rasheed M, Maged A, Saad H. Hysteroscopic management versus ultrasound-guided evacuation for women with first-trimester pregnancy loss: a randomized controlled trial. BMC Women's Health. 2022;22(1):190. doi:10.1186/s12905-022-01751-7.
14. Kakinuma T, Kakinuma K, Sakamoto Y, Kawarai Y, Saito K, Ihara M, et al. Safety and efficacy of manual vacuum suction compared with conventional dilatation and sharp curettage and electric vacuum aspiration in surgical treatment of miscarriage: a randomized controlled trial. BMC Pregnancy and Childbirth. 2020 Nov 16;20(1).