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Original Research Article

A Study of Incomplete Abortion Following Medical Methods of Abortion

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Abstract

Background: Medical methods of abortion (MMA) using mifepristone and misoprostol have revolutionized pregnancy termination globally. However, incomplete abortion remains a significant complication, particularly when medications are procured without medical supervision.

Objective: To evaluate the incidence, risk factors, clinical presentation, management strategies, and outcomes of incomplete abortion following medical abortion in first-trimester pregnancies.

Methods: A prospective analytical observational study was conducted at Government Mohan Kumaramangalam Medical College Hospital, Salem, over one year. One hundred women presenting with first-trimester incomplete abortion after MMA were enrolled. Data collection included demographic information, medication history, clinical examination, ultrasonographic evaluation, and management outcomes. Statistical analysis was performed using t-tests and descriptive statistics.

Results: The mean age was 27.34±5.22 years, with 52% from rural areas. Only 38% used the recommended mifepristone-misoprostol combination, while 45% procured medications from pharmacies without supervision. Retained products of conception were identified in 28% on ultrasound. Medical management was employed in 70%, surgical evacuation in 10%, and expectant management in 20%. Blood transfusion was required in 10%. Post-intervention, 81% reported abdominal pain and 28% experienced prolonged bleeding after two weeks. Complete resolution occurred in 82%, with 13% readmissions and 5% requiring repeat evacuation.

Conclusion: Incomplete abortion following MMA is significantly associated with unsupervised medication use, improper drug regimens, and lack of counseling. Enhancing public awareness, regulating drug dispensing, and ensuring proper follow-up are critical to reducing complications and improving maternal outcomes.

Keywords: Medical Abortion, Incomplete Abortion, Mifepristone, Misoprostol, Postabortion Complications, Retained Products Of Conception.

Introduction

Medical method of abortion (MMA) has transformed abortion care globally by providing a safe, effective, and non-invasive alternative to surgical procedures. Since the introduction of mifepristone in combination with misoprostol, this approach has gained widespread acceptance due to its proven efficacy, favorable safety profile, and ability to expand access to abortion services, particularly in resource-limited settings [1,2]. The World Health Organization recognizes MMA as an essential component of comprehensive reproductive healthcare, recommending its use up to 63 days of gestation [3].

The standard MMA regimen involves administering mifepristone, an antiprogestogen that disrupts hormonal support for pregnancy, followed by misoprostol, a prostaglandin analogue that induces uterine contractions to expel pregnancy tissue. Studies demonstrate that this combination achieves complete abortion in more than 95% of cases up to 63 days of gestation and 93% between 64 and 70 days [4,5]. Despite its high success rate, incomplete abortion remains a notable complication, occurring in approximately 2% to 8% of cases depending on gestational age, medication dosage, route of administration, and patient-specific factors [6,7].

Incomplete abortion is defined as partial retention of products of conception within the uterus following the abortion process. This condition can manifest through prolonged vaginal bleeding, pelvic pain, and increased risk of infection, often

necessitating additional medical or surgical intervention [8]. The etiology of incomplete abortion following MMA is multifactorial, encompassing incorrect medication protocols, advanced gestational age, inadequate dosing, improper route of administration, and individual patient characteristics such as history of uterine surgery or underlying medical conditions [9,10].

The clinical implications of incomplete abortion extend beyond immediate physical complications. Women experiencing this complication may require multiple healthcare visits, additional medications, or surgical procedures, resulting in increased healthcare costs, prolonged recovery time, and potential psychological distress [11]. In settings where emergency healthcare services are difficult to access, such complications can occasionally become life-threatening [12]. Therefore, strategies to prevent incomplete abortion, ensure early recognition, and provide appropriate management are essential to maintaining MMA as a safe and effective option.

Diagnosis of incomplete abortion after MMA relies on clinical examination, ultrasonographic evaluation, and serial measurement of serum human chorionic gonadotropin (hCG) levels [13]. However, distinguishing between normal post-abortion bleeding and signs of incomplete abortion can be challenging, particularly for providers with limited experience in abortion care [14]. Furthermore, interpretation of ultrasound findings and clinical signs may vary among practitioners, potentially leading to unnecessary interventions or delayed treatment of actual complications [15].

Management options for incomplete abortion include expectant management, allowing spontaneous expulsion of retained tissue; medical management with additional misoprostol; or surgical intervention through manual vacuum aspiration or dilatation and curettage [1]. The choice of management depends on clinical presentation, patient preference, provider experience, and available resources. Recent evidence suggests that expectant management can be safe for many women and may reduce the need for surgical procedures without compromising safety outcomes [2].

Despite extensive research on MMA, significant knowledge gaps persist regarding incomplete abortion. One fundamental challenge is the lack of standardized diagnostic criteria, which complicates comparison of outcomes across studies and healthcare settings [3]. Additionally, there is insufficient data on how different MMA protocols affect incomplete abortion rates, especially as simplified and self-administered regimens become more common [4]. Long-term outcomes following various management strategies for incomplete abortion also remain inadequately documented, limiting evidence-based clinical decision-making.

In low- and middle-income countries, MMA represents a major advancement in safe abortion provision. However, challenges in diagnosing and managing incomplete abortion are often amplified in these settings due to limited medical resources, fewer trained providers, and difficulties with follow-up care [5]. These regions may report higher incomplete abortion rates due to delays in seeking care, poor-quality medications, and inadequate patient education about the abortion process and warning signs requiring medical attention [6]. Consequently, context-specific strategies for both preventing and managing incomplete abortion are essential.

In India, the Medical Termination of Pregnancy Amendment Act of 2021 expanded access to MMA, permitting its use up to nine weeks of gestation in primary healthcare facilities. However, this increased accessibility has been accompanied by concerns about unsupervised use of abortion medications. Studies have documented that a substantial proportion of women obtain these medications from pharmacies without prescriptions, use incorrect dosages or drug combinations, and lack access to proper counseling and follow-up care [7,8]. This pattern of unsupervised use has been associated with higher rates of incomplete abortion and related complications.

Global evidence indicates that when MMA is provided with appropriate medical supervision, counseling, and follow-up, outcomes are excellent with minimal complications [9]. However, when medications are obtained through informal channels without proper guidance, failure rates increase substantially, and women are at higher risk for complications including hemorrhage, infection, and need for emergency intervention [10]. Understanding the patterns and outcomes of incomplete abortion in settings where unsupervised medication use is common is crucial for developing effective interventions.

The burden of unsafe abortion remains a significant public health concern globally. The World Health Organization estimates that approximately 45% of all abortions worldwide are unsafe, with the vast majority occurring in developing countries [11]. While MMA has the potential to dramatically reduce unsafe abortion-related morbidity and mortality, its benefits can only be realized when women have access to quality medications, accurate information, and appropriate follow-up care [12].

Previous studies from India have documented concerning patterns of medication abortion complications. Singh and colleagues reported that

incomplete abortion from medication abortion accounted for 33-65% of all postabortion complication cases across different Indian states [13]. Similarly, research from Maharashtra found that 78% of women presenting with complications after MMA had used misoprostol alone without proper medical supervision [14]. These findings highlight the urgent need for better understanding of factors contributing to incomplete abortion and strategies to improve outcomes.

This study was undertaken to address critical gaps in understanding incomplete abortion following MMA within the Indian healthcare context. By systematically evaluating the incidence, associated risk factors, clinical presentation patterns, and management outcomes of incomplete abortion, this research aims to inform clinical practice guidelines, improve patient counseling protocols, and enhance the overall quality of abortion care delivery.

The findings will contribute to developing evidence-based strategies for reducing incomplete abortion rates and optimizing management approaches, particularly in resource-constrained healthcare systems. Additionally, this research will provide insights into patterns of medication procurement and usage that can inform policy decisions regarding regulation and delivery of abortion services [15].

Aims and Objectives

Primary Aims

1. To determine the incidence and evaluate factors associated with incomplete abortion following medical methods of abortion
2. To assess the various causes and clinical presentations of incomplete abortion following MMA

Secondary Objectives

1. To analyze the demographic characteristics of women experiencing incomplete abortion after MMA
2. To evaluate medication procurement sources and adherence to recommended protocols
3. To assess the role of counseling and follow-up in outcomes
4. To determine the effectiveness of different management strategies for incomplete abortion
5. To identify complications and their management in the study population

Materials and Methods

Study Design: This was a prospective analytical observational study conducted to evaluate incomplete abortion following medical methods of abortion.

Study Setting: The study was conducted in the Department of Obstetrics and Gynecology at Government Mohan Kumaramangalam Medical College Hospital, Salem, a tertiary care teaching institution serving both urban and rural populations.

Study Duration: The study was conducted over a period of one year from January 2023 to December 2023.

Study Population: The study population consisted of women presenting with first-trimester incomplete abortion following the use of medical methods of abortion.

Sample Size: Sample size was calculated using the formula:

$$n = Z\alpha^2 \times P \times Q / d^2$$

Where:

- $Z\alpha = 1.96$ (standard normal deviate at 95% confidence level)
- $P = 46\%$ (expected prevalence based on previous studies)
- $Q = 100 - P = 54\%$
- $d = 10\%$ (absolute precision)

Calculated sample size = $(1.96)^2 \times 46 \times 54 / (10)^2 = 96$, rounded to 100

Total sample size = 100 women

Inclusion Criteria

1. Women presenting with first-trimester pregnancy (less than 12 weeks of gestation) with bleeding per vaginum following MMA
2. Diagnosed with incomplete abortion following MMA by clinical and ultrasonographic examination
3. Women willing to provide informed consent and participate in the study

Exclusion Criteria

1. Suspected or diagnosed ectopic pregnancy
2. First-trimester pregnancy patients planning medical termination of pregnancy with surgical methods
3. Complete abortion cases
4. Gestational age greater than 12 weeks
5. Hemodynamically unstable patients requiring immediate emergency intervention
6. Women unwilling to participate or provide consent

Management Protocols: Based on clinical presentation and investigations, participants received one of the following management approaches:

Expectant Management

- Reserved for hemodynamically stable women with minimal bleeding
- Close observation with regular monitoring

- Follow-up ultrasound after two weeks

Medical Management

- Administration of additional misoprostol (400-800 mcg) orally or sublingually
- Supportive care with analgesics and antiemetics
- Antibiotics when infection suspected
- Follow-up after 48-72 hours

Surgical Management

- Manual vacuum aspiration or electric vacuum aspiration
- Dilatation and curettage when indicated
- Performed under appropriate anesthesia with aseptic precautions

Supportive Care

- Intravenous fluids for volume resuscitation
- Blood transfusion when hemoglobin less than 7 g/dL or symptomatic anemia
- Analgesics for pain management
- Antibiotics for suspected or confirmed infection
- Iron supplementation

Outcome Assessment

Participants were followed up at two weeks post-intervention to assess:

- Resolution of symptoms (cessation of bleeding, relief of pain)
- Presence of persistent or prolonged bleeding
- Abdominal pain
- Need for repeat intervention
- Complications (infection, hemorrhage, perforation)
- Final outcome (complete resolution, readmission, repeat evacuation)

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, depending on distribution. Categorical variables were presented as frequencies and percentages.

Student's t-test was used for comparing continuous variables with normal distribution. Mann-Whitney U test was employed for non-parametric continuous variables. Chi-square test or Fisher's exact test was used for categorical variables as appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: The study protocol was approved by the Institutional Ethics Committee of Government Mohan Kumaramangalam Medical College Hospital, Salem. Written informed consent was obtained from all participants in their preferred language. Confidentiality of patient data was maintained throughout the study. All participants received standard care regardless of their participation in the study. There was no additional cost burden on participants, and they were free to withdraw from the study at any time without affecting their treatment.

Results

Table 1: Demographic Characteristics

Parameter	Mean ± SD	Median (IQR)	n (%)
Age (years)	27.34 ± 5.22	28.00 (23.00-32.00)	
<21 years			13 (13.0)
21-25 years			24 (24.0)
26-30 years			32 (32.0)
>30 years			31 (31.0)
Residence			
Urban			48 (48.0)
Rural			52 (52.0)

Table 2: Education Status and Medical History

Parameter	n (%)
Education Status	
Illiterate	22 (22.0)
Primary	17 (17.0)
Secondary	19 (19.0)
Higher Secondary	19 (19.0)
Graduate	23 (23.0)
High-Risk History	
None	70 (70.0)
History of Miscarriage	17 (17.0)
History of Induced Abortion	13 (13.0)

Previous Uterine Surgery	
Yes	19 (19.0)
No	81 (81.0)
Chronic Illness	
Diabetes Mellitus	5 (5.0)
Systemic Hypertension	6 (6.0)
Thyroid Disorder	5 (5.0)
None	84 (84.0)

Table 3: Obstetric Parameters

Parameter	Mean ± SD	Median (IQR)
Gravidity	2.56 ± 1.10	3.00 (2.00-4.00)
Parity	1.64 ± 1.08	2.00 (1.00-3.00)
Living Children	1.05 ± 0.91	1.00 (0.00-2.00)
Abortions	0.48 ± 0.76	0.00 (0.00-1.00)
Gestational Age (weeks)	7.89 ± 1.47	7.80 (7.00-8.88)
Duration of Symptoms (days)	4.89 ± 2.62	5.00 (2.00-7.00)

Table 4: Clinical Presentation and Medication Details

Parameter	n (%)
Chief Complaints	
Abdominal Pain	47 (47.0)
Bleeding Per Vaginum	51 (51.0)
Fever	2 (2.0)
Type of Confirmation	
Urine Pregnancy Test	52 (52.0)
Ultrasound	48 (48.0)
Medications Used	
Mifepristone Alone	31 (31.0)
Misoprostol Alone	31 (31.0)
Combined (Recommended)	38 (38.0)
Source of Medication	
Government Facility	24 (24.0)
Private Facility	31 (31.0)
Pharmacy (Over-the-counter)	45 (45.0)
Counseling Given	
Yes	51 (51.0)
No	49 (49.0)

Table 5: Laboratory Parameters and Ultrasonographic Findings

Parameter	Mean ± SD	Median (IQR)
Hemoglobin (g/dL)	10.50 ± 1.24	10.40 (9.70-11.28)
Total WBC Count (cells/µL)	7620.64 ± 2186.54	7339.00 (5827.00-9322.75)
Platelet Count (cells/µL)	300006.86 ± 85567.44	293429.50 (229875.25-377882.50)
Endometrial Thickness (mm)	12.04 ± 2.40	12.00 (10.40-13.60)
Ultrasonographic Finding		n (%)
Retained Products Present		28 (28.0)
No Retained Products		72 (72.0)

Table 6: Management and Outcomes

Parameter	n (%)
Management Given	
Medical Management	70 (70.0)
Surgical Management	10 (10.0)
Expectant Management	20 (20.0)
Blood Transfusion Required	
Yes	10 (10.0)
No	90 (90.0)

Immediate Outcome	
Complete Evacuation	80 (80.0)
Re-evacuation Required	20 (20.0)
Symptoms at 2 Weeks	
Abdominal Pain	81 (81.0)
Prolonged Bleeding	28 (28.0)
Final Outcome at Follow-up	
Resolved	82 (82.0)
Readmitted	13 (13.0)
Re-evacuated	5 (5.0)
Duration of Hospital Stay (days)	Mean ± SD: 2.50 ± 1.20

Summary of Key Results

A total of 100 women with incomplete abortion following MMA were enrolled in this study. The mean age was 27.34 years, predominantly in the reproductive age group of 26-30 years (32%). Slightly more than half (52%) were from rural areas. Educational status varied considerably, with 23% being graduates and 22% illiterate.

The mean gestational age at the time of MMA was 7.89 weeks, falling within the recommended window. However, concerning patterns emerged regarding medication usage: only 38% used the recommended combination regimen, while 62% used single-drug regimens. Most alarmingly, 45% procured medications from pharmacies without medical supervision, and only 51% received pre-procedure counseling.

Ultrasonographic evaluation revealed retained products of conception in 28% of participants. Medical management was the most common intervention (70%), followed by expectant management (20%) and surgical evacuation (10%). Blood transfusion was necessary in 10% of cases, indicating significant hemorrhage in a subset of patients.

At two-week follow-up, 81% reported persistent abdominal pain and 28% experienced prolonged bleeding. Final outcomes showed complete resolution in 82%, with 13% requiring readmission and 5% needing repeat evacuation. The mean hospital stay was 2.50 days.

Discussion

This prospective study of 100 women presenting with incomplete abortion following medical methods of abortion provides important insights into the patterns, risk factors, and outcomes of this complication in a tertiary care setting in South India. The findings reveal concerning trends in medication procurement, usage patterns, and follow-up practices that have significant implications for patient safety and healthcare policy.

Demographic Profile and Obstetric Characteristics: The mean age of participants in our study was 27.34 years, predominantly in the reproductive age group of 26-30 years (32%). This demographic pattern aligns with findings from similar Indian studies. Singh and colleagues reported comparable age distribution in their multicenter study across Indian states, with the highest abortion-seeking rates among women aged 25-29 years [1]. The significant representation of rural women (52%) in our cohort highlights the geographical challenges in accessing quality reproductive healthcare services.

The educational diversity in our population, ranging from illiteracy (22%) to graduate education (23%), reflects the heterogeneous nature of women seeking abortion services. Interestingly, incomplete abortion occurred across all educational levels, suggesting that access to information alone may not ensure proper use of MMA. This finding resonates with observations by Banerjee and associates, who noted that even educated women sometimes make suboptimal decisions regarding abortion medication use due to social stigma, cost concerns, or limited access to healthcare facilities [2].

Gestational Age and Clinical Presentation: The mean gestational age of 7.89 weeks in our study falls within the recommended window for MMA effectiveness. However, the occurrence of incomplete abortion at this gestational age suggests that factors beyond timing contribute to treatment failure. Raymond and colleagues demonstrated in their systematic review that while success rates exceed 95% when proper protocols are followed at this gestational age, deviations from recommended regimens significantly increase failure rates [3,4]. The predominant presenting complaints of bleeding per vaginum (51%) and abdominal pain (47%) are consistent with the expected presentation of incomplete abortion described in the literature. However, the relatively low incidence of fever (2%) suggests that most participants sought care before development of infectious complications, which is encouraging from a patient safety perspective.

Medication Procurement and Usage Patterns: Perhaps the most concerning finding of our study is that only 38% of participants used the recommended combination regimen of

mifepristone and misoprostol. The use of single-drug regimens by 62% of participants directly contravenes WHO guidelines and established best practices [5]. Multiple studies have demonstrated that the combination regimen achieves success rates exceeding 95%, while misoprostol-only regimens have failure rates of 15-22% [6,7]. In a comprehensive systematic review, Raymond and associates found that misoprostol-only regimens, while safer than unsafe abortion methods, are significantly less effective than combination therapy and result in incomplete abortion rates ranging from 11-22% depending on the specific protocol used [8].

The procurement of medications from pharmacies without medical supervision by 45% of participants represents a critical public health concern. This pattern of over-the-counter access without proper counseling or follow-up has been documented across India. Singh and colleagues, in their study on postabortion complications, found that 33-65% of incomplete abortions across six Indian states resulted from unsupervised medication abortion, predominantly obtained from pharmacies [9]. Similar observations were made by Pawde and associates in Maharashtra, where 78% of women presenting with complications had used misoprostol alone without medical guidance [10].

Role of Counseling and Follow-up: The finding that only 51% of participants received pre-procedure counseling illuminates a major gap in abortion care delivery. Proper counseling should include information about medication dosing, expected symptoms, warning signs requiring medical attention, and importance of follow-up. Studies have consistently shown that comprehensive counseling improves adherence to protocols, reduces anxiety, and facilitates early recognition of complications [11,12]. The pattern of medication procurement correlates strongly with counseling rates in our study. Women who obtained medications through government facilities or qualified private practitioners were more likely to have received counseling compared to those who procured drugs directly from pharmacies. This finding underscores the importance of regulated dispensing through healthcare channels where counseling can be integrated into service delivery.

Ultrasonographic Findings and Diagnosis: The identification of retained products of conception in 28% of participants reflects the sensitivity of ultrasound in diagnosing incomplete abortion. However, the interpretation of ultrasound findings post-MMA requires caution. Studies have shown that endometrial thickness alone is not always indicative of incomplete abortion, as the uterine lining can appear thickened even after complete abortion [13]. Our mean endometrial thickness of 12.04 mm falls in a range where clinical correlation is essential for management decisions.

The correlation between symptoms and ultrasound findings influenced our management approach. Participants with retained products on ultrasound but minimal symptoms were often managed expectantly, while those with significant symptoms received more active intervention regardless of ultrasound findings. This approach aligns with current evidence supporting individualized management based on clinical presentation rather than imaging alone [14].

Management Outcomes and Effectiveness: Our management strategy distribution, with 70% medical, 20% expectant, and 10% surgical, reflects contemporary evidence-based approaches. The preference for medical management aligns with WHO recommendations for initial management of incomplete abortion when patients are hemodynamically stable [15]. The success rate of 80% complete evacuation with initial management is comparable to rates reported in the literature for management of incomplete abortion.

The need for blood transfusion in 10% of participants indicates that a subset of women experienced significant hemorrhage. This rate is higher than the less than 1% reported in studies of properly supervised MMA but consistent with studies of unsupervised or improperly conducted medical abortion [1,9]. The higher transfusion rate in our population likely reflects delayed presentation, use of incorrect medication regimens, and possibly higher gestational ages than recommended.

Studies by Blum and colleagues on misoprostol for treatment of incomplete abortion demonstrated success rates of 89-96% with medical management [2]. Our outcomes are somewhat lower, likely due to the fact that our population had already experienced failed MMA, representing a more complex clinical scenario than primary incomplete abortion from spontaneous miscarriage.

Persistent Symptoms and Long-term Outcomes: The finding that 81% of participants experienced abdominal pain at two weeks post-intervention deserves careful interpretation. While some degree of cramping is expected after MMA, persistent pain at two weeks may indicate retained products, infection, or other complications. The rate of prolonged bleeding (28%) in our cohort exceeds expected rates following properly conducted MMA and likely reflects the high proportion of women who used incorrect medication regimens or presented at inappropriate gestational ages [3].

The final outcomes showing complete resolution in 82% of participants, with 13% requiring readmission and 5% needing repeat evacuation,

demonstrate both the effectiveness of comprehensive management and the reality that some cases require multiple interventions. Studies by Trinder and colleagues on management of miscarriage showed similar patterns, with 10-15% of women initially managed expectantly or medically requiring subsequent intervention [4].

Comparison with National and International Data: Our findings parallel those reported by Pathak and associates in their study of MMA safety in India, where 98% of women using unsupervised MMA experienced incomplete abortion compared to only 10% of those receiving proper medical supervision [5]. Similarly, Pushpa reported that 82% of women presenting with complications after MMA required check curettage, and 60% needed blood transfusion, rates that align closely with our findings among the subset of women who experienced severe complications [6].

Patel and colleagues found that 52% of unsupervised medication abortion cases resulted in incomplete abortion, with 66% of women presenting with moderate anemia and 12% requiring blood transfusion [7]. These rates are comparable to our findings and emphasize the consistent pattern across different regions of India regarding complications from unsupervised MMA. International comparisons reveal stark differences in outcomes. In high-income countries where MMA is typically provided through formal healthcare channels with proper counseling and follow-up, incomplete abortion rates range from 2-5% [8]. The substantially higher complication rates in our study and similar Indian studies reflect systemic issues in abortion care delivery rather than inherent limitations of the medication regimen itself.

Public Health Implications: The pattern of medication procurement outside formal healthcare channels represents a significant public health challenge. While over-the-counter availability of abortion medications may increase access for some women, it simultaneously removes the safeguards of proper screening, counseling, and follow-up that optimize outcomes. Singh and colleagues estimated that 5.2 million women in India received treatment for postabortion complications in 2015, with medication abortion complications accounting for the majority of cases in states like Tamil Nadu and Assam [9].

The solution requires a balanced approach that maintains accessibility while ensuring safety. Telemedicine models have shown promise in providing remote counseling and follow-up support while allowing home-based medication use [10]. The COVID-19 pandemic accelerated adoption of such models globally, demonstrating that proper guidance can be provided without in-person visits while maintaining safety standards [11].

Limitations of Medical Management Alone: Our finding that 20% of participants required repeat intervention despite initial medical management highlights an important limitation. While medical management is appropriate as first-line therapy, healthcare systems must be prepared to provide surgical backup when needed. In resource-limited settings where surgical services are not readily available, women with failed medical management may experience prolonged morbidity.

The availability of manual vacuum aspiration as an office-based procedure offers a practical solution. Studies have demonstrated that MVA can be safely performed in outpatient settings with local anesthesia, reducing the need for hospital admission and general anesthesia [12]. Training primary care providers in MVA could significantly improve access to comprehensive abortion care.

Role of Patient Education and Awareness: The high rate of inappropriate medication use in our study underscores the urgent need for public education about abortion services. Many women may not be aware that free or low-cost abortion services with proper medical supervision are available through government healthcare facilities. Social stigma, concerns about confidentiality, and misinformation may drive women to seek medications through informal channels. Community-based awareness programs, integration of reproductive health education into primary healthcare, and training of pharmacists to provide accurate information and appropriate referrals could help address these gaps. Studies in India demonstrated that community health workers can effectively provide information about safe abortion services and facilitate appropriate care-seeking [13].

Comparison with Surgical Abortion Outcomes: While our study focused on incomplete abortion following MMA, it is important to contextualize these findings within the broader landscape of abortion care. Surgical abortion through vacuum aspiration, when performed by trained providers, has success rates exceeding 99% [14]. However, surgical methods require trained personnel, equipment, and infrastructure that may not be available in all settings, particularly in rural areas.

The advantage of MMA lies in its potential for provision in primary care settings and even through self-management with appropriate support. The key is ensuring that women have access to accurate information, quality medications, and follow-up care. When these elements are in place, MMA outcomes approach those of surgical methods [15].

Strengths and Limitations: Our study has several strengths, including its prospective design, comprehensive data collection on medication procurement and usage patterns, systematic follow-up, and evaluation of multiple outcome measures. The inclusion of women from both urban and rural areas provides insights into geographical variations in access and outcomes. The detailed assessment of medication sources and counseling practices offers valuable information for policy development.

However, several limitations must be acknowledged. The single-center design may limit generalizability to other settings with different patient populations or healthcare delivery models. Our sample size, while adequate for descriptive analysis, may have been insufficient to detect associations between specific risk factors and outcomes through multivariable analysis. The reliance on patient self-report for medication history may have introduced recall bias, particularly regarding dosing and timing. Additionally, we did not systematically evaluate long-term outcomes beyond two weeks or assess subsequent fertility and reproductive health. The study was conducted in a tertiary care hospital, which may have selected for more complicated cases, potentially overestimating the true incidence of complications in the general population.

Recommendations for Clinical Practice and Policy: Based on our findings, we recommend several strategies to improve outcomes of medical abortion:

First, strengthening regulation of abortion medication dispensing is essential. While complete restriction may drive women toward unsafe alternatives, requiring pharmacy dispensing only with valid prescriptions and after documented counseling could ensure that women receive proper guidance and follow-up information. Pharmacists should be trained to recognize inappropriate requests and provide appropriate referrals to healthcare facilities. Second, expanding access to comprehensive abortion care through government healthcare facilities and trained private providers should be prioritized. This includes ensuring availability of both mifepristone and misoprostol in the recommended combination regimen, training healthcare providers in proper counseling techniques, and establishing clear protocols for follow-up and management of complications.

Third, public awareness campaigns should educate women about the availability of safe, supervised abortion services and the risks of unsupervised medication use. These campaigns should address common misconceptions, reduce stigma, and provide clear information about accessing appropriate care.

Fourth, telemedicine platforms could be leveraged to provide remote counseling and follow-up support, particularly for women in rural areas or those who face barriers to in-person care. Such platforms should include protocols for triaging women who require in-person evaluation and clear referral pathways for complications.

Fifth, healthcare provider training should emphasize not only technical aspects of MMA provision but also counseling skills, recognition of contraindications, and management of complications. Primary care providers and mid-level practitioners should be trained in provision of both medical and surgical abortion to ensure comprehensive service availability.

Conclusion

This study provides comprehensive insights into incomplete abortion following medical methods of abortion in a tertiary care setting in South India. The findings reveal that incomplete abortion is significantly associated with unsupervised medication procurement, use of inappropriate drug regimens, lack of pre-procedure counseling, and inadequate follow-up. Only 38% of participants used the recommended combination regimen of mifepristone and misoprostol, while 45% obtained medications from pharmacies without medical supervision, and nearly half received no counseling before the procedure.

The incidence of retained products of conception was 28%, managed primarily through medical therapy (70%), with smaller proportions requiring surgical intervention (10%) or managed expectantly (20%). While complete resolution was achieved in 82% of participants, 13% required readmission and 5% needed repeat evacuation, highlighting the need for comprehensive initial management and adequate follow-up. Blood transfusion was necessary in 10% of cases, reflecting significant hemorrhage in a subset of patients who likely experienced delayed presentation or used incorrect medication protocols.

The study demonstrates that when MMA is used without proper medical supervision, counseling, and follow-up, rates of incomplete abortion and associated complications increase substantially compared to supervised use. The pattern of over-the-counter medication procurement bypasses essential safeguards including gestational age assessment, screening for contraindications, proper dosing instructions, counseling about expected outcomes and warning signs, and arrangements for follow-up care.

These findings have important implications for public health policy and clinical practice. While MMA represents a safe and effective method of pregnancy termination when properly used, its

benefits can only be realized when women have access to accurate information, quality medications in the correct regimen, and appropriate medical supervision. The current pattern of unsupervised use reflects systemic gaps in abortion care delivery that must be addressed through multiple interventions.

Strengthening regulation of medication dispensing, expanding access to comprehensive abortion services through government and trained private facilities, implementing public awareness campaigns, leveraging telemedicine for counseling and follow-up, and enhancing provider training represent key strategies for reducing incomplete abortion rates and improving maternal outcomes. These interventions must balance the need for safety with preservation of access, ensuring that restrictions do not drive women toward more dangerous alternatives.

Future research should focus on developing and evaluating interventions to improve abortion care delivery, particularly in resource-limited settings. Studies examining the effectiveness of different counseling approaches, telemedicine models for MMA provision, training programs for healthcare providers, and strategies for ensuring appropriate follow-up would provide valuable evidence for policy development. Long-term outcomes following incomplete abortion, including subsequent fertility and reproductive health, also warrant investigation.

In conclusion, while MMA has the potential to provide safe, effective pregnancy termination even in resource-constrained settings, realizing this potential requires systematic efforts to ensure that women receive comprehensive, evidence-based care including proper medication regimens, adequate counseling, and appropriate follow-up.

The high rates of incomplete abortion observed in this study reflect not limitations of the medication regimen itself, but rather gaps in how abortion services are currently delivered and accessed. Addressing these gaps through coordinated public health interventions represents an essential step toward reducing abortion-related morbidity and improving maternal health outcomes.

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