Original Article

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Factors Associated with Complete Abortion in Elective Medically Induced Abortion of Pregnancy at A Tertiary Care Hospital in Southern Thailand

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Abstract:

Objective: To identify the factors associated with successful complete abortion in women undergoing elective medically induced abortion of pregnancy at gestational age ≤24 weeks at a tertiary care hospital in Southern Thailand.

Material and Methods: This retrospective cohort study reviewed medical records from January 2017 to June 2024 of women with unintended pregnancies at GA ≤24 weeks who underwent medical abortion using mifepristone and misoprostol. Multivariable logistic regression identified factors associated with abortion success and complications.

Results: Complete abortion was significantly higher among women with gestational age ≤12 weeks (59.5%, 251/378) compared to those >12 weeks (40.5%, 171/306) (p-value 0.006). Overall, among 684 cases, complete abortion was achieved in 422 (61.7%). Surgical intervention was required in 35.2%, sponge forceps uterine evacuation in 2.9%, and subtotal hysterectomy in 0.1%. Gestational age beyond 12 weeks was associated with an increased risk of incomplete abortion (adjusted odds ratio [OR] 1.61, 95% confidence interval [CI] 1.17–2.21).

Conclusion: Gestational ages ≤12 weeks had higher complete abortion rates. Early access to abortion services may reduce complications and improve success rates.

Keywords: medical abortion, mifepristone, misoprostol, repeated abortion, unintended pregnancy

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Introduction

Unintended pregnancy[1] is a growing concern worldwide[2–5]. Medical termination of pregnancy (MTP) is a widely recognized and commonly utilized method for managing unintended pregnancies, offering a non-invasive alternative to surgical procedures[6–8]. Extensive research has demonstrated the effectiveness and safety of medically induced abortion, particularly when using a combination regimen of mifepristone and misoprostol[9–12], which is associated with the highest rates of complete abortion[13,14] and the lowest rates of complications such as bleeding, infection, incomplete abortion, and uterine perforation[15,16].

The success and outcomes of medical abortion vary among different demographic groups. In Thailand, increasing attention to this issue has led to the development of abortion laws[7] and national clinical guidelines from the Royal Thai College of Obstetricians and Gynecologists (RTCOG)[6]. These guidelines recommend that abortion can be performed up to 12 weeks of gestation. For pregnancies beyond this period, management should rely on the clinical judgment of the attending physician in collaboration with a multidisciplinary team.

Medical abortion before 12 weeks of gestation is generally highly effective. International guidelines recommend the administration of mifepristone 200 milligrams followed by misoprostol 800 micrograms, which resulted in a complete abortion rate of 92.0–98.0%, with low complication rates and a rare need for surgical intervention[17,18]. By contrast, second-trimester medical abortion (13–24 weeks) carries a higher risk of complications, especially retained placenta and incomplete expulsion, with surgical evacuation rates reported at 30.8%[19].

Hatyai Hospital, a tertiary care facility in Southern Thailand, has a long history of providing safe abortion services to women with unintended pregnancies. Data from the Medical Statistics Unit in the Department of Obstetrics and Gynecology indicated a significant rise in the number of medical abortions over the past eight years, particularly following the legalization of abortion. With the increasing reliance on medically induced abortion of pregnancy, it is essential to investigate the factors influencing its effectiveness and safety in real-world settings, particularly within the context of a developing country such as Thailand. Identifying these factors is critical for optimizing abortion care and improving overall health outcomes.

This retrospective cohort study was conducted to identify the factors associated with successful complete abortion among women undergoing elective medically induced abortion at Hatyai Hospital. Data were analyzed from women who underwent medically induced abortion at up to 24 weeks of gestation. The findings from this study will contribute to improving the quality of abortion care and minimizing potential complications.

Material and Methods

Setting and population

This retrospective cohort study was approved by the Ethics Committee of Hatyai Hospital, Songkhla, Thailand (HYH EC 069-67-01). The medical records of adolescent and adult women with unintended pregnancies at gestational ages of ≤24 weeks were reviewed between January 2017 and June 2024. Inclusion criteria were women with unintended pregnancies and gestational ages ≤24 weeks who wished to terminate their pregnancies. Exclusion criteria included women with abnormal pregnancies (such as ectopic or molar pregnancies), a history of allergy to mifepristone or misoprostol, and outpatients who were lost to follow-up. The medical abortion regimen consisted of mifepristone 200 mg orally, followed by misoprostol 800 µg sublingually 24–48 hours later. This regimen was consistently applied to all participants in the study population.

Data collection

The medical records were reviewed by a physician

using a standardized form, with data retrieved from the Hatyai Hospital Information System (HIS). The collected information included maternal age, categorized into two groups based on World Health Organization (WHO) definitions as adolescent pregnancy (women under 20 years) and adult pregnancy (women 20 years or older)[20]. Other data collected included gestational age at abortion, gravidity, parity, history of previous abortion, uterine surgery or curettage, and complications related to the abortion.

Follow-up for complete abortion was performed through pelvic examination and transvaginal ultrasound by the resident and attending staff to ensure the absence of pregnancy tissue and to check for signs and symptoms such as cervical dilation, vaginal bleeding, or endometrial thickness >30 mm. Monitored complications included infection within 2 weeks, hemorrhage requiring transfusion, and uterine rupture. Inpatient cases were evaluated immediately after pregnancy expulsion, whereas outpatient cases were scheduled for follow-up 1–2 weeks after medication administration.

Data analysis

A pilot medical chart review of medically induced abortions performed at Hatyai Hospital in 2023 was conducted prior to the main study. Age was considered the primary factor in determining the appropriate sample size (n). The findings were as follows:

- Adolescent group: total=27, complete abortion=19 → P1=0.70
- Adult group: total=103, complete abortion=60 → P2=0.58

Sample size estimation was based on the pilot data, assuming a 95% confidence level, 80% power, and a 3:1 allocation ratio (N2/N1).

The sample size was calculated using G*Power software with the "Two independent proportions (Fisher's exact test)" option, resulting in a required sample size of 684 participants (Adolescent: Adult=171:513). During the study period, 1,446 women underwent medically induced abortion. After applying the exclusion criteria, primarily due to outpatient cases who did not return for follow-up, 684 participants were included in the final analysis.

Descriptive statistics were used to summarize demographic characteristics, maternal age, gestational age at abortion, and other baseline characteristics. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations (S.D.) or medians and interquartile ranges (IQR), as appropriate. Associations between categorical variables and medically induced complete abortion were assessed using Chi-square tests, with Fisher's Exact Test applied when expected cell counts were low. Multivariable logistic regression was performed to identify factors independently associated with the complications of medical abortion, adjusting for potential confounders such as maternal age, parity, and previous abortion history. A p-value of <0.05 was considered statistically significant. All analyses were conducted using R software, version 4.2.

Results

During the study period, a total of 1,446 cases of medically induced abortion of pregnancy were identified and reviewed. All medical records were thoroughly assessed, and after applying the predefined inclusion and exclusion criteria, 684 cases met eligibility and were included in the final study population. The majority of excluded cases were outpatients with a gestational age of ≤12 weeks who did not attend the scheduled follow-up within two weeks after receiving the medication. Among the 684 enrolled cases at gestational ages of ≤24 weeks, 176 (25.7%) were adolescent pregnancies, while 508 (74.3%) were adult pregnancies. The median age of the participants was 26 years (interquartile range [IQR] 19–34). Of the total, 273

(39.9%) were nulliparous and 411 (60.1%) were multiparous, with no significant difference between the adolescent and adult groups (p-value=0.965).

Of the 684 participants, 422 (61.7%) had a successful, complete medical abortion, including 109 adolescents (25.8%) and 313 adults (74.2%). In contrast, 262 participants (38.3%) experienced incomplete abortion, defined by symptoms such as cervical dilation, vaginal bleeding, or endometrial thickness greater than 30 mm. This group included 67 adolescents (25.6%) and 195 adults (74.4%).

Complete abortion rates were higher among patients with gestational ages ≤12 weeks (251 of 378, 59.5%) compared to those with gestational ages >12 weeks (171 of 306, 40.5%), and this difference was statistically significant (p-value=0.006). These results suggested that earlier gestational age was associated with higher rates of successful medical abortions. Demographic and obstetric characteristics are detailed in Table 1.

Univariable analysis revealed that pregnancies at gestational ages of ≤12 weeks were associated with higher rates of complete abortion compared to those with gestational ages >12 weeks (Odd ratio [OR] 1.56, 95.0% confidence Interval [CI] 1.14–2.13). No significant differences in rates of complete abortion were observed between the adolescent and adult pregnancy groups with respect to gravidity, parity, history of abortion, history of cesarean delivery, and history of uterine curettage (OR 1.01, 95.0% CI 0.71–1.44).

Multivariable analysis of gestational ages >12 weeks showed significantly higher rates of incomplete abortion (adjusted odds ratio 1.61, 95.0% confidence interval 1.17–2.21, p-value=0.003), adjusted by maternal age, gestational age, and history of uterine procedure (previous cesarean delivery and uterine curettage) (Table 2).

The most common surgical procedure was manual vacuum aspiration (MVA) or dilatation and curettage (D&C), performed in 241 cases (35.2%), slightly more frequent in adolescents (38.6%) than adults (34.1%). Within this group, hemorrhage occurred in 8 cases, while infection was observed in only 2 cases. Sponge forceps uterine evacuation was required in 20 cases (2.9%), predominantly

Table 1 Characteristic features of the study population (n=684)

Demographics	Total (n=684)	Complete abortion, n (%)	Incomplete abortion, n (%)
Number	684	422 (61.7%)	262 (38.3%)
Age, median (IQR)	26 (19,34)	26 (19,34)	26 (19,33)
Gravidity, median (IQR)	2 (1–3)	2 (1–3)	2 (1–3)
Parity, median (IQR)	1 (0–2)	1 (0–2)	1 (0–2)
GA, median (IQR), weeks	10.6 (7.6,15.4)	9.9 (7.3,15.7)	12.3 (8.1,15.1)
Previous abortion, times			
0	566 (82.7)	350 (82.9)	216 (82.4)
1	95 (13.9)	59 (14)	36 (13.7)
2	19 (2.8)	11 (2.6)	8 (3.1)
3	4 (0.6)	2 (0.5)	2 (0.8)
History of uterine procedure	102	62 (60.8)	40 (39.2)

IQR=interquartile range, GA=gestational age at abortion, History of uterine procedure=identified as women with a history of cesarean delivery and/or uterine curettage.

Table 2. Univariable and multivariable analysis of the significant factors for incomplete abortion

Variable	Complete abortion	Incomplete abortion	Crude OR[1] (95%CI)	p-value	Adjusted OR (95% CI)	p-value
Age				0.94		0.828
Adult (ref[2])	313 (74.2)	195 (74.4)				
Adolescent (<20)	109 (25.8)	67 (25.6)	1.01 (0.71,1.44)		1.06 (0.65,1.72)	
Gravidity				0.94		0.632
1 (ref)	156 (37)	97 (37)				
2-4	219 (51.9)	138 (52.7)	1.01 (0.73,1.41)		0.97 (0.33,2.89)	
>4	47 (11.1)	27 (10.3)	0.92 (0.54,1.58)		0.69 (0.16,2.94)	
Parity				0.965		0.814
0 (ref)	168 (39.8)	273 (39.9)				
1-4	244 (57.8)	394 (57.6)	0.98 (0.72,1.35)		1.1 (0.38,3.14)	
>4	10 (2.4)	17 (2.5)	1.12 (0.41,3.03)		1.59 (0.32,7.99)	
Previous abortion[3] (times)				0.95		0.828
0 (ref)	350 (82.9)	216 (82.4)				
1	59 (14)	36 (13.7)	0.99 (0.63,1.55)		1.06 (0.6,1.87)	
2	11 (2.6)	8 (3.1)	1.18 (0.47,2.98)		1.57 (0.52,4.74)	
3	2 (0.5)	2 (0.8)	1.62(0.23,11.59)		1.94(0.23,16.21)	
GA[4], median (IQR), weeks	9.9 (7.3,15.7)	12.3 (8.1,15.1)	1.02 (0.99,1.06)	0.16		
>12 weeks	171 (40.5)	135 (51.5)	1.56 (1.14,2.13)	0.005	1.61 (1.17,2.21)	0.003
History of uterine procedure[5]	62 (60.8)	40 (39.2)	1.05 (0.68,1.61)	0.837	1.08 (0.67,1.75)	0.744

OR=odds ratio, ref=reference, Previous abortion=defined as a history of either spontaneous abortion or induced abortion (medical or surgical), GA=gestational age at abortion, History of uterine procedure=identified as women with a history of cesarean delivery and/or uterine curettage

in adults (3.5% vs. 1.1% in adolescents), with hemorrhage reported in 2 adult cases. One adult patient with a history of two previous cesarean deliveries experienced a uterine rupture, which required a subtotal hysterectomy. No maternal deaths were reported in this study.

This study found that 3 out of 12 women required repeated medically induced abortion.

Discussion

This retrospective cohort study examined factors associated with complete abortion following medically induced termination of pregnancy up to 24 weeks of gestation in a tertiary hospital in Southern Thailand. The overall complete abortion rate in our cohort was 61.7%, which is notably lower than the 92–98% success rates reported in international guidelines for first-trimester medical abortion using the mifepristone–misoprostol regimen[17,18]. This discrepancy may be explained by the higher median gestational age of our study population (10.6 weeks), as well as the inclusion of second-trimester cases up to 24 weeks. Previous studies have consistently shown that higher gestational age is associated with an increased likelihood of incomplete expulsion and the need for surgical intervention[19,21,22]. Furthermore, because Hatyai Hospital is a tertiary care center, cases with gestational ages >12 weeks were admitted as inpatients and closely monitored by resident physicians after expulsion. This practice may have facilitated earlier and more frequent interventions, potentially contributing to the lower complete abortion rate compared with prior studies.

Gestational age emerged as the most significant determinant of abortion success. Women with gestational

ages ≤12 weeks achieved higher rates of complete abortion compared with those >12 weeks, and gestational age >12 weeks was significantly associated with incomplete abortion (adjusted OR 1.61; 95% CI 1.17–2.21; p-value=0.003). These findings are in agreement with the international evidence and reinforce the importance of promoting early access to abortion services to improve outcomes and minimize complications[21,22].

In contrast, maternal age—adolescents versus adults—was not significantly associated with differences in either complete abortion or complication rates. This result is consistent with prior studies indicating that biological responses to medical abortion are similar across age groups, and that age itself is not a predictor of treatment success[21–24]. Importantly, adolescents accounted for over one-quarter of the study population, underscoring the ongoing need for accessible, confidential, and adolescent-friendly reproductive health services in Thailand.

Complications in this study were relatively uncommon. Surgical intervention was required in 35.2% of cases, primarily manual vacuum aspiration or dilatation and curettage, which is comparable to rates reported in second-trimester studies[19]. Hemorrhage and infection were rare, and only one case of uterine rupture was identified, occurring in a woman with two prior cesarean deliveries and requiring subtotal hysterectomy. No maternal deaths were reported, which supports the safety profile of the mifepristone–misoprostol regimen when administered in a structured healthcare setting.

Repeated medical abortion was identified in a small proportion of women (1.8%). This observation highlights potential gaps in contraceptive counseling and service provision. Strengthening access to effective contraception, particularly long-acting reversible contraceptives, remains essential to reducing the need for repeat procedures.

Strengths

The study included a relatively large sample of 684 women, encompassing both adolescents and adults across a broad gestational age range. Data from a tertiary care hospital provided real-world insights into medical abortion outcomes. Comprehensive demographic and clinical information enhanced the depth and reliability of the analysis. Inclusion of a long study period allowed robust comparisons, and contextualizing the findings with the existing literature strengthened their validity.

Weaknesses

The retrospective design relied on existing medical records, which may have resulted in incomplete or inconsistent data. Key confounders, such as socioeconomic status, psychosocial factors, and mental health, were not assessed. The study was conducted at a single tertiary hospital, which may limit generalizability to other regions or healthcare systems. Outpatient cases lost to follow-up, particularly early gestations, could have influenced outcome estimates.

Limitations

The relatively higher mean gestational age (10.6 weeks) may affect comparability with previous studies. Minor complications may have been underreported due to the retrospective nature of the study. All procedures were performed in a tertiary hospital and predominantly managed by resident physicians, which may have contributed to a higher rate of surgical intervention, particularly MVA. Future practice should emphasize careful observation and thorough assessment while minimizing unnecessary interventions in uncomplicated cases.

Conclusion

Gestational age ≤12 weeks was the strongest predictor of successful complete abortion in this cohort,

whereas maternal age was not associated with differential outcomes. These findings highlight the need to promote early access to safe medical abortion services in line with national guidelines. Strengthening follow-up care and post-abortion contraceptive counseling, particularly among adolescents, may further improve reproductive health outcomes and reduce the risk of repeat abortions.

Future research directions

Prospective multicenter studies are needed to confirm these findings, evaluate the long-term safety of medical abortion across different healthcare settings, and investigate the psychosocial and socioeconomic factors influencing abortion decisions and outcomes in Thailand.

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Conflict of interest

The authors declare no conflicts of interest.

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