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STUDENTERRAPPORT

Investigation of the preferred abortion method among women with consecutive spontaneous abortions

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Abstract

Background and Aim: Recurrent pregnancy loss is present in 1-2% of all women. These women will sometimes experience "missed abortion", where intervention is required. Danish guidelines currently recommend medical treatment of missed abortion rather than surgical treatment, but only a few studies have investigated which treatment women with recurrent pregnancy loss would prefer. This study aims to identify possible predictors for women preferring one method over the other and clarify the impact of side effects on the women's treatment experiences.

Methods: Women referred to The Centre for Recurrent Pregnancy Loss of Western Denmark between January 2016 and September 2022, who had experienced both surgical and medical treatment for missed abortion, were sent a questionnaire regarding their experiences with the treatment methods (n = 157); 87 women submitted a response and were included in the study. The data was analyzed and compared using χ^2 test and Wilcoxon Signed Rank Test and univariate analyses were conducted to determine possible associations.

Results: Significantly more women experienced a higher intensity of pain and had to take more pain killers after their first medical treatment for missed abortion compared to their first surgical treatment ($p < 0.001$ and $p = 0.006$). Bleeding, pain, prolonged sick leave, and mental discomfort had a significantly greater impact in women, who experienced a first medical abortion, in their choice of treatment method for their subsequent missed abortion. A reported failure rate for medical treatment of 44.8% was found. The odds ratio for preferring medical treatment was 3.3 if the women had given birth before ($p = 0.011$). The odds ratio for preferring medical treatment was 0.3, if the women had received medical treatment for their first missed abortion ($p = 0.015$). 66.7% of the women would prefer surgical treatment for their next missed abortion, while the remaining 33.3% would prefer medical treatment.

Conclusion: This study found that previous birth is a positive predictor for preferring medical treatment. However, the preference for surgical treatment of missed abortion, is twice as high as for medical treatment. This study found that, it is a negative predictor for preferring medical treatment, if the women received medical treatment for their first missed abortion. In our patient group medical treatment was also associated with a stronger experience of side effects and a high failure rate. These findings might be an explanation to why more women prefer surgical treatment and suggest, that current treatment recommendations should be reevaluated for women with missed abortion.

Introduction

Approximately 1-2% of all women will experience recurrent pregnancy loss (RPL) defined as three or more consecutive early pregnancy losses (Christiansen, 2020). In 2007, among pregnancy losses admitted to hospital and thus included in the Danish register of disease, 47% got the diagnosis "missed abortion" defined as a nonviable pregnancy detected by ultrasound examination in a woman with no or only slight vaginal bleeding (Vestergaard & Lidegaard, 2008; Colov, et al., 2013). In case of a missed abortion, the fetal and placental tissue is often not expelled from the uterus for several weeks after the demise, which is unacceptable for most women, and furthermore, presumably increases the risk of pelvic infection. Two meta-analyses examined the success rate of expectant management of missed abortion compared to medical and surgical treatment. One study found that only 14.5% of women with a missed abortion expel the remaining tissue spontaneously whereas the other study found a spontaneous expulsion frequency of 28% (Sotiriadis, et al., 2005; Graziosi, et al., 2004). Due to the low success rate of expectant management, this method is not recommended for missed abortions by the Danish Society for Obstetrics and Gynecology (DSOG) (Colov, et al., 2013).

Treatment options for missed abortion

There are two options available for inducing abortion: instrumental evacuation of the uterus and medical induced abortion. These options involve different surgical techniques and multiple pharmacological combinations. In Denmark, medical treatment is accomplished with a vaginally administered prostaglandin analogue (misoprostol, 0.4-0.6 mg). At present, the recommendation from DSOG is medically induced abortion up to a CRL equaling <9 gestational weeks. Medically induced abortion in cases where the CRL surpasses 9 weeks of gestation should be performed during hospitalization (Colov, et al., 2013). A vaginal ultrasound control scan is performed one week after the medical abortion procedure to assure that the abortion is completed. Success of treatment is defined as absence of a gestational sac and an endometrial echo with an anterior-posterior diameter < 15 mm. If these criteria are not met, the patient is offered a new attempt of medical abortion or uterine evacuation (Jørgensen, 2022). The surgical treatment is performed during day hospitalization and under general anesthesia. During the surgical procedure, the cervix is dilated, and the uterine cavity is emptied using vacuum aspiration. To ensure there is no fetal and placental tissue left, the uterine cavity can be further emptied with curettage (Nielsen, 2020).

Missed abortion treated with misoprostol has a success rate of approximately 80% whereas the success rate for vacuum aspiration is 97%. Danish guidelines allow a failure rate for medical abortion of 20% (Colov, et al., 2013). Consequently, if the patient is treated by a medical compared to a surgical procedure, their risk of incomplete abortion and need for additional intervention is elevated.

Both methods have been associated with various side effects. Studies have shown that the duration of bleeding after surgical treatment is significantly shorter and less intense than after medical treatment (Davis, et al., 2007; Colov, et al., 2013). However, the surgical procedure carries a risk of uterine perforation and a possibility of tearing the cervical tissue, hereby reducing the chance of implantation in future pregnancies (Torres-Miranda, et al., 2022). Furthermore, it is estimated that 90% of cases with Asherman's syndrome, a condition characterized by intra-uterine adhesions with consequent risk of hypomenorrhea/amenorrhea, reduced fertility, pregnancy loss and abnormal placentation, occur after pregnancy-related curettage (Dreisler & Kjer, 2019; Schenker & Margalioth, 1982).

The final choice of method should be made by the patient after thorough information about the national recommendations and possible side effects of both treatment methods (Colov, et al., 2013). Thorough counseling is essential, as demonstrated in an RCT-study by Creinin, where only 5% of the women who sought termination of their pregnancy, had no preferred method after counseling and description of medical and surgical methods. This study and other published reports find that women are more satisfied when they can decide which method they would prefer (Creinin, 2000; Tang, et al., 1993; Creinin & Park, 1995; Creinin & Burke, 1996). Furthermore, one study suggests that women who are given the option to choose a course of treatment for early pregnancy loss have better subsequent mental health (Wieringa-De Waard, et al., 2002).

Different aspects and thoughts can have an impact on this decision. Some women may regard medical treatment as more "natural" while others prefer surgical treatment due to the speed of the treatment process (Chen & Creinin, 2007). The psychological impact of early pregnancy loss should be considered in the physicians counseling, as studies find that a significant percentage of women experience psychiatric symptoms in the weeks to months after early pregnancy loss. The patient may be experiencing guilt over what they could have done to prevent the situation along with symptoms of anxiety and depression (Griebel, et al., 2005). This emphasizes the importance of clarifying the thoughts and experiences from women with RPL regarding medical and surgical treatment of missed abortion in order to refine clinical guidelines for this group of patients.

Method

Participants in the study were identified via the database of The Centre for Recurrent Pregnancy Loss of Western Denmark (Data Protection Agency of The North Denmark Region, Approval Number 2018-5). Patients referred between January 2016 and September 2022 were included in the study if they had undergone at least one misoprostol-induced medical abortion and at least one surgical abortion (uterine evacuation) confirmed from their medical records. A power calculation was conducted based on results from an unpublished pilot study and found that a minimum of 16 participants in each group[1] was necessary to achieve 80% power.

In 2022 between October 5th and November 14th, 157 women, who met the inclusion criteria, received an online questionnaire regarding their experience with the two treatment methods. The questionnaire was made in REDCap and consisted of four parts. The first part collected general information about the women, including relevant gynecological questions. The second and third part collected information about experiences, including side effects regarding their first medical and surgical treatment for missed abortion, respectively. The women had the option to state their general opinion on the two treatment methods and the opportunity to elaborate if and why they found a certain method unacceptable. In the fourth part, the women were asked which treatment method they experienced first, and which side effect(s) had an impact on their choice of treatment of their subsequent missed abortion. The women could give as many reasons as they desired. The included side effects were duration and intensity of bleeding, experience of pain, prolonged sick leave, and mental discomfort. It was an option to choose "other" as a reason as well and elaborate on this. Lastly, they were asked which method they would choose if they were to have another missed abortion and elaborate on why (supplemental material).

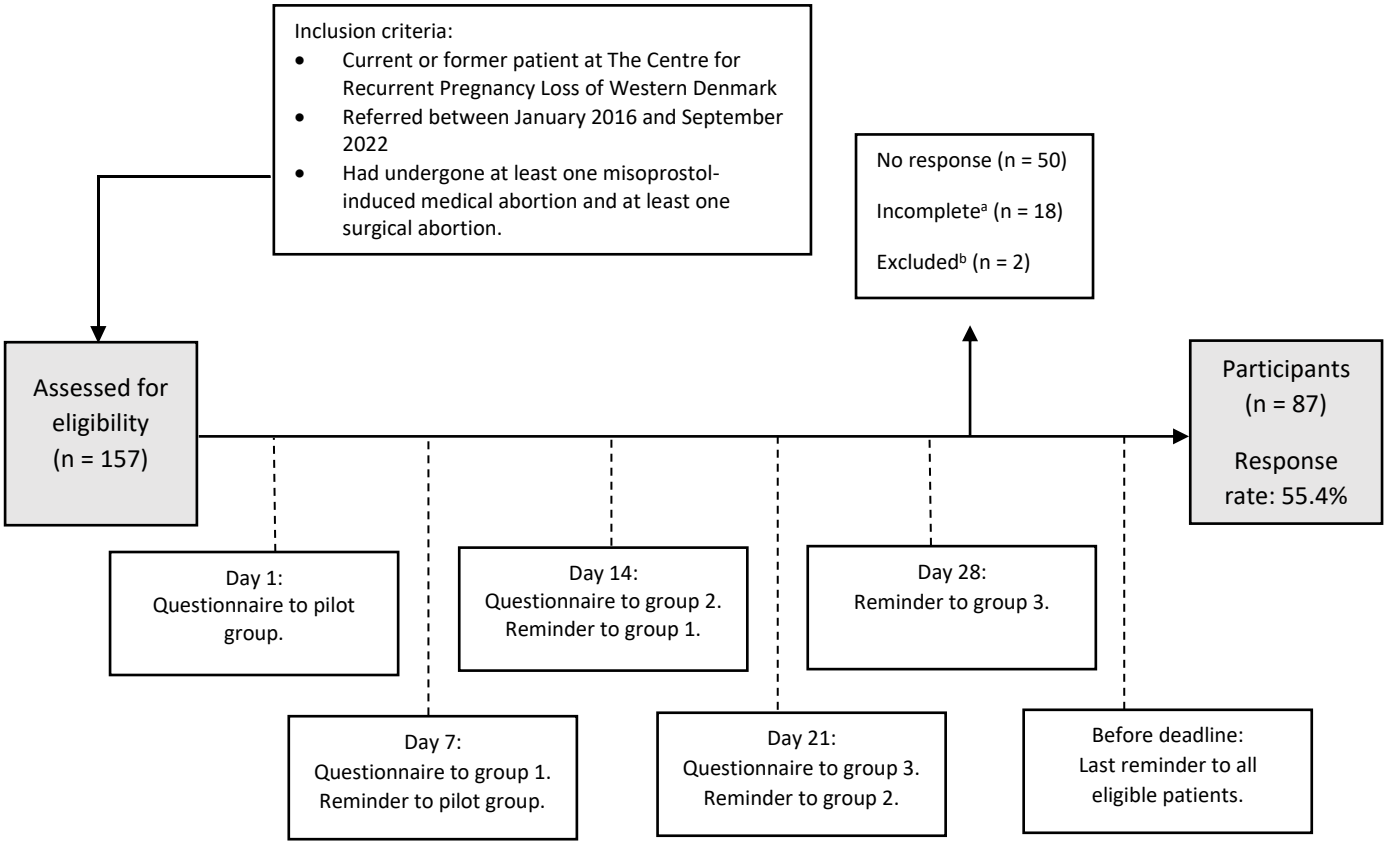
Before the questionnaire was sent out to the entire group of eligible participants, 10 women were randomly selected for a "pilot group". This pilot group received the questionnaire one week before the remaining eligible participants. Besides filling out the questionnaire, the participants were asked to report any feedback or remarks regarding technical issues and the composition and content of the questions. This was done to identify and correct overlooked issues and to adjust the questionnaire before final data collection was performed.

The participants were divided into three groups who received the questionnaire at three different dates over the course of three weeks to prevent a potential overload of inquiries. Each

[1] Two groups, where the women's first treatment of missed abortion was medical or surgical, respectively.

group received a reminder one week after the questionnaire was sent and a final reminder a few days before deadline. This final reminder was sent out due to the observation, that many of the participants answered the questionnaire within the first 24 hours of receiving the request. The final reminder was written as a special thanks to the majority of the participants, who had filled out the questionnaire thoroughly, and as a reminder to the rest, who had yet to submit an answer. The intent was to utilize the phenomenon called "social proof", which describes the behavioral pattern of people copying the actions of the majority in order to fit in, hereby achieving a higher response rate.

Figure 1. Flowchart over the recruitment process and a timeline over when the questionnaire and reminders were sent out.



[a]Started to answer the questionnaire but did not submit.
[b]Submitted an inadequate response.

Statistical analysis

The data was analyzed using Stata (MP 17 for Windows revision 15 November 2022). Shapiro-Wilk test was used to assess the distribution. Baseline characteristics were presented as percentages for categorical data, as means with standard deviations (SD) for continuous, parametric data, and as median and inter-quartile range (IQR) for continuous, non-parametric

data. Non-normally distributed continuous variables were compared using Wilcoxon Signed Rank Test for paired samples. Categorical variables were compared using $\chi 2$-test. Binomial Probability Test was conducted to examine if the failure rate of medical treatment was higher in this study population compared to the allowed failure rate of 20% set by Danish guidelines (Colov, et al., 2013).

The association between potential predictors and preferred treatment for missed abortion was assessed using a univariate analysis. The outcome variable 'preferred treatment method' was coded as surgical abortion = 0, medical abortion = 1. The exposure variables were coded as following: age at first abortion ($<30 = 0$, $\geq 30 = 1$), BMI ($<25 = 0$, $\geq 25 = 1$), parity ($<1 = 0$, $\geq 1 = 1$), menstrual pain (none-moderate = 0, strong = 1), first abortion method (surgical abortion = 0, medical abortion = 1).

Due to the quantity of statistical analyses conducted in this study, the risk of type 1 error is 66%, which is not ideal. To counteract the multiple comparisons problem a Bonferroni correction was conducted and a new probability value <0.002 would be considered significant. However, it was decided to disregard this correction and keep the probability value <0.05. Because of this, the results of this study should be considered exploratory and as a basis for further research.

Results

Overall, 87 of the 157 women, to whom the online questionnaire was sent, filled out the self-administered questionnaire adequately, which provided a response rate of 55.4%.

TABLE 1. Baseline characteristics

Participants	n = 87
Age at survey submission (yr., mean ± SD)	37 ± 0.5
Age at 1st missed abortion (yr., mean ± SD)	31 ± 0.6
Region (%)	
Capital	5.8[a]
Zealand	1.2[a]
Southern Denmark	12.6[a]
Central Jutland	41.4[a]
Northern Jutland	37.9[a]
Highest level of education (%)	
Primary school	2.3
Vocational education, gymnasium, other	6.9
Intermediate level (2-4 years)	44.8
University level (>4 years)	43.7
BMI (kg/m2, median (IQR))	24.1 (6.0)
Smoking (%)	
Yes	4.6[a]
No	94.3[a]
Endometriosis (%)	
Yes	10.3[a]
No / Never examined	88.5[a]
Previous history of gynecological surgery (%)	
Yes	33.3
No	66.7
Menstrual pain (%)	
None – mild	50.6
Moderate	31.0
Strong	18.4
1 or more births before recurrent pregnancy loss diagnosis (%)	
Yes	49.4[a]
No	49.4[a]
No. of medical abortions (median (IQR))	1 (1)
No. of surgical abortions (median (IQR))	2 (2)

[a]Indicates 1 missing value.

TABLE 2. Side effects and measures of failure for 1st medical and surgical treatment for missed abortion

n = 87	1st medical treatment	1st surgical treatment	P-value[a]
Bleeding			
Intensity of bleeding (%)			0.478
No bleeding	2.3	2.3	
Weaker than a menstruation	6.9	35.6	
Equal to a menstruation	23.0	39.1	
Stronger than a menstruation	66.7	21.8	0.211[b]
	1 missing value	*1 missing value*	
Duration of bleeding (%)			0.218
No bleeding	2.3	2.3	
1-7 days	50.6	70.1	
8-14 days	31.0	19.5	
Over 14 days	14.9	6.9	
	1 missing value	*1 missing value*	
Pain			
Intensity of pain (median (IQR)) Measured on a scale from 0-100, where 100 is the worst imaginable pain.	72 (33) *9 missing values*	34 (51) *17 missing values*	<0.001
Duration for use of pain killers[c] (%)			0.006
No painkillers	18.4	18.4	
1-7 days	69.0	71.3	
8-14 days	9.2	8.1	
Over 14 days	2.3	1.2	
	1 missing value	*1 missing value*	
Infection			
Proportion of women who experienced fever after the procedure (%)	3.5	2.3 *1 missing value*	0.786
Proportion of women who were prescribed antibiotics after the procedure (%)	1.2	4.6 *2 missing values*	0.823
Sick leave			
Number of days with sick leave after the procedure (median (IQR))	5 (5) *7 missing values*	3 (5) *7 missing values*	0.144
Failure			
Proportion of medical treatments, that were incomplete[c] (%)	44.8 *1 missing value*	--	--
Proportion of women, who found the discomfort of the treatment method unacceptable (%)	32.2 *1 missing value*	8.1 *2 missing values*	0.072

The missing values are included in the percentage distribution.
[a]P-value for differences between 1st medical and 1st surgical treatment for missed abortion.
[b]An additional analysis was conducted to test if there was a significant difference in the frequency of bleeding stronger than a menstruation between the groups.
[c]Pain killers in the form of simple analgesics (NSAID or paracetamol).

The intensity of pain related to the women's first medical treatment was significantly higher than the intensity related to their first surgical treatment. Furthermore, the duration of use of pain killers was significantly longer after the medical treatment (Table 2). There are several

missing values for intensity of pain, which likely is due to an inexpedient scale marker in REDCap.

The binomial probability test showed that the failure rate of medical treatment of 44.8% is significantly higher than the accepted failure rate of 20% with a p-value <0.001. Thirty-two percent of the women found the discomfort of their first medical treatment unacceptable whereas only 8.1% of the women found the discomfort of their first surgical treatment unacceptable. The difference did not reach statistical significance, but it was borderline significant with a p-value of 0.072. The discontent with the medical treatment was clarified from their elaborations to be due to the excessive pain and/or bleeding while they were coping with the psychological impact of losing the pregnancy. Only four of the women, who thought the discomfort of their surgical treatment was unacceptable, elaborated on this answer and common to these four answers were uncertainty about the procedure and fear of retained product of conception.

Figure 2a. Impact of side effects, experienced during medical or surgical treatment of the women's first missed abortion, on their choice of the opposite method of treatment of their subsequent missed abortion

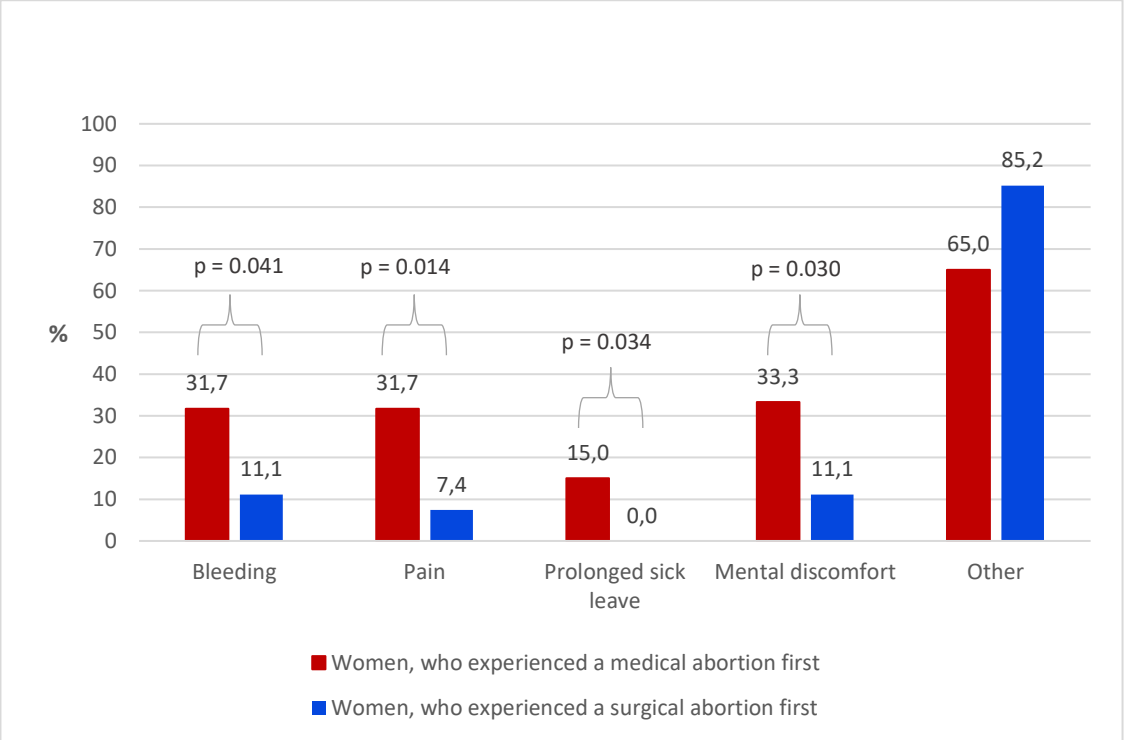
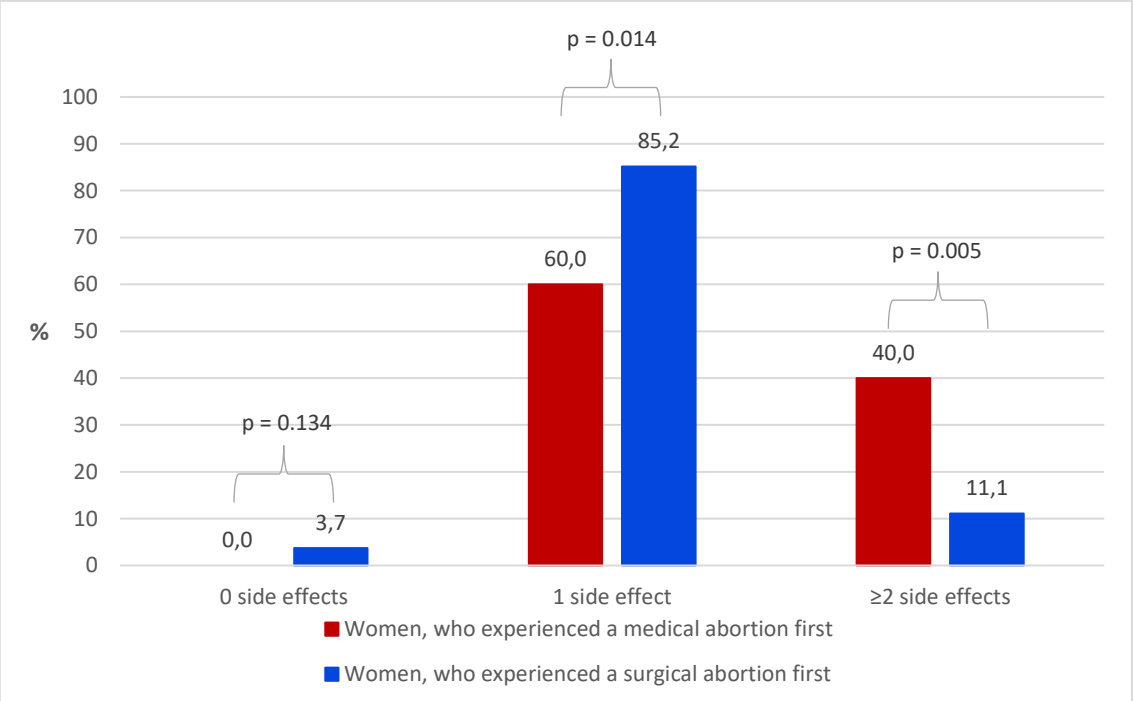


Figure 2b. Distribution of selected number of side effects



In Figure 2a, percentages describe the number of women of whom, the specific side effects had an impact on their decision to choose the opposite method at the subsequent missed abortion. It was possible to select more than one side effect. The percentage of women who chose none, 1 or ≥2 side effects as having an impact on their decision is illustrated in Figure 2b.

Bleeding, pain, prolonged sick leave, and mental discomfort had a significantly greater impact on the women who experienced a medical abortion first. "Other" was the most frequently chosen option in both groups, and most of the women who experienced a surgical treatment first, stated that the reasons for choosing a medical treatment for their subsequent missed abortion primarily relied on other factors than those listed (Figure 2a). Based on the women's elaborations for choosing "other", a subdivision of the answers was made (Table 3).

Significantly more women who experienced surgical treatment first, selected that one side effect had an impact on their decision for choosing medical treatment subsequently, while significantly more women, who experienced medical treatment first, selected that 2 or more side effects had an impact on their decision to choose the opposite method next time (Figure 2b).

TABLE 3. Subdivision of other reasons with an impact on the choice of treatment of the women's subsequent missed abortion

	Women, who experienced medical abortion first n = 39	Women, who experienced surgical abortion first n = 23
Did not get the choice or followed advice from the doctor (n (%))[a]	3 (7.7%)	8 (34.8%)
Incomplete abortion (n (%))[b]	26 (66.7%)	1 (4.4%)
Mola pregnancy in the subsequent pregnancy (n (%))	2 (5.1%)	--
Gestational age in the subsequent pregnancy (n (%))	3 (7.7%)	5 (21.7%)
Desire for genetic analysis in the subsequent pregnancy (n (%))	2 (5.1%)	--
To avoid narcosis or complications such as scar tissue, perforation or impact on fertility (n (%))	--	3 (13.0%)
To avoid aggravation of Asherman's syndrome (n (%))	--	1 (4.4%)
Length of treatment (n (%))	2 (5.1%)	--
Felt ready to try a new method (n (%))	--	3 (13.0%)
Did not elaborate (n (%))	1 (2.6%)	2 (8.7%)

[a]Includes the women who answered "I did not get the choice" or "I followed the doctor's advice" without further elaboration.
[b]Includes the women who had to have surgical treatment subsequently due to an incomplete medical abortion and the women who chose surgical treatment due to previous experiences with multiple unsuccessful medical treatments.

The women had the opportunity to comment on both treatment methods regarding their experiences and general thoughts. Three representative comments about medical treatment were: *"Unpleasant and lengthy in addition to grief", "I felt insecure with the heavy bleeding", "It was mentally hard for me and my partner to experience the pain and grief of standing alone with the loss of a dream in our own home […]".* Other women would prefer medical treatment due to the wish of having a more natural procedure or the feeling of giving birth.

There were not as many emotive comments on the surgical treatment. It was mostly described as "*fine*" or "*good*" and as the one of the two options that would get them through the process fastest. Though, some women felt that the surgical procedure was too clinical and impersonal. Several women preferred surgical treatment due to former experiences with multiple incomplete medical treatments. Common to both methods, several women indicated, that

they needed the psychological aspect to play a bigger part in the counselling process and after the procedure.

TABLE 4. Univariate analysis of the association between a predictor (row) and preferred treatment method for missed abortion (column)

	Medical treatment as preferred method for missed abortion	
	OR [95% CI][a]	P-value
Age at first missed abortion <30 yr. vs. ≥30 yr.	1.781 [0.668-4.751]	0.241
BMI <25 vs. ≥25	0.498 [0.202-1.232]	0.128
Parity before recurrent pregnancy loss diagnosis <1 vs. ≥1	3.285 [1.273-8.478]	0.011
Menstrual pain None-moderate vs. strong	1.252 [0.405-3.867]	0.698
Treatment method for first missed abortion Medical vs. surgical abortion	0.310 [0.119-0.804]	0.015

[a]Interpretation: the odds ratio for preferring medical treatment when age ≥ 30 yr., BMI ≥25, parity ≥1, menstrual pain 'strong' or treatment for first missed abortion 'medical'.

Overall, 66.7% of the women preferred a surgical treatment, while the remaining 33.3% preferred a medical treatment in the future. The univariate analyses found a statistically significant associations between parity and preferred treatment method and between order of treatment experiences and preferred treatment method, at a probability value <0.05. The odds for preferring medical treatment for women, who have given birth before, were 3.3 times that of nulliparous women. The odds for preferring medical treatment for women, who received medical treatment for their first missed abortion, were 0.3 times that of women who had surgical treatment. This means that if the women had a medical treatment for their first missed abortion, they were less likely to prefer medical treatment and more likely to prefer surgical treatment compared to women, who had a surgical treatment first.

Discussion

Impact of side effects on women's decisions

Our study found that statistically more women had a higher intensity of pain and needed pain killers for a longer duration of time after their first medical abortion compared their first surgical abortion. This is consistent with findings in other studies (Torres-Miranda, et al., 2022; Grønlund, et al., 2002; Ashok, et al., 2002).

Other studies have found that bleeding after medical treatment is significantly stronger in intensity and of longer duration than after surgical treatment (Davis, et al., 2007; Torres-Miranda, et al., 2022; Grønlund, et al., 2002). Our study found that three times as many women experienced bleeding stronger than a menstruation after their medical abortion compared to their surgical, however this difference was not statistically significant.

Our study found that side effects after the women's first medical abortion have a significantly greater impact on the women's decision for surgical treatment of their subsequent missed abortion compared to women who decide to receive medical treatment subsequent to their first surgical treatment. Significantly more of the women, who had a first surgical abortion, reported only one side effect to have had an impact on choosing the opposite treatment method for their next missed abortion. In most cases, their reason for this decision didn't rely on the listed side effects, but on the option "other". This suggests that reasons other than the listed side effects were more impactful for the women who chose medical treatment subsequent to their first surgical treatment. Similar findings were seen in a Danish study by Grønlund et al., where the participants were asked if they would recommend the treatment they received. The main reasons for not recommending medical treatment were unsuccessful treatment, length of bleeding and pain. The reasons for not recommending surgical treatment were instrumentation of the uterus, anesthetic side effects and narcosis, which are similar to some of the reasons in our study (Grønlund, et al., 2002).

Success rate and acceptability

The recommended management of missed abortion should first and foremost be the treatment which is most effective, safe and acceptable for the women but at the same time be economically sound (Colov, et al., 2013). Surgical treatment significantly increases the cost compared to medical treatment (Torres-Miranda, et al., 2022) and the waiting time for surgical treatment in Denmark may sometimes be days due to a tight schedule at the surgical ward, whereas medical treatment can be initiated immediately (Grønlund, et al., 2002).

Several studies have compared the success rate of medical and surgical treatment of early

pregnancy failure, including incomplete abortion and/or missed abortion. Two randomized control trials and one prospective crossover study tested the effectiveness of medical and surgical management of early pregnancy failure and found a success rate for medical management of 82.5% to 90% and for surgical management of 97% to 100% (Demetroulis, et al., 2001; Zhang, et al., 2005; Grønlund, et al., 2002). Another randomized control trial found a lower success rate for medical management of only 53.2% and for surgical management of 96%. The fact that the women in this trial received either medical or surgical treatment, after >1 week of expectant management, might be an explanation for the low success rate of medical treatment. (Graziosi, et al., 2004). The variation in success rates between the studies may be explained by differences in patient selection, different definitions of failed treatment or different dosing regimens for medical management and makes it difficult to generalize a success rate. One study suggests that the efficacy of medical management in missed abortion is lower compared to incomplete abortion because the women with missed abortion, who do not experience a spontaneous expulsion, have more difficulty expelling the fetus compared to women, who begin their abortion process spontaneously (Grønlund, et al., 2002).

Our study did not define any criteria for successful medical treatment as the women answered this from their memory. It must be assumed that the women were assessed and treated in accordance with the current Danish guidelines. On this basis, there presumably will be a difference between the criteria set for the comparative studies and the Danish guidelines.

In our study, 44.8% of the women's first medical abortions were unsuccessful and required surgical intervention to ensure complete evacuation, which provides a success rate of only 55.2%. This result is surprisingly far from the allowed failure rate for medical management of 20% according to the Danish guidelines (Colov, et al., 2013) and the aforementioned success rates found in other studies.

The high failure rate of the women’s first medical treatment gives rise to an additional hypothesis regarding the etiology of recurrent pregnancy loss. One study suggests that immune responses towards fetal male specific H-Y-antigens expressed on the fetus and placenta could be a possible explanation for subsequent secondary pregnancy loss, as a firstborn boy increases the risk of a new pregnancy loss in these patients. It is hypothesized that immunization against trophoblast antigens in former pregnancies can result in immunological rejection of subsequent embryos (Nielsen, et al., 2010). Since the product of conception is left for a longer time in the uterus during an unsuccessful medical treatment, it would be interesting to investigate if a similar immunization mechanism takes place in these cases, resulting in unviable subsequent pregnancies. Since the patient group in our study is selected from a group of

recurrent pregnancy loss patients it is possible that the group is "enriched" with women with a prolonged and complicated first abortion procedure explaining the high failure rate.

The questionnaire did not feature a question regarding the success rate of the women's first surgical treatment; thus, unfortunately it is not possible to compare our result of the effectiveness of surgical management with other studies. However, it is worth mentioning that only one woman (4.35%) chose a medical treatment after her first surgical treatment because the surgical intervention was unsuccessful. This result along with a borderline significant difference in the proportion of women, who found the discomfort of the treatment method unacceptable, may indicate that in the present cohort the surgical treatment of missed abortion was more successful than medical treatment.

A meta-analysis found that medical treatment seems to be acceptable to women with early pregnancy failure, depending on the success of the treatment. Three of their included studies showed that 76% to 79% of the women who received successful medical treatment were willing to choose the same treatment again. A similar percentage of women, who had surgical treatment, were willing to choose the same treatment again. Only 36% to 38% of the women, who received failed medical treatment, would choose medical treatment again (Chen & Creinin, 2007). This is supported by a randomized controlled trial which finds that women who have had to undergo surgical treatment after failed medical treatment of early pregnancy loss are less likely to express satisfaction with the medical treatment and in addition to this are less willing to select that same treatment again (Lee, et al., 2001). This is consistent with the finding of our study, where incomplete medical treatment was mentioned several times as a reason for choosing surgical treatment in the future.

Predictors for preferred treatment

After the introduction of medical management of missed abortion, it has become a point of interest to identify predictors for successful treatment. By identifying these predictors, it would be possible to organize the course of treatment optimally for the individual patient. Multiple studies have found positive predictors for successful medical treatment to be nulliparity, low gravida, Rh negative status, bleeding and lower abdominal pain in the past 24 hours, artificial reproductive technology (ART) and low levels of s-hCG (between 3000 and 20.000) (Crenin, et al., 2006; Machtinger, et al., 2009; Grønlund, et al., 2002; Odeh, et al., 2008). Our study does not examine the correlation between possible predictors and the effectiveness of the two treatment methods directly, but rather between possible predictors and the patients' preference for treatment of missed abortion. Based on high parity being a negative

predictor for successful medical treatment in previous studies, there is reason to assume, that parity >1 would be a negative predictor for preferring medical treatment, yet this study finds a positive association between a parity >1 and a preference for medical treatment. The same association is found in a non-randomized, prospective study in women seeking elective abortion (Di Carlo, et al., 2016). A possible explanation for multiparity being a negative predictor for success, is due to previous pregnancies resulting in better uterine implantation and hereby difficulty inducing abortion (Colov, et al., 2013). A possible explanation for our contrasting results is that successful treatment and preference are not necessarily interrelated for this group of women. It is possible, that women, who have given birth before, would not perceive unsuccessful treatment and the side effects of medical treatment as significant as nulliparous women. This however has not been investigated.

Our study found that if the women received medical treatment for their first missed abortion, they are less likely to prefer a medical treatment again, compared to the women, who received surgical treatment first. This also means, that these women are more likely to prefer a surgical treatment in the future. Although it is not possible to explain this association based on our results, a potential explanation could be primacy bias. This type of bias is described as ”a cognitive bias that results from the fact that primary information influences the processing of subsequent information”. Primacy bias can impact the way we make decisions based on our first impressions (Kotchoubey, 2014). It is possible, that the women who had medical treatment before surgical, have had a worse first impression with medical treatment as it was their first experience with treatment for missed abortion. In these situations, they had to endure possible severe side effects on top of the grief of their lost pregnancy for the first time.

Strengths and weaknesses

Due to the quantity of comparative analyses, the risk of type 1 error is high, and the results of this study should be considered exploratory.

Recollection bias is the primary weakness of this study. The women were asked to answer a questionnaire about experiences that potentially could be years back. This was evident when the women had to write the date of their first medical and surgical treatment, where many women only remembered the specific year. It is presumed that recollection bias had an unknown amount of impact on other answers as well and can be a possible explanation for some of the missing values. Answers, characterized by obvious misunderstandings or errors, were excluded from the analyzed data.

Another probable weakness of this study is sampling bias. With a response rate of 55.4%

there is a risk, that the women who answered the questionnaire have a stronger desire to express an opinion about a certain treatment method due to negative experiences. It was expected that not all women would answer the questionnaire, since the topic is sensitive and might bring back unpleasant memories. Despite the low response rate, the study reached the necessary sample size to achieve a power of 80%.

A strength of the study is the reproducibility in a similar cohort. The questionnaire was easily distributed and allowed effective collection of data. The lack of depths in the generalized questions were compensated for by giving the women the option to elaborate.

Conclusion

This study found that women experienced a higher intensity of pain and had to take more pain killers after their first medical treatment for missed abortion compared to their first surgical treatment. Furthermore, an unacceptably high failure rate was found in the women's first medical treatment. Side effects had a significantly greater impact in the women who experienced a medical abortion first and preferred the opposite method for the subsequent missed abortion. Most of the women who experienced a surgical treatment first, stated that the reasons for choosing a medical treatment for their subsequent missed abortion primarily relied on other factors than the listed side effects. From the women's elaborations, it is clear that there was an essential psychological aspect to their preference as well.

Women, who had given birth before were more likely to prefer medical treatment in the future compared to nulliparous women. If the women received medical treatment for their first missed abortion, they were less likely to prefer medical treatment and more likely to prefer surgical treatment in the future. Overall, twice as many women would prefer surgical treatment over medical treatment in the future. Based on our results, a possible explanation could be, that medical treatment is associated with a stronger experience of side effects and a high failure rate. These findings suggest that current treatment recommendations should be reevaluated for women with missed abortion, but further research on the issue is required.

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