




Fear of childbirth after medical vs surgical abortion. Population-based register study from Finland

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Abstract

Introduction: To evaluate the effect of method of induced abortion and other abortion-associated variables on the incidence of fear of childbirth in subsequent pregnancy.

Material and methods: This population-based register study cohort includes all nulliparous women with their first pregnancy ending in an induced abortion in 2000-2015 and subsequent pregnancy with live singleton delivery between 2000 and 2017 (n = 21 479). Data were derived from three national registers maintained by the Finnish Institute for Health and Welfare. We divided the study population in three cohorts: (a) medical and (b) surgical abortion during first trimester (≤ 84 days of gestation), and (c) medical abortion during second trimester (85-168 days of gestation). Primary outcome measures were the incidence of registry-identified fear of childbirth and cesarean delivery related to it.

Results: The overall incidence of fear of childbirth was 5.6% (n = 1209). Altogether, 19.2% (n = 4121) of women underwent cesarean delivery. The odds were elevated especially for elective cesarean delivery (odds ratio [OR] 9.30, 95% CI 7.95-10.88, $P < .001$) in women with fear of childbirth. In multivariable analysis, the odds for fear of childbirth (adjusted OR [aOR] 0.80, 95% CI 0.68-0.94) and cesarean delivery (aOR 0.66, 95% CI 0.84-0.90) were decreased in women with a history of first-trimester medical abortion compared with those with first-trimester surgical abortion. Second-trimester medical abortion had no effect on the odds for fear of childbirth (aOR 1.04, 95% CI 0.71-1.50). Maternal age of 30-39 years and interpregnancy interval over 2 years were additional risk factors for both fear of childbirth and cesarean delivery, but surgical evacuation of uterus after the abortion was not.

Conclusions: One first- or second-trimester medical abortion does not increase the odds for fear of childbirth, and cesarean delivery related to it in subsequent pregnancy when compared with first-trimester surgical abortion. Older maternal age and longer interpregnancy interval emerged as risk factors for fear of childbirth.

Abbreviations: aOR, adjusted odds ratio; ICD-10, International Classification of Diseases, 10th revision; OR, odds ratio; SD, standard deviation.

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KEYWORDS

cesarean delivery, fear of childbirth, induced abortion, medical abortion, termination of pregnancy

1 | INTRODUCTION

Fear of childbirth is a common obstetrical challenge and its known risk factors include nulliparity, higher socioeconomic status, long history of infertility, and depression.¹⁻⁵ Induced abortion might also increase the risk.^{1,6} Among parous women, previous negative or traumatic birth experience, such as protracted or operative delivery (vacuum extraction or emergency cesarean delivery) are risk factors for fear of childbirth.^{2,5,7-9}

Request for cesarean delivery is common in women with severe fear of childbirth.^{5,10-13} Fear of childbirth is treated with psychoeducation, teaching relaxation techniques, and with written or audio information.^{14,15} By treating fear of childbirth, it is possible to decrease the number of cesarean deliveries.¹⁵ Furthermore, the fear of childbirth disposes women to postpartum depression and to post-traumatic stress disorder, and so also influences newborn health.^{16,17}

Women undergoing induced abortion are typically young with a long reproductive life ahead. The use of medical abortion has become the dominant method for induced abortion, especially in the Nordic countries.¹⁸ As women often experience severe pain during medical abortion, we speculated that previous medical abortion, as a potentially traumatic event, might result in fear of childbirth.¹⁹

Our primary aim was to study whether the method of abortion (medical vs surgical) or duration of pregnancy at the time of induced abortion had an association with fear of childbirth or an associated elective cesarean delivery in subsequent pregnancy. The second aim was to evaluate the association of various background characteristics with fear of childbirth in this population-based register study.

2 | MATERIAL AND METHODS

We formed this population-based register cohort by linking data from two national registers maintained by the Finnish Institute for Health and Welfare: the Register of Induced Abortions and the Medical Birth Register. We included all nulliparous women with their first pregnancy ending in an induced abortion between 2000 and 2015, and whose subsequent pregnancy ended in a live singleton birth between 2000 and 2017. As our goal was to estimate the effect of induced abortion on fear of childbirth in subsequent pregnancy; we excluded women with more than one induced abortion or any miscarriage.

To obtain data on the diagnosis and codes of surgical procedures at the time of induced abortion and during subsequent pregnancy, the study cohort was linked to the Hospital Discharge Register. This register contains information on all inpatient care and outpatient visits in public hospitals in Finland. Codes for diagnosis are according to International Classification of Diseases 10th revision

Key message

The overall incidence of fear of childbirth was 5.6%. One first- or second-trimester medical abortion does not increase odds for fear of childbirth or cesarean delivery related to it in subsequent pregnancy when compared with first-trimester surgical abortion.

(ICD-10) diagnoses and codes for surgical procedures according to the NOMESCO (Nordic Medico-Statistical Committee) Classification of Surgical Procedures. The coverage and reliability of registers used in the present study has been shown to be high.²⁰⁻²²

In Finland, it is mandatory to report all performed induced abortions to the Register of Induced Abortions and all live births and stillbirths of at least 22 gestational weeks or birthweight 500 g or more to the Medical Birth Register. Induced abortion is legal in Finland up to 20 weeks of gestation for social and ethical reasons and up to 24 weeks of gestation in case of confirmed fetal illness or congenital anomaly.²³ There is a national guideline on induced abortion in Finland.²⁴ Both medical and surgical abortions are available for first-trimester abortion and the woman can choose the method after discussion with a physician. Second-trimester abortions are almost exclusively medically induced. The few cases of second-trimester surgical abortion were excluded from the analysis because of the low number of cases and uncertainty over the procedures performed.

The study population was divided in three cohorts based on the method of abortion and the duration of gestation at the time of abortion: (a) medical and (b) surgical abortion during first-trimester (up to 84 days of gestation), and (c) medical abortion during second-trimester (between 85 and 168 days of gestation).

The primary outcomes of this study were the diagnosis of fear of childbirth during subsequent pregnancy and the number of cesarean deliveries, in total and related to fear of childbirth. The ICD-10 code O99.80, a unique code for Finland, set by a physician during subsequent pregnancy and childbirth was used to indicate fear of childbirth. As a result, in our study, fear of childbirth means that the woman had received the diagnostic code O99.80 during a consultation due to fear of childbirth at an inpatient or outpatient maternity clinic at least once during pregnancy. In Finland the goal is to treat a woman's fear of childbirth and encourage vaginal delivery.² Still, no one is compelled to give birth vaginally, and if needed an elective cesarean delivery related to fear of childbirth is performed in the 39th week of gestation. Furthermore, we assumed that elective cesarean deliveries related to fear of childbirth represent more severe or poorly treated cases of fear of childbirth. The cesarean deliveries due to fear of childbirth were defined as those where the primary

indication for cesarean delivery was fear of childbirth in the Medical Birth Register.

Confounding factors were obtained from all three registers. From the Register of Induced Abortions, we obtained information on the indication and method of abortion as well as duration of gestation and woman's age at the time of abortion. Indications for abortion, as specified in Finnish law, were divided in three: social, ethical, or medical reasons. Social reasons include indications due to a woman's age (age <17 or ≥40 years at the time of conception), number of children (four or more), and considerable strain on living or other conditions; ethical reasons include, for example, rape; and medical reasons include both fetal abnormality or anomaly and woman's health.²⁴ In the analysis, we combined social and ethical reasons in one group.

We collected the following background characteristics of the women at the time of childbirth from the Medical Birth Register: woman's age, smoking habits during pregnancy, marital status or cohabitation, socioeconomic status, and residential area. Socioeconomic status is classified into five classes due to reported occupation or the highest educational level: upper and lower white-collar workers, blue-collar workers, students, and others (for example entrepreneurs, farmers, and unemployed). In analysis, we combined upper and lower white-collar workers as one. Residential area is divided into city, densely populated area, and rural area. Information on the mode of delivery and obstetrical procedures performed was also collected from the Medical Birth Register.

Interpregnancy interval is the time interval between the index abortion and the beginning of the subsequent pregnancy. It was calculated by using the date of delivery and duration of pregnancy at the time of delivery as reported to the Medical Birth Register and the date of the index abortion from the Register of Induced Abortions. We excluded women with a time between abortion and delivery of

less than 12 months to ensure that abortion and delivery represent two different pregnancies.

From the Hospital Discharge Register, we identified surgical uterine evacuations that were performed after induced abortion due to abortion complications, by recognizing codes for surgical procedures performed within 42 days after the index abortion. These codes included those for uterine dilatation and evacuation with suction and/or curettage after induced abortion. In the medical abortion group, we assumed that all operations including codes of dilatation and uterine evacuation with suction and/or curettage were performed due to adverse events (such as bleeding or infection due to retained products of conception). In the surgical abortion group, we assumed that uterine re-evacuation after the day of the index procedure was due to abortion-related complication.

The Finnish Institute for Health and Welfare performed the linkage between the Register of Induced Abortions and the Medical Birth Register by using women's encrypted identification numbers, which are unique. We linked the information from the Hospital Discharge Register with the same encrypted identification numbers.

2.1 | Statistical analyses

Demographic and background characteristics are shown as mean with standard deviation (SD) or as proportions. For categorical variables, Pearson's chi-squared test was used for comparisons. In the case of continuous variables, Student's *t* test or analysis of variance with Tamhane's T2 post hoc test was used. Binary logistic regression was applied to examine the association between the potential risk factors and the fear of childbirth. Before building the multivariable model, possible multicollinearity was assessed using a variance inflation factor. Method of abortion, uterine evacuation due to residual

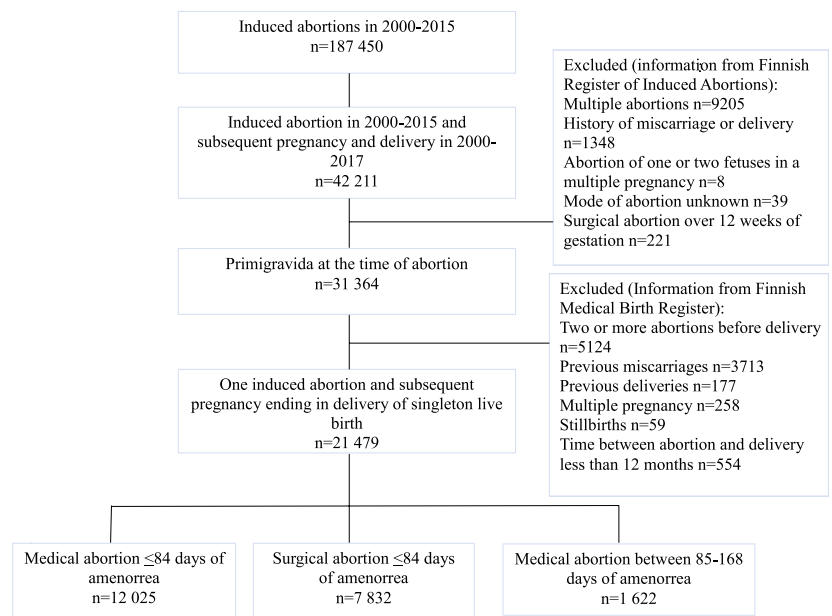
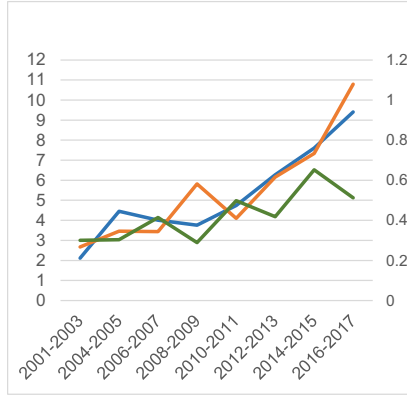
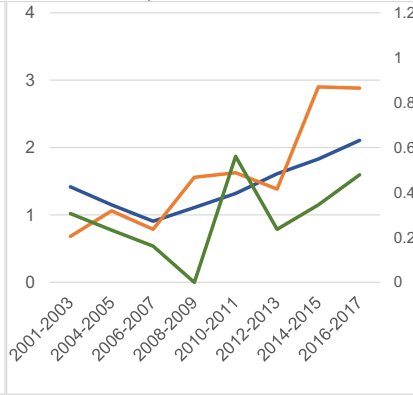


FIGURE 1 Study flow [Color figure can be viewed at wileyonlinelibrary.com]

Incidence of fear of childbirth

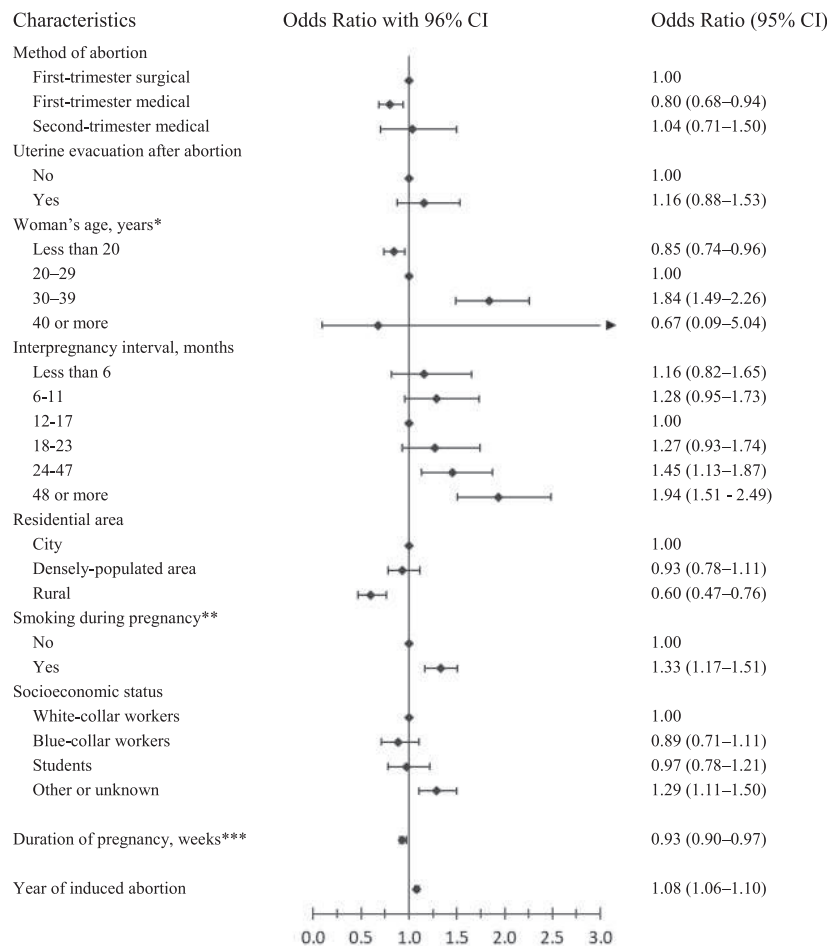


Cesarean delivery related to fear of childbirth



— First-trimester medical abortion — First-trimester surgical abortion
— Second-trimester medical abortion

FIGURE 2 Incidence on fear of childbirth and cesarean delivery related to it in subsequent pregnancy in different abortion groups. Incidence is in percentage within the method of abortion and within the study population [Color figure can be viewed at wileyonlinelibrary.com]



*At the time of delivery

**Smoking during pregnancy: Yes, includes women, who reported smoking either during first pregnancy trimester or throughout the pregnancy.

***At the time of induced abortion

FIGURE 3 Factors associated with the fear of childbirth after induced abortion. Results of the multivariate analysis

complication, woman's age at the time of delivery, interpregnancy interval, residential area, smoking habits during pregnancy, socioeconomic status, length of pregnancy at the time of abortion, and the year of induced abortion were chosen as relevant explanatory

variables in the final multivariable logistic regression analysis. Estimates are presented as odds ratios (OR) with 95% CI. The level of statistical significance was set at $P < .05$. Statistical analyses were performed using SPSS v.24 for Windows (SPSS Inc.).

TABLE 1 Demographic and background characteristics of study population divided by the method of abortion. Results are presented as mean and (SD) if not otherwise specified

Total 21 479 women	First-trimester medical abortion (n = 12 025)	First-trimester surgical abortion (n = 7832)	Second-trimester medical abortion (n = 1622)	P value
Woman's age at the time of abortion, years	21.5 (4.6)	20.4 (4.2)	23.2 (6.5)	<.001
Duration of gestation at the time of abortion, days	53.3 (9.8)	64.0 (11.2)	114.6 (20.1)	<.001
Indication for abortion ^a , n (%)				
Social or ethical	11 989 (99.7)	7821 (99.9)	1018 (62.8)	<.001
Medical	36 (0.3)	11 (0.1)	604 (37.2)	
Uterine evacuation after induced abortion, n (%)	490 (4.1)	201 (2.6)	433 (26.7)	<.001
Interpregnancy interval, months ^b	46.6 (35.2)	59.5 (43.3)	33.5 (33.9)	<.001
Woman's age at the time of delivery, years	26.2 (5.0)	26.2 (5.1)	26.8 (6.0)	<.001
Smoking, ^c n (%)				
Yes	3944 (33.9)	2745 (35.8)	515 (32.5)	.001
No	7809 (66.4)	4929 (64.2)	1069 (67.5)	
Marital status				
Married or cohabiting	9605 (79.9)	5977 (76.3)	1284 (79.2)	<.001
Single or unknown	2420 (20.1)	1855 (23.7)	338 (20.8)	
Socioeconomic status				
White-collar workers	3330 (27.7)	2522 (32.2)	508 (8.0)	<.001
Blue-collar workers	1519 (12.6)	1287 (16.4)	220 (13.6)	
Students	1586 (13.2)	1296 (16.5)	221 (13.6)	
Other or unknown	5590 (26.5)	2727 (34.8)	673 (41.5)	
Residential area ^d				
City	9057 (75.4)	5919 (75.6)	1195 (73.9)	.030
Densely populated area	1702 (14.2)	1030 (13.2)	252 (15.6)	
Rural	1249 (10.4)	880 (11.2)	171 (10.6)	

^aSocial reasons include indications due to woman's age, number of children, social and ethical reasons, and medical reasons include both fetal abnormality or anomaly, and woman's health reasons.

^bInformation is missing from 52 women, because information of the length of the pregnancy at the time of delivery is missing.

^cSmoking during pregnancy: Yes, includes women, who reported smoking either during first pregnancy trimester or throughout the pregnancy. Women with unknown smoking status are not included in this analysis (n = 468).

^dWomen living abroad were excluded due to low numbers (17 women in first-trimester medical abortion group, 3 in surgical abortion group and 4 in second-trimester medical abortion group).

2.2 | Ethical approval

Permission to use personal data from national registers was provided by the Finnish Institute for Health and Welfare (THL/1097/5.05.00/2017) on 4 May 2018.

3 | RESULTS

In all, 21 479 women were included in the analysis (Figure 1). This covered 11.5% of all induced abortions performed between 2000 and 2015 in Finland. Of these, 19 857 (92.4%) were first-trimester abortions (≤ 84 days of amenorrhea) and 60.6% (n = 12 025) of the first-trimester abortions were medically induced. Furthermore, 7.6% (n = 1 622) of women underwent a medical second-trimester abortion (85-168 days of amenorrhea).

The majority of all abortions (n = 13 647, 63.5%) were medically induced.

The demographic and background characteristics of the study groups are shown in Table 1. Women undergoing first-trimester abortion (either medical or surgical) were younger compared with those undergoing second-trimester abortion. In first-trimester abortions, the duration of gestation was longer in women with surgical abortion than medical abortion (64.0 days vs 53.3 days of amenorrhea, $P < .001$). Indication for abortion was medical in 3.0% (n = 651) of abortions and most of these (n = 604, 92.8%) were performed during the second-trimester. There were statistically significant, but clinically minor, differences in women's age at the time of delivery, smoking habits, marital status, socioeconomic status, and residential area between the groups.

A total of 1124 women (5.2% of the cohort) underwent surgical uterine (re)-evacuation at the time of abortion due to an

TABLE 2 Fear of childbirth and mode of delivery in subsequent pregnancy in different study groups. The data are reported as n (%)

	First-trimester medical abortion (n = 12 025)	First-trimester surgical abortion (n = 7832)	Second-trimester medical abortion (n = 1622)	P value
Diagnosis of fear of childbirth	748 (6.2)	389 (5.0)	72 (4.4)	<.001
Mode of delivery				
Vaginal	7994 (66.5)	5218 (66.6)	1130 (69.7)	<.001
Assisted vaginal ^a	1782 (14.8)	1049 (13.4)	183 (11.3)	<.001
Cesarean				
Overall	2248 (18.7)	1564 (20.0)	309 (19.1)	.082
Elective	585 (4.9)	424 (5.4)	77 (4.7)	.189
Emergency	1663 (12.5)	1140 (13.3)	232 (12.6)	.349
Cesarean delivery related to fear of childbirth	177 (1.5)	109 (1.4)	15 (0.9)	.190

^aAssisted vaginal delivery includes vacuum, forceps or assisted breech delivery.

abortion-related adverse event. The proportion was lowest after first-trimester surgical abortion (2.6%) and highest in second-trimester medical abortion (26.7%, $P < .001$, Table 1). Interpregnancy interval was longer after surgical than medical first-trimester abortion (mean 59.5 months [SD 43.3] vs 45.0 [SD 35.3], $P < .001$).

The overall incidence of fear of childbirth was 5.6% ($n = 1209$), and it increased during the study period in 2000-2017 (Figure 2). The incidence was 2.6% during 2000-2002, and 9.4% during 2016-2017. Cesarean delivery related to fear of childbirth also became more frequent. Fear of childbirth during subsequent pregnancy was less common ($P < .001$) after second-trimester medical abortion (4.4%) compared with first-trimester medical and surgical abortions (5.0% and 6.2%, respectively).

Mode of delivery for subsequent pregnancy in the different abortion groups is presented in Table 2. Vaginal delivery was more frequent ($P < .001$) in women with second-trimester medical abortion (69.7%) compared with first-trimester medical and surgical abortion (66.5% and 66.6%). The rate of cesarean deliveries was similar between the three groups. In univariate analysis the odds for fear of childbirth were lower after second-trimester abortion (OR 0.77, 95% CI 0.60-0.98, $P = .031$) compared with first-trimester abortion.

Altogether, 19.2% ($n = 4121$) of all women underwent a cesarean delivery. The cesarean delivery rate was significantly higher in women with fear of childbirth than in women without it (40.1% vs 17.9%, $P < .001$). In women with a diagnosis of fear of childbirth, the odds for both operative vaginal delivery (OR 1.32, 95% CI 1.10-1.59, $P = .002$) and cesarean delivery (OR 3.24, 2.85-3.67, $P < .001$) were higher. The odds were elevated especially for elective cesarean delivery (OR 9.30, 95% CI 7.95-10.88, $P < .001$), but also for emergency cesarean delivery (OR 1.57, 95% CI 1.32-1.86, $P < .001$).

After adjustment for confounding factors and year of induced abortion, risks for fear of childbirth (adjusted OR [aOR] 0.80, 95% CI 0.68-0.94, $P = .007$) and cesarean delivery related to it (aOR 0.66, 95% CI 0.84-0.90, $P = .008$) were decreased in women with first-trimester medical abortion compared with surgical abortion (Figure 3). This was not seen in the second-trimester medical abortion group. Overall, the use of medical abortion was associated with decreased

risk for fear of childbirth in subsequent pregnancy (aOR 0.69, 95% CI 0.52-0.91, $P = .009$) compared with surgical abortion.

In addition, the maternal age of 30-39 years (aOR 1.84, 95% CI 1.49-2.26, $P < .001$) and an interpregnancy interval of 48 months or more (aOR 1.94, 95% CI 1.51-2.49, $P < .001$) were associated with fear of childbirth as well as with a cesarean related to fear of childbirth (age 30-39 years aOR 2.50, 95% CI 1.75-3.56, $P < .001$; and interpregnancy interval over 48 months aOR 2.10, 95% CI 1.25-3.51, $P = .005$). Increased odds were not found in women older than 40 years, but this age group was small ($n = 31$). Age of less than 20 years was associated with lower risk of both fear of childbirth (aOR 0.85, 95% CI 0.75-0.96, $P = .009$) and cesarean delivery related to fear of childbirth (aOR 0.68, 95% CI 0.52-0.87, $P = .003$). Surgical evacuation of the uterus due to abortion-related adverse event had no effect on either the fear of childbirth or cesarean delivery.

4 | DISCUSSION

We find that history of medical abortion is not a risk factor for fear of childbirth nor for cesarean delivery related to fear of childbirth in subsequent pregnancy when compared with surgical abortion. The overall incidence of fear of childbirth in this cohort was 5.6%. This is somewhat higher than that seen in a previous register-based study from Finland (2.5%),¹ but lower than those reported in questionnaire-based studies (8%-24%, depending on the screening method and severity of fear of childbirth).^{3,4,8,9,25-27} Other factors associated with both fear of childbirth and elective cesarean delivery related to fear of childbirth were longer interpregnancy interval between the induced abortion and subsequent delivery, and higher maternal age at the time of delivery. On the other hand, history of second-trimester abortion, indication for abortion (social vs medical), or need of uterine evacuation at the time of abortion were not associated with either of the two.

The strength of our study is the use of reliable registers, which allow longitudinal follow up of the same population and

a large cohort.²⁰⁻²² All abortions and deliveries in Finland during the study period can be found from the Register of Induced Abortions and the Medical Birth Register. Recognition and care of fear of childbirth has improved during the study period and there are currently uniform criteria for diagnosing and treating fear of childbirth.¹⁵

Still, there are some limitations in the register data. As information is provided to the registers by healthcare professionals, some information might be missing or inaccurate. Also, not all women with fear of childbirth receive a referral to specialist health care and so are missing from the Hospital Discharge Register.¹⁵ However, all women managed and having undergone an elective cesarean due to fear of childbirth are found from registers. The possible effects of ethnicity would have been of interest, but data on ethnicity are lacking from the Finnish registers. Moreover, information on socioeconomic status is missing from one-third of women in the Medical Birth Register due to difficulties to determine a status for young women who may still be in education or at home with child(ren). This leads to a high number in the 'other or unknown' group for socioeconomic status. In addition, we included only women with a history of a single induced abortion, so we are not able to assess the possible effects of repeated abortions or miscarriages on the incidence of fear of childbirth.

The incidence of fear of childbirth increased during the study and was higher than that reported previously.^{1,6} This increasing trend can be explained by better recognition of fear of childbirth in both primary and specialist health care. Also, the method of induced abortion changed from surgical to predominantly medical during the study period. Against our hypothesis, the odds for fear of childbirth in subsequent pregnancy were not higher after medical abortion compared with surgical abortion. We speculate that the reasons for choosing surgical abortion might be in part similar to those behind fear of childbirth and wish for cesarean delivery, for example fear of losing control or fear of pain.^{28,29} However, the overall effect of induced abortion on fear of childbirth cannot be estimated in this study as we only included women with a history of abortion.

The women in the study cohort were younger at the time of their first delivery compared with average Finnish women at the time of their first delivery (26.0 vs 29.2 years). Risk factors for fear of childbirth and cesarean delivery related to it were age between 30 and 39 years at the time of delivery, residence in an urban area, and smoking during pregnancy. The risk for fear of childbirth and cesarean related to it was lower in women aged under 20 years. We did not find elevated risk in women aged over 40 years, but this group was very small. It is possible that these women had a history of miscarriage or several abortions, and were therefore excluded from the study. We assume that the longer the time between the abortion and delivery, the weaker the connection of previous induced abortion and the fear of childbirth, because background of fear of childbirth is complex.²⁹

Fear of childbirth was associated with an increased rate of cesarean delivery as reported previously.^{1,5,11,30} Risk for elective cesarean

delivery was nine times higher if a woman had been diagnosed with fear of childbirth. Cesarean delivery in study cohort (19.2%) was somewhat similar to the national average in Finland (16%-17% during the study period).

5 | CONCLUSION

A key finding of the study is that neither first- nor second-trimester medical abortion was a risk factor for fear of childbirth in subsequent pregnancy compared with first-trimester surgical abortion. Furthermore, uterine re-evacuation at the time of abortion did not have an effect on risk of fear of childbirth. These data are important in counseling both women with request of induced abortion as well as their healthcare providers.

CONFLICT OF INTEREST

OH serves occasionally on advisory boards for Bayer, Gedeon Richter, HRA Pharma, and Vifor Pharma, and has lectured at educational events for Bayer, Gedeon Richter, and Sandoz. Other authors do not have any conflicts of interest to declare.

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