

Research Paper

Anxiety reduction through obstetric consultation combined with ultrasound examination in women after cesarean section

O Vikhareva^{a,*}, E Nedopekina^a, K Sjöström^b^a Department of Obstetrics and Gynecology, Skåne University Hospital Malmö, Lund University, Malmö, Lund, Sweden^b Department of Care Science, Faculty of Health and Society, Malmö University, Sweden

ARTICLE INFO

Keywords:

Cesarean section
 Ultrasound
 Uterine scar
 Stai
 Postpartum anxiety

ABSTRACT

Background: Women are at increased risk of developing anxiety or depression disorders after Cesarean section (CS). This study aims to evaluate whether an appointment with a senior obstetrician combined with an ultrasound examination reduces levels of anxiety in women after CS.

Methods: A prospective observational study was conducted in Sweden. Women underwent an appointment with an obstetrician 6–9 months after their first CS. Before the appointment, women were asked to fill in the state and trait subscales of the Spielberger State-Trait Anxiety Inventory and the Beck's Depression Inventory. The women's experience of the childbirth was discussed and an ultrasound examination of the hysterotomy scar was performed. After the appointment, the participants filled in the state scale again. The women were divided into low trait anxiety (< 40) and high trait anxiety (≥ 40) groups for comparisons.

Results: 147 women were included. Of those, 114 (78%) had lower trait score <40 (mean 29.2 ± 5.4) and 33 (22%) had higher trait score ≥ 40 (mean 47.4 ± 6.5). Mean difference of state score in the low trait anxiety group before and after the examination was 4.8 ± 5.6 (95% CI 7.20 to 11.97, $p < 0.0001$) and in the high trait anxiety group, the mean difference was 9.2 ± 6.5 (95% CI 3.77 to 5.82, $p < 0.0001$).

Limitations: A clinical examination with a diagnosis of depression in these women was not made by a psychiatrist. **Conclusions:** A supportive obstetric consultation combined with an ultrasound examination of the uterine scar decreased anxiety levels in women after CS, particularly in patients with higher anxiety

1. Background

There is a difference in postpartum self-reported general health status scores between women who delivered vaginally and by Cesarean section (CS) (Lydon-Rochelle et al., 2001). A significant worsening in physical and mental health and an increase of bodily pain and fewer daily activities in women after CS was found (Lydon-Rochelle et al., 2001). After CS, women have a higher risk of anxiety disorders, depression and post-traumatic stress symptoms (Janssen et al., 2018; Kuo et al., 2014; Lydon-Rochelle et al., 2001; Ryding et al., 1998). One study found that anxiety and depression symptoms persisted up to one year after an elective CS (ELCS), particularly in women who were highly worried or depressed before delivery (Janssen et al., 2018). A negative birth experience is even more common after an emergency CS (EMCS) (Smarandache et al., 2016). A bad experience of labor may negatively influence women's perception of parenthood as well as their attitude

towards subsequent pregnancies and deliveries (Shorey et al., 2018). This may be related to an increased awareness of the risks with a CS already in the postpartum period and in subsequent deliveries (Molina et al., 2015; Sandall et al., 2018; Vikhareva Osser, Valentin, 2011).

It is reported that women receive insufficient information after their CS (Lyckestam Thelin et al., 2019; Ryan et al., 2019). According to clinical experience, women worry about the condition of the uterine wall after a CS. The routine postpartum follow-up consultation by a midwife deals mostly with parenting issues and does not usually cover women's concerns about the uterine healing process and the circumstances surrounding their previous CS.

The appearance of the uterine scar can non-invasively and successfully be evaluated by a transvaginal ultrasound examination with or without saline contrast sonohysterography and is reported to be a well-validated technique to assess uterine scar after CS in non-pregnant women (Jordans et al., 2019; Vikhareva Osser et al., 2010).

* Corresponding author at: Department of Obstetrics and Gynecology, Skåne University Hospital, Lund University, Malmö/Lund, Sweden.

E-mail address: olga.vikhareva@med.lu.se (O. Vikhareva).

¹ Jan Waldenströms gata 47, SE-20502, Malmö, Sweden

The literature on how to help women process and facilitate their birth experience after a CS is scarce. An opportunity to discuss the circumstance of the previous CS, obtaining information about the condition of the uterine scar and advice on the following pregnancies may thus be essential to reduce mental distress and improve psychological well-being after CS.

The aim of the study was to evaluate anxiety levels before and after CS and whether an appointment with a senior obstetrician combined with an ultrasound examination, may reduce anxiety levels in women six to nine months after their CS. Factors known to influence anxiety were analyzed and satisfaction with the appointment evaluated.

2. Methods

The study was performed at Skåne University Hospital Malmö/Lund in Sweden. In 2018, there were 8848 deliveries and of those, 1566 (18%) women were delivered by CS. In the CS group, 1051 women underwent their first CS. The recruitment period was between January 30th 2018 and January 30th 2019. Only women who had their first CS between 37⁺⁰ and 41⁺⁶ weeks of gestation, irrespective of the indication for CS, were asked to participate in the study six to nine months after their CS. The inclusion criteria were non-pregnant women, speaking and reading Swedish fluently. We searched for eligible women in the hospital patient records system. To those who fulfilled the inclusion criteria, letters of invitation to participate in the study with detailed information about the study procedure were mailed by post. About 50 letter per month were sent to 550 women. The response rate was 60 to 70% (332/550). Of those who responded about 50% were eligible for the study, which resulted in 151 women. Women, who agreed to participate, signed a written informed consent and were given an appointment time.

Before the appointment, women were asked to fill in the Spielbergers' State-Trait Anxiety Inventory (STAI, Form Y) (Spielberger 1983) to assess their levels of anxiety and Beck's Depression Inventory (BDI) (Beck et al., 1996) to detect levels of depressive symptoms. The women were given privacy to fill in all questionnaires, having a possibility to ask for clarification if any of the questions was difficult to understand. After the forms were completed, information of current contraception, breast-feeding and day of menstrual cycle were registered in a standardized research protocol. A urine pregnancy test was done on all participants to exclude any unexpected pregnancy before the ultrasound examination. A senior obstetrician with experience of ultrasound examinations of Cesarean hysterectomy scar conducted a semi-structured interview with open-ended questions related to the circumstances of the previous CS. All women got the opportunity to speak freely about any concerns regarding the previous CS delivery and their fear of possible influences on future pregnancies. Follow-ups were offered to all women from an early stage of a subsequent pregnancy. Before the appointment, the obstetrician was prepared for the conversation by scrutinizing women's journal entries of their previous CS. Psychiatric and obstetric history that potentially could influence anxiety were investigated in all women. Gestational age, indication for the CS, cervical dilatation at the operation, duration of active labor, blood loss and complications were registered. All information, including biological and social background data obtained from the hospital data records were registered in the standardized research protocol.

The same obstetrician who conducted the semi-structured interview performed an ultrasound examination. The examination was carried out with the women in the lithotomy position with an empty bladder using a GE Voluson E8 ultrasound system (General Electric, Zipf, Austria) equipped with a 2.8–10-MHz transvaginal transducer. The uterus wall was evaluated for the appearance of the Cesarean scar, with and without saline contrast sonohysterography, with the same method as described in previous studies (Naji et al., 2012; Vikhareva et al., 2010). The ultrasound images were evaluated during the ultrasound examination and representative images were stored in the digital image storing system Siemens Syngo® Dynamics, version 5.0 (Siemens Medical Solutions

Health Services Corp., Malvern, PA, USA). Afterwards, women were informed about the ultrasound examination results. Based on the current knowledge, it is not possible to state whether a defect in the hysterotomy scar detected by ultrasound in non-pregnant women may influence the outcome in subsequent pregnancy and delivery (Vikhareva Osser, Valentin, 2011). Therefore, a supportive stance concerning subsequent pregnancy and delivery was conveyed to the women, regardless of the appearance of the uterine scar area. Any abnormal findings detected besides the uterine scar were managed in accordance with routine clinical guidelines. Immediately after the appointment, the participants filled in the STAI -state scale once more and the Client Satisfaction Questionnaire (CSQ-8) was distributed.

The STAI (Form Y) consists of 40 statements and is a well-established self-rating scale with high stability and validity often used in surgical, gynecological, medical and psychiatric clinical anxiety research (Chan et al., 2003; Freeman-Wang et al., 2001; Howells et al., 1999; Johnston et al., 1980; Sjostrom et al., 1997). The first 20 statements assess state anxiety i.e., assess how a person feels at a particular moment or a chosen period. The state anxiety scale is highly sensitive in measuring acute anxiety. In this study, subjects were asked to rate their anxiety before the examination, that is "right now, at this moment." The subsequent 20 items assess trait anxiety i.e., a stable anxiety proneness or an individual perception of stressful situations as dangerous or threatening in general. Persons with higher trait anxiety respond to stressful situations with higher elevations in intensity of their state anxiety. Trait anxiety is very stable over time with a test-retest reliability ranges from 0.73 to 0.86 in a normative sample (Spielberger, 1983). Answers are given on a 4-point Likert scale. Scores on the state and trait scales range from 20 to 80 points respectively, with higher scores indicating higher levels of anxiety symptoms. The state and trait anxiety scales usually strongly correlate ($r = 0.70$) (Spielberger, 1983). In large normative samples of female working adults and college students, 19 to 39 years of age, the mean values of state and trait anxiety range from 35.2 to 38.8, and 34.8 to 40.4, respectively. A cut-off ≥ 40 has been suggested to detect clinically significant anxiety symptoms for the trait anxiety scale. The study population was divided into two groups of low trait anxiety (< 40) and high trait anxiety (≥ 40) for comparisons.

The Beck Depression Inventory Second Edition (BDI-II) is one of the most widely used self-report measures of depression in both research and clinical practice, with high validity and good psychometric properties (Beck et al., 1996). This inventory does not measure clinical depression but rather different levels of depressive symptoms. The questionnaire consists of 21 items and answers are rated on a four-point scale from 0 = low to 3 = high. The total score ranges from 0 to 63. For persons clinically examined for depression, scores from 0 to 13 represent minimal depressive symptoms, scores of 14–19 indicate mild, scores of 20–28 indicate moderate, and scores of 29–63 indicate severe depressive symptoms. In this study, a cut-off ≥ 20 defined high depressive scores. The BDI questionnaire was used in this study to detect women with higher depressive scores that may be related to anxiety symptoms.

The eight-item Client Satisfaction Questionnaire (CSQ-8), Swedish version, is a validated eight question self-administered form to assess satisfaction with health services (Attkisson et al., 1982; Matsubara et al., 2013). Responses are based on a four-point scale from 1 to 4. Total scores range from 8 to 32 with higher values corresponding to higher satisfaction with treatment. Scores of 8–20 represent dissatisfaction, 21–24 as mildly satisfied, 25–28 as satisfied and 29–32 highly satisfied. Items include satisfaction with appointment, satisfaction with consultation provided at the appointment, and a question of whether the respondent would recommend the same appointment to a friend.

An ethical approval for the study was obtained from the Ethics Committee of the Medical Faculty of Lund University, Sweden, reference number 2018/432.

The statistical software package SPSS 24.0 (SPSS Inc., Chicago, IL) was used for statistical analyses. Statistical power for the STAI state subscale was estimated to, using a two-sided Students *t*-test with a 5%

significance level and a mean (SD) of 35 (10) and a sample size of 100 women, have a power of 99% to detect a difference of ten points. Differences in categorical data were analyzed using chi-square and Fisher's exact tests. Student's *t*-test was used for comparisons for continuous normally distributed variables and Mann-Whitney U test was used for skewed data. An analysis of state anxiety before and after the consultation was performed in women with different employment status. Paired *t*-tests were used to assess differences in state anxiety scores before and after the appointment. Pearson's correlation coefficient was used to analyze correlations between continuous variables. The level of significance was set at $p < 0.05$, two-tailed.

3. Results

151 women agreed to participate and filled out the forms. Three women were excluded because of missing data on the STAI trait scale and one woman because of missing data on the BDI. Thus, 147 women were included in the study. Of these, 114 (78%) had low trait anxiety scores < 40 , and 33 (22%) had high trait anxiety scores ≥ 40 . In total, there were 90% (132/147) women with BDI score indicating only minimal depressive symptoms, 6% (9/147) with mild depressive symptoms and 4% (6/147) with higher scores, indicating moderate to severe depressive symptoms. A positive statistical correlation was found between BDI scores and trait anxiety scores ($r = 0.65, p < 0.0001$); between BDI scores and state anxiety scores ($r = 0.60, p < 0.0001$); and between trait and state anxiety scores ($r = 0.73, p < 0.0001$). Background characteristics for the low and high trait anxiety groups and the total sample are presented in Table 1. In the group of women with high trait anxiety scores, the mean BDI scores and the mean state anxiety scores were statistically significantly higher both before and after the appointment, compared to women with low trait anxiety (Table 2). In both low and high trait anxiety groups, state anxiety scores decreased significantly after the appointment, $p < 0.001$ (Fig. 1).

In 11 of 147 (8%) women, state anxiety scores were equal or increased after the appointment. After a separate analyze of medical records, we found that these women had either pre-existing severe psychiatric comorbidity or previous dramatic obstetric circumstances (Table 3).

No differences in trait or state anxiety levels were found between occupational categories (Table 1). We found a non-significant trend between groups of low and high trait- anxiety for women unemployed. Comparison showed that unemployed women ($n = 8$), had higher mean trait anxiety scores compared to the women employed ($n = 139$), (40.5 ± 11.6 vs. $32.9 \pm 9.2, p = 0.08$). State anxiety scores before and after appointment were similarly higher in the women unemployed (45.5 ± 11.3 vs. $30.5 \pm 8.6, p = 0.001$ and 31.4 ± 9.2 vs. $25.1 \pm 6.1, p = 0.016$, respectively).

There were no statistically significant differences in trait anxiety and BDI scores between women who underwent an EMCS or ELCS (31.8 ± 8.7 vs. $34.0 \pm 9.8, p = 0.16$ and 5.8 ± 4.4 vs. $6.7 \pm 6.3, p = 0.77$ respectively). Neither did state anxiety scores differ significantly between groups of EMCS and ELCS before and after the appointment (30.1 ± 8.3 vs. $31.8 \pm 9.8, p = 0.43$ and 24.4 ± 4.7 vs. $26.0 \pm 7.1, p = 0.44$, respectively).

Satisfaction with the appointment was assessed in 145/147 because of missing data in two cases. Most of the women 133 (91%) were highly satisfied with the appointment, eight (5%) were satisfied and four (3%) were mildly satisfied. None of the women reported to be unsatisfied with the appointment. In the group of 11 women with equal or higher state anxiety scores after the appointment, CSQ-8 score showed that they were satisfied or very satisfied with their medical appointment.

4. Discussion

The results of the present study showed that 22% of the women had state and trait anxiety scores equal to those in clinical anxiety conditions

Table 1
Background characteristics for the total sample and in low and high trait anxiety groups.

Characteristics	Total population N = 147	Low trait anxiety < 40 n = 114	High trait anxiety ≥ 40 n = 33	P-value
Age, years	30.37 \pm 3.04	30.4 \pm 3.1	30.3 \pm 3.0	0.79*
Occupation				
Professional	69 (46.9)	56 (49.1)	13 (39.4)	0.33
Technician	27 (18.4)	21 (18.4)	6 (18.2)	0.98
Managers, directors	12 (8.2)	11 (9.6)	1 (3.0)	0.30†
Secretary	22 (15.0)	15 (13.2)	7 (21.2)	0.25
Unemployed	8 (5.4)	4 (3.5)	4 (12.1)	0.08†
Student	9 (6.1)	7 (6.1)	2 (6.1)	1.00
Social satisfaction				
Satisfied	147 (100.0)	114 (100.0)	33 (100.0)	1.00
Partner				
Yes	145 (98.6)	112 (98.2)	33 (100)	1.00
No	2 (1.4)	2 (1.8)	0	
Parity				
1	120 (81.6)	96 (84.2)	24 (72.7)	0.20
≥ 2	27 (18.4)	18 (15.8)	9 (27.3)	
Pregnancy				
Expected and welcome	140 (95.2)	107 (93.9)	33 (100.0)	1.00
Unexpected but welcome	7 (4.8)	7 (6.1)	0	
Gestational age, weeks	39.3 \pm 1.6	39.3 \pm 1.6	39.2 \pm 1.4	0.82*
CS				
ELCS	47 (32.0)	39 (34.2)	8 (24.2)	0.40
EMCS	100 (68.0)	75 (65.8)	25 (75.8)	
Indication for CS				
Maternal request	13 (8.8)	10 (8.8)	3 (9.1)	1.00†
Failure to progress	35 (23.8)	28 (24.6)	7 (21.2)	0.82
Non-cephalic, macrosomia or disproportion	35 (23.8)	30 (26.3)	5 (15.2)	0.25†
Fetal distress	44 (29.9)	31 (27.2)	13 (39.4)	0.20
Placenta praevia	4 (2.7)	2 (1.8)	2 (6.1)	0.22†
Maternal conditions	13 (8.8)	10 (8.8)	3 (9.1)	1.00†
Foetal abnormalities	3 (2.0)	3 (2.6)	0	1.00†
Experience of CS				
Unstressful	48 (32.7)	38 (33.3)	10 (30.3)	0.74
Stressful but understandable	79 (53.7)	63 (55.3)	16 (48.5)	0.49
Stressful and not understandable	6 (4.1)	5 (4.4)	1 (3.0)	1.00†
Extremely stressful	14 (9.5)	8 (7.0)	6 (18.2)	0.05
Previous psychiatric conditions				
Healthy	112 (76.2)	92 (80.7)	20 (60.7)	0.02
Depression	17 (11.5)	10 (8.7)	7 (21.2)	<0.05
Anxiety	12 (8.1)	8 (7.0)	4 (12.1)	0.47
ADHD/ADD	2 (1.4)	2 (1.8)	0 (0.0)	1.00†
Bipolar	2 (1.4)	1 (0.9)	1 (3.0)	0.40†
Other	2 (1.4)	1 (0.9)	1 (3.0)	0.40†

* Student's *t*-test.

† Fisher's exact test

Data are given as mean \pm SD or n (%) unless otherwise specified.

CS: Cesarean section, ELCS: elective Cesarean section, EMCS: emergency Cesarean section.

and that state anxiety scores decreased after an appointment with an obstetrician supplemented by an ultrasound examination in women 6–9 months after a CS. The higher the state anxiety before the appointment the more positive effect of the appointment was noted.

We chose a cut-off value for trait anxiety of ≥ 40 which is similar to other studies. Grant et al. showed that prepartum trait anxiety levels of 40 or higher correlated to postpartum anxiety and postpartum depressive conditions (Grant et al., 2008). Previous studies have shown that women consider their received information about circumstances and

Table 2
Psychological variables for the total sample and in low and high trait anxiety groups.

Measurements	Total population N = 147	Low trait anxiety < 40n = 114	High trait anxiety ≥ 40n = 33	P-value*
STAI trait anxiety	33.3 ± 9.5 32 (20 – 62)	29.2 ± 5.4 29.5 (20 – 39)	47.4 ± 6.5 45 (40 – 62)	<0.0001
STAI state anxiety before the appointment	31.3 ± 9.4 29 (20 – 60)	28.3 ± 7.2 27 (20 – 60)	41.5 ± 9.0 41 (24 – 54)	<0.0001
State anxiety after the appointment	25.5 ± 6.4 23 (20 – 54)	23.5 ± 4.5 21.5 (20 – 40)	32.3 ± 7.5 31 (21 – 54)	<0.0001
Mean difference in state anxiety before and after the appointment	5.8 ± 6.1 4 (–7 – 33)	4.8 ± 5.6 4 (–6 – 33)	9.2 ± 6.5 9 (–7 – 28)	<0.0001
BDI score	6.4 ± 5.8 5.0 (0 – 30)	4.8 ± 4.3 4 (0 – 23)	11.9 ± 6.7 12 (0–30)	<0.0001
CSQ-8	30.9 ± 1.9 32 (23 – 32)	31.2 ± 1.6 32 (23 – 32)	29.9 ± 2.4 31 (24 – 32)	<0.0001

Data are presented as mean±SD, median (range).

CSQ-8 - Client Satisfaction Questionnaire.

*Mann-Whitney U test.

indications for the CS as insufficient (Lyckestam Thelin et al., 2019; Ryan et al., 2019). Moreover, women worry about the healing process and the anatomical condition of the uterus after surgery (Lyckestam et al., 2019; Vikhareva Osseer, Valentin, 2011). An ultrasound examination may give the obstetrician an opportunity to discuss and explain the uterine healing process more thoroughly. Furthermore, the obstetrician may give a more detailed information about the circumstances of the CS compared to e.g. a midwife at the postnatal visit. This overall information may have contributed to the decrease in state anxiety levels as rated by the women. Furthermore, an advice about future pregnancies and options for the mode of delivery given in a positive manner towards vaginal birth after CS, may be supportive for women. Speculatively, it could be suggested that this type of early information to women may also contribute to an increase in the rate of vaginal deliveries after a CS.

In the eleven women where anxiety slightly increased after the appointment, there were preexisting mental health conditions and severe traumatic obstetric events (Table 3). In ten out of eleven women, this information was partially missed by the obstetrician in the preparation stage before the appointment. This suggest that not only a

thorough preparation of obstetrical and gynecological history but also the history of psychological comorbidity is required. This approach together with a reassuring ultrasound examination may help to process previous trauma and create a more positive attitude towards subsequent pregnancies and deliveries.

A separate analysis revealed that unemployed women had higher trait and state anxiety scores than those employed. Women who were unemployed seemed to be a socially vulnerable group with higher anxiety, however the differences did not reach statistical significance. This result is in agreement with many published studies where unemployment shows to have a negative impact on mental wellbeing (Paul et al., 2009).

We did not find any statistically significant differences in anxiety between women receiving an EMCS or an ELCS. The state scores were somewhat higher in the ELCS group, but the difference did not reach statistical significance. Probably, it may be so that women are more worried about the scar and the healing process than the type of CS, whether it was elective or emergent. This is in agreement with one other Swedish study (Ryding et al., 1998), where the authors did not find any differences of mental distress between women having an EMCS or an ELCS. However, one other study found anxiety scores to be statistically significantly higher in a group of women after an ELCS compared to women with vaginal delivery and EMCS (Zanardo et al., 2018). The discrepancies may be explained by differences between populations and obstetrical approach in different countries. The work by both Ryding et al. (1998) and the current study are based on Swedish populations, whereas another study (Zanardo et al., 2018) was performed in Italy. Differences in cultural perspectives on vaginal birth between Sweden and Italy have been described previously (Lundgren et al., 2020).

Only a few women (4%) rated their depressive symptoms as high, indicating a possible clinical depression. A clinical examination with a diagnosis of depression in these women was not made by a psychiatrist, which may be seen as a limitation. Usually, obstetricians with good clinical skills are trained to detect women with major depression. However, continuous discussions about the evaluation of psychological ratings of anxiety and depression levels were possible, since one of the authors is a psychiatrist. Furthermore, BDI scores showed that most women were not depressed, thus, depression was not the probable cause of pre-examination anxiety levels. This finding supports that women may be more anxious after a CS. In this study, women were somewhat less anxious than the normative sample regarding gender and age for Spielberger’s reference values (Spielberger, 1983). This may further suggest that the risk of not detecting any serious mental condition was low.

The aim of this study was not to evaluate obstetric treatments for

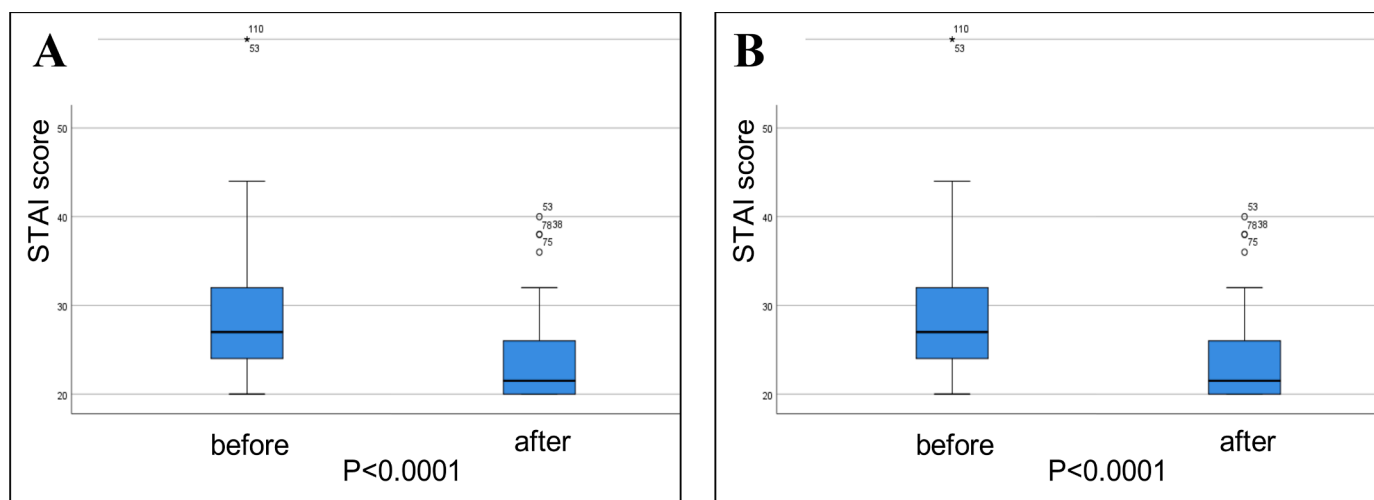


Fig. 1. Spielberger state anxiety scores before and after the appointment in the low trait anxiety- (A) and high trait anxiety (B) subgroups.

Table 3Characteristics of women with increased state anxiety level after the appointment with ultrasound examination ($n = 11$).

Patient N	Age	History of mental illness(y/n)	Obstetric history	Background factors for STAI score increase	BDI	STAI-trait anxiety	STAI-state anxiety before appointment	STAI-state anxiety after appointment	Δ -STAI-state anxiety	CSQ-8
1	30	No	Emergency CS due to ablatio placentae and intrauterine foetal demise.	foetal death due to placenta abruption	14	41	47	54	7	24
2	30	No	Planned CS due to foetal breech position after non-successful external cephalic version.	highly traumatic birth experience,	5	27	26	32	6	29
3	34	No	Planned CS due to foetal breech position after non-successful external cephalic version.	highly traumatic birth experience,	0	31	27	32	5	32
4	32	No	Emergency CS due to primary uterine inertia	highly traumatic birth experience,	3	22	24	28	4	32
5	31	Yes	Emergency CS due to secondary uterine inertia.	bipolar disorder type I	0	36	25	28	3	31
6	32	No	Emergency CS due to severe preeclampsia. Dichorionic and diamniotic twin-pregnancy.	highly traumatic birth experience,	2	24	23	25	2	32
7	31	No	Emergency CS due to primary uterine inertia.	highly traumatic birth experience,	4	36	36	38	2	24
8	31	No	Emergency CS due to secondary uterine inertia after being fully dilated for 4 h.	highly traumatic birth experience,	17	32	21	23	2	32
9	30	No	Planned CS due to medical condition.	highly traumatic birth experience,	5	26	20	21	1	29
10	29	No	Emergency CS due to foetal distress	highly traumatic birth experience,	1	25	37	38	1	30
11	29	Yes	Emergency CS due to prolonged 1st stage of labor and foetal distress.	diagnosed unplanned pregnancy at the appointment	6	33	26	27	1	31

BDI: Beck depression inventory.

STAI: State-trait anxiety inventory STAI (Form Y).

CSQ-8: Client satisfaction questionnaire- 8 item version.

anxiety after a CS, but to recognize the impact of a supportive conversation based on ultrasound findings. One important strength of this study is the use of well-validated psychological rating scales with normative data and cut-off values based on comparisons with psychiatric illnesses such as anxiety conditions and severity of depression. The measurement scales are also widely used in both clinical practice and research (Chan et al., 2003; Howells et al., 1999; Hellsten et al., 2007; Johnston, 1980).

A limitation of the study may be that women were not followed up with the purpose of examine longstanding effects of the supportive ultrasound examination. The positive effect of anxiety reduction may be caused by an immediate relief after hearing about normal findings. On the other hand, such a message may also confirm reproductive ability which may be beneficiary since women with higher anxiety levels also were more depressive. The self-confidence in depressive subjects could be strengthened after receiving a message that you are fine, and your reproductive ability is sufficient. This may increase women's self-confidence and lower anxiety levels over time. If a follow-up examination is included in the design positive life events could interfere with anxiety levels meanwhile by improving mental condition, which could create a methodological problem.

To the best of our knowledge, this is the first study evaluating the impact of an appointment with the purpose to reduce anxiety in women after a CS by a supportive ultrasound examination. The findings of the study emphasize the importance of special consideration for women after a CS, particularly beneficial for those who are socially or constitutionally more vulnerable or have experienced trauma in relation to their CS. This is in line with current guidelines and published data, that emphasizes the importance of relevant information for women and their

partners in the postpartum period (Lyckestam Thelin et al., 2019; Royal College of Obstetricians and Gynaecologists, 2015; Ryan et al., 2019).

5. Conclusions

A supportive obstetric consultation combined with an ultrasound examination of the uterine scar may decrease anxiety levels in women after CS, particularly in patients with higher trait anxiety and in vulnerable groups.

6. Author statement

We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We understand that the Corresponding Author is the sole contact for the Editorial process.

He/she is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs

7. Contributors

Olga Vikhareva: Study concept and design, Acquisition of data, Analysis and interpretation of data, Drafting of the manuscript, Critical revision of the manuscript, Final approval of the version to be published.

Ekaterina Nedopekina: Study concept and design, Acquisition of data, Analysis and interpretation of data, Drafting of the manuscript, Critical revision of the manuscript, Final approval of the version to be published.

Karin Sjöström: Study concept and design, Analysis and interpretation of data, Drafting of the manuscript, Critical revision of the manuscript, Final approval of the version to be published.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We are grateful to Dr. Eva Biringer at the Department of Research and Innovation, Helse Fonna HF, for her advice and support during the process of writing the PRESENT paper.

References

- Attkisson, C.C., Zwick, R., 1982. The client satisfaction questionnaire. Psychometric properties and correlations with service utilization and psychotherapy outcome. *Eval. Program Plann.* 5 (3), 233–237.
- Beck, A.T., Steer, R.A., Garbin, M.G., 1996. *Psychometric Properties of the Beck Depression Inventory*, 2nd edn. Swedish version. San Antonio, TX, USA: Psykologiförlaget AB, Sweden, Under License from Harcourt Assessment Inc.
- Chan, Y.M., Lee, P.W., Ng, T.Y., Ngan, H.Y., Wong, L.C., 2003. The use of music to reduce anxiety for patients undergoing colposcopy: a randomized trial. *Gynecol. Oncol.* 91, 213–217.
- Freeman-Wang, T., Walker, P., Linehan, J., Coffey, C., Glasser, B., Sherr, L., 2001. Anxiety levels in women attending colposcopy clinics for treatment for cervical intraepithelial neoplasia: a randomised trial of written and video information. *BJOG* 108, 482–484.
- Grant, K.A., McMahon, C., Austin, M.P., 2008. Maternal anxiety during the transition to parenthood: a prospective study. *J. Affect. Disord.* 108 (1–2), 101–111. May.
- Hellsten, C., Sjöström, K., Lindqvist, P.G., 2007. A prospective Swedish cohort study on psychosocial factors influencing anxiety in women referred for colposcopy. *BJOG* 114 (1), 32–38. Jan.
- Howells, R.E., Dunn, P.D., Isasi, T., Chenoy, R., Calvert, E., Jones, P.W., et al., 1999. Is the provision of information leaflets before colposcopy beneficial? A prospective randomised study. *Br. J. Obstet. Gynaecol.* 106, 528–534.
- Janssen, A.B., Savory, K.A., Garay, S.M., Sumption, L., Watkins, W., Garcia-Martin, I., Savory, N.A., Ridgway, A., Isles, A.R., Penketh, R., Jones, I.R., John, R.M., 2018. Persistence of anxiety symptoms after elective cesarean delivery. *BJ Psychiatry Open* 4, 354–369.
- Johnston, M., 1980. Anxiety in surgical patients. *Psychol. Med.* 10, 145–152.
- Jordans, I.P.M., de Leeuw, R.A., Amso, Stegwee SINN, Barri-Soldevila, P.N., van den Bosch, T., Bourne, T., Brölmann, H.A.M., Donnez, O., Dueholm, M., Hehenkamp, W. J.K., Jastrow, N., Jurkovic, D., Mashlach, R., Naji, O., Streuli, I., Timmerman, D., van der Voet, L.F., Huirne, J.A.F., 2019. Sonographic examination of uterine niche in non-pregnant women: a modified Delphi procedure. *Ultrasound Obstet. Gynecol.* 53 (1), 107–115. Jan.
- Kuo, S.Y., Chen, S.R., Tzeng, Y.L., 2014. Depression and Anxiety trajectories among women who undergo an elective cesarean section. *PLoS ONE* 9 (1), e86653.
- Lundgren, I., Morano, S., Nilsson, C., 2020. perspectives on vaginal birth after previous caesarean section in countries with high and low rates - a hermeneutic study. *Women Birth* 33 (4), e339–e347. Jul.
- Lyckestam Thelin, I., Lundgren, I., Nilsson, C., 2019. To challenge oneself as a childbearing woman—the lived experience of vaginal birth after caesarean section in Sweden. *Int. J. Qual. Stud. Health Well-Being* 14 (1), 1605784. Dec.
- Lydon-Rochelle, M.T., Holt, V.L., Martin, D.P., 2001. Delivery method and self-reported postpartum general health status among primiparous women. *Paediatr. Perinat. Epidemiol.* 15 (3), 232–240. Jul.
- Matsubara, C., Green, J., Astorga, L.T., Daya, E.L., Jervoso, H.C., Gonzaga, E.M., Jimba, M., 2013. Reliability tests and validation tests of the client satisfaction questionnaire (CSQ-8) as an index of satisfaction with childbirth-related care among Filipino women. *BMC Pregnancy Childbirth* 13, 235. Dec 17.
- Molina, G., Weiser, T.G., Lipsitz, S.R., Esquivel, M.M., Uribe-Leitz, T., Azad, T., Shah, N., Semrau, K., Berry, W.R., Gawande, A.A., Haynes, A.B., 2015. Relationship between cesarean delivery rate and maternal and neonatal mortality. *JAMA* 314 (21), 2263–2270.
- Naji, O., Abdallah, Y., Bij De Vaate, A.J., Smith, A., Pexsters, A., Stalder, C., McIndoe, A., Ghaem-Maghami, S., Lees, C., Brölmann, H.A.M., Huirne, J.A.F., Timmerman, D., Bourne, T., 2021. Standardized approach for imaging and measuring Cesarean section scars using ultrasonography. *Ultrasound Obstet. Gynecol.* 39 (3), 252–259. Mar.
- Paul, K.I., Moser, K., 2009. Unemployment impairs mental health: meta-analyses. *J. Vocat. Behav.* 74 (3), 264–282. Jun.
- Royal College of Obstetricians and Gynaecologists. *Birth after previous caesarean birth. Green-top Guideline No. 45.* London (UK): RCOG; 2015. Available at: https://www.rcog.org.uk/globalassets/documents/guidelines/gtg_45.pdf.
- Ryan, G., Doherty, K.C.O., Devane, D., McAuliffe, F., Morrison, J., 2019. Questionnaire survey on women's views after a first caesarean delivery in two tertiary centres in Ireland and their preference for involvement in a future randomised trial on mode of birth. *BMJ Open* 9 (10), e031766. Oct 3.
- Ryding, E.L., Vijma, K., Vijma, B., 1998. Psychological impact of emergency caesarean section in comparison with elective caesarean section, instrumental and normal vaginal delivery. *J. Psychosom. Obstet. Gynaecol.* 19 (3), 135–144. Sep.
- Sandall, J., Tribe, R.M., Avery, L., Mola, G., Visser, G.H., Homer, C.S., Gibbons, D., Kelly, N.M., Kennedy, H.P., Kidanto, H., Taylor, P., Temmerman, M., 2018. Short-term and long-term effects of section on the health of women and children. *Lancet* 392 (10155), 1349–1357.
- Shorey, S., Yang, Y.Y., Ang, E., 2018. A bad experience of labor may negatively influence women's perception of parenthood as well as their attitude towards subsequent pregnancies and deliveries. *J. Adv. Nurs.* 74 (6), 1236–1244. Jun.
- Sjostrom, K., Valentin, L., Thelin, T., Marsal, K., 1997. Maternal anxiety in late pregnancy and fetal hemodynamics. *Eur. J. Obstet. Gynecol. Reprod. Biol.* 74, 149–155.
- Smarandache, A., Kim, T.H., Bohr, Y., Tamim, H., 2016. Predictors of a negative labour and birth experience based on a national survey of Canadian women. *BMC Pregnancy Childbirth* 16 (1), 114, 2016 May 18.
- Spielberger, C.D., 1983. *Manual for the State-Trait Anxiety inventory*, STAI (Form Y). Consulting Psychologists Press Inc, Palo Alto, CA.
- Vikhareva Osser, O., Jokubkiene, L., Valentin, L., 2010. Cesarean section scar defects: agreement between transvaginal sonographic findings with and without saline contrast enhancement. *Ultrasound Obstet. Gynecol.* 35 (1), 75–83. Jan.
- Vikhareva Osser, O., Valentin, L., 2011. Clinical importance of appearance of caesarean hysterotomy scar at transvaginal ultrasonography in nonpregnant women. *Obstet. Gynecol.* 117 (3), 525–532. Mar.
- Zanardo, V., Giliberti, L., Giliberti, E., Volpe, F., Straface, G., Greco, P., 2018. The role of elective and emergency cesarean delivery in maternal postpartum anhedonia, anxiety, and depression. *Int. J. Gynaecol. Obstet.* 143 (3), 374–378. Dec.