Perinatal Mood Disorders in Second Trimester Pregnant Women with Cervical Insufficiency, a Population-based Cohort Study

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Abstract

Background: Perinatal mood disorders can seriously endanger the health of pregnant women and fetus, affect family relationships and cause heavy burden and potential hazards to family and society. This study aims to investigate anxiety and depression in second trimester pregnant women with cervical insufficiency (CI) and identify its risk factors, so as to provide guidance for daily clinic work.

Methods: From April 2019 to July 2020, 98 mid-pregnancy women with CI underwent laparoscopic cervical cerclage in the First Affiliated Hospital of Sun Yat-sen University were selected as observation group and 166 normal pregnant women in second trimester were set as control group. Zung's Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) were applied to evaluate perinatal mood disorders in both groups.

Results: Pregnant women in CI group had a SAS score of 46.31 ± 11.29 and SDS score of 54.12 ± 11.72 , higher than the SAS score of 41.63 ± 7.70 and SDS score of 47.56 ± 9.31 in control group (both $P < 0.001$). While 32.65% and 67.35% of pregnant women in observation group were considered to have different degrees of anxiety and depression, only 15.06% and 30.72% of normal pregnant women meet the same condition (both $P < 0.001$). Multiple logistic regression analysis indicated that educational experience is an independent protective factor for depression disorder in second trimester pregnant women with CI.

Conclusion: Pregnant women with CI are prone to develop anxiety and depression in the second trimester than normal pregnant women, therefore doctors and nurses should pay more attention to them in clinic work.

Background

Cervical insufficiency (CI) is defined as painless dilatation with shortening of the cervix in the absence of other causes before the 37th week of pregnancy, resulting in membrane prolapse, premature rupture of the membranes, midtrimester pregnancy loss, or preterm birth, and is one of the basic causes of pregnancy loss, accounting for 14.3 – 65% of preterm births.^(1–4) Midtrimester pregnancy loss often happens at identical pregnancy week, and with the labor process progress rapidly, negative outcomes are usually inevitable. Previously studies show that fetal loss in those pregnancy with CI commonly occurs between 18 and 25 weeks of gestation.⁽⁵⁾ In the second trimester, women can experience the joy of becoming a mother through fetal heartbeat and fetal movement and build up a deep relationship with their babies, and as a result of this, pregnancy loss at this stage can cause irreversible damage, not only physically but most important, spiritually.⁽⁶⁾ ⁷⁾ Susil et al investigated 137 women and proved that involuntary termination before 28 weeks of gestation could lead to adverse mental health consequences, with near one fifth of women fulfilled criteria for depression and over half of women fulfilled criteria for complicated grief after spontaneous abortion.⁽⁸⁾ The older the women are, the lower their fecundity is, and the more pressing they are to have their own children, thus they are much easier to develop anxiety and depression under the huge psychological burden. Continuous perinatal mood disorders likely results in tension between couples, poor family relations and even suicide tendencies.^(9–11)

Previous negative pregnancy outcomes have deep influence upon psychological state of pregnant women, especially in their crisis period. Research shows that incidence rate of depression during pregnancy reaches 12.7%,^(12, 13) meanwhile 22.9% of pregnant women suffer from anxiety.^(14, 15) He and Wang et al investigate

1138 non-pregnant women and discovered that women with previous non-voluntary abortion had a significantly higher rate of anxiety and depression, compared to those with no history of pregnancy loss.⁽¹⁶⁾ Craig et al analyzed 81 women of recurrent miscarriage and found that nearly one sixth of patients could be diagnosed with depression and one fifth of women had chronic anxiety.⁽¹⁷⁾ Perinatal depression and anxiety disorders can have devastating effects on women, infants, and their families, as well the potential long-term effects on babies' cognition, emotion and behavior. In some serious cases, patients even ultimately come up with commit suicide or infanticide, leading to extremely bad impact on family and society.⁽¹⁸⁾ Thus, it's very important and essential to identify and prevent perinatal mood disorders in clinic work.

Several surgical modalities have been proposed to treat CI, including transvaginal and transabdominal cervical cerclage, and the latter can be accomplished through open laparotomy or laparoscopy surgical.⁽¹⁾ Since Karen B et al reported the first cervical cerclage via laparoscopy in 1998,⁽¹⁹⁾ this kind of cerclage became popularized all over the world and its safety and effectiveness had been confirmed. Chen et al found that laparoscopic cervical cerclage can significantly prolong the gestational weeks compared with traditional vaginal cerclage.⁽²⁰⁾ However, to those pregnant women suffering from CI, the importance of surgical treatment is beyond doubt, but mental health should also be paid more attention. Those women are more likely to have negative emotions during their pregnancy than normal pregnant women, leading to higher incidence of perinatal mood disorders. Reports on psychological status of pregnant women with CI have not been published yet, thus it's very necessary to focus on those women and their mental health.

In this study, we analyzed the situation of depression and anxiety in second trimester pregnant women with CI, compared with normal pregnant women at the same trimester. At the same time, potential influencing factors were also discussed in our study.

Methods

Study design and population

Totally 98 CI patients were enrolled from the First Affiliated Hospital of Sun Yat-sen University from April 2019 to July 2020. Patients included in the observation group must meet the criteria that (1) pregnant women in the second trimester, (2) had one or more times of abnormal pregnancy previously and were diagnosed with CI by our hospital, (3) underwent laparoscopic cervical cerclage during their first trimester in our hospital, (4) never been diagnosed with mental illness and other neurological disorders and (5) were able to read and communicate normally and participated in this survey voluntarily. Exclusion criteria were set as (1) diagnosed with psychiatric disorders by psychology department of regular hospitals, (2) took antipsychotic drugs for long and (3) not willing to cooperate with follow-up or quit halfway through this survey. For control group, 166 normal pregnant women in second trimester without complications of pregnancy were included.

Data collection

Online and paper questionnaires were designed to collect the name, age, height, weight, gestational age, pregnancy times, delivery times, children numbers, abnormal pregnancy times, induced abortion times,

spontaneous abortion times, educational experience, employment situation, payment model and family monthly income for our objects of study.

Main outcome measures

We used two widely-used self-report measures named Zung's Self-Rating Depression Scale (SDS)^(21, 22) and Self Rating Anxiety Scale (SAS)⁽²³⁾ to evaluate the degree of depression and anxiety. A significant score represents the presence of clinically significant symptoms. SAS score was divided into groups for normal (≤ 49), mild (50-59), moderate (60-70) and severe anxiety (≥ 70), and SDS for normal (≤ 52), mild (53-62), moderate (63-72) and severe anxiety (≥ 72). Questionnaires were distributed by members of our research group and respondents completed the questionnaire on their own, based on their feelings of the recent week. When the respondents had doubts, our members would explain the question one by one until they understood the survey exactly. After they completed the questionnaires, our team members would check the integrity and authenticity of the results, and double check was necessary while input them into the computer.

Statistical analysis

The Statistical Package for the Social Sciences (SPSS) 23.0 was used for data analysis. Descriptive statistics were calculated for major variables, including means and standard deviations. The independent samples t test, one way ANOVA and Pearson chi-square test were used to compare the means and proportions of dependent variables. Stepwise binary logistic regression analysis was used to find factors associated with perinatal mood disorders. A p-value of < 0.05 was considered statistically significant.

Details of ethics approval

The study has been approved by the Ethics Committee for Clinical Research and Animal Trials of the First Affiliated Hospital of Sun Yat-sen University (#178-2020, Jun-2, 2020). All procedures for the ethical conduct of scientific investigation will be adhered to by the research team. All methods were performed in accordance with the relevant guidelines and regulations. All participants were fully informed and agreed to participate in this study. Written informed consent was obtained from all of the participants. Personal information of the participants will be treated in the strictest confidence.

Results

Analysis of basic data between two groups

As shown in Table 1, CI group included 98 cases, with an average age of 30.63 ± 4.10 years old and gestational age of 22.40 ± 5.20 weeks, while it became 31.26 ± 4.67 years old and 22.66 ± 4.11 weeks in control group. No obvious difference was found between the two groups ($P > 0.05$). However, the difference was statistically significant between groups in body mass index (BMI), pregnancy times, delivery times, abnormal pregnancy times, spontaneous abortion times, educational experience, employment situation, payment model and family monthly income ($P < 0.05$).

Table 1
Comparison of basic data between two groups

Variables	CI group (n = 98)	Control group (n = 166)	P
	Mean ± SD	Mean ± SD	
Age(year)	30.63 ± 4.10	31.26 ± 4.67	0.257
Gestational age(week)	22.40 ± 5.20	22.66 ± 4.11	0.655
BMI(kg/m ²)	24.84 ± 4.37	22.88 ± 2.78	<0.001
Pregnancy times	3.29 ± 1.28	1.99 ± 1.15	<0.001
Delivery times	0.76 ± 0.96	0.54 ± 0.56	0.020
Children numbers	0.45 ± 0.56	0.50 ± 0.55	0.471
Abnormal pregnancy times	1.64 ± 0.97	0.17 ± 0.43	<0.001
Induced abortion times	0.30 ± 0.72	0.26 ± 0.48	0.653
Spontaneous abortion times	1.56 ± 0.96	0.13 ± 0.34	<0.001
	CI group	Control group	
	N(%)	N(%)	
Educational experience			<0.001
High school and below	57(58.16%)	28(16.87%)	
Bachelor or more	41(41.84%)	138(83.13%)	
Employment situation			<0.001
Employed	41(41.84%)	118(71.08%)	
Unemployed	57(58.16%)	48(28.92%)	
Payment model			<0.001
Self-paying	48(48.98%)	39(23.49%)	
Health insurance	50(51.02%)	127(76.51%)	
Family monthly income			<0.001
< 10000 yuan	45(45.92%)	32(19.28%)	
> 10000 yuan	53(54.08%)	134(80.72%)	

Perinatal mood disorders in two groups

From Table 2, we noticed that pregnant women in CI group had a SAS score of 46.31 ± 11.29 and SDS score of 54.12 ± 11.72 , higher than the SAS score of 41.63 ± 7.70 and SDS score of 47.56 ± 9.31 in control group, both

with a P value < 0.001. Besides, 32.65% and 67.35% of pregnant women in CI group were considered to have different degrees of anxiety and depression, but only 15.06% and 30.72% of normal pregnant women meet the same situation (both P < 0.001).

Table 2
Comparison of SAS, SDS score and mood disorders between two groups

Group	SAS score ($\bar{x} \pm s$)	SDS score ($\bar{x} \pm s$)	Anxiety degree (n,%)			Depression degree (n,%)		
			Normal	Mild	Moderate and above	Normal	Mild	Moderate and above
CI group (n = 98)	46.31 $\pm$ 11.29	54.12 $\pm$ 11.72	66(67.35)	15(15.31)	17(17.34)	32(32.65)	40(40.82)	26(26.53)
Control group (n = 166)	41.63 $\pm$ 7.70	47.56 $\pm$ 9.31	141(84.94)	23(13.86)	2(1.20)	115(69.28)	37(22.29)	14(8.43)
χ^2			21.957			35.415		
t	3.990	5.014						
P	< 0.001	< 0.001	< 0.001			< 0.001		

Risk factors of perinatal mood disorders in CI group

To identify risk factors for the perinatal mood disorders in pregnant women with CI, we analyzed those 98 pregnant women in CI group. For univariate logistic regression analysis, we defined whether anxiety or depression or not as dependent variables, and defined 13 factors as independent variables, including age, gestational age, BMI, pregnancy times, delivery times, children numbers, abnormal pregnancy times, induced abortion times, spontaneous abortion times, educational experience, employment situation, payment model and family monthly income. As shown in Table S1, all 13 factors were considered not relevant to occurrence of anxiety (P > 0.05). Meanwhile, we noticed that educational experience may be a risk factor for the occurrence of depression in CI group, with P value < 0.05 (Table 3).

After univariate logistic regression, 5 factors with P value < 0.15 were identified as independent variables, and whether depression or not was defined as dependent variables. Multiple logistic regression analysis was performed then. Taken P = 0.05 as cut-off value, finally we confirmed educational experience to be risk factor for the happen of depression in second trimester pregnant women with CI, with a OR value = 0.323 (95% CI, 0.123 ~ 0.844). The results are presented in Table 4.

Table 3
Univariate logistic regression analysis of depression disorder in CI group

Factors	B	S.E.	Wald	P	OR	95%CI
Age	-0.106	0.056	3.590	0.058	0.900	0.806 ~ 1.004
Gestational age	-0.021	0.041	0.260	0.610	0.979	0.903 ~ 1.062
BMI	0.092	0.056	2.682	0.101	1.096	0.982 ~ 1.224
Educational experience	-1.475	0.424	12.097	0.001	0.229	0.100 ~ .525
Employment situation	0.306	0.435	0.494	0.482	1.357	0.579 ~ 3.182
Pregnancy times	-0.025	0.169	0.021	0.884	0.976	0.700 ~ 1.360
Delivery times	0.429	0.274	2.455	0.117	1.536	0.898 ~ 2.628
Children numbers	0.209	0.395	0.280	0.596	1.233	0.568 ~ 2.674
Payment model	-0.693	0.441	2.471	0.116	0.500	0.211 ~ 1.187
Family monthly income	-0.400	0.213	3.541	0.060	0.670	0.442 ~ 1.017
Abnormal pregnancy times	-0.071	0.223	0.102	0.749	0.931	0.602 ~ 1.441
Induced abortion times	0.141	0.320	0.193	0.661	1.151	0.614 ~ 2.157
Spontaneous abortion times	-0.201	0.223	0.816	0.366	0.818	0.528 ~ 1.265

Table 4
Multivariate logistic regression analysis of depression disorder in CI group

Factors	B	S.E.	Wald	P	OR	95%CI
Age	-0.056	0.066	0.719	0.396	0.945	0.830 ~ 1.076
BMI	0.110	0.066	2.815	0.093	1.117	0.982 ~ 1.270
Educational experience	-1.131	0.491	5.310	0.021	0.323	0.123 ~ 0.844
Delivery times	0.552	0.396	1.941	0.164	1.736	0.799 ~ 3.772
Payment model	0.241	0.514	0.221	0.639	1.273	0.465 ~ 3.482
Family monthly income	-0.243	0.240	1.026	0.311	0.784	0.490 ~ 1.255

Discussion

To date, although numbers of studies about CI were found, perinatal mood disorders rates had not been evaluated. Because women suffer from CI often lose their babies in the second trimester, they would be under greater psychological pressure in the same stage of their next pregnancy. Therefore, in our study, 2 groups of pregnant women were included to evaluate perinatal mood disorders in second trimester pregnant women with CI.

Results of the present study showed that the SAS, SDS score in second trimester pregnant women with CI is significantly higher than those in normal second trimester pregnant women. Meanwhile, the incidence rate of anxiety and depression was much higher than normal pregnant women. Of the CI group, 100% of pregnant women have previous spontaneous pregnancy loss and the average time of abortion was 21.14 ± 3.52 weeks. Previous negative pregnancy outcomes can have profound and lasting influence upon women, both physiologically and psychologically. The closer they were to the “critical week”, the greater psychological pressure they have, not just from themselves but also from families and societies, which increases the probability of perinatal mood disorders. Besides, we also discovered that anxiety and depression ubiquitously happened in pregnant women with CI, no matter once or several times of abnormal pregnancy they had. These results indicate that in daily clinical work, we should not assess women’s risk of developing perinatal mood disorders by abnormal pregnancy times, since once they had previous pregnancy loss, they are far more likely to have anxiety and depression than common pregnant women. Doctors and nurses should attach great importance to this situation and try to intervene earlier.

In the present study, multivariate logistic regression analysis showed that educational experience is an independent protective factor for depression disorder in second trimester pregnant women with CI. The poorer education experience they have, the more likely they develop perinatal depression. Larry and Errol⁽⁵⁾ reported that CI may be present in only 0.1%~2% of obstetric populations. After those low-education women had their fetal loss, they were more unlikely to seek help from doctors, but kept trying to get pregnant, and finally came up with many times of abnormal pregnancy. The lack of knowledge about CI made them miss the opportunity of early intervention and surgical treatment. However, women with higher education experience may learn for relative knowledge via network, medical platform or other ways after their first pregnant loss and seek for help or treatment more actively, therefore reducing the impairment from CI and decrease their psychological pressure. Meanwhile, they have more channels to understand the relative knowledge of gestation well and they can better regulate their emotions during pregnancy, thus decreasing the occurrence of perinatal depression.

Table 1 shows that the self-paying rate and unemployment rate in CI group is significantly higher than the normal group, both with a P value < 0.001. Due to their history of unexplained spontaneous abortions, especially some of them had a history of pregnancy loss after emergency cervical cerclage, everything becomes extremely careful in their next gestation. Our study showed that over half of women in CI group were unemployed at home and their husbands’ earnings took up a large proportion of family income. Among CI group, 45.92% of women had a family income lower than 10000 yuan monthly while it just took about 23.49% of women in normal group. On an equal basis of medical treatment, patients with lower income had to endure larger proportion of medical expenses to total income and this would increase their financial burden, as well as mental stress. So, it’s very important for our doctors and nurses to pay close attention to CI women with low family income in daily work, particularly give them more anti-anxiety and anti-depression care and support.

To reduce perinatal mood disorders, members of our group kept in touch with those pregnant women in CI group until six weeks after delivery and provided one-to-one profession guidance. We created a group chat named “Circle of Life” on the internet with doctors and nurses in our hospital and communicated with pregnant women to help them. Online maternity schools were also founded to provide knowledge about health care, physical exercise and diet during pregnancy. All pregnant women could get support and communicate with doctors directly from the group chat and maternity school. In addition, we also print some brochure about

laparoscopic cervical cerclage, containing all the details from pathogenesis to psychological counseling until postpartum recovery. Everything we did was aim to alleviate their psychological pressure and avoid perinatal mood disorders, including anxiety and depression. Until now, 81 women of CI group have delivered successfully, with a live-birth rate of 91.36%, average gestational age at delivery of 36.69 weeks and average birth weight of 2.79 kilograms, and none of them develops into serious adverse events associated with perinatal mood disorders.

For the first time, our study tries to focus on perinatal mood disorders in second trimester pregnant women with CI and explore its risk factors, so as to provide guidance for psychological caring and counseling in clinic work. Pregnant women undergoing laparoscopic cervical cerclage will return home after surgery and perinatal mood disorders such as anxiety and depression will become difficult to identify. Once these negative emotions can not be detected timely, serious adverse effects can happen soon. Therefore, we suggest a conventionally evaluation on psychological conditions for pregnant women during their second trimester, especially their “critical week”. Appropriate assessment and early intervention can improve life quality during pregnancy and promote both maternal and infant’s health.

However, there were some limitations in the present study. Firstly, relevant factors and mental status were obtained by self-report questionnaire, therefore measurement error caused by subjective factors may exist. Secondly, since the mid-trimester abortion often occurred in maternity wards of different hospitals, it is difficult to know the psychological statements of pregnant women after their latest pregnancy loss. Lastly, participants of the present study were from different provinces all over China, our findings may not generalize to the population in other countries. Extrapolation of this study requires careful consideration.

Conclusions

In conclusion, our study shows the evidence that women with CI suffer more psychological stress and are easier to develop anxiety and depression in their next pregnancy than the healthy population. Therefore, for those people undergoing cervical cerclage, individualized and targeted mental care should be added into our clinic work routinely to prevent negative outcomes.

Abbreviations

SAS: Zung's Self Rating Anxiety Scale, SDS: Zung's Self-Rating Depression Scale, CI: cervical insufficiency

Declarations

Ethics approval and consent to participate

The study has been approved by the Ethics Committee for Clinical Research and Animal Trials of the First Affiliated Hospital of Sun Yat-sen University(#178-2020, Jun-2,2020). All procedures for the ethical conduct of scientific investigation will be adhered to by the research team. All methods were performed in accordance with the relevant guidelines and regulations. Written informed consent was obtained from all of the participants. Personal information of the participants will be treated in the strictest confidence.

Consent for publication

All participants have consented to the publication of this study.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to patient confidentiality reasons but are available from the corresponding author on reasonable request.

Competing interests

All authors declare no personal or commercial conflict of interest in this study.

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Authors' contributions

CL and QZ contributed to the analysis and interpretation of the data and revising of the manuscript. HL and JC were responsible for collection and interpretation of the data. XC and WY contributed to distribution of the questionnaires and follow-up with participants. JC and SY contributed to the conception and design of the study.

All authors read and approved the final manuscript.

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