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ORIGINAL ARTICLE

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Does caesarean section negatively influence the post-partum prognosis of low back pain and pelvic pain during pregnancy?

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Abstract Low back and pelvic pain (LBPP) is prevalent during pregnancy and also post-partum. The aetiology is poorly understood. The aim of this study was to investigate possible associations between epidural or spinal anaesthesia and caesarean section (CS) with persistent LBPP half a year after pregnancy. In a previous questionnaire study ($n = 891$) altogether 639 (72%) women had reported LBPP during pregnancy. We sent these respondents a second questionnaire at approximately 6 months post-delivery. The response rate was 72.6% ($n = 464$). The respondents were divided into three groups reporting 'no pain', 'recurrent pain' and 'continuous pain' in relation to LBPP 6 months after delivery. Pearson's chi-square test was used to test the difference between groups and logistic regression analysis was performed. Forty percent of the respondents had received epidural anaesthesia (EDA) or spinal anaesthesia during delivery and 18.5% of women had been delivered by CS. Epidural or spinal anaesthesia was not associated with persistent LBPP. There was no significant difference in CS rates between different subgroups. The risk of persistent LBPP was increased three- to fourfold in women delivered by elective CS compared with women delivered by emergency CS. Epidural or spinal anaesthesia was not associated with risk of persistent LBPP. Elective CS was associated with an increased risk of persistent LBPP. However, the results must be interpreted with caution because of a relatively small study sample.

Keywords Low back and pelvic pain · Pregnancy · Post-partum · Epidural anaesthesia · Caesarean section

Abbreviations LBPP: Low back and pelvic pain during pregnancy · Q1: The first questionnaire after delivery · Q2: The second questionnaire at approximately 6 months after delivery · CS: Caesarean section

Introduction

Low back and pelvic pain (LBPP) is a prevalent condition during pregnancy and most studies report that at least half of the pregnant population are affected [8, 17, 23] although some report a lower prevalence of the condition [2]. Some of the discrepancies in reported prevalence is probably due to different definitions of this pregnancy-related state. There is no consensus on the definition of the condition although attempts have been made in this direction [1, 33].

During pregnancy lumbal pain is most commonly stable while pelvic pain may increase [23]. The pelvic pain symptoms interfere with most activities of daily

living [6, 13] and in one-third of pregnant women back pain is a severe problem [8, 23]. The aetiology of LBPP during pregnancy is still poorly understood. Some pathophysiological mechanisms have been elucidated [24, 26, 30] although results are contradictory [5, 9, 29].

Persistence of LBPP after pregnancy varies from 5% to around 40% half a year after delivery [1, 10, 22, 25, 31]. Even at 3 years after pregnancy, as many as 20% of women with back pain symptoms during pregnancy report persistent symptoms [20] and post-partum pain is also associated with disabilities in movement-related activities [19]. Furthermore, back symptoms post-partum have been found not to represent a unitary concept [18].

Whether epidural anaesthesia results in an increased risk of persistent post-partum pain is controversial [4, 12, 27]; however, prospective and randomized studies indicate no difference in incidence of post-partum back pain between women who receive epidural anaesthesia (EDA) during labour and women who do not [4, 7, 28]. Furthermore, no association has been reported between EDA during labour and risk of debut of back pain post-partum or risk of development of LBPP in a subsequent pregnancy [11, 21]. Neither has spinal anaesthesia during vaginal delivery or during caesarean section (CS) been found to be associated with increased risk of post-partum low back pain [32].

To our knowledge it has not been reported in the literature whether CS per se influences the prognosis of low back pain and pelvic joint pain after pregnancy. However, CS has been suggested as a cause of chronic (intra-) pelvic pain [3]. Results from the present cohort have been reported elsewhere and the prevalence of persistent LBPP after pregnancy was previously estimated to be 43% [14–17].

The aim of this study was to investigate possible associations between epidural or spinal anaesthesia and caesarean section (CS) with persistent LBPP half a year after pregnancy in women who experienced LBPP during pregnancy.

Subjects and methods

In a previous study all women who delivered at the Departments of Obstetrics and Gynaecology at Umeå University Hospital (UUH) and the Sunderby Hospital (SH) in the counties of Västerbotten and Norrbotten in northern Sweden were invited to complete a questionnaire (questionnaire 1 = Q1) on their obstetric and gynaecological history, actual pregnancy, delivery and other background variables [17]. The inclusion period was 1 January 2002 to 30 April 2002. The questionnaire was usually collected before the women were discharged from hospital. For inclusion in the study, a woman had to have reached a gestational age of at least 23 weeks, ending in a live birth or stillbirth. The study used a cross-sectional design. During the inclusion period the total number of women delivered at UUH and SH was 1,114, with 516 (46.3%) delivered at UUH and 598 (53.7%) delivered at the SH. The net sample consisted of 891 respondents (Q1) and the response rate was therefore 83.2% (891/1 071). Place of delivery did not influence risk in the logistic regression analyses. Detailed information on the sample has been presented in a previous paper [17].

Women reporting LBPP ($n = 639$) during pregnancy (Q1) were followed up with a second questionnaire (Q2) within approximately 6 months. The questionnaire included 39 questions on different issues such as LBPP after pregnancy, use of medical services, family situation, perceived health, sick leave, sexual life, physical activities, oral contraception and breast feeding.

An extensive description of subjects and methods of this study is presented in another paper of this journal [14]. Altogether 77.0% (492/639) of eligible subjects responded to Q2. Twenty-eight women were excluded because they completed the questionnaire 9 months or more after date of delivery. The net sample included 464 (72.6%) women who responded to Q2.

Altogether 86/464 women (18.5%) had been delivered by CS. Their medical records were scrutinized and data on indication for CS were noted in all cases. Normally, one or two indications for CS were given, rarely three or four. The order of the indications, by importance, was assessed. In the Swedish context the indication 'psychosocial reasons' denotes a non-medical indication and includes such items as 'fear of childbirth' and 'CS on request'. In three women 'back problems' were mentioned as indication for CS; in two of these there was a combination of 'psychosocial reasons' and 'back problems' while in the third case the indication was 'scoliosis' and 'back problems'. Common indications for induction of delivery were prolonged pregnancy and premature rupture of the membranes.

Ethics

The study was approved by the Ethics Committee at Umeå University (Dnr. 01–335).

Definitions

Epidural or spinal anaesthesia during delivery

The respondents in the Q1 study responded with 'yes' or 'no' to the question whether they had received epidural or spinal anaesthesia during delivery. Other relevant definitions are given in a previous paper [14].

Statistics

Pearson's chi-square test was used to test the difference between two groups for categorical data. Mean values and standard deviations were calculated for parametric data where applicable. Cohen's kappa was used to evaluate response consistency in the questionnaire for a sub-group of respondents who completed a second, identical questionnaire. The sample was analysed with calculation of odds ratios (ORs) and their 95% confidence intervals (CIs) by univariate and multivariate logistic regression.

Results

In the present study, 185/464 (40.0%) women with LBPP during pregnancy had received EDA or spinal anaesthesia during delivery (Table 1). Of all women responding to Q1, 344/885 (38.9%) reported having received EDA or spinal anaesthesia during delivery. A greater number of women with LBPP during pregnancy (40.9%) than of women without LBPP during pregnancy (33.6%) had been given EDA or spinal anaesthesia during delivery ($P = 0.044$; data not presented previously).

Eighty-six women had been delivered by CS (86/464 = 18.5%), which also corresponds very well with the level of CS (18.9%) within the cohort made up of 891 women [17]. Indications for elective and emergency CS are presented in Table 2. There was no significant difference in the rates of CS between the groups reporting 'no pain', 'recurrent pain' and 'continuous pain' (Table 2). The distribution of elective and emergency CS was fairly equal among all women delivered by CS ($n = 86$); however, the distribution differed significantly among different groups of women (Table 2). The proportion of emergency CS of all CSs for different indications is shown in Table 2.

There was no statistical difference in assessment of highest level of pain because of LBPP either during pregnancy or after pregnancy for women delivered vaginally or by CS between the different sub-groups (Table 3).

The distribution of elective and emergency CS differed significantly between women with persistent LBPP and women with remission of LBPP, with a higher proportion of elective CS among women with persistent LBPP (Table 2). When mode of CS (elective or emergency) was evaluated by univariate and multivariate logistic regression the risk of persistent LBPP was increased three- to fourfold in women delivered by elective CS compared with women delivered by emergency CS (Table 4).

A proportion of 32.4% of the respondents (149/460) reported previous experience of low back pain or pelvic pain in life before pregnancy (Q1). The mean age of first pain symptoms because of low back pain or pelvic pain was reported to be 22.8 years (range 10–39 years, SD = 5.6 years; $n = 140$). Of those women who had experienced low back pain or pelvic pain before the pregnancy (Q1), a proportion of 45.5% reported that the original pain had started during a pregnancy (65/143).

The respondents were divided into three groups of LBPP after pregnancy: 'no pain' (i.e. remission of LBPP), 'recurrent pain' and 'continuous pain' at 6 months post-partum. The objective was to create a tool which might reflect the severity of the condition post-partum.

Table 1 Prevalence of epidural or spinal anaesthesia among different groups

Variable	All subjects (%)	No pain[a] (%)	Recurrent pain[b] (%)	Continuous pain[c] (%)	*P*-value (no pain vs. recurrent pain + continuous pain)	Non-respondents (%)	
						n	*P*-value[d]
Number of subjects (%)	464 (100.0)	264 (56.9)	168 (36.2)	32 (6.9)		175 (100.0)	
Epidural or spinal anaesthesia during delivery (Q1)	$n = 462$	$n = 262$	$n = 168$	$n = 32$	0.762	$n = 173$	0.450
Yes	185 (40.0)	100 (38.2)	73 (43.5)	12 (37.5)		75 (43.3)	
No	277 (60.0)	162 (61.8)	95 (56.5)	20 (62.5)		98 (56.6)	
Epidural or spinal anaesthesia during CS (Q1)	$n = 85$	$n = 42$	$n = 35$	$n = 8$	0.014	$n = 42$	0.663
Yes	77 (90.6)	41 (97.6)	30 (85.7)	6 (75)		37 (88.1)	
No	8 (9.4)	1 (2.4)	5 (14.3)	2 (25)		5 (11.9)	

Test of difference between groups analysed with Pearson's chi-square test; statistical testing of non-respondents versus respondents in the last column, *LBPP* low back pain and pelvic pain, *Q1* first questionnaire

[a]No pain denotes respondents reporting remission of LBPP after pregnancy

[b]Recurrent pain denotes respondents reporting recurrent LBPP after pregnancy

[c]Continuous pain denotes respondents reporting continuous LBPP after pregnancy

Table 2 Indications for elective and emergency caesarean section (CS)

Variable	All subjects delivered by CS, *n* (%)	Emergency CS, *n* (%)[a]	No pain[b] subjects delivered by CS, *n* (%)	Recurrent pain[c] subjects delivered by CS, *n* (%)	Continuous pain[d] subjects delivered by CS, *n* (%)	Pearson's chi-square test, *P*-value (no pain vs. recurrent pain + continuous pain)	Non-respondents	
							n (%)	*P*-value
Number of subjects (%)	86/464 (18.5)		43/264 (16.3)	35/168 (20.8)	8/32 (25.0)	0.152	43/175 (24.6)	0.090
Elective CS[e] (Q1)	44 (51.2)		15 (34.9)	23 (65.7)	6 (75.0)	0.003	21 (48.8)	0.803
Emergency CS[e] (Q1)	42 (48.8)		28 (65.1)	12 (34.3)	2 (25.0)		22 (51.2)	
Indications for CS[e]								
Imminent or apparent fetal asphyxia	16 (18.6)	16 (100.0)	11 (25.6)	4 (11.4)	1 (12.5)	0.118		
Abnormal labour	6 (7.0)	6 (100.0)	5 (11.6)	1 (2.9)	–			
Psychosocial reasons	9 (10.5)	2 (22.2)[f]	3 (7.0)	6 (17.1)	–			
Breech or foot presentation	18 (20.9)	4 (22.2)	10 (23.3)	5 (14.3)	3 (37.5)			
Failed induction of labour	9 (10.5)	8 (88.9)	2 (4.7)	7 (20.0)	–			
Back problems	3 (3.5)	–	1 (2.3)	2 (5.7)	–			
Previous surgery of the uterus[g]	13 (15.1)	1 (7.7)[h]	4 (9.3)	5 (14.3)	4 (50.0)			
Other indications[h]	12 (14.0)	5 (41.7)	7 (16.3)	5 (14.3)	–			

Test of difference between groups analysed with Pearson's chi-square test; statistical testing of non-respondents versus respondents in the last column, *LBPP* low back pain and pelvic pain, *Q1* first questionnaire

[a]The denominator is the total number of subjects delivered by CS within each stratum

[b]No pain denotes respondents reporting remission of LBPP after pregnancy

[c]Recurrent pain denotes respondents reporting recurrent LBPP after pregnancy

[d]Continuous pain denotes respondents reporting continuous LBPP after pregnancy

[e]The denominator is the total number of subjects delivered by CS within each column

[f]Elective CS was converted to emergency CS because of spontaneous labour

[g]Previous surgery of the uterus is equal to two or more CSs, or myomectomy performed previously

[h]Other indications include pre-eclampsia, multiple births, cephalopelvic disproportion, prolapse of the umbilical cord, placenta praevia, imminent rupture of the uterus, previous proctocolectomy, ablatio of placenta

Table 3 Assessment of highest level of pain during and after pregnancy for specified groups

Variable	All subjects	No pain[a]	Recurrent pain[b]	Continuous pain[c]
Total number of subjects	464	264	168	32
Assessment of pain during pregnancy (Q1)	$n=436$	$n=242$	$n=164$	$n=30$
Vaginal delivery	5.6 (355)	5.2 (203)	6.2 (129)	6.9 (23)
CS	6.0 (81)	5.3 (39)	6.5 (35)	7.3 (7)
P-value	0.213	0.748	0.399	0.657
Assessment of pain after pregnancy (Q2)	$n=434$	$n=235$	$n=167$	$n=32$
Vaginal delivery	3.6 (354)	1.8 (197)	5.5 (133)	8.0 (24)
CS	4.0 (80)	2.0 (38)	5.5 (34)	7.2 (8)
P-value	0.247	0.514	0.939	0.296
Assessment of pain during the previous week (Q2)	–	–	$n=167$	$n=32$
Vaginal delivery			2.5 (132)	6.7 (24)
CS			2.5 (35)	6.3 (8)
P-value			0.373	0.678

Assessment of pain, i.e. of highest level of LBPP, scored on a Visual Analogue Scale, where end-point 0 denotes 'no pain' and 10 denotes 'worst thinkable pain'

Difference between groups analysed by Pearson's chi-square test for ordinal data, *LBPP* low back pain and pelvic pain, *Q1* first questionnaire, *Q2* second questionnaire

[a]No pain denotes respondents reporting remission of LBPP after pregnancy

[b]Recurrent pain denotes respondents reporting recurrent LBPP after pregnancy

[c]Continuous pain denotes respondents reporting continuous LBPP after pregnancy

Table 4 Odds ratios (ORs) and 95% confidence intervals (CIs) for 'recurrent pain', 'continuous pain' and 'recurrent + continuous pain'

Variable	Recurrent pain[a]		Continuous pain[b]		Recurrent + continuous pain	
	Crude OR (n)	95% CI	Crude OR (n)	95% CI	Crude OR (n)	95% CI
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.58 (78)	1.40–9.15	5.60 (51)	1.01–31.23	3.87 (86)	1.58–9.46
Adjusted for maternal age						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	4.64 (78)	1.64-13.11	4.80 (51)	0.84-27.45	4.60 (86)	1.73-12.16
Adjusted for parity						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.57 (78)	1.34-9.47	5.11 (51)	0.85-30.64	3.85 (86)	1.49-9.91
Adjusted for BMI						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.09 (74)	1.17–8.10	5.54 (50)	0.97–31.43	3.40 (82)	1.36–8.46
Adjusted for EDA[c]						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.70 (77)	1.39–9.80	9.66 (50)	1.05–88.40	4.15 (85)	1.62–10.62
Multivariate analysis[d]						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.42 (74)	1.12–10.40	5.32 (50)	0.78–36.10	3.39 (82)	1.19–9.62
Multivariate analysis[e]						
Emergency CS	1.00	–	1.00	–	1.00	–
Elective CS	3.49 (73)	1.11–10.96	17.70 (49)	1.06–295.30	3.52 (81)	1.20–10.29

Reference group: women included in the 'no pain' group and delivered by emergency caesarean section (CS), *BMI* body mass index, *EDA* epidural anaesthesia

[a]Recurrent pain denotes respondents reporting recurrent LBPP after pregnancy

[b]Continuous pain denotes respondents reporting continuous LBPP after pregnancy

[c]Adjusted for epidural or spinal anaesthesia

[d]Adjusted for maternal age, parity and BMI

[e]Adjusted for maternal age, parity, BMI and EDA/spinal anaesthesia

Representativity and validity are discussed in another paper of this journal [14]. In summary, in the current (Q2) study the non-respondents did not differ from the respondents with regard to maternal age, maternal height, gestational age, birth weight, mode of delivery, pre-pregnancy and end-pregnancy body mass index

(BMI) and EDA or spinal anaesthesia during delivery. The content of the questionnaires was validated. Some respondents were asked to complete Q1 ($n = 25$) and Q2 ($n = 20$) a second time and data were compared and evaluated (Q2) [14]. Cohen's kappa for information on EDA or spinal anaesthesia during delivery (Q1; $n = 24$) was 0.92 (95% CI = 0.75-1.08).

Discussion

In total, 18.5% of the participants in the present study (Q2) underwent elective or emergency CS, which was in very close agreement with the overall percentage of women delivered by CS in the Q1 study (18.9%) [17]. The proportion of CSs was higher among women with persistent LBPP than among women with remission of LBPP (21.5 vs. 16.3%); however, in statistical testing this difference was not significant. A larger study population might have proved that CS per se may be associated with an increased risk of persistent LBPP after pregnancy.

The most interesting finding in this study is that the distribution of elective CS and emergency CS differed significantly between women with remission of LBPP and women with persistent LBPP, with an increased risk of persistent LBPP if delivered by elective CS compared with emergency CS. To our knowledge this has not been previously reported in the literature and must be interpreted with caution since it may be a chance association. If this relation does correspond to causal mechanisms the contributing factors may only be speculated at this stage. The majority of Swedish women undergoing CS receive EDA or spinal anaesthesia even during emergency CS. New long-term backache is not significantly increased in women who receive EDA during labour [28]. Epidural or spinal anaesthesia results in pain relief and/or motor blockade (depending on the anaesthetic agent/s used). During local or general anaesthesia the woman will not perceive signals of adverse positions in the low back and pelvis and therefore these positions cannot be corrected during surgical intervention. Women with advanced LBPP during pregnancy commonly suffer from frequent disturbances of sleep during the night caused by episodes of pain and consequent correction of stature. The artificial immobilization during anaesthesia and surgical intervention may result in short-term or long-term damage of joints, muscles and ligaments, which may result in an impaired prognosis for the long term outcome of LBPP during pregnancy.

A tentative explanation for the possible difference in outcome for women delivered by elective or emergency CS may be the duration of immobilization. In the emergency situation the maternal and/or fetal outcome may be time-dependent. For this reason, it is probable that procedures are performed in a more time-sparing manner resulting in a shorter period of immobilization of the woman, which may influence her long term risk of persistent LBPP after pregnancy.

A plausible explanation for the uneven distribution of elective and emergency CSs among the 'no pain', 'recurrent pain' and 'continuous pain' groups could be that increased severity of pain symptoms may have contributed to an increased 'risk' of being delivered by elective CS and may therefore have confounded the associations. All records on the women delivered by CS were scrutinized to evaluate indications for CS (Table 2). Evidently, all women had LBPP of varying degrees during pregnancy; however, only three women had an indication of back problems for their CS. No women in the 'continuous pain' group were delivered by CS as a result of back pain symptoms. As many as 20% of the indications for CS in the 'recurrent pain' group were 'failed induction of labour' where the underlying cause of induction may have been LBPP during pregnancy. However, in some cases LBPP during pregnancy may have contributed to the decision of being delivered by CS although the records do not reveal this consideration.

Whether EDA or spinal anaesthesia contribute to post-partum back problems has been debated during the last decade; however, most studies conclude that there is no increased risk for persistent back pain after EDA or spinal anaesthesia [4, 7, 12, 27, 28, 32]. In our study, there was no difference in distribution of EDA or spinal anaesthesia between women with remission of LBPP and women with persistent LBPP after pregnancy among all women included in the study ($n = 464$). However, for women who had undergone CS ($n = 86$) the distribution of EDA or spinal anaesthesia was significantly uneven for the different sub-groups. In our sample EDA or spinal anaesthesia exerted a protective effect, which we interpret as a chance association.

Conclusions

Epidural or spinal anaesthesia was not associated with long term risk of persistent LBPP after pregnancy. Elective CS was significantly associated with an increased risk of persistent LBPP after pregnancy, which is a new finding in the literature. However, the study population was relatively small and the results must therefore be interpreted with caution. Future studies should address this question with a larger sample size.

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