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Research Article

Pain Assessment after Cesarean Section with a Standardized Pain Questionnaire

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Abstract

Background: The importance of postoperative pain management after Cesarean Section (CS) becomes clear in view of the increasing CS rates and the negative long-term consequences of inadequate acute pain therapy. The aim of this study was to describe postoperative pain after CS, to assess patient satisfaction with postoperative pain management and to identify reasons associated with stronger postoperative pain.

Methods: Assessment of postoperative pain took place on the first postoperative day after CS using the PAIN OUT Outcome and Process Questionnaire. To cover a wide range of risk factors, information regarding demography, intervention, anesthesia and pain therapy as well as relevant obstetric parameters were recorded. These factors were analyzed for correlation with postoperative pain.

Results: Overall maximum pain intensity was high (7.3±1.6) but only short-lasting. Adequate pain management relieved pain by 70% (minimal pain intensity 2.1±1.6) and resulted in a good patient satisfaction in 70%. Severe postoperative pain was significantly associated with greater impairment in activity and uncertainty ($p < 0.01$, $r = 0.46$).

A weak correlation was found between maternal age and intensity of postsurgical pain (Pearson coefficient: 0.29, $p=0.021$) with women ≥35 years having stronger pain. Intensity of postsurgical pain was rated statistically significant lower by nulliparous women (6.9±1.5) compared with parity ≥1 women (7.7±1.7) ($p=0.04$).

Conclusion: Risk factors for higher pain intensity after CS were maternal age ≥35 years and parity ≥1. Therefore, a sufficient and individual pain management especially in these women is mandatory.

Keywords: Cesarean section; Pain management; Standardized questionnaire

Introduction

Cesarean Section (CS) is among the most frequently performed surgical procedures in developed countries. According to the Organization for Economic Co-operation and Development (OECD), CS rate is on average 28.1% in 2017 and has continuously risen since 2000, when it was 20% [1]. A prospective cohort-study [2] released in 2013 showed that median pain intensity after CS was 6.0±2 on a 0-10 numeric rating scale (NRS). High pain-scores after CS result from insufficient pain management. Therefore, quality control and optimization of pain management are necessary. Good postoperative pain management is paramount given the negative long-term consequences severe postsurgical pain may have: Multiple studies have shown that postsurgical pain aggravates the healing process and is a risk factor for the development of chronic pain [3-7] and postpartum depression [5]. According to Eisenach et al. [5] the risk for persistent pain and depression does not depend on the mode of delivery but on the intensity of acute postpartum pain. Quick recovery of daily functions is important particularly after birth, ensuring the mother to take adequate care for her child and establish a good mother-child relationship. The evaluation of postoperative pain may help to identify risk factors for high pain intensity. Most studies examined only the pain intensity, the influence of delivery mode and the peri- and postoperative pain therapy [2,8]. Therefore, the aim of this study was not only to describe the postoperative pain after CS using a multinational PAIN-OUT research concept, but also to assess patient satisfaction with postoperative pain management and to identify reasons associated with severe postoperative pain.

Methods

The study was carried out at the Department of Obstetrics of the University Hospital of Zurich (USZ), Switzerland, according to good clinical practice guidelines and the Helsinki Declaration. After oral and written informed consent patients were included in the study. The realization of the study was approved by the cantonal ethic commission Zurich (KEK ZH 2013-0180).

To evaluate the quality of postoperative pain management, the multinational PAIN-OUT research concept was applied (http://pain-out.med.uni-jena.de, ClinicalTri-als.gov Identifier: NCT02083835). Two questionnaires were used: 1. the outcome questionnaire for pain evaluation by the patient and the process questionnaire to collect

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information regarding demography, surgery and pain therapy. The data were anonymized and entered in the web-based PAIN-OUT data base. PAIN-OUT [9] is an international research project from the European Union (EU) founded in 2009, with the aim to improve the postsurgical PAIN-OUT come.

At our institution a primary CS is defined as an elective surgery, performed before the onset of first contractions or rupture of membranes, usually at 38 weeks of pregnancy. No premedication is normally needed. Standard surgical technique is a transversal incision after Joel-Cohen in the lower uterine segment under spinal anesthesia (SPA; using bupivacaine and sufentanyl). The postoperative analgesic regimen is a combination of paracetamol (4x1g p.o. per day), mefenamic acid (a non-steroidal anti-inflammatory drug, 3x500mg p.o. per day) and subcutaneous morphine as rescue medication in an individual dosage.

Secondary CS is defined as CS during the course of planned vaginal delivery whenever a complication with a higher risk for mother or child occurs.

Single-shot Spinal Anesthesia (SPA) is the preferred anesthetic technique for CS. In patients who already had an Epidural Analgesia (EDA) for delivery, CS was realized after deepening the sensory block by bolus injections of local anesthetic via the epidural catheter. In emergencies or in case of insufficient or contra-indicated SPA, CS was performed in general anesthesia (GA: succinyl choline, thiopental, sevofluran).

The enrollment of the study took place in February 2015. Sixty women on the first postoperative day after a CS were included.

Further, inclusion criteria were age over 18 years and written informed consent after oral information. Exclusion criteria were unwillingness to participate in the evaluation, lack of communication due to language barrier or cognitive impairment of the patient. Data were collected using the two questionnaires (outcome- and process-questionnaire). The outcome-questionnaire with questions on pain intensity (numeric rating scale, NRS: 0=no pain, NRS 10=strongest pain) as well as impairment during activity such as movements in bed or, coughing (NRS 0=no impairment, NRS 10=complete impairment) were completed by the patient. Additionally, questions on satisfaction about pain therapy (NRS 0=extreme unsatisfied, NRS 10=extremely satisfied), and wish for more pain therapy (yes/no answer) were answered by the patients. We evaluated also the non-medical methods for pain therapy and the severity of drug side effects such as nausea, drowsiness, vertigo and itchiness (NRS 0=no side effects, NRS 10=severe). Demographic and obstetric data were examined by means of the process questionnaire: age, body mass index, ethnicity, education, gravidity, parity, medical history, intervention, anesthesia as well as pain therapy before and after surgery, numbers of fetuses, gestational age at delivery, blood loss during surgery as well as weight, size and gender of the baby.

Data analysis was performed with SPSS Statistics for Windows (Version 22.0. Armonk, IBM, NY 2013). Descriptive Statistics were calculated for all variables and results are presented as mean ±standard deviation (SD) for continuous variables, or number (n) and percentage (%) for categorical variables, unless otherwise indicated. Subsequently, the variables correlation was proved for maximum pain intensity and postsurgical opioid use. This was done with Pearson Correlations Test or ANOVA, paired t-Test, Chi-Quadrat-Test and Wilcoxon Rang Sum-Test for multiple variance analysis.

Results

Demographic characteristics of the participants and their children are illustrated in Table 1. Forty women received a primary and twenty an unplanned CS. Table 2 shows an overview of the postoperative pain intensity, the percentage of time of worst pain and pain effects on mood. Two thirds of the women reported that their sleep quality was not affected by pain (64% NRS <6). Negative emotions such as insecurity and helplessness due to pain were rated with a NRS score <6 in 62% resp. 58%.

Results of the Pearson correlation indicated that there was a significant positive association between helplessness and the most severe pain since surgery ($r=0.27$; $p<0.05$).

Our analysis indicated a statistically significant, but weak positive correlation between maternal age and intensity of postsurgical pain (Pearson coefficient: 0.29, $p=0.021$) with older women having stronger pain (Figure 1).

Intensity of postsurgical pain was rated statistically significant lower by nulliparous women (6.9±1.5) compared with women who already gave birth to a child (7.7±1.7) ($p=0.04$). The distribution of maximal pain intensity for nulliparous women and women giving birth one or more times is shown in Figure 2. Child characteristics such as weight, head circumference, gender or number of fetuses were correlated with postsurgical pain intensity, but no significant association were found.

Seventy-three percent of all women (n=44) declared that they

Table 1: Demographic data of the study participants and characteristics of the children presented as mean ± standard deviation (SD) or absolute number (n) and percentage (%).

Material Characteristics	
Age [years]	35±4.8
BMI [kg/m²]	28.6±4.9
Ethnicity	
Caucasian	39 (65%)
Other	21 (35%)
Education	
Unskilled	8 (13.3%)
Professional training	20 (33.3%)
Academic Study	25 (41.7%)
Unknown	7 (11.7%)
GW at birth [Weeks]	37.5±2.8
Nulliparity	28 (46.7%)
Child Characteristics	
Weight (g)	3081±675.7
Length (cm)	48±4
Head Circumferences (cm)	34.5±2.4
Female	30 (50%)

BMI: Body Mass Index; GW: Gestational Week.

Table 2: Pain intensity, the percentage of time under severe pain and pain-related effects.

Outcome-Questionnaire	mean±SD
Worst pain [NRS]	7.3±1.6
Least pain [NRS]	2.1±1.6
Percentage of time of worst pain [%]	37±24
Pain prevented	
Activity in bed [NRS]	7.0±1.9
Deep breath/cough[NRS]	5.5±3.3
Sleep [NRS]	4.0±2.8
Activity outside bed [NRS] (n=51*)	6.7±2.1
Pain induced the feeling of	
Anxiety [NRS]	3.3±2.9
Helplessness [NRS]	4.4±3.3

*Nine women did not answer the question about impairment outside of bed.

Table 3: Surgical interventions and related parameters with their NRS values.

	Number [n(%)]	NRS±SD	p-value
Intervention			
Cesarean section (CS)	49 (82%)	7.1±1.6	p=0.13
CS and sterilization	7 (12%)	8.5±1.4	
CS and peritoneal adhesiolysis	3 (5%)	7.6±2.1	
CS and adhesiolysis from ovary and tubae uterinae	1 (1%)	6±0	
Duration			
15-25 min	20 (33.3%)	6.8±1.6	p=0.74*
25-40 min	31 (38.3%)	7.4±1.6	
40-60 min*	8 (28.3%)	8.6±1.6	
Blood loss			
≤500ml	42 (70%)	7.2±1.6	p=0.36
>500ml	18 (30%)	7.6±1.6	

*One data set missing.

received any information about pain treatment options. Pain therapy was considered to be sufficient by 70% of patients (n=42). The satisfaction with the pain therapy is shown in Figure 3. Only 17% (n=10) wished a stronger pain therapy. Four patients (6.7%) had a persistent painful condition for 3 months or more before surgery. These patients had higher pain scores compared to patients without chronic pain but without statistically significant difference (NRS 8.0 *vs.* NRS 7.2, p=0.6).

The surgery types are shown in Table 3. Additional interventions such as adhaesiolysis or tubal sterilization had no influence on postsurgical pain (p=0.13).

Also, the other characteristics such as duration of surgery (15-25 min *vs.* 25-40 min *vs.* 40-60 min; p=0.74) or blood loss (≤500ml *vs.* >500ml; p=0.36) had no significant influence on postsurgical pain intensity. We found that the highest pain scores appeared in patients with planned second section (NRS 7.8±1.7) and the lowest after primary CS (NRS 7.0±1.3). Pain scores after unplanned CS (NRS 7.1±1.8) were similar to primary CS.

Ninety-three percent of the CS were performed in regional

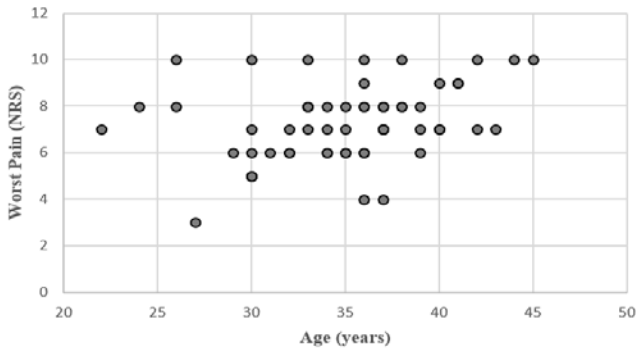

Figure 1: Correlation between age of mother (years) at time of birth and strongest pain (NRS Score).

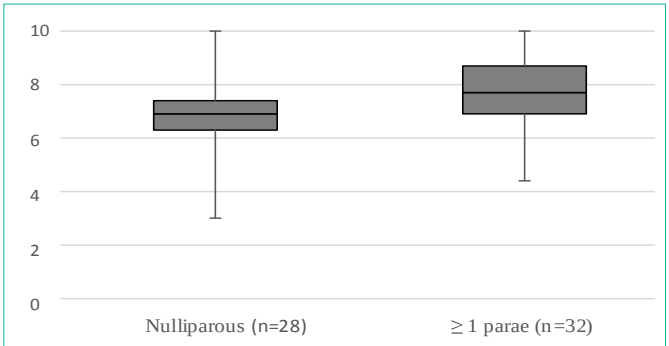

Figure 2: Box plot of the NRS values as mean ± standard deviation (SD) for the strongest pain in Nulliparous and ≥1parae.

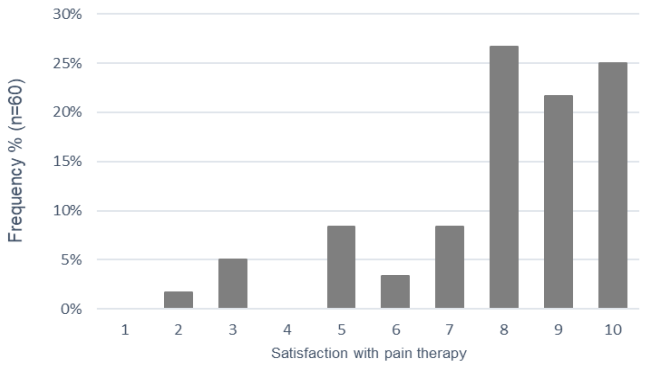

Figure 3: Satisfaction with pain therapy (0 = extremely unsatisfied, 10 = very satisfied).

anesthesia, 16.7% (n=10) of which received an EDA and 78.3% (n=47) were performed in SPA. In 11 % (n=7), a general anesthesia had to be done, in 4 cases because of an insufficient regional anesthesia. Anesthetic technique had no influence on postoperative pain (p=0.177).

Discussion

The main findings of this study are that parous women and women aged ≥ 35 years reported stronger pain compared to nulliparae and women aged less than 35 years. A higher need for painkillers in women 35 years and older supports the correlation between pain and age of patient. Ip et al. [10] and Caumo et al. [11] postulated that

preoperative anxiety could be a risk factor for postoperative pain in elderly women. We did not evaluate the preoperative anxiety but it is possible that women can remember pain from last birth, which could lead to increased postoperative pain. According to Ip et al. [10] pain before surgery leads to a lowering of the pain threshold, pain facilitation and activation of the limbic system, which favors stronger post-operative pain. According to Niklasson et al. [3], preoperative pain is not only a risk factor for postoperative pain but also for chronification of pain. A meta-analysis from Weibel et al. [12] showed that chronic pain after CS ranges between 15% at 3 months and 11% after 12 months. Kainu et al. [4] showed a higher incidence of pain persistency after CS compared to vaginal delivery. Eisenach et al. [5] emphasize that not the mode of delivery but the postsurgical pain intensity after CS is a risk factor for pain persistency. The results of this study indicate that maximal postoperative pain score on the first day after CS was much higher than the literature reports for other surgeries [2]. The multicenter study of Gerbershagen et al. [1] investigated pain intensity on the first postoperative day after different surgical interventions. The study included 70764 patient in 105 German hospitals. Overall, the mean pain intensity was NRS 5.0. The comparison between different specialties (obstetrics, gynecology, orthopedics, traumatology, urology, ophthalmology, ear nose & throat, general surgery, thoracic surgery, vascular surgery) showed a relatively high postoperative pain intensity after obstetric interventions with a NRS 6.0. Cesarean section was on the ninth place out of a total of 179 procedures, with mean NRS of 6.1. Marcus et al. [8] compared the pain intensity on the first day after cesarean section (n=811) with abdominal, laparoscopic and vaginal hysterectomy (n=2406). CS-patient reported in average higher intensity of pain (NRS 6.2) than hysterectomy (HE)-patients (abdominal HE, NRS 5.3; vaginal HE, NRS 4.8; laparoscopic HE, NRS 4.4). Compared to hysterectomy, patients after CS got significantly less opioids. These patients were also evaluated with a validated 15 item questionnaire. Compared with these two studies, our patients had higher postoperative pain intensity, but also received more opioids. Over-all satisfaction of our study participants with their pain management was high (80%). The anesthetic technique did not influence the pain intensity. In our study, all women with regional anesthesia received neuraxial opioids either intrathecal (SPA) or epidural (EDA). There are many studies that support the recommendation of the use of neuraxial opioids such as Booth et al. [13], and Lavoie et al [14]. Corresponding to the Practice Guidelines for Obstetric Analgesia [15] published in 2016, neuraxial opioid administration is the preferred way for intra- and postoperative analgesia after CS. A Cochrane review from Ng et al. [16] found no differences in intraoperative analgesia between spinal and epidural anesthesia. There was no difference to conversion to general anesthesia, postoperative analgesia or neonatal intervention. To reduce the intraoperative need for local anesthetic and to prolong the effect of the opioids, lipophilic and hydrophilic opioids are given frequently in combination. With the decrease of local anesthetic, the risk of drug side effects such as hypotension could be decreased significantly. Intraoperative use of neuraxial morphine lead to a postoperative analgesia up to 14-36 hours, while fentanyl lasted only for 2-13 hours after CS. Fentanyl and Sufentanyl are lipophilic substances with a low risk of drug side effects such as apnea or bradypnoea. These substances are therefore preferred over morphine. However, many studies and the ASA guidelines recommend the use of morphine because of limited opioid transfer to the breast milk, low oral bioavailability and unlikely negative effects on the baby [17-19].

To reduce postoperative analgesia with morphine often a multimodal management is recommended [14,20]. In the multicenter study by Marcus et al. [8], an i.v. Patient Controlled Analgesia (PCA) was used in 19% of study participants. They had the best results in terms of postoperative pain, impairment of activity and satisfaction with treatment. In our study, a PCA was used in only one participant. Another possibility to reduce pain after CS is a local infiltration of lidocaine 2% in the scar. Recording to Mansour et al. there is a significant pain reduction without any side effects [21].

Our study is limited by the small sample size and recruitment of only German-speaking women. Results can therefore not necessarily be generalized. The strength of our study is its prospective design using standardized assessment questionnaires and the accurate collection of data. This makes our results comparable to other studies using the same methods.

Conclusion

In conclusion, risk factors for higher pain intensity after CS in our study were maternal age ≥35 years and parity ≥1.

Therefore, a sufficient and individual pain management especially in these women is mandatory. A postoperative questionnaire on pain is important for evaluation and reflection of the chosen pain-management.

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