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# Postoperative pain after cesarean section: an audit of practice after implementation of the PROSPECT recommendations

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**Abstract**: Cesarean section (CS) is the most frequently performed surgical intervention worldwide. Post-cesarean pain is often underestimated and undertreated and can impair rapid maternal recovery, mother and child bonding and breastfeeding. Recently, PROSPECT recommendations on postoperative pain for CS were published and they include systematic paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs), intravenous dexamethasone, neuraxial morphine/diamorphine or an abdominal wall block or wound infiltration, abdominal wall binders, non-closure of the peritoneum and a Joel-Cohen incision. Opioids are administered as rescue. In UZ Leuven, these PROSPECT recommendations were implemented at the end of 2020. To evaluate the efficacy of these PROSPECT recommendations, a prospective audit was performed from January 1st 2021 till April 30th 2021. All CS were prospectively followed for correct implementation of the pain protocol and for pain scores in rest and at mobilization. Rescue opioid consumption was recorded as well as patient satisfaction. There were 185 consecutive CS included in the audit. In 55 patients the pain protocol was not followed mostly due to no or reduced administration of NSAIDs. Patient satisfaction was high, especially in patients in which the protocol was followed. Pain scores at rest and at mobilization were low and the percentage of patients having pain scores above 30 mm VAS remained low. Rescue opioid consumption was low. We conclude that the implementation of the PROSPECT based pain protocol after CS was effective in controlling pain, reducing opioid consumption and resulted in high patient satisfaction especially if the protocol was correctly followed. Omission of NSAIDs is occurring relatively frequent, but mostly because of valid medical reasons to omit NSAIDs.

**Keywords**: Postoperative pain; cesarean section; PROSPECT; wound infiltration; audit; dexamethasone.

## Introduction

Worldwide, cesarean section (CS) is the most commonly performed surgical procedure with an estimated 30 million procedures performed globally each year (1). As with any surgical intervention, also after CS postoperative pain can be considerable and impair rapid recovery (2). Pain in the postoperative period can make breastfeeding success more difficult. Additionally, enhanced recovery after CS programs will be more successful if pain control is optimal (3). Adequate control of pain is complicated because both midwifes and parturients are reluctant to routinely take prescribed minor analgesic drugs due to unfound fears of negative effects on the baby and on breastfeeding (2, 3). As a result, opioids might be required which can result in significant side-effects on both mother and the breastfeeding infant.

Recently, the PROSPECT group produced recommendations for post-cesarean section analgesia which include analgesic drugs and techniques as well as surgical aspects of care (4). The recommendations provide advice on surgical aspects and recommend the Joel-Cohen type incision, non-closure of the peritoneum and abdominal binders. Routine regular administration of paracetamol and NSAID's is recommended combined with a single post-delivery dose of dexamethasone. Additionally, either neuraxial long acting opioids or wound infiltration or abdominal wall blocks are recommended.

At UZ Leuven, the PROSPECT guidelines were implemented at the end of 2020 for all parturients

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*Table 1*

UZ Leuven post-cesarean section pain protocol

| Intervention | Timing and dose |
|---|---|
| Systematic regular paracetamol | 4 X 1000 mg per day either IV or oral on day 0, 1 and 2 |
| Systematic regular non-steroidal anti-inflammatory agents | Day 0: 3 x 30 mg ketorolac IV<br>Day 1 and Day 2: 4 x 400 mg ibuprofen per day |
| Single bolus of dexamethasone | After delivery of the baby, 5 mg IV |
| Single shot wound infiltration | 40 mL ropivacaine 0.375% wound infiltration at end of surgery blocking with a bilateral field block the iliohypogastric nerve, infiltration of the anterior rectus muscle fascia, rectus sheath and the subcutaneous tissue. |
| Surgical aspects | Non-closure of the peritoneum<br>Abdominal binders postoperatively |
| Opioid rescue in case of inadequate pain relief | Tramadol 3 x 50 mg on demand and oxycodone orally 5 mg maximum 2 x 24 hours. |

undergoing planned or unplanned CS. The goal of the present investigation was to evaluate the implementation of the new post-CS pain protocol and to evaluate the quality of pain relief both during rest and mobilisation and to assess patient satisfaction with pain relief. Therefore, an audit of practice was performed including all CS performed over a 4 month period.

## Methods

Following implementation of the new post-cesarean section pain protocol, which is based on the recently published PROSPECT recommendations, a prospective audit was planned to evaluate implementation and effectivity of the pain protocol. Ethical committee approval was received on October 5th 2020 (S64284, Chairperson Prof. Dr. Minne Casteels) to evaluate all consecutive CS performed during a 4-month period both planned and unplanned. Patient informed consent was waived. CS were evaluated from January 1st 2021 till April 30th 2021.

During December 2020, the new pain protocol after CS was implemented and midwifery staff, surgical staff and anesthetic staff was briefed. The new protocol was based on the PROSPECT recommendations (4). We refer to table 1 for detailed information on the protocol.

The audited primary endpoints were visual analogue pain scores at movement (coughing, standing, 2-meter walking) and at rest (resting in bed, during breastfeeding). Additionally, the need for rescue analgesia (defined as rescue drugs on top of the standard strategy of paracetamol, NSAID's, dexamethasone and wound infiltration) was another primary endpoint. A VAS score of more than 30 at movement is defined in our protocol as an uncomfortable patient in need for extra pain relief. Pain scores will be recorded by midwifes and nurses in the electronic medical file. Additionally, the investigators will evaluate pain scores, pain protocol compliance, need for rescue analgesia and patient satisfaction. Nightly visits between 11 pm and 07 am will be avoided in order to guarantee patient's rest. Complications and length of hospital stay will be recorded. Demographic variables will be recorded.

Descriptive statistics will be performed.

## Results

A total of 185 patients were included in the audit between January 1st 2021 and April 30th 2021. Demographic data are listed in Table 2. Mean length of hospital stay was 4.1 days (minimum 3.5 days and maximum 8 days).

*Table 2*

Demographic data (mean ± standard deviation)

| | |
|---|---|
| Age (years) | 31.7 ± 4.9 |
| Height (cm) | 168 ± 5 |
| Weight (kg) | 86 ± 6 |
| Pregnancy duration (weeks) | 35.4 ± 2.6 |

Planned CS accounted for 46% (n=86) cases whilst unplanned CS accounted for 54% (n=99) cases. Most procedures were performed under neuraxial anesthesia (1 single shot spinal, 85 combined spinal epidural and 96 top-ups of the in situ epidural catheter). Three CS were performed under general anesthesia.

The standard pain protocol was not followed in 55 patients (30%). Wound infiltration was not used in 1 patient, inadequate dosing of paracetamol was

given in 2 patients and in 4 patients dexamethasone was not administered. In the remaining 48 patients NSAID's were not given or given in inadequate dosing.

Overall patient satisfaction with the pain protocol was a satisfaction VAS score of 80 ± 10. Pain scores assessed at rest, at movement in bed, at coughing, at breastfeeding, at standing and during a 2 meter walk are reported in Tables 3-8. Every day patients were asked if they were comfortable and satisfied with their analgesia. On day 0, 16 women (9%) were uncomfortable. On day 1, 26 women (14%) were not comfortable. Whilst on day 2 and 3 respectively 18 (10%) and 9 (5%) women were not comfortable with their analgesia. Interestingly, out of the 130 women in which the pain protocol was followed correctly, only 2 patients (1%) indicated that they were uncomfortable with analgesia

*Table 3*

Pain scores (Visual Analogue Scale; 0-100 mm) at rest

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | 184 | 8 ± 15 | 13 (7%) |
| Day 1 morning | 185 | 11 ± 18 | 20 (11%) |
| Day 1 afternoon | 185 | 10 ± 16 | 15 (8%) |
| Day 2 morning | 185 | 8 ± 12 | 6 (3%) |
| Day 2 afternoon | 185 | 7 ± 11 | 3 (2%) |
| Day 3 morning | 185 | 4 ± 9 | 2 (1%) |
| Day 3 afternoon | 183 | 4 ± 9 | 2 (1%) |

*Table 4*

Pain scores (Visual Analogue Scale; 0-100 mm) at movement in bed

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | 184 | 24 ± 20 | 44 (24%) |
| Day 1 morning | 185 | 26 ± 17 | 44 (24%) |
| Day 1 afternoon | 185 | 24 ± 16 | 34 (18%) |
| Day 2 morning | 185 | 20 ± 14 | 19 (10%) |
| Day 2 afternoon | 185 | 18 ± 13 | 13 (7%) |
| Day 3 morning | 185 | 13 ± 15 | 13 (7%) |
| Day 3 afternoon | 182 | 13 ± 13 | 6 (3%) |

*Table 5*

Pain scores (Visual Analogue Scale; 0 – 100 mm) at coughing

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | 172 | 31 ± 20 | 25 (15%) |
| Day 1 morning | 178 | 31 ± 19 | 46 (26%) |
| Day 1 afternoon | 178 | 30 ± 19 | 44 (25%) |
| Day 2 morning | 184 | 25 ± 16 | 36 (20%) |
| Day 2 afternoon | 183 | 23 ± 15 | 35 (21%) |
| Day 3 morning | 185 | 18 ± 14 | 19 (10%) |
| Day 3 afternoon | 183 | 17 ± 13 | 12 (7%) |

*Table 6*

Pain scores (Visual Analogue Scale; 0 – 100 mm) at breastfeeding

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | 79 | 8 ± 13 | 4 (5%) |
| Day 1 morning | 118 | 5 ± 9 | 2 (2%) |
| Day 1 afternoon | 131 | 7 ± 14 | 6 (5%) |
| Day 2 morning | 134 | 6 ± 11 | 3 (2%) |
| Day 2 afternoon | 138 | 6 ± 11 | 3 (2%) |
| Day 3 morning | 140 | 4 ± 9 | 2 (1%) |
| Day 3 afternoon | 139 | 4 ± 9 | 1 (1%) |

*Table 7*

Pain scores (Visual Analogue Scale; 0 – 100 mm) at standing

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | 38 | 29 ± 18 | 9 (24 %) |
| Day 1 morning | 138 | 29 ± 19 | 42 (30%) |
| Day 1 afternoon | 166 | 29 ± 17 | 50 (30%) |
| Day 2 morning | 177 | 25 ± 15 | 41 (23%) |
| Day 2 afternoon | 180 | 23 ± 15 | 37 (21%) |
| Day 3 morning | 185 | 19 ± 16 | 26 (14%) |
| Day 3 afternoon | 183 | 17 ± 15 | 21 (11%) |

*Table 8*

Pain scores (Visual Analogue Scale) at 2 meter walking

| Time point | Number of patients evaluated | VAS score for pain (mean ± standard deviation) | Number of patients with VAS score >30 (% of total number evaluated) |
|---|---|---|---|
| Day 0 afternoon | NOT PERFORMED | NOT PERFORMED | NOT PERFORMED |
| Day 1 morning | 102 | 33 ± 20 | 40 (39%) |
| Day 1 afternoon | 148 | 52 ± 19 | 56 (38%) |
| Day 2 morning | 173 | 28 ± 16 | 54 (31%) |
| Day 2 afternoon | 174 | 25 ± 14 | 37 (21%) |
| Day 3 morning | 185 | 23 ± 16 | 32 (17%) |
| Day 3 afternoon | 183 | 20 ± 14 | 22 (12%) |

and this only on day 1 after surgery. Out of the 55 women in which the pain protocol was NOT followed correctly, 34 patients (62%) reported to be uncomfortable with their analgesia on 1 or more post CS days.

Opioid rescue medication consisted of tramadol and oxycodone. In Table 9 rescue tramadol medication is reported. Oxycodone second line rescue medication was rarely used: In 8 patients on day 0 and day 1 and in respectively 3 and 2 patients on day 2 and day 3.

## Discussion and conclusion

A new post-CS pain protocol was introduced and an audit of practice was performed to evaluate the quality of pain relief as well as adherence to the new protocol. Overall adherence to the protocol

*Table 9*

Rescue tramadol medication

| Time point | Number of patients requiring rescue medication (%) | Tramadol use (mg; mean ± standard deviation) |
|---|---|---|
| Day 0 | 68 (37%) | 25 ± 51 |
| Day 1 | 93 (50%) | 39 ± 61 |
| Day 2 | 54 (29%) | 20 ± 40 |
| Day 3 | 24 (13%) | 8 ± 30 |

was good. The protocol was not followed in 30% of patients. However, in the majority of cases this was due to the fact that NSAID's were contraindicated and could not be given due to medical reasons such as preeclampsia or a history of gastric ulcera. Pain scores at rest or at mobilization remained low and acceptable. The need for opioid rescue was low. Pain scores were highest on day 1 after surgery.

The new pain protocol after CS followed the PROSPECT guidelines (4). Part of the PROSPECT recommendations were already in place at UZ Leuven such as the use of paracetamol and NSAID's, abdominal binders, non-closure of the peritoneum and a regional technique, the transversus abdominis plane block (TAP block). The new features that were introduced are routine systemic administration of dexamethasone 5 mg after delivery of the baby, single shot wound infiltration replacing a TAP block and routine and uninterrupted administration of paracetamol and NSAIDS (as opposed to on demand administration). We refer to the PROSPECT publication as for the reasons why dexamethasone and the various regional techniques are valid strategies for pain management after CS (4, 5, 6, 7). We decided to replace the TAP block with single shot wound infiltration because it requires less technical skills and has a lower potential for side-effects. Also, the surgical aspects of the PROSPECT recommendations were already in place except for the Joel-Cohen incision. Non-closure of the peritoneum and the use of abdominal binders postoperatively is routine in our service.

It is remarkable that patients in which the pain protocol was rigorously followed, reported to be comfortable with their pain protocol and did not require any opioid supplementation. However, 60% of patients in which the standard protocol was not or could not be followed, reported not being comfortable with pain relief. In the majority of cases NSAID's were omitted from the protocol. This underlines the importance of NSAID's (and thus reduction of inflammation) for post CS pain management. Although NSAID's are relatively contraindicated in patients with preeclampsia, we would suggest that this recommendation is critically reviewed. Similarly, a relative contraindication such as a history of previous gastric ulcera should be carefully reviewed and perhaps NSAIDs are still a possibility.

Importantly, pain scores in rest but also at mobilization were evaluated and mean pain scores are low and well within limits that are generally accepted as adequate for good pain relief. At rest and during breastfeeding, only a very small percentage of patients had a VAS score more then 30 mm. During coughing, standing and walking a subgroup of patients had higher pain scores. Approximately 30% of patients reported VAS scores > 30 mm at start of mobilisation. However, this improved rapidly and by day 3 virtually all patients were comfortable also during activity. No patient received a prescription of opioids for home use.

Rescue opioid medication was low. Only 50% of patients required rescue tramadol on day 1. This was the day mobilization was initiated in most patients. The mean tramadol consumption was 39 mg indicating that usually pain was managed with one tramadol tablet. On day 0, day 2 and day 3 tramadol consumption was lower and also the number of patients requiring tramadol was lower than on day 1. Day 1 is the day patients are mobilized out of bed. Second line rescue opioid with oxycodone was almost never used.

We conclude that overall the PROSPECT based new pain protocol was well followed. Few errors occurred. However, NSAIDs were omitted in almost 30% of parturients for medical reasons. However, we feel the omission of NSAIDs should be critically reviewed especially since the patients that did not receive NSAIDs had clearly worse pain scores then those who did receive NSAIDs. Overall pain scores were low, satisfaction high and need for rescue opioid very low.

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