

THE EFFECT OF LOCAL ANAESTHETIC WOUND INFILTRATION ON POST-OPERATIVE PAIN AFTER CAESAREAN SECTION

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ABSTRACT

Objective To find out the effect of local anaesthetic (bupivacaine) wound infiltration before skin wound closure on postoperative use of opioids after elective lower segment caesarean section.

Study design A randomized clinical trial.

Place & Duration of study Department of Obstetrics & Gynecology, Delma hospital WMR, UAE, from March 2007 till May 2009.

Methodology Thirty patients were assigned randomly to receive either 20ml of 0.5% bupivacaine or 20ml normal saline solution (group A - placebo group) that was injected in the subcuticular tissue and fascia before closure of the skin. Pethidine consumption was measured during the postoperative period till 24 hours. Postoperative pain was assessed at 30 minutes, and 2, 4, 6, 12 and 24 hours after operation with a visual analog scale (VAS). Data were analyzed by the student t-test

Results The two treatment groups were treated by the same physicians and all had elective lower segment caesarean sections via Pfannenstiel incision. There was a decrease in opioid consumption and pain on visual analog scale in the group B that received local anaesthesia, as compared with the placebo group. (group A). The total consumption of pethidine between the groups was 113 mg versus 73.3mg ($p < 0.05$).

Conclusion Pre-emptive analgesia with 20ml of 0.5% bupivacaine infiltrated before closure of the skin decreased postoperative analgesia request with pethidine in patients who underwent elective lower segment caesarean section by Pfannenstiel incision.

Key words Pre-emptive analgesia, Local anaesthesia, Caesarean section.

INTRODUCTION:

The advent of various multimodal analgesia techniques has greatly facilitated the management of postoperative pain.¹ Opioids like pethidine and morphine, are the most widely used and cost-effective agents. Augmentation of intravenous analgesia has been achieved with regional nerve blockade, particularly for patients undergoing hysterectomy or caesarean delivery.^{2,3} Opioids cause sedation and

its secretion to breast milk leads to sedation of the newborn. Improvements in pain relief that makes the postanesthetic period less uncomfortable are important after caesarean section because childbirth involves bonding with the newborn and starting breast feeding.

The rationale behind the use of pre-emptive analgesia is to stop pain from starting by blocking the usual response of nervous system to pain. The local anaesthesia is used to protect the central nervous system from the deleterious effects of noxious stimuli. According to some neural pain pathway theories, the stimulation of superficial pain receptors may further sensitize the nervous system to painful sensation.⁴ Elimination of some of the superficial components

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of the pain after caesarean delivery could modulate the perception of deeper visceral pain. The data from previous studies suggest that the infiltration of local anaesthesia into the wound during caesarean delivery appears to be effective in reducing postoperative narcotic requirements. This study is particularly important in light of the growing number of women giving birth by caesarean section all around the world. Preventing or reducing the postoperative pain and narcotic use allows good well-being of the mother, enhance bonding and breast feeding. This study was conducted to confirm above mentioned advantages.

METHODOLOGY:

A randomized clinical trial was conducted at the department of Obstetrics & Gynaecology, Delma Hospital WMR UAE from March 2007 till May 2009. Thirty female patients aged 19-41 years, weighing 52-89 kilograms, scheduled for elective caesarean section under general anaesthesia were studied. All were classified as American society of anesthesiologists (ASA) physical status I – II. In all cases, written informed consent was obtained before inclusion in to the study. The study was performed as prospective, randomized, double blind, placebo controlled trial. The use of standard 10 mm visual analog scale (VAS) for scoring pain was explained to the patient during the pre-operative visit. No preoperative oral or intravenous analgesia was given. Pre-medication was given as ranitidine 150 mg orally two hours before surgery. The general anaesthesia technique was standardized and remained the same in all the cases. Fentanyl 100mcg was given to supplement analgesia at the end of the procedure. No opioid administered at the time of emergence.

The patients were divided randomly in two groups. A random number table was used. All syringes were blinded to surgeon and anaesthesiologist, identical-appearing pre-filled, and with numerical code secured in the pharmacy.

Group A patients received 20 ml of 0.9% saline infiltration and group B patients received 20 ml of 0.5% bupivacaine infiltration. Both groups received the infiltrations in the subcuticular tissue and fascia before closure of skin. The patients were treated by the same physicians, and all patients had Pfannenstiel incision. All patients received non-steroidal anti-inflammatory drugs (diclofenac sodium) 100mg suppositories during the immediate postoperative period and repeated every 12 hours for the first 24 hours, to support analgesia.

The patients received opioids (pethidine) as a postoperative analgesia, on demand and when visual analogue score was equal or more than four. Observations concerning opioid consumption and the time for the first analgesic request were documented. The total dose of analgesic drug was calculated for each patient. Post-operative pain was evaluated at 30 minutes, and 2, 4, 6 and 24 hours after operation using 10 mm visual analogue scale by the nurse, who was unaware of the treatment groups. Two sided Students t-test was used to compare mean data from the two groups.

RESULTS:

The study enrolled a total number of 30 patients, 15 in each group. The data of group A (placebo group) who received normal saline and group B (bupivacaine group) regarding age, weight, height and the length of operation were in a similar statistical range. No side effects were recorded in both groups.

The total consumption of opioid (pethidine) after 24 hours was significantly different between the two groups 113mg vs 73.3mg ($P < 0.05$), the $t = 2.09$, $SD = 52.3$, degrees of freedom = 28. The probability of this result, assuming the null hypothesis, was 0.045. The details are as follows:

Group A: Number of patients= 15
50.0 50.0 50.0 50.0 100. 100. 100. 100. 100. 100.
150. 150. 200. 200. 200.

Mean = 113.
95% confidence interval for Mean: 85.66 through 141.0
Standard Deviation = 55.0
Hi = 200. Low = 50.0
Median = 100.
Average Absolute Deviation from Median = 40.0

Group B: Number of patients= 15
0.00 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50.0
100. 100. 100. 150. 200.

Mean = 73.3
95% confidence interval for Mean: 45.66 through 101.0
Standard Deviation = 49.5
Hi = 200. Low = 0.00
Median = 50.0

Average Absolute Deviation from Median = 30.0.

The first request for opioid was statistically different between the two groups with $P < 0.05$, $t = -2.50$, $SD = 53.3$, degrees of freedom = 18. The probability of this result, assuming the null hypothesis, was 0.022.

Group A patients showed higher pain intensity on

visual analogue score, both clinically and statistically, in comparison with group B patients at the end of 30 minutes, 2 hours, 4 hours, 6 hours and 24 hours on average, with $t = 2.33$ $SD = 1.49$, degrees of freedom = 28. The probability of this result, assuming the null hypothesis, was 0.027.

DISCUSSION:

In this study, the effect of local anaesthetic infiltration of the wound before closure of the skin on postoperative pain was investigated. Post-caesarean section pain is an important issue in obstetrics. Several studies have shown the importance of adequate postoperative analgesia on mobilization, rehabilitation, and decreasing the length of hospital stay.⁵ Further, it enhances bonding between the mother and the newborn.

We have found that infiltration of the wound with local anaesthesia with concomitant non-steroidal anti-inflammatory agents significantly decreased postoperative pain and narcotic use (pethidine) in the postpartum period. Our aim was to decrease narcotic use because they are associated with sedation, slow return of bowel function, and its secretion into breast milk can lead to sedation of the baby. The injection of local anaesthesia before or after incision has been shown in some studies to provide short-term pain relief after the operation.⁶ Many studies have evaluated the use of local anaesthesia after abdominal hysterectomy⁷ or caesarean delivery. These studies have shown conflicting results.⁸ The conflicting evidence may be due to the short duration of action of the local anaesthetics like lidocaine and bupivacaine as pre-emptive analgesic to block postoperative pain.⁹ This study was performed in a randomized, blinded manner that would be expected to minimize most confounding variables.

The use of local anaesthesia after caesarean delivery would not be expected to have an effect on uterine pain. However, it is uncertain what proportion of pain after a caesarean delivery is produced by superficial structures and what proportion is produced by deeper visceral structures. Furthermore, according to some neural pain pathway theories, the stimulation of superficial pain receptors may further sensitize the nervous system to painful sensation. Thus, elimination of some of the superficial components of the pain after caesarean delivery could modulate the perception of deeper visceral pain. The significant reduction in narcotic use that was associated with the use of local anaesthesia in this study, suggests that a substantial amount of this pain is superficial in origin.

According to Cochrane Researchers local anaesthetics are part of integrated pain management strategies for caesarean section operations, provided that consideration is given to the cost. Local anaesthetics can be given, in addition to general or regional anaesthetics, to manage pain during and after operations. The local anaesthesia is either injected to block nerves in the abdominal wall or applied directly to the wound. The researchers reviewed data from 20 studies that together involved 1,150 women who gave birth by caesarean section in both developing and developed countries. They found that women treated with local anaesthetic did not require as much morphine or other opioid drugs for pain relief after their operations. When non-steroidal anti-inflammatory drugs were also given, pain was reduced further.¹⁰

The commonly used local anaesthetic agents do have side effects but these are very rare, ranging from allergy to cardiovascular and central nervous system effects. Furthermore, there is no report of side effects in infants following local anaesthetic infiltration.

A meta-analysis of 19 trials of pre-incisional versus post-incisional administration of local anaesthetics did not support the pre-incisional infiltrations.¹¹ This is because only four studies demonstrated reduction in pain, decrease analgesic consumption, or delay until first analgesic request with pre-incisional analgesic in this meta-analysis.

The rationale behind the use of pre-emptive analgesia is to stop pain from starting by blocking the nervous system usual response to pain. The trauma from a surgical incision may cause the nerves in the spinal cord to "wind up" which leads to heightened sensitivity and enduring pain after surgery. With pre-emptive analgesia we can prevent the sensitizing reaction to the surgical incision, thereby reducing post-surgical pain.

Instead of taking a reactive approach, we can take preventive measures against pain before surgery starts.¹² Gabapentin is reported to possess antihyperalgesic and antiallodynia properties, but less opioid-related side effects such as vomiting and pruritus.¹³ Some studies found that gabapentin has an analgesic and opioid-sparing effect in acute postoperative pain management when used in conjunction with opioids,¹⁴ while others indicated that gabapentin has no effect on immediate pain after the operation but decreases pain one month postoperatively.¹⁵

CONCLUSION:

Local analgesia infiltration as adjunct to general anaesthesia is of benefit in caesarean section by reducing opioid consumption and postoperative pain.

Intraoperative wound instillation of ropivacaine extraperitoneally subfascially fails to provide analgesia after remifentanyl-isoflurane for abdominal hysterectomy. *Acute Pain* 2005;7:133-7.

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