

ACTUALIZĂRI

## Analgesia after Caesarean section: are neuraxial techniques outdated?

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### Abstract

Parturients do not feel ill and bedridden like other patients undergoing the same incision. Therefore they dislike motor impairment which is at risk with catheters placed in the lumbar area. The problems with breast feeding are overemphasized but may partly explain the increase in popularity of other modalities such as the use of minor analgetics, single dose spinal morphine covering the first 24 hours, TAP blocks and wound related techniques. More studies are required to determine the optimal catheter placement, nature, dose and concentration of drugs given into the wound or their improved outcome justifying their increased cost. Similarly more cost/benefit studies should be performed to evaluate whether the pain in these patients is not underestimated and undertreated and how outcome can be further improved and discharge accelerated. Especially with a 50% shortening of the hospitalisation noticed during the last 10-15 years, optimisation of post-caesarean delivery pain may play a more important role, but obstetricians should determine discharge criteria more strictly.

**Key words:** Caesarean, analgesia, postoperative

J Rom Anest Terap Int 2009; 16: 129-133

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### Introduction

Pain relief after Caesarean section (C-section) varies from a single suppository to high tech invasive analgesia techniques for 48 h. Despite ethical differences in pain perception, similar to postoperative pain relief in general, analgesia after Caesarean section may be severely undertreated for several reasons. Parturients are not always considered as 'patients' because there is no disease involved. Not infrequently, pain relief

is restricted to minimum because of the wrong belief that this is the best way to avoid sedation, to maintain the patient as mobile as possible to care for her baby while preventing thromboembolism and to optimize breast feeding.

### Breast feeding

Analgesics are often considered to be responsible for unsuccessful breast feeding. However, pain relief should not be blamed alone. Other factors of importance are anxiety, separation of the mother from her child, postpartum tubal ligation, emergency surgical delivery and social factors. Drugs may theoretically affect the success of breast feeding but a distinction should be made between the effect of drugs upon the neonate and the effects upon milk production. It cannot be ignored that opioids and sedative substances should be titrated very carefully rather than administering them in to large boluses as used on previous occasions. In several studies, concentrations of opioids have been

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measured in colostrums, but estimating their effect upon the neonate seems extremely difficult [1-3]. Although concentrations may be even higher than in plasma, the small volumes delivered to the neonate and the low bioavailability of oral opioids do not seem to affect neonatal behaviour or the quality of breast feeding to a large extent. On the other hand, and probably more important, persistent pain will also negatively affect mother-child bonding and the success of breast feeding. A better quality of analgesia, even if obtained with parenteral morphine, may improve the success of breast feeding [4]. In conclusion, there is no reason why C-section patients should have to choose between good analgesia and breast feeding.

### Systemic non-opioid and opioid analgesia

Moderate pain can be treated by minor analgesics such as paracetamol (oral, i.v.) and NSAIDs. As a C-section requires a lower abdominal incision it may be expected that in the majority of patients the use of these substances, surely when used alone may be insufficient. NSAIDs have been shown to reduce pain caused by uterine cramping [5]. Ketorolac has been given preoperatively resulting in more stable haemodynamics, less pain, lower cortisol levels without premature closure of the ductus arteriosus [6].

Despite some exceptions, numerous studies were able to demonstrate the effectiveness of all these substances, either when used alone or combined in their opioid dose sparing up to 40%, although this was not necessarily reflected by different pain scores or less side-effects [7, 8]. Analgesics can be given on demand or as a fixed schedule. Drugs that can be administered intravenously merit some preference over those to be given intramuscularly.

Although weak to strong opioids may be administered as a nurse administered intermittent bolus by different routes, Parent Controlled Analgesia (PCA) by intravenous route has been very popular for the relief of many types of postsurgical pain. Morphine is still the most widely used opioid for intravenous PCA. Demand doses of 1-2 mg with a 5 min lock-out and a 1 hr limit of 5-8 mg is accepted worldwide. Other possible drugs are piritramide (0.75-2 mg per bolus), pethidine and tramadol (20-25 mg bolus) but experience with these substances is more limited. As cost-benefit studies have shown a higher acquisition cost of PCA without any further outcome difference, this may partly explain the fading popularity of opioid PCA during the last years [9]. Actually morphine PCA is mostly used as a rescue and study tool for comparison with other modalities rather than as a standard technique.

## Neuraxial analgesic techniques

### *Single / multiple dose epidural opioid analgesia*

Opioids may be added to the local anaesthetic required for effective epidural anaesthesia during the surgical procedure. This may prolong analgesia for several hours. Morphine is still the opioid offering the longest duration of analgesia but its onset is rather slow. The optimal dose has been found to be 3.75 mg [10]. Lipophilic opioids on the other hand may, because of their rapid onset, can be more useful for intraoperative analgesia but the duration of their action is rather limited to a few hours which may cast some doubt on their real benefit in terms of outcome. They will require extreme vigilance during the first 20 minutes when plasma concentrations will be the highest. Fentanyl and sufentanil (buprenorphine and pethidine to a lesser extent) are the most popular lipophilic substances whereas morphine (tramadol to a lesser extent) is still the most widely used hydrophilic substance being at risk for delayed respiratory depression. However, several thousands of patients have been reported now receiving epidural morphine on the surgical ward [11]. Although becoming less popular, opioid administration may be repeated if the catheter is maintained postoperatively.

Recently extended release morphine has been used for relief of C-section pain. Doses of 10-17 mg have been suggested but similar alertness should be considered as with conventional morphine [12].

### *Single dose intrathecal opioids*

Unless via a spinal catheter, only a single dose can be given during spinal anaesthesia. Morphine will offer the longest benefit whereas fentanyl analogues will be more beneficial to suppress intraoperative, visceral pain, while prolonging the interval to the first analgesic request by few hours only.

Several studies have repeatedly shown that the optimal dose is 100 µg, while higher doses will not offer a dose dependent improvement of analgesia but only increasing side-effects [13, 14]. As morphine doses are extremely low, this modality may affect breast feeding success the least. After the effect of spinal morphine is fading, further pain relief can be provided by starting minor analgesic substances. Spinal morphine may reactivate oral herpes simplex more than intravenous administration [15].

Effective lipophilic doses have been found to be 6.25 µg for fentanyl and 2.5 µg for sufentanil, but research to determine the optimal dose/effect ratio is lacking.

### ***Prolonged neuraxial pain relief (CEI or PCEA)***

In fact, catheters should ideally be placed at the lower thoracic level but this is not feasible with Combined Spinal Epidural (CSE) anaesthesia being the technique of choice in > 60% of the hospitals in Belgium.

A crucial question is whether continuous lumbar neuraxial analgesia is the technique of choice for post-Caesarean pain. It may be considered a waste of energy to prematurely remove the catheter placed following epidural or CSE anaesthesia, while others may consider it as a waste of time to provide pain relief in the lower abdomen by the 'exotic' perispinal lumbar route. In addition, the fading popularity of the prolonged use of the epidural catheter may be attributed to the effects upon micturition and the use of Low Molecular Weight Heparin (LMWH), increasing the concerns with respect to the timing of catheter removal.

As lipophilic opioids have a rather short duration of action and local anaesthetics may also be of further benefit for other than analgesic reasons, the prolonged epidural use of such a combination remains the best option to provide excellent analgesia. All kind of study designs have been used in non-obstetrical surgery to compare Patient Controlled Epidural Analgesia (PCEA) and Continuous Epidural Infusion (CEI) with other analgesic modalities, including intravenous PCA. The association of opioids with local anaesthetics may act synergistically and the comparison with i.v. PCA has left no doubt in most studies about the regimen which is most effective. PCEA may consume lower analgesic doses which may be further reduced with NSAIDs [16]. However, up to date no study was able to show improved outcome with the more expensive PCA modality. In fact, during the last seven years no important study has been published about the continuous use of the epidural route for pain relief after caesarean section.

Since 1990 pain after Caesarean delivery in our hospital has been treated with PCEA. In 1997 we started to give a single dose of spinal morphine supplemented with minor analgesics. Midwives seemed to dislike this change. Therefore we performed a cost-efficiency study to compare PCEA (bupivacaine 0.06% + sufentanil 1 µg/ml) with morphine 0.15 mg intrathecally [17]. Rest and dynamic pain scores were significantly in favour of the PCEA treated patients especially during the second 24 hours. This did not affect satisfaction, quality of sleep length of hospitalisation which was 7-8 days at that time. Morphine resulted in more nausea and vomiting probably because of the 50% larger than recommended dose. The price for the superiority of PCEA was 35 euro mainly by the more expensive equipment and prolonged

Post Anesthesia Care Unit (PACU) stay. Actually, cheaper equipment is available while most patients receiving low dose spinal bupivacaine/sufentanil may bypass the recovery unit.

### **Wound infiltration, infusion or PCRA (Patient Controlled Regional Analgesia)**

Local anaesthetics may be administered by direct application into the wound. Although this has been done since more than a decade, actually, continuous administration seems to gain popularity. There may be some uncertainty about the optimal placement of catheters (above or under the fascia and depending whether the peritoneum is closed or not by the surgeon). While some use a conventional epidural catheter placed subcutaneously, the most sophisticated but probably better application consists of a multipore catheter. A design exists of a catheter entering the wound at both sides, whereas one part remains subcutaneously while another arm is placed subfascially. Pain relief may not be complete because the peritoneum may cause the most pain while it is difficult to infiltrate although spraying may be successful [18]. In addition, the patient may still feel the post-delivery uterine contractions as opposed to neuraxial techniques. There is no consistency in the optimal concentration or hourly volume to be given for C-section or abdominal hysterectomy. Concentrations should be potent enough (e.g. bupivacaine or levobupivacaine 0.25%). Apart from excesses in the used concentrations used, the most common concentrations reported are 0,2-0,5% (bupi, levo or ropivacaine, range 0.125-0.75%) with boluses up to 10ml, infusion rates up to 5 ml/h and total hourly doses of 12 mg (bupi and levo, range 10-25 mg) and 20 mg (ropivacaine, range 10-50 mg) [18-22]. There is a lack of studies comparing wound infiltration techniques with more commonly used analgesic modalities. The few comparative studies resulted in contradictory results [21, 22]. Lack of success with wound techniques may be explained by less optimal catheter placement or choice of the local anesthetic solution. However, there is also uncertainty whether a bolus dose is required and boluses infusion should start before incision, before or after skin closure. Catheters can be connected with an elastomeric pump or PCA pump delivering a preset volume either continuously or on demand. Actually, a large choice of catheter types and pumps containing a wide range of volumes and delivering variable infusion rates do exist, while prices have increased (ranging between 90 and 160 euro for the combination catheter + pump) which may be far too much in relationship with the questionable benefit.

## Less common drugs and techniques

Much concern has been given recently to the development of chronic pain and hyperalgesia following C-section. Balanced, multimodal analgesia has been recommended to avoid undertreatment [23]. Suggested techniques, despite lack of studies on optimal dosing, include intravenous ketamine, epidural and intrathecal clonidine, neostigmine and midazolam and wound infusion with NSAIDs and ketamine [24-28]. Among new techniques, especially since the availability of ultrasound equipment, TAP blocks have been found to reduce morphine requirements by 75% [29]. Also ilioinguinal and iliohypogastric infusion techniques may be successful [30].

## Conclusions

Although it is probably the best quality of complete analgesia we can offer nowadays, neuraxial techniques seem to become less and less popular. Although the single use of neuraxial morphine remains widely used, the improved quality obtained with systemic non-opioid substances and tailored analgesia with opioid-PCA makes it increasingly difficult to demonstrate better outcomes with continuous or patient-controlled analgesia by the epidural route. Newer techniques such as wound catheters and TAP blocks are gaining increased interest. It remains to be proven whether the expensive wound catheter systems and encapsulated morphine are safer and cause better outcomes as compared to classical techniques. In addition, more studies are required to determine the exact incidence and possible contributing factors of the development of chronic pain after Caesarean section.

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## **Analgezia după operația cezariană: sunt tehnicile neuraxiale depășite?**

### **Rezumat**

Parturientele nu se simt bolnave și țintuite la pat ca alți pacienți supuși unei operații similare. Prin urmare, ele nu suportă alterarea funcției motorii care poate fi urmarea plasării cateterelor în regiunea lombară. Problemele în legătură cu alăptarea sunt exagerate, dar pot explica parțial creșterea în popularitate a altor modalități de analgezie, precum utilizarea analgezicelor minore, o doză mică de morfină subarahnoidian cu efect pe durata primelor 24 ore, blocurile TAP și tehnicile de analgezie la nivelul plăgii operatorii. Sunt necesare mai multe studii care să determine plasamentul optim al cateterului, natura, doza și concentrația medicamentelor injectate la nivelul plăgii sau dacă rezultatele mai bune justifică costurile mult mai mari. De asemenea, mai multe studii privitoare la raportul cost-beneficiu ar trebui efectuate pentru a stabili dacă durerea la acești pacienți nu este subestimată și subtrată și în ce fel evoluția poate fi în continuare ameliorată și externarea accelerată. În special, prin scăderea cu 50% a spitalizării observată în ultimii 10-15 ani, optimizarea durerii post naștere prin cezariană ar putea juca un rol mult mai important, cu condiția ca obstetricienii să determine mult mai strict criteriile de externare.

**Cuvinte cheie:** cezariană, analgezie, postoperator