International Journal of Obstetric Anesthesia (2014) 23, 302–308
0959-289X/$ - see front matter
http://dx.doi.org/10.1016/j.ijoa.2014.07.004

ORIGINAL ARTICLE

ELSEVIER
www.obstetanesthesia.com

Bupivacaine-soaked absorbable gelatin sponges in caesarean section wounds: effect on postoperative pain, analgesic requirement and haemodynamic profile

S. Simavli,[a,b] I. Kaygusuz,[b] T. Kinay,[a] A. Akinci Baylan,[c] H. Kafali[b]
[a]*Department of Obstetrics and Gynecology, Izzet Baysal State Hospital, Bolu, Turkey*
[b]*Department of Obstetrics and Gynecology, Turgut Ozal University School of Medicine, Ankara, Turkey*
[c]*Department of Anesthesia and Reanimation, Izzet Baysal State Hospital, Bolu, Turkey*

ABSTRACT
Background: Pain is a common distressing adverse effect in the early postoperative period following caesarean section. The aim of this study was to investigate the effect on postoperative pain, analgesic requirement and haemodynamic profile of placing a suprafacial bupivacaine-soaked absorbable gelatin sponge in the caesarean section wound.
Methods: A total of 164 healthy patients scheduled to undergo general anaesthesia for elective caesarean section were randomised to a study group (n=81) or a control group (n=83). In the study group, a bupivacaine-soaked absorbable gelatin sponge was placed subcutaneously in the caesarean section wound. Intramuscular diclofenac 75 mg was given to all patients at 8-h intervals during the first 24 h. Postoperatively, visual analogue scale pain scores, requirement for pethidine and diclofenac and changes in blood pressure and heart rate were compared between groups.
Results: Pain scores were lower in the study group compared to the control group at all assessments (P <0.001). During the first eight hours after surgery, fewer patients in the study group required rescue pethidine compared with the control group (4 vs. 33, P <0.001). In the study group, total opioid and diclofenac consumption was lower (P <0.001), and blood pressure and heart rate were lower (P <0.001) compared to the control group.
Conclusion: Suprafascial wound placement of a bupivacaine-soaked absorbable gelatin sponge improved postoperative analgesia and decreased opioid consumption following caesarean section.

Keywords: Gelatin sponge; Bupivacaine; Caesarean section; Postoperative pain

Introduction

Caesarean section (CS) rates are increasing worldwide, and pain is the most common adverse effect in the early postoperative period.[1] Effective postoperative pain relief improves the quality of recovery and the resumption of normal activities. Many options are available for postoperative pain relief following CS, including systemic and neuraxial analgesic techniques; the choice determined by drug availability, institutional protocols, individual preference, available resources and financial considerations.[2]

Multimodal analgesia has the goal of obtaining additive analgesia with fewer side effects by combining analgesics with different mechanisms of action.[3] The addition of non-steroidal anti-inflammatory drugs (NSAIDs) potentiates the effects of opioids, decreasing their consumption and reducing side effects.[4,5] Local anaesthetic administered via wound instillation is an alternative to opioid-based analgesic regimens for the treatment of acute postoperative pain,[6] and has been described after gynaecological and obstetric surgery.[7–9] Sustained release of local anaesthetic may be advantageous by reducing pain without impairing the recovery.

Absorbable gelatin sponges (Spongostan®, Ferrosan, Soborg, Denmark) contain haemostatic material and may be used for local application in surgical procedures with venous haemorrhage and exudation in situations where traditional haemostasis is difficult.[10] In addition to its haemostatic effect, an absorbable gelatin sponge can be used as a drug reservoir to provide sustained release of drugs.[11,12] In a previous study by our group, we found that use of bupivacaine-soaked gelatin sponge in the episiotomy bed decreased postpartum pain and

Accepted July 2014
Correspondence to: Serap Simavli, Laboratory of Reproductive Endocrinology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA 02115, USA.
E-mail address: serapsimavli@yahoo.com

total analgesic requirement, which we considered to be related to maintenance of higher concentrations of local anaesthetic in the wound.[11] In another study, we found that placement of bupivacaine-soaked gelatin sponge in the CS wound resulted in decreased postoperative anxiety and postpartum depression, and increased patient satisfaction.[13] In the latter study, we also found that opioid consumption was decreased when a bupivacaine-soaked gelatin sponge was applied; however, this was a secondary outcome of the study and therefore requires confirmation.

The current prospective, double-blind study aimed to determine the effect on postoperative pain and analgesic consumption of placement of a bupivacaine-soaked gelatin sponge in CS wounds. We hypothesised that its use would provide enhanced postoperative analgesia when given in conjunction with NSAIDs. We assessed postoperative pain scores, analgesia requirements and maternal haemodynamic changes.

Methods

This prospective, randomised double-blind single-centre study was carried out in the Obstetrics and Gynecology Department, Bolu Izzet Baysal State Hospital, Turkey, between July 2012 and April 2013. The study was approved by the Turgut Ozal University Human Ethical Committee and complied with the Helsinki Declaration including current revisions and Good Clinical Practice guidelines. A total of 164 American Society of Anesthesiologists (ASA) physical status I–II women scheduled for elective CS were recruited. Inclusion criteria included age 18–35 years, gestation 37–40 weeks, and general anaesthesia. Exclusion criteria included history of pelvic surgery, chronic pelvic pain, known allergy to any of the planned perioperative medications, hypertension, diabetes mellitus, evidence of intrauterine growth restriction and inability to understand a visual analogue scale (VAS). Indications for CS were repeat CS, cephalopelvic disproportion, breech position, placenta praevia or maternal request. All patients received preoperative information about the routine duration of surgery, anaesthesia, and recovery as well as the postoperative period and were instructed on how to use a 10 cm VAS for measurement of pain scores (0 cm=no pain; 10 cm=worst possible pain).

Patients were randomly assigned to the study (n=81) or control (n=83) group according to computer-generated random numbers. Patient demographics, such as age, gravidity, parity, weight, height, economic class, education level and occupation were recorded. Patients and all medical staff, except the obstetrician who performed the surgery, were blinded to group assignment.

According to hospital protocol, if there are no medical reasons to prefer one method of anaesthesia, information is given to patients and they are asked whether they want spinal or general anaesthesia. Overall, 80–90% of our patients choose general anaesthesia. For this reason, we decided to perform this study in patients receiving general anaesthesia. All patients received intravenous 0.9% saline 500 mL and were preoxygenated with 6 L/min of 100% oxygen for 3–5 min. We then administered propofol 3 mg/kg and rocuronium 0.5 mg/kg. Anaesthesia was maintained with oxygen, air and sevoflurane 1.5% with mechanical ventilation (tidal volume 500 mL, frequency 12/min, FiO_2 0.5). Anaesthesia was administered by the same anaesthetist (AAB) in all cases. Surgery was performed by one of two obstetricians (SS or TK) via a Pfannenstiel incision. After delivery and umbilical cord clamping, cefazolin 1 g, oxytocin 20 U diluted in 0.9% saline 1000 mL and intravenous fentanyl 1 μg/kg were administered. Neostigmine and atropine were given to antagonise residual neuromuscular block during skin closure, after the return of spontaneous respiration. After skin closure, intravenous tramadol 1 mg/kg was administered.

A bupivacaine-soaked gelatin sponge was placed in the wound subcutaneously after closing the abdominal fascia (between abdominal fascia and skin) without suturing (Fig. 1) and left until it dissolved approximately two weeks later. The skin incision was closed in the normal way. The dose of bupivacaine and length of sponge were chosen using the same methodology as previously described;[11] the length was matched with that of the incision and 1 mL of bupivacaine (5 mg/mL) was injected into each centimetre of gelatin sponge immediately after placing it in the wound as shown in Fig. 1. The maximum dose of bupivacaine used was 75 mg. All patients received routine postoperative care in addition to regular analgesics. Diclofenac 75 mg was given intramuscularly to all patients at 8-h intervals during the first 24 h, and if needed it was also administered on the second postoperative day. All patients received oral paracetamol 500 mg at 6-h intervals during the first 48 h postoperatively. If the patient indicated that analgesia was inadequate during the first 24 h, intramuscular pethidine 50 mg was given as rescue.

The primary outcome measure was pain scores during the first 48 h postoperatively, recorded at eight time points: 1, 4, 8, 12, 18, 24, 36 and 48 h. Secondary outcomes included postoperative analgesic requirement (diclofenac, pethidine), side effects (nausea, vomiting

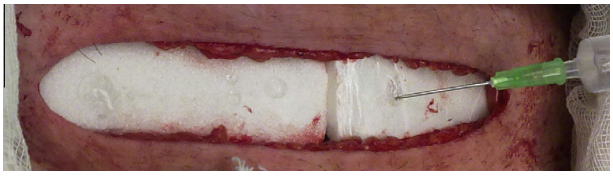

Fig. 1 Gelatin sponge placed in the caesarean section wound