

Original Article

Does Bupivacaine Infiltration Reduce Postoperative Pain in Patients with Caesarean Section? A Randomized Control Trial

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Abstract

Objective: To evaluate the effects of bupivacaine wound infiltration with placebo during a caesarean section in terms of mean pain scores, analgesic need, and hospital stay duration.

Methodology: This was a randomized controlled trial, took place at the Pak Emirates Military Hospital's Department of Gynecology and Obstetrics from January 10th, to April 10th, 2021. A computer-generated lottery approach was used to divide the patients into two groups. Patients in group A received 20 ml of sterile water infiltrated into the subcutaneous tissue around the incision site, whereas patients in group B received 0.5 percent bupivacaine injection.

Results: A total of 298 patients were enrolled, with 149 patients in each group. In terms of patient age, parity, gestational duration, and indication of caesarean section, both groups had a comparable profile. At one, two, and six hours after surgery, the bupivacaine group had considerably lower pain scores, but the difference was not statistically significant at 12 hours. In comparison to patients in the placebo group, patients in the bupivacaine group required lower doses of supplemental analgesia in the form of opioid ($p = 0.001$) and had a shorter hospital stay ($p = 0.008$).

Conclusion: When used as an adjunct to non-steroidal anti-inflammatory drugs (NSAIDs), local infiltration with 20 ml of 0.5 percent bupivacaine during caesarean section not only reduces postoperative pain intensity and opioid requirement, but also has a significant impact on reducing the length of hospital stay.

Keywords Analgesic, Analgesia, Bupivacain, Caesarean section local anesthetic,

Cite this article as: Yasrab M, Ahmed M, Shaheen T, Khawar M, Ahmed F, Ali M. Does Bupivacaine Infiltration Reduce Postoperative Pain in Patients with Caesarean Section? A Randomized Control Trial. J Soc Obstet Gynaecol Pak. 2021; 11(4):254-258.

Introduction

The rate of caesarean section has increased rapidly in recent decades.^{1,2} According to the information collected from a hundred and fifty countries, almost 18.6% of the entire births are due to caesarean section, with rates starting from 6% to 27% in different regions.³ In Egypt and Turkey, the rate of caesarean section is over 50%.⁴ The Caesarean section rate in 2013 was 15.8% in Pakistan, 11.5% in rural areas and 25.6% within urban population.⁵

One of the most common surgical procedures nowadays is a Caesarean section, which is associated with moderate to severe pain thereafter. Inadvertent injury to

the parietal peritoneum and the nerves supplying the skin causes post-caesarean discomfort. It has been discovered that up to 70% of women will have significant pain following surgery⁶. The mother-baby bond, breastfeeding, and the patient's rehabilitation are all affected by pain following a caesarean section. It also lengthens hospital stays and restricts movement, raising the risk of thromboembolism after surgery. Postpartum depression and pain that lasts 8 weeks after delivery have also been linked to severe post-caesarean section pain.⁷ Effective postoperative analgesia is critical after a Caesarean operation to allow for early mobility and newborn care. It's critical that the analgesics used are

Authorship Contribution: ¹Proposed topic of study, manuscript writing, ²Interpretation of results and Manuscript writing, ³Literature review and data collection, ⁴References and quality insurer, ⁵Methodology and statistical analysis, ⁶Literature review and interpretation of results

Funding Source: none

Conflict of Interest: none

Received: Sept 26, 2021

Accepted: Feb 16, 2022

both safe and effective, with minimum adverse effects for both the mother and her infant.⁸

The best painkiller for postoperative pain after a caesarean section is yet unknown. This has been accomplished using a variety of approaches. The most usual way is to utilize parenteral opioids, but the hazards of nausea, vomiting, drowsiness, and respiratory depression in both the mother and the kid limit their usage. Continuous epidural or patient-managed analgesia is also effective and has few adverse effects, but it is expensive and requires specialized equipment and knowledge.⁹ Analgesic effects are provided by local anaesthetics such as lignocaine and bupivacaine, which inhibit nerve impulses from the wounded area. There is, however, no conclusive proof in this regard. Some research has found high efficacy, while others have found no advantages.¹⁰

This study was conducted to evaluate the effectiveness of 20 ml 0.5% bupivacaine wound infiltration after cesarean section on postoperative pain levels and analgesic needs. If found to be effective, this scheme is cheap and easy to use and can be implemented locally

Methodology

A double-blind, randomized clinical trial was conducted in the Department of Obstetrics and Gynecology at Pak Emirates Military Hospital with the approval of the Institutional Review Board. This study was conducted from January 10th to April 10th, 2021 under study registration number NCT04728308 (<https://register.clinicaltrials.gov/>). Sample size was calculated by using Open EPI sample size calculator. For reference, we used the local study, confidence of 95% and power of 80. In this calculation the method used involved the mean difference of two groups (the means and SD from referenced study were used as Group 1: mean 1.86 + 1.34, Group 2: 2.60 + 2.28).¹⁸ The sample size was calculated to be 202 with 101 patients in each arm (but we included all the patients that fulfilled the inclusion criteria during our study period that were a total of 298)

Our inclusion criteria were pregnant women aged 20-40 years, ASA class II, BMI 35 at the time of operation, gestation 37+0- 40+0 weeks, elective caesarean section under spinal anaesthetic, pfennensteil skin incision, and lower segment transverse incision on the uterus. Exclusion criteria were a local anaesthetic allergy, an emergency caesarean section, a conversion of spinal anaesthesia to general anaesthesia, a caesarean

section due to aberrant placentation, a midline skin incision, and an upper segment incision on the uterus.

The technique was explained to the patients who met the inclusion criteria, and they were taught how to utilize the visual analogue scale (VAS) in particular. Written informed consent was obtained. A computer-generated system randomly separated patients into two groups. On the day before surgery, all patients were interviewed by the researcher and reviewed by a consultant obstetrician and a consultant anaesthetist.

A well-trained consultant obstetrician performed the Caesarean section under spinal anaesthetic. A 20 ml syringe containing either 20 ml of 0.5 percent Bupivacaine or 20 ml of placebo was given to the surgeon (distill water). Our researcher obstetrician prepared the syringe. The operating surgeon and the patient was uninformed of the contents of the syringe, which were determined by figures generated by the computer. The operative surgeon injected the solution in subcutaneous tissue around the incision before sealing it.

Our primary goal was to compare the two groups' postoperative pain in terms of average pain score measured with a visual analogue scale (VAS) and total dose of analgesia required in the first twenty-four hours after surgery. The average length of stay in the two groups of patients was our secondary result.



Patients were given an intravenous injection of ketorolac 30mg every eight hours in the surgical ward for the first twenty-four hours. VAS was used to assess patients' pain levels at 1, 2, 6, and 12 hours following surgery. This score was explained to patients before to surgery. Patients were asked to rate their pain on a scale of one to ten, with zero indicating no discomfort and ten indicating the most severe pain they had ever felt. When the VAS reached 4, we administered a Tramadol 1mg/kg intravenous infusion. The dose of tramadol provided to patients in the first twenty-four hours, as well as the length of their stay in the hospital, were both recorded.

With the help of SPSS version 16, we input all of the data and examined it. We calculated mean and standard deviation for quantitative data like mean pain score, average dose of opioid necessary, and average length

of hospital stay, and frequency and percentage for qualitative variables like indication of caesarean section. We utilised an unpaired T-test to compare quantitative factors between the two groups, and a chi-square test to examine qualitative variables. A 0.05 p-value was considered significant.

Results

Age range in this study was from 18 to 35 years with mean age of 28.755±2.04 years, mean gestational age 32.958±2.01 weeks and mean weight was 63.843±7.42 kg. Middle cerebral artery doppler test diagnosed 37%, uterine artery doppler test 19.8% and delivery outcome diagnosed 55.2% patients with Intra uterine growth restriction as shown in Table I.

Middle cerebral artery doppler test has shown sensitivity of 61.3%, specificity 93%, diagnostic accuracy by 76%, PPV 91.5% and NPV 66.1% (p=0.000) for diagnosis of Intra uterine growth restriction are shown in Table II and 3 respectively. Uterine artery doppler test has shown sensitivity of 28.3%, specificity 90.7%, diagnostic accuracy by 56%, PPV 78.9% and NPV 50.6%

(p=0.001) for diagnosis of Intra uterine growth restriction are shown in Table II , III and IV respectively.

Discussion

Postoperative pain is caused by surgical wounds, so inhibiting pain signals at the surgical site should assist lessen pain severity. Local anaesthetic infiltration into the subcutaneous tissue inhibits pain transmission by binding to fast sodium channels in the axons of nociceptive afferent neurons, preventing action potential propagation across them. By reducing the local inflammatory response to injury, local anaesthetics also prevent pain fiber activation.^{11,12} Local anaesthetics are a useful alternative for pain treatment after a caesarean section since they have fewer side effects such sleepiness, nausea, and vomiting. This is because the mother is expected to feed the infant and care for other parts of the newborn quickly after the surgery.

Bupivacaine is a local anaesthetic that works for a long time. Nerve blocks, epidural anaesthesia, and caudal anaesthesia all involve bupivacaine. It is used for epidural anaesthesia in obstetrics because it has a more selective effect on sensory nerve fibers than motor nerve

Table I: Maternal characteristics of study groups (n=149)

Characteristics	Group A (placebo group)	Group B (Bupivacaine group)	p value
Age (years)(mean +SD)	29.11 ± 2.44	29.47 ± 2.04	0.17
Parous (number (%))			
Nulliparous	30 (20.1%)	26 (17.4%)	0.56
Para1 and above	119 (79.3%)	123 (82.3%)	
Gestational age (weeks) (mean +SD)	38.17 ± 0.50	38.11 ± 0.53	0.32
Indication (n(%))			
Repeat	129 (86.6%)	132 (88.6%)	
Mal-presentation	17 (11.3%)	14 (9.3%)	0.64
CPD	0	1 (0.6%)	
Other	3 (2.0%)	2 (1.3%)	
Operative time (min) (mean ± SD)	40.14 ± 5.59	39.74 ± 5.36	0.47
Length of hospital stay after caesarean section(hours) (mean ± SD)	50.93 ± 4.90	49.43 ± 4.75	< 0.05 (0.01)

Table II: Postoperative analgesic treatment and pain assessment in study groups by VAS score (n=149)

	Group A (placebo group)	Group B (Bupivacaine group)	P value
Pain score 1 hour after surgery	1.56 ± 0.50	1.38 ± 0.49	0.002
Pain score 2 hours after surgery	5.48 ± 0.58	1.62 ± 0.79	0.000
Pain score 6 hours after surgery	5.13 ± 0.36	2.65 ± 0.80	0.000
Pain score 12 hours after surgery	2.09 ± 0.64	1.94 ± 0.68	0.070
Total opioid consumption in the first 24 hours (mg)	59.07 ± 10.70	29.93 ± 7.28	0.000
Nausea and vomiting	40 (26.84%)	29(19.46%)	0.071
Allergic reaction	0	0	

fibers.^{13,14} We investigated whether bupivacaine wound infiltration provided efficient analgesia following a caesarean operation. When comparing patients who got bupivacaine wound infiltration to those who received placebo, pain intensity as measured by the visual analogue score was shown to be lower in those who received bupivacaine wound infiltration. At 1, 2, and 6 hours following surgery, pain levels were found to be significantly decreased. We also saw a significant decrease in opiate intake and length of stay in the hospital. Anthony Akinloye Bamigboye conducted research to see how wound infiltration with a local anaesthetic affected pain after a caesarean section. They concluded that the difference in visual analogue score between the study group and the control group was not statistically significant. However, he discovered that patients who got bupivacaine wound infiltration used less morphine over the course of 24 hours than those who received a placebo.¹⁵ Similarly to Anthony Akinloye Bamigboye, Nguyen et al discovered the same conclusion.¹⁶ A comparable study was carried out in Pakistan at a tertiary care hospital, and the researchers discovered that bupivacaine infiltration causes a substantial difference in postoperative pain and opioid demand after caesarean section.¹⁷ They did, however, have a smaller sample size than our study. In Islamabad, Pakistan, a study was conducted employing wound infiltration with ropivacain, a local anaesthetic, after a caesarean delivery. It also revealed a significant decrease in VAS score and the necessity for extra analgesia.¹⁸

J Padmanabhan et al investigated the efficiency of local anaesthetic wound infiltration in patients undergoing laparotomy with a midline incision¹⁹. They discovered no statistically significant differences in pain scores or opioid use. They came to the conclusion that midline incisions cause more nerve injury and so had a weaker sensitivity to local anaesthetics. The efficacy of continuous subcutaneous bupivacaine infusion in lowering postoperative pain and opiate intake was tested by Azin alvi and colleagues, and the results were statistically significant.²⁰ There have been no major negative effects associated with local infiltration of bupivacaine in any of the investigations that have been undertaken.

We discovered in our research that local infiltration of 0.5 percent bupivacaine after a caesarean section can lessen the intensity of pain, opiate intake, and length of hospital stay. As a result, the patient will be able to care for her newborn, will be able to mobilize sooner, and will

have a faster recovery. Its method is straightforward; it does not necessitate intense monitoring and has few negative effects on both the mother and the infant. More studies on the usefulness of bupivacaine in postoperative caesarean section pain reduction are needed before it may be used for this purpose.

Conclusion

During caesarean section, local infiltration with 20 ml of 0.5 percent bupivacaine, used as an adjuvant to non-steroidal anti-inflammatory medicines (NSAIDs), not only reduces postoperative pain intensity and opioid demand, but also has a substantial impact on reducing hospital stay duration.

References

1. Shabila NP. Rates and trends in cesarean sections between 2008 and 2012 in Iraq. *BMC pregnancy and childbirth*. 2017 Dec 1;17(1):22.
2. Jafarzadeh A, Hadavi M, Hasanshahi G, Rezaeian M, Vazirinejad R, Aminzadeh F, Sarkoobi A. Cesarean or Cesarean Epidemic?. *Arch. Iran. Med.* 2019;22(11):663-70.
3. Bhatia M, Banerjee K, Dixit P, Dwivedi LK. Assessment of Variation in Cesarean Delivery Rates Between Public and Private Health Facilities in India From 2005 to 2016. *JAMA network open*. 2020;3(8):e2015022-.
4. Mumtaz S, Bahk J, Khang YH. Rising trends and inequalities in cesarean section rates in Pakistan: Evidence from Pakistan Demographic and Health Surveys, 1990-2013. *PloS one*. 2017;12(10):e0186563.
5. Lavand'homme P. Postoperative cesarean pain: real but is it preventable?. *Curr Opin Anaesthesiol*. 2018;31(3):262-7.
6. Ismail S, Shahzad K, Shafiq F. Observational study to assess the effectiveness of postoperative pain management of patients undergoing elective cesarean section. *Journal of anaesthesiology, Clin Pharmacol*. 2012;28(1):36.
7. Moriyama K, Ohashi Y, Motoyasu A, Ando T, Moriyama K, Yorozu T. Intrathecal administration of morphine decreases persistent pain after cesarean section: a prospective observational study. *PLoS One*. 2016;11(5):e0155114.
8. Mohamed MS, Abd El-Razik AN, Abd El-Ghani NA. A comparative study of low dose ketamine versus magnesium sulfate for local wound infiltration after cesarean section. *MJMR*. 2019;30(1):72-77.
9. Gao Y, Guo M, Du C, Zhang H, Zhang H. Clinical study of ultrasound-guided transversus abdominis plane block for analgesia after cesarean section. *Medicine*. 2019 Oct;98(41). e17542.
10. Cohen MR, Smetzer J. Patient-controlled analgesia safety issues. *J. Pain Palliat. Care Pharmacother*. 2005;19(1):45-50.
11. Behdad S, Sekhvat L, Ayatollahi V, Meshkat F, Mortazavi A. Comparison of postoperative analgesic effect of tramadol and bupivacaine subcutaneous infiltration in patients undergoing cesarean section. *Acta clinica Croatica*. 2013;52(1.):93-7.

12. Sarwar A. Effectiveness of Local Bupivacaine Wound Infiltration in Post-Operative Pain Relief After Caesarean Section. *J Soci Obstet Gynaecol* . 2016;6(3):125-8.
13. Ilfeld BM. Liposome bupivacaine in peripheral nerve blocks and epidural injections to manage postoperative pain. *Expert Opin Pharmacother*. 2013;14(17):2421-31.
14. Dumlu EG, Tokaç M, Öcal H, Durak D, Kara H, Kılıç M, Yalçın A. Local bupivacaine for postoperative pain management in thyroidectomized patients: a prospective and controlled clinical study. *Turk. J. Surg. /Ulusal cerrahi dergisi*. 2016;32(3):173.
15. Bamigboye AA, Hofmeyr GJ. Caesarean section wound infiltration with local anaesthetic for postoperative pain relief—any benefit?. *S. Afr. Med. J*. 2010;100(5):313-319
16. Nguyen NK, Landais A, Barbaryan A, M'barek MA, Benbaghdad Y, McGee K, Lanba P. Analgesic efficacy of pfannenstiel incision infiltration with ropivacaine 7.5 mg/mL for caesarean section. *Anesthesiology research and practice*. 2010;2010
17. Amin SA, Tahir SH. Impact of bupivacaine infiltration of postoperative wound on parenteral narcotic analgesic requirement for pain. *Journal of Surgery Pakistan*. 2010 Oct;15:177-81.
18. Nasir F, Sohail I, Sadiq H, Habib M. Local wound infiltration with ropivacaine for postoperative pain control in caesarean section. *Cureus*. 2019 Sep;11(9).
19. Padmanabhan J, Rohatgi A, Niaz A, Chojnowska E, Baig K, Woods WG. Does rectus sheath infusion of bupivacaine reduce postoperative opioid requirement?. *The Annals of The Royal College of Surgeons of England*. 2007;89(3):229-32.
20. Alavi A, Salehpour S, Narimani M. The Efficacy of Postoperative Wound Infusion with Bupivacaine for Pain Control after Cesarean Delivery: Randomized Double Blind Clinical Trial. *Journal of Family and Reproductive Health*. 2007:59-64.