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ORIGINAL ARTICLE

Intraperitoneal chloroprocaine is a useful adjunct to neuraxial block during cesarean delivery: a case series

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ABSTRACT
Background: Use of intraperitoneal local anesthetic to treat intraoperative pain during cesarean delivery has not been described previously. The aim of this study was to determine if intraperitoneal chloroprocaine may be useful as an adjunct to neuraxial block in reducing the proportion of patients with severe intraoperative pain that requires conversion to general anesthesia. Intraperitoneal chloroprocaine was administered during cesarean delivery as a potential alternative, when the anesthesiologist considered performing a general anesthetic due to severe intraoperative pain.
Methods: A keyword search for "chloroprocaine" was performed for patients on labor and delivery between November 2013 and March 2017. Patients were included if cesarean delivery was initiated with neuraxial anesthesia and there was documented intraoperative intraperitoneal instillation of chloroprocaine.
Results: Among 2479 patients who had cesarean delivery with neuraxial anesthesia, 32 received intraperitoneal chloroprocaine (mean dose 11.8 mg/kg). No patients exhibited signs of local anesthetic systemic toxicity or required conversion to general anesthesia. Among the 32 patients who received chloroprocaine, 17 had improved pain scores documented after instillation.
Conclusion: Intraperitoneal chloroprocaine may be useful as part of a multimodal approach to managing intraoperative pain during cesarean delivery.

Keywords: Local anesthetic; Intraperitoneal; Chloroprocaine; Cesarean delivery; Anesthesia; Neuraxial

Introduction

Compared to general anesthesia, neuraxial anesthesia is associated with a lower risk of maternal aspiration and airway compromise, exposes the baby to less anesthetic, and allows for greater maternal involvement in the birth process. For these reasons, it has become the preferred method of anesthesia for cesarean delivery.[1–3] Unfortunately, suboptimal neuraxial anesthesia is not rare. In a prospective observational study of 3568 cesarean deliveries, Rukewe et al. found a 9% incidence of spinal anesthetic failure.[4] The rate of conversion from regional to general anesthesia was 2% for elective cesarean delivery,[5] and 5% when a labor epidural catheter was already in place.[6] In addition, incomplete neuraxial anesthesia raises the concern of legal liability.[7,8]

In 1975 Ranney et al. described intraperitoneal local anesthetic (IPLA) administration in 218 patients that underwent cesarean delivery under local field block alone.[9] Patients were administered up to 100 mL of 1% procaine. Some of this was injected into the skin and fascia, and the remainder was diluted to 0.5% and "spilled" into the peritoneum.[9] Although IPLA received little attention following this publication, recent publications have surfaced showing that IPLA can treat intraoperative pain, prevent postoperative nausea, decrease early

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postoperative pain and opioid administration, and shorten hospital length of stay.[10–16] Chloroprocaine is advantageous due to its short plasma half-life (11–21 seconds), given the possibility of significant vascular uptake when poured into a surgical wound that may have open venous channels.[17]

To our knowledge, this is the first study to report the effect of chloroprocaine IPLA on intraoperative pain during cesarean delivery. The aim of this study was to determine if intraperitoneal 2-chloroprocaine (3%) may be useful as an adjunct to neuraxial block in reducing the proportion of patients with severe intraoperative pain that require conversion to general anesthesia. This case series presents our experience with 2-chloroprocaine IPLA, administered after delivery of the baby, in 32 patients. The efficacy, risks, and benefits of this technique as well as the anesthetic management are presented.

Methods

Data collection in preparation for this case series was approved by the Institutional Review Board at Oregon Health and Science University (STUDY00015129). Study registration and patient consent were not required by the Institutional Review Board because of the retrospective nature of the study.

A keyword search for "chloroprocaine" was performed in patients' medical charts on labor and delivery between November 1, 2013 and March 31, 2017. The chart of each patient identified as having received chloroprocaine was reviewed for route of administration and the procedure associated with its administration. Thus, a cohort of patients receiving IPLA during cesarean delivery was identified.

At our institution, intraoperative pain during cesarean delivery (identified by verbal complaint, facial grimace, or changes in vital signs) has historically been treated first with intravenous opioids or epidural local anesthetics. Unremitting pain was then managed using a multimodal approach that included propofol infusion, nitrous oxide, ketamine, or IPLA. The backup plan for patients in this case series that were not successfully treated with IPLA was general anesthesia. An endotracheal tube, laryngoscope, propofol, and succinylcholine were within reach of the anesthesia provider at the time of IPLA administration. There was no institutional protocol or training program to guide the administration of chloroprocaine IPLA. Providers learned about IPLA by word of mouth. For the cohort of patients identified as receiving IPLA, the providers were identified and queried: "Where was the patient's pain?"; "Did IPLA seem to relieve the pain?"; and "Would the next intervention have been general endotracheal intubation?"

The anesthesia provider performing IPLA selected the dose, with most providers choosing to administer close to the recommended maximum intravenous dose of 11 mg/kg. All providers chose to administer chloroprocaine post-delivery, during uterine exteriorization and repair, perhaps due to their concern about local anesthetic toxicity and possible effects on the baby. Anesthesia providers that thought their patient could benefit from IPLA asked them if they would like to try an experimental approach to relieving pain that involved pouring numbing medicine into their stomach. If the patient agreed, chloroprocaine could be administered within a minute, as the vials were stored in the anesthesia cart. The IPLA technique was performed in the following manner (Fig. 1): the uterus was retracted in a caudal direction to expose the intraperitoneal space, chloroprocaine was poured in, two sides of the Pfannenstiel incision were grasped by a resident surgeon, the solution was agitated with a goal of widespread dissemination until the patient stated their pain was relieved (typically 1–2 minutes, but always less than 5 minutes), and the solution was suctioned in order to limit systemic absorption and risk of local anesthetic toxicity.

The following maternal and obstetrical characteristics were sought: age, height, weight at time of cesarean delivery, body mass index (BMI), modified Mallampati scale score, parity, and gestational age. All patients were screened for obstructive sleep apnea. The following surgical and anesthetic details were collected: the urgency of cesarean delivery, the type of neuraxial block (anesthesia mode), the number of needle redirections required to access the spinal or epidural space, and whether conversion to general anesthesia was required. The number of anesthesiologists that used IPLA during the study period was determined, expressed as a number and percentage of total anesthesiologists that staffed the labor and delivery unit during the study period.

Fig. 1 Two chloroprocaine vials and sterile basin; materials required to administer intraperitoneal local anesthetic. Original photo by authors

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