Egyptian Journal of Anaesthesia (2016) **32**, 385–390

HOSTED BY

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Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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www.sciencedirect.com

Research Article

Assessment of the analgesic potency of ropivacaine 0.2% versus ropivacaine 0.5% in transversus abdominis plane block after cesarean delivery

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Received 1 December 2015; revised 26 February 2016; accepted 22 March 2016
Available online 30 April 2016

KEYWORDS

Ropivacaine;
Transversus abdominis plane (TAP) block;
Cesarean delivery

Abstract *Background:* Transversus abdominis plane (TAP) block provides sensory block from T6 to L1. It is one of the most widely used regional analgesic techniques and important component of multimodal approach for postoperative analgesia in multiple lower abdominal surgeries.
Objective: To compare between the analgesic potency of ropivacaine 0.2% and ropivacaine 0.5% when used in transversus abdominis plane (TAP) block for post operative analgesia after cesarean delivery.
Patients and methods: Fifty parturients with American society of Anesthesiologists Physical Status I or II aged between 25 and 35 years undergoing cesarean delivery with general anesthesia were included in this prospective, randomized, double blind study. They were randomly divided into 2 groups according to the concentration of ropivacaine used in TAP block. The 1st group received bilateral 20 ml of 0.2% ropivacaine while the 2nd received the same volume of 0.5% ropivacaine at the end of the surgery. Intensity of postoperative pain at rest and during movement, time to 1st analgesic request, total dose of tramadol used, time to 1st mobilization from bed, parturients satisfaction of pain management, and complications of TAP block were recorded.
Results: Visual Analogue Scale (VAS) at rest and during movement, time to 1st analgesic request, total dose of tramadol, time to 1st mobilization from bed, patients satisfaction of pain management were comparable between the two groups.
Conclusion: Ropivacaine 0.2% when used in TAP block provided postoperative analgesia similar to ropivacaine 0.5% in TAP block after cesarean delivery.

1. Introduction

Postoperative pain after cesarean delivery represents a major problem that facing both the obstetrician and the anesthesiologist; it is mainly related to the abdominal wall incision and dissection of the abdominal muscles [1]. Inadequate postoperative

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Peer review under responsibility of Egyptian Society of Anesthesiologists.

http://dx.doi.org/10.1016/j.egja.2016.03.003

analgesia after cesarean delivery delays ambulation with subsequent increased risk of thromboembolism, and harms mother–baby relationship [2]. Goal standard for postoperative pain is opioids whether administered systemic or neuraxial but it is associated with many side effects such as nausea, vomiting, pruritus, constipation, and respiratory depression [3]. Multimodal approach of postoperative analgesia which combines parenteral analgesics with regional analgesic techniques may enhance analgesia of each component and decrease its side effects [4]. Transversus abdominis plane (TAP) block represents one of the most widely used regional analgesic techniques and important component of multimodal approach for postoperative analgesia [5]. Transversus abdominis plane (TAP) is a neurovascular plane between the internal oblique muscle and the transversus abdominis muscle through which pass the nerves supplying the anterolateral abdominal wall [6]. Application of the local anesthetics in this plane will produce myocutaneous sensory block between T6 and L1 (TAP) block which is suitable for pain relief in abdominal surgeries [7]. TAP block was described for the 1st time by Rafi in 2001; he called the technique as refined abdominal field block. TAP block has been used successfully as an important element of multimodal postoperative analgesia for many abdominal procedures such as cholecystectomy, gynecological laparoscopy, appendectomy, nephrectomy, and cesarean delivery [8].

Establishment of TAP block requires injection of large dose of LA in this relatively vascular plane which leads to potential neurotoxic plasma level of the LA [9], especially during pregnancy which increases susceptibility of the pregnant women to local anesthetic toxicity [10].

The aim of this study was to compare between ropivacine 0.2% and ropivacaine 0.5% as regards their analgesic potency and safety when they used in TAP block for postoperative analgesia after cesarean delivery performed under general anesthesia.

2. Patients and methods

This prospective, randomized, double blinded study was performed in El –Minia university hospital in the period from July 2014 to July 2015. After obtaining approval of the local ethics committee of the faculty of medicine and informed written consents from all the parturients, fifty parturients ASA I or II aged from 25 to 35 years scheduled for cesarean delivery under general anesthesia. Parturients with coagulopathy, infection in the site of the block, allergy to LA used, or sensitivity to prescribed analgesics, who are unable to understand visual analogue scale (VAS) were excluded.

Parturients included in the study were randomly allocated into two equal groups according to the concentration of the ropivacaine used in TAP block by random allocation software (windows software, version 1.0, May 2004). The allocation ratio was 1:1 and the group identification cards were put in sealed and opaque envelops to hide allocation. The local anesthetic solution was made by the pharmacist in a glass bottle labeled as A or B. Parturients were injected with 20 ml of this solution in each side in the TAP. At the end of the study these labels were known from the pharmacist that A was ropivacine 0.2% while B was ropivacaine 0.5%. Anesthesiologist, parturients, and nursing staff who follow up the parturients were blinded with the concentration of ropivacaine used. Parturients were instructed to use Visual Analogue Scale (VAS) 0/10 to assess the post operative pain, where 0 represents no pain while 10 represents the worst possible pain. Parturients were cannulated when they entered the operation room and they preoxygenated for 3 min through face mask. Standard monitoring (pulse oximetry, electrocardiogram, capnography, and non invasive blood pressure measurement) was applied to the parturients. Induction of anesthesia was done by thiopental 5 mg/kg and succinylcholine 1 mg/kg followed by tracheal intubation with suitable size of endotracheal tube with cricoid pressure. Maintenance of anesthesia was done by isoflurane 1% and atracurium 0.25 mg/kg to maintain train–of- four (TOF) at 1 throughout the surgery using peripheral nerve stimulator and mechanical ventilation was adjusted to keep end-tidal PaCo2 at 35–45 mmHg. After delivery of the baby, the parturients received 5 international units (I.U) bolus dose of oxytocin and 40 I.U as continuous infusion. 1 μg/kg fentanyl was administered to the parturients after delivery. At the end of the surgery and after wound closure TAP block was performed by the guidance of ultrasound device CHISON Ultrasound Diagnostic System model ECO 3 Chison Medical Imaging Co., Ltd. No 8, XIANG NAN ROAD, SHUO FANG, NEW District, WUXI, China, 214142 with broadband linear array probe 6–11 MHz.

2.1. Technique of TAP block

After complete disinfection and sterilization of the entry site which located in the midaxillary line midway between the costal margin and the iliac crest, 150 mm Stimuplex needle (B-Braun Medical, Bethlehem, PA, USA) was advanced in the neurofascial plane between the internal oblique muscle and transversus abdominis muscle using plane technique. Once the needle was introduced in the correct place 20 ml of the LA solution was injected. Visualization of hypoechoic layer between the two muscles on injection of the local anesthetic solution was considered as the end point of success of the block [11]. This procedure was repeated on the other side.

After the end of the TAP block anesthesia was terminated and neuromuscular block was antagonized by 2.5 mg neostigmine plus 1 mg atropine, then extubation was done when airway reflexes returned. Parturients considered awake when they could open their eyes on command.

Parturients were transferred to the post anesthesia care unit (PACU) where they were observed by nursing staff blinded with the concentration of LA used. Parturients received analgesic regimen of 1 gm of intravenous paracetamol/24 h, and diclofenac 75 mg I.V infusion/8 h starting from the time of admission to PACU to overcome the visceral component of postoperative pain. Parturients were advised that they could ask for a rescue analgesic dose if the VAS was >4 at any time. The rescue analgesic dose was bolus dose of 0.5 mg/kg of tramadol hydrochloride though intravenous route.

3. Parameters assessed

1. Intensity of pain using visual analogue scale (VAS) where 0-no pain or 10 = maximum sever pain during rest and during movement (passive flexion of hip and knee) at 30 min, 1, 2, 4, 8, 12, 24 h after admission to the PACU.