Egyptian Journal of Anaesthesia (2014) **30**, 267–272

Egyptian Society of Anesthesiologists

Egyptian Journal of Anaesthesia

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Research Article

Clonidine versus fentanyl as adjuvants to bupivacaine in peribulbar anesthesia

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Received 13 December 2013; revised 15 January 2014; accepted 17 January 2014
Available online 17 February 2014

KEYWORDS

Clonidine;
Fentanyl;
Peribulbar block;
Adjuvants to local anesthetic;
Postoperative analgesia

Abstract *Background:* Peribulbar anesthesia is widely practiced as a safe local block for cataract eye surgeries. Fentanyl has been used as an adjuvant to local anesthetics, prolonging their duration of action. Clonidine has been shown to increase the duration of analgesia and anesthesia produced by local anesthetics.

Aim of the study: The aim of this study was to compare the effect of fentanyl versus that of clonidine when used as adjuvants to bupivacaine in peribulbar block.

Methodology: Ninety patients, ASA physical status I–III, scheduled for cataract operations, under peribulbar block, were enrolled in the study and randomly assigned into 3 equal groups. Group F ($n = 30$) received a mixture of bupivacaine, hyaluronidase, and fentanyl; Group C ($n = 30$) received a mixture of bupivacaine, hyaluronidase, and clonidine; and in the control Group B ($n = 30$), a mixture of bupivacaine, hyaluronidase, and saline was used for peribulbar block. The onset, duration of globe anesthesia, akinesia, and lid akinesia were recorded. Intraoperative and postoperative patient comfort, first time to analgesic request, and any recorded complications due to drugs used were all assessed.

Results: Groups C and F showed significantly faster onset and longer duration of globe anesthesia, akinesia, lid akinesia, and the time to first analgesic request when compared to Group B ($p < 0.001$). The onset, of lid akinesia was significantly faster in Group C compared to Group B ($p < 0.01$). Group C showed a significantly longer duration of lid akinesia and globe akinesia compared to Group F ($p < 0.01$).

Conclusion: The addition of either clonidine or fentanyl to the local anesthetic during peribulbar block results in a faster onset and longer duration of the block with a longer period of postoperative analgesia. The addition of clonidine was found to prolong the duration of the block more than fentanyl.

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Peer review under responsibility of Egyptian Society of Anesthesiologists.

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1. Introduction

Regional anesthesia has gained wider popularity over general anesthesia, especially in different ophthalmic surgeries [1,2]. The majority of patients undergoing ophthalmic surgeries are elderly, with multiple chronic diseases, which makes them at increased risk of morbidity and mortality under general anesthesia [3]. Different eye blocks have been practiced with great success. Peribulbar anesthesia is widely practiced now as a safe local block for cataract eye surgeries. However, the limited duration of these blocks was shown to be the main problem encountered intraoperatively. Therefore, additional top-up doses are usually needed to continue the operation. Many researches tried to introduce solutions in order to prolong the duration of the local anesthetics used. Several drugs were added as adjuvants to local anesthetics, and their effects have been studied [4–7]. Fentanyl is a narcotic that has been successfully used as an adjuvant to local anesthetics, prolonging its action with better analgesia and anesthesia [8]. Likewise, clonidine, an alpha 2 agonist was shown to increase the duration of analgesia and anesthesia when used as an adjuvant to local anesthetics [9–11]. Several studies found that the best dose for clonidine as an adjuvant to local anesthetics was 1 μg/kg. This concentration was shown to produce desirable effects without systemic complications [12]. Adding hyaluronidase to the local anesthetic proved to be of help in spreading the injected mixtures, thus accelerating the onset time as well as improving the quality of the block [13].

We hypothesized that the addition of either fentanyl or clonidine will affect the quality of the peribulbar block, prolonging its anesthetic and analgesic duration. This will later help in providing adequate anesthesia, analgesia, and comfort during lengthy ophthalmic operations. The aim of this study was to compare the effect of the addition of fentanyl versus the addition of clonidine to bupivacaine, when used as adjuvants to local anesthetics in peribulbar block.

2. Methods

The study was conducted in Kasr Al-Ainy teaching hospital, Cairo University from December 2012 to May 2013. After getting approval from the local ethical committee and taking patients' written consents, 90 patients, scheduled for elective cataract operations under peribulbar block, were enrolled in the study. Patients aged 40–60 years, ASA physical status I–III, with no history of anticoagulant therapy or allergy to local anesthetics, and with axial length <28 mm were included in the study. Exclusion criteria were as follows: patient refusal, cardiac patients on anticoagulants, international normalized ratio (INR) >1.5, recent myocardial infarction, uncontrolled hypertension, disturbed conscious level, mentally retarded patients, active respiratory disease, morbidly obese patients, chronic clonidine or analgesic therapy, failure of proper communication in deafness diseases, patients with excessive tremors or agitations, impaired orbital/periorbital sensations, and patients with glaucoma. The patients were randomly assigned into 3 equal groups; Group B, Group F, and Group C by computer generated lists and then concealed in closed envelopes. In the control Group B ($n = 30$) the peribulbar block was performed using a mixture of 8 ml bupivacaine 0.5%, 1 ml hyaluronidase (75 IU), and 1 ml of normal saline. Group F ($n = 30$) received a mixture of 8 ml bupivacaine 0.5%, 1 ml hyaluronidase (75 IU), and 20 μg fentanyl diluted in 1 ml normal saline. Group C ($n = 30$) received a mixture of 8 ml bupivacaine 0.5%, 1 ml hyaluronidase (75 IU), and 1 μg/kg clonidine diluted in 1 ml normal saline. The total volume of the mixture was amounting to 10 ml in each group. Both the patient and the anesthetist were blind to the drug mixture used. Preoperative assessments and details of the anesthetic technique were explained to the patients at the preoperative visit.

At the operating room, the patient was fully monitored, by electrocardiogram (ECG), pulse oximetry, and intermittent non-invasive blood pressure. Preoperative hemodynamic data were recorded. Midazolam 0.02 mg/kg was injected intravenously to the patient to provide conscious sedation while performing the block. The specified eye was sterilized with antiseptic solution. The patient was asked to fix his eyes looking straight forward toward the ceiling while lying in a supine position. A 10 ml syringe with a 25G needle was used for the local anesthetic injection. The Peribulbar block was performed by inserting the needle at the junction between lateral third and medial two thirds of the inferior eyelid (inferior orbital notch). With the sharp bevel facing the globe, the needle was inserted along the inferior orbital wall 20 mm deep, in a perpendicular direction to the frontal plane. After negative aspiration, 4–6 ml of local anesthetic solution was injected slowly until the appearance of proptosis and lid fullness. This was followed by gentle digital massage to the eyeball to facilitate diffusion of the local anesthetic mixture.

The onset of the sensory and motor block was assessed using the following measurements: **The ocular sensations** (globe anesthesia, was recorded from the time of injection of the local anesthetic solution until complete disappearance of sensation) were assessed by gentle sensory touch to the conjunctiva with a cotton swab. The onset of the sensory block was confirmed by the disappearance of sensation. ***The onset of motor block*** was confirmed by testing the ability to move the ocular muscles (*globe akinesia*) and lid muscles (*lid akinesia*). ***Globe akinesia*** was assessed by scoring the ocular movements in each direction of gaze (superior, inferior, medial, and lateral), using a 3 point scale [14,15]. Scores ranged from (0 to 2) in each direction, where 0 = total akinesia (no movement), 1 = partial akinesia (reduced movement), and 2 = no akinesia (normal movement) with total score of the four directions ranging from (0 to 8). The onset of globe akinesia was recorded from the time of injection of local anesthetic solution until complete globe akinesia (score 0). ***Lid akinesia*** was assessed by informing the patient to open both eye lids widely followed by squeezing them maximally. The onset of lid akinesia was defined as the time elapsing from injection of local anesthetic solution until complete lid akinesia (complete lid paralysis). If the total ocular movement score was $\geqslant 6$ or there was full movement in any direction, reflecting incomplete block after 10 min from injection, extra 2–3 ml from the same mixture was reinjected via the same approach. The maximum allowed volume of local anesthetic solution injected was 8 ml. However, if more than 8 ml was required the patient was excluded from the study. After satisfactory sensory and motor block, oxygen 4 L/min was delivered through a nasal cannula to the patient. Surgery was then allowed to proceed. The duration of the lid akinesia was recorded, from the time of injection of the anesthetic mixture till full recurrence of lid movement when was tested as before. The duration of globe akinesia was recorded, measuring