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The effect of adding cisatracurium versus hyaluronidase to levobupivacaine and lidocaine mixture in single injection peribulbar block for cataract surgery

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ABSTRACT

Background: Several adjuvants can be utilized to improve the quality of peribulbar block (PBB). We compared the effects of adding cisatracurium or hyaluronidase to levobupivacaine and lidocaine mixture for PBB on the onset of globe and lid akinesia in cataract surgery.
Methods: 105 adult patients scheduled for cataract surgery under PBB were randomly allocated into three groups. Control group received 4 ml 0.5% levobupivacaine plus 3 ml 2% lidocaine diluted in saline to a total volume of 8 ml. Hyaluronidase 15 IU/ml and cisatracurium 1 mg were added to local anesthetics (LAs) mixture in hyaluronidase and cisatracurium groups respectively. Onset and duration of lid and globe akinesia, time for adequate conditions to start surgery and adverse events were recorded. Distribution of LAs solution was evaluated by B-scan ultrasound at 3 min and 10 min after injection of LAs.
Results: Onset of lid and globe akinesia, as well as time to adequate conditions to start surgery, were faster in cisatracurium and hyaluronidase groups compared to the control group ($P < 0.05$). Cisatracurium group had the fastest onset. At 3 min after injection of LAs, the ultrasound examination revealed that hyaluronidase group had the highest percentage of patients showing intraconal diffusion of LAs solution with the appearance of a characteristic T sign ($P < 0.05$).
Conclusions: The addition of cisatracurium 1 mg or hyaluronidase 15 IU/ml to levobupivacaine and lidocaine mixture for PBB hastened the onset of lid and globe akinesia without increase the incidence of adverse effects. This effect is more obvious with cisatracurium compared to hyaluronidase.

1. Introduction

The greater part of patients undergoing cataract surgery is older and has multiple co-morbidities making regional anesthetic a more secure contrasting option to general anesthesia. Due to the simplicity of situation, safety, and efficacy, peribulbar block (PBB) is the most common anesthesia used for cataract surgery [1]. In any case, PBB utilizing local anesthetics (LAs) alone may bring about delayed akinesia, delayed corneal anesthesia and frequent need for block supplementation [2,3]. Subsequently added substances, for example, fentanyl [4], sodium bicarbonate [5], and clonidine [6] are utilized to enhance the onset time and quality of PBB.

Neuromuscular blocking drugs have been utilized in PBB as a part of the local anesthetic (LA) mixture to enhance the quality of the PBB [7,8].

Hyaluronidase is supplemental to LAs for ophthalmic blocks causing a wide spread of the injected solution and improved quality of the block [9,10].

So, the aim of our study was to compare the effects of addition of cisatracurium (1 mg) versus hyaluronidase (15 IU/ml) to the LAs solution for PBB on the onset of globe and lid akinesia in patients undergoing cataract surgery.

2. Patients and methods

After obtaining approval from the Institutional Ethics Committee (approval code: 30940/05/16), registration in the Pan African Clinical Trials Registry (PACTR 201606001658235) on 2 June 2016 and written informed consent from all the patients, a

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prospective double-blind randomized study was carried out on 105 adult patients, American Society of Anesthesiologists (ASA) I-III, scheduled for elective cataract surgery under PBB. The duration of the study was 6 months. All the data of patients were confidential with secret codes and private file for each patient, all the given data was used for the current medical research only. Any unexpected risks may take place during the course of the research were clarified to the participants and the ethical committee.

Exclusion criteria included; previous allergic reaction to studied medications, mental illness, difficulty in communication, extraocular muscles or eyelid abnormalities, age younger than 18 years, patients refusing local anesthesia, patients with a single eye, hepatic dysfunction, anticoagulation therapy, active infection, posterior synechia, orthopnea, or severe uncontrolled hypertension, previous intraocular surgery or injury, and patient with ocular axial length more than 25 mm.

The patients were randomized using a computer-generated randomization numbers into the three groups by using sealed opaque envelopes and each patient chose the envelope which determined the group in which the patient was allocated.

Out of 121 patients were evaluated for the eligibility; 7 patients were not met the inclusion criteria (one patient had a single eye, 2 patients were difficult to comminute, one patient had ocular axial length >25 mm and 3 patients were receiving anticoagulant therapy), 9 patients refused to participate in our study and the remaining 135 patients were randomly allocated into one of three groups (each group was 35 patients) (see Fig 1).

The studied groups were:

Control group: Patients received single injection PBB using 4 ml 0.5% levobupivacaine plus 3 ml 2% lidocaine diluted in saline to a total volume of 8 ml.

Hyaluronidase group: Patients received single injection PBB using 4 ml 0.5% levobupivacaine plus 3 ml 2% lidocaine plus hyaluronidase (15 IU/mL) diluted in saline to a total volume of 8 ml.

Cisatracurium group: Patients received single injection PBB using 4 ml 0.5% levobupivacaine plus 3 ml 2% lidocaine plus cisatracurium (1 mg) diluted in saline to a total volume of 8 ml.

The study solution for PBB was prepared by an investigator who has no further role. All patients were sedated with intravenous midazolam (0.03 mg/kg), 5 min before the PBB, in the preparation room. Then they transferred to the operating room. Standard monitoring was conducted; noninvasive arterial blood pressure, electrocardiogram, and peripheral oxygen saturation. A nasal catheter was applied and supplemental oxygen was given throughout the procedure at 2–3 L/min. The operative eye was prepared with a 5% povidone iodine solution. PBB was performed using a

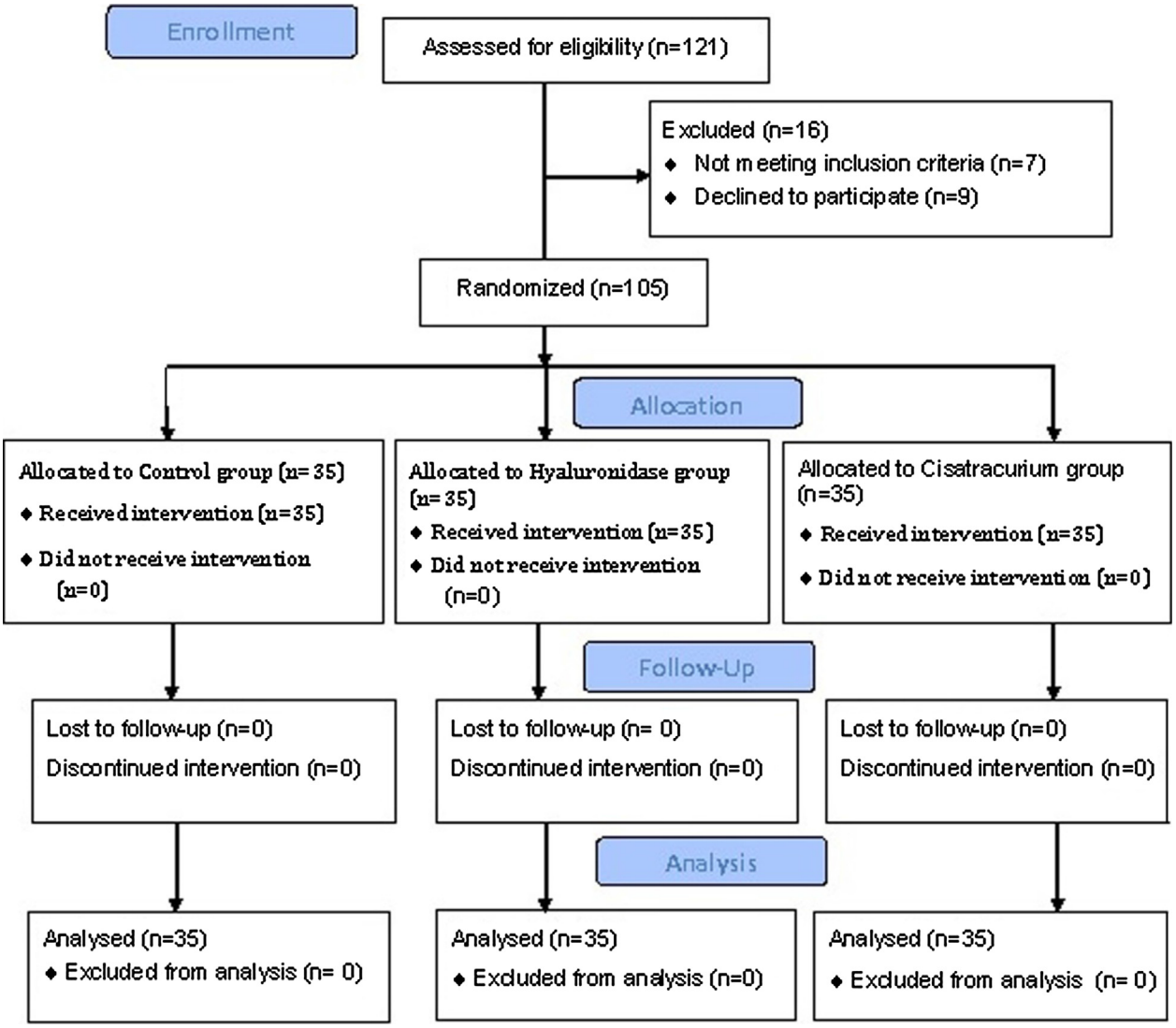

Fig. 1. CONSORT Flow Diagram of participants through each stage of the randomized trial.