

The Anesthetic and the Akinetic Effects of 1% Ropivacaine Given in Two Different Peribulbar Blocks; Single Medial Canthus or Double Injection Technique

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Abstract

Background: Owing to the advanced age of patients scheduled for cataract and IOL insertion, and the high concentrations of local anesthetic used in peribulbar blockade, the use of ropivacaine produces an effective motor blockade with minimal risks for neuro and cardiotoxicity. Concerning globe injury due to multiple injection the new single injection medial canthus is theoretically preferred to decrease the frequency of globe injury.

Aim of the work: To evaluate anesthetic and akinetic effects in single and double injection peribulbar technique to detect the better method of administration in peribulbar blockade.

Methods: This single blind randomized study was done on 60 patients ASA I-III underwent cataract and IOL insertion surgery. Patients were taken peribulbar block using 8 ml, 1% ropivacaine with 30 IU/ml hyaluronidase. Patients were classified into two equal groups; group I (n.30) is the single injection group group II (n.30) is the double injection group. Eye globe and lid akinesia and anesthesia, the need for supplementary injection and the incidence of complications like ecchymosis, high intra ocular pressure nausea, vomiting and pain were recorded.

Results: 26 patients (86.6%) of single injection group vs. 28 patients (93.3%) in double injection group were having complete anesthesia and akinesia after giving block; only 4 patients in group I (13.3%) needed supplementation of block vs. 3 patients (10%) in group II with almost no difference in absence of intra and postoperative complications.

Conclusions: Single injection peribulbar block with 1% ropivacaine is as effective as the double injection peribulbar block with 1% ropivacaine in cataract surgery providing effective block with fewer possibility for globe injury with multiple injections.

Keywords: Ropivacaine; Peribulbar block; Medial canthus; Double injection

Introduction

Ophthalmic procedures such as cataract extraction can be performed with either topical or regional anesthesia regional anesthesia are still widely used in cases of difficult and extended surgery [1]. Retrobulbar anesthesia was the standard technique for regional anesthesia in ophthalmic surgery, however peribulbar anesthesia has lesser incidence of complications [2,3].

The most common disabling injuries are related to nerve blocks, so the proposal of single rather than multiple injection technique of peribulbar anesthesia was to decrease the risks of complications [4-6]. Ropivacaine has less central nervous system and cardiac toxicity [7,8]. Several studies had demonstrated the efficacy of ropivacaine in different regional anesthetic techniques for different eye procedures including vitreoretinal surgery [9,10].

The aim of this study is to evaluate the anesthetic and akinetic effects of 1% ropivacaine given in two different peribulbar blocks; single medial canthus or double injection technique.

Patients and Methods

After informed consent had taken from all patients including the surgical and the anesthetic procedures 60 adult patients ASA I-III scheduled for cataract surgery and IOL insertion with expected duration less than 70 min duration were enrolled in this prospective, single-blinded, randomized study in Tanta University Hospital between March and December 2016. Patients allergic to local anesthetic, local sepsis impairment of coagulation and orbital abnormality uncooperative patients and who refused the anesthetic technique were not included in the study. After routine preparation and evaluation, irritable patients were premeditated with intravenous midazolam 1-2 mg. The patients were randomly allocated using a sealed envelope technique to 1 of 2 equal groups to receive peribulbar anesthesia with 8 ml; 1% ropivacaine and hyaluronidase 30 IU/ml using either the single injection peribulbar with a 25-gauge, 16-mm in group I (n.30) or the classic double injection peribulbar technique with a 25-gauge, 25-mm in group II (n.30). Injections were done with 25 G needle 2.5 cm length. Non-invasive blood pressure, electrocardiogram (ECG), heart rate (HR), peripheral arterial oxygen saturation (SaO₂) variables were recorded every 5 min till completion of surgery. In both techniques, the patients were in supine position. In single injection

peribulbar blockade patients were asked to maintain eye in the primary position, the injection site was percutaneous limited superiorly by inferior lacrimal canaliculus, medially by lateral margin of nose, laterally by imaginary line joins inferior lacrimal papilla to inferior margin of the orbit and inferiorly by inferior margin of the orbit. In double injection technique, patients were asked to maintain eye in the primary position the needle was inserted at the junction of the lateral third and the medial two thirds of the lower orbital margin injecting 4 ml, the second injection is just lateral to supratrochlear notch, injecting a volume of 3 ml then during withdrawal 1 ml was injected into orbicularis muscle. with gentle massaging for 1-2 min, Honnan balloon was inflated to 30 mmHg to promote the spread of local anesthetic solution and avoid rise of IOP (Intraocular pressure) data were collected about patients age, sex, weight, the need for supplementary injection, pain during or after injection by using NRS (numerical rating score) (0-10), complications; like ecchymosis, haematomas nausea, vomiting and retrobulbar hemorrhage. Assessment for akinesia and anesthesia was don after 10 min; eye movements in four directions superior, inferior medial and lateral was recorded using scale from (0-2) 0=no movement 1=reduced movement 2=normal movement [11]. While anesthesia score of 2=complete anesthesia 1=partial anesthesia and 0=no anesthesia. All supplementary injections were given by same kind of needle and additional assessment was performed 5 min after injection. During operation oxygen was administered under the sterile drapes postoperative analgesia was controlled by oral ketoprofen. The statistical analysis of our results was conducted using the computer program SPSS version 15.0 for Windows (SPSS, Chicago, IL). Data were expressed as mean SD or percentages. The 2-way repeated measures analysis of variance was used to compare the interval data, and Student's t-test was used as the post hoc test to determine differences between and within groups χ^2 test was used to compare nominal data or percentages. Bonferroni correction for repeated comparisons was applied if necessary. P<0.05 was considered significant.

Results

There was no statistical significant difference between the two groups in the demographic data and the duration of surgery. As regard globe anesthesia, 26 (86.6%) in single injection group comparable with 28 (93.3%) in double injection group; had complete anesthesia after the first injection.

When comparing akinesia of the globe or the lid it was more adequate in the second group resulting in 27 (90%) and 25 (83.3%) comparable with 26 (86.6%) and 23 (76.6%) in the first group, these differences were statistically insignificant. Scores for globe anesthesia, globe and lid akinesia were better in the second group than in the first but without significant differences.

Regarding the supplementary injection, there were 4 patients in group 1 comparable with 3 patients in group 2; (13.3%) vs. (10%) with no significant difference.

The incidence of postoperative nausea and vomiting was less than 5% in all cases, only 5 patients (16.6%) in group 1 and 7 patients (23.3%) in group 2 developed ecchymosis with no conjunctiva or globe hematoma the acceptance of the technique was good in all cases 27 patients in group 1 and 28 patients in group 2 would repeat the same technique in the next eye surgery (Tables 1-6).

	Group I	Group II	p. value
Male/female	14/16	18/12	0.059
Age	57 ± 14.7	59.7 ± 13.05	0.055
Weight	70 ± 11.1	68 ± 12.05	0.231
Duration of surgery (min)	47.5 ± 22	48 ± 23	0.986

Table 1: Demographic data of the patients in both groups.

	Group I	Group II	p. value
Globe anesthesia score	4.2 ± 1.1	4.3 ± 1.08*	0.236
Globe anesthesia after block	26 86.60%	28* 93.30%	0.048*

Table 2: Globe anesthesia in both groups (P=0.47*).

	Group I	Group II	p. value
Globe akinesia score	2.24 ± 1.59	1.93 ± 1.57*	0.033*
Globe akinesia after block	26 (86.6%)	27 (90%)	0.425

Table 3: Globe akinesia in both groups (P=0.47*).

	Group I	Group II	p. value
Lid akinesia score	1.17 ± 0.6	0.94 ± 0.62**	0.019*
Lid akinesia after block	23 (76.6%)	25 (83.3%)	0.058

Table 4: Lid akinesia in both groups (P=0.4**).

	Group I	Group II	p. value
Supplementary block	4 (13.3%)	3 (10%*)	0.782

Table 5: Supplementary block in both groups (p>0.05).

	Group I	Group II	p. value
Complications after block	5 (16.6%)	7 (23.3%)	0.035*

Table 6: Complications after block.

Discussion

Peribulbar anesthesia is achieved by bulk spread of local anesthetic, the choice of the technique depends on the volume of the orbit, and the preference of the anesthesiologist, however in single injection technique the site of injection is relatively a vascular, which decreases the risk of orbital hematoma [12].

In our study, we found that globe akinesia, lid akinesia, and globe anesthesia were slightly better in double injection technique than single injection but still these values were statistically insignificant.

The supplementary injection required in 13.3% of patients in group 1 and in 10% of patients in group 2 results in complete anesthesia and akinesia with pain free and both patients and surgeon's satisfaction all over the surgery.

Our results were in hands with Ballj et al. [13] who showed that adequate block can be achieved with single peribulbar injection either by inferotemporal or medial canthus injection technique, and that there was no evidence that the second primary injection decreases the rate of supplementary injection required, proposing its unnecessary with an increasing risk of globe perforation [14,15].

Also, Leonardo Rizzo et al. [12] showed that medial single injection technique is a simple and satisfactory alternative owing to its painless insertion decreased volume of anesthetic, single puncture in a relatively avascular area and needle passage with less subject to misdirection. With an ideal local anesthetic, we should have rapid onset, dense motor block, and safety.

Our results showed that with the use of 1% ropivacaine with 30 IU/ml hyaluronidase in a volume of 8 ml injection it gives initial good anesthesia and akinesia with almost fewer need for supplementary block in both groups, these results agreed with the findings of Luigi Gioia et al. [16] who studied 0.75% ropivacaine and compare it with 2% lidocaine and 0.5% bupivacaine for vitreoretinal surgery and stated that the lower potential for systemic toxicity of ropivacaine enables it to be used for surgical anesthesia in concentrations up to 1%; this facilitates diffusion of local anesthetic molecules into peripheral nervous tissue and improves the onset of nerve block.

With the use of hyaluronidase 30 iu/ml this helps spread of local anesthetic and enhances its faster onset [12,17].

Pj Corke et al. [18] who compared 1% ropivacaine and a mixture of 2% lignocaine and 0.5% bupivacaine for peribulbar anesthesia in cataract surgery concluded that; 1% ropivacaine is a suitable agent for single injection peribulbar anesthesia for cataract surgery.

Short needles were associated with a lower incidence of moderate and severe pain in patients undergoing the single-injection technique [19]. So we used relatively short needles (16 or 25 mm) in single- or double injection techniques, respectively, and this was associated with a low incidence of needle-related complications (hematoma and globe perforation) in both groups. Moreover, the Ghali et al. [20] used similar needles' lengths and concluded that the single-injection technique for percutaneous peribulbar anesthesia with a short needle is a suitable alternative to the double-injection technique peribulbar anesthesia for cataract extraction.

Conclusions

1% ropivacaine is a suitable agent for single injection peribulbar anesthesia as well as double injection technique providing both good anesthesia and akinesia with few complications, however single injection peribulbar block is as effective as the double injection peribulbar block in cataract surgery providing effective block with fewer possibility for globe injury with multiple injections.

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